UNAPPROVED MINUTES

10.5. SC Insulating Fluids Meeting
April 13, 2011
San Diego, California

Insulating Fluids Subcommittee
Chair Susan McNelly
Vice-Chair Jerry Murphy
Secretary C. Patrick McShane

10.5.1. Introduction/Attendance, F10 Minutes Approval, & Patent Disclosure Request

The Insulating Fluids Subcommittee meeting in San Diego, California was called to order by the Chair at 3:00 PM on Wednesday, April 13, 2011.

Introductions and the subcommittee roll call followed. All of the officers of the SC were present. There were 22 out of 40 members so the quorum requirement was met. Soon after the quorum count, 3 additional members arrived. 52 guess were present, of which nine indicated they wish to become members.

As required the IEEE patent disclosure requirements were discussed, no new disclosures were forthcoming.

The Minutes of the Fall 2010, Toronto, Ontario, Canada meeting were approved as written.

Guests requested membership.

- Paul Caronia
- Larry Christodoulou
- Marc Cyr
- George Forrest
- Sub Joon Han
- George Leinhauser
- Thomas Melle
- Jerry Reeves
- Brian Sparling

10.5.2. Working Group and Task Force SC Reports and Submitted Unapproved Minutes

10.5.2.1. C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformers

WG Chair Rick Ladroga, Vice-Chair Claude Beauchemin

The WG Report Given at the Sub-Committee Meeting:

WG report was presented by Vice-Chair Claude Beauchemin. The WG met on Tuesday, 43 guests. 3 requested membership. A quorum was achieved.

The quick presentation was made, economic tool a discussion forum is being set up. Thousands of data point to analyze from 97,000 transformers.

Paul Bowman presented four case studies of DGA.

Question/comment from Mark Cyr on the issue of uncertainly around DGA measurement, historically much difference lab to lab. New round robin testing is needed, and he requested labs to participate.

The Minutes (unapproved) of WG Meeting as Submitted:

C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformers

3:15PM, Tuesday, April 12, 2011
San Diego, California, USA
Minutes of WG Meeting

The meeting was called to order by Chair Rick Ladroga at 3:18pm on Tuesday, April 12. Vice Chair Claude Beauchemin and Secretary Susan McNelly were also present.

There were 38 of 58 members present. There were 43 guests, and 8 guests requesting membership. A membership quorum was achieved.

Guests requesting membership were:

Stephen Bauer	Jow Ortiz
George Forrest	Poorvi Patel
Wayne Johnson	Brett Sargent
Ali Naderian	Prabhu Soundarrajan

Agenda

1. Welcome & Roll Call
2. Introductions
3. Approval of Minutes from Fall 2010 Toronto, Ontario Meeting
4. Patent Disclosure
5. Report of work done since last meeting, R. Ladroga
6. Proposed motions
7. New Business

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 Fall 2010 Toronto, Ontario meeting was requested. The minutes were approved as written.

Report of work done since last meeting:

Rick Ladroga gave a recap of the chairs of the various TFs that have been initiated.

1. Arc Furnace – Chair Tom Lundquist
2. Framework – Chair Jim Dukarm, Vice-Chair Dave Hanson
3. Data – Chair Norman Field, Vice-Chair Pierre Feghali
4. Case Studies – Chair – Paul Boman, Vice-Chair Arturo Nunez
5. Diagnostic Methods – Chair Michel Duval, Vice-Chair Dave Wallach
6. Bibliography – Chair Jerry Murphy, Vice-Chair Tom Prevost

Rick indicated that he would like to have short regular meetings with these groups to help keep the Guide on track.

1. Discussion Forum: Claude Beauchemin

   Claude discussed the on-line forum for discussion of issues that has been set up. He encouraged members to sign up on the e-mail that he had set up. The next step will be to open the forum up to guests as well.

2. Data Analysis: Norm Field and Jim Dukarm

   Norm Field gave a recap of the work done to day. He indicated that he had underestimated the time that this would take by a considerable amount. Much of the time has been spent cleaning up the data rather than analyzing it to date.

   The data so far comes from 10 sources and has recently added a couple more. They began with 590,000 DGA samples. After editing , they have 292,000 high integrity DGA samples representing approximately 97,000 transformers.

   Editing included removing blank or nonsence items, removing non-mineral oil entries, removing duplicate entries, removing OEM lab data (factory test), and verified that an ID#, Sample Date, Breathing Type, kV, and MVA were included.

   For comparison to Table 1 of 104, the individual gas concentration data was analyzed with respect to percentile values.

   Presented first, a simple calculation showing the 90^{th}, 95^{th}, and 98^{th} dissolved gas percentile points. The data below is before any outliers were removed. The values are provided in ppm. There is much that needs to be refined, stray gassing also needs to be addressed.

	H2	**CH4**	**C2H6**	**C2H4**	**C2H2**	**CO**	**CO2**	**N2**	**O2**
90th %	99	87	89	56	1	743	7544	90661	25316
95th %	226	170	183	125	5	934	10262	103537	29326
98th %	649	454	370	455	25	1195	14467	120673	32604

   A request for other percentile points was requested to allow comparison to what CIGRE has put together.

   Norm indicated that he would welcome any help that he can get. Luiz Cheim offered to help.

   Jim Dukarm also gave a report on the exploratory statistics that have been done as the data has been cleaned up. He indicated the goal will be to have a large, clean database that can be archived to support the values eventually used within the Guide. This would then be available for any future revisions to the guide.

3. Case Studies: Paul Boman

   Paul provided four case studies.

   The first was for a Turn-to-Turn Winding Fault, No-Load Tap Changer Fault, Unintentional Core Ground Fault, and a High Voltage Phase-to-Ground Fault.

He also has put together instructions for using the Roger's Ratio and Duval Triangle methods.

Paul requested that if there are any other case studies that anyone wishes to suggest, to please let him know.

Sue McNelly volunteered to review the writing portion to make sure that the case studies are clearly written and understandable to the user.

The meeting was adjourned at 4:30 pm.

Rick Ladroga
WG Chair

Claude Beauchemin
WG Vice-Chair

Susan McNelly
WG Secretary

10.5.2.2. C57.130 Trial-Use Guide for Dissolved Gas Analysis During Factory Temerature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors. WG Chair Jim Thompson

The WG Report Given at the Sub-Committee Meeting:

Presented by Tom Prevost. No patent declarations. The document was on Draft 18 when the decision to let expire was made. The WG will begin where the previous group left off and will be starting with a new Draft 19. A listing of variables were listed, including winding types.

The Minutes (unapproved) of WG Meeting as Submitted:

Unapproved Minutes of WG Meeting

The working group meeting was called to order by Chair Jim Thompson on Tuesday, April 12 at San Diego, California with 64 people in attendance, including 15 of 30 members present.

There was a request for patent declarations regarding the PC57.130 document and none given.

This document was in draft 18 when the decision was made to let the PAR expire in 2009. A new PAR was approved on June 17, 2010 and is labeled Draft 19.

The current document was placed on the overhead media projector and members volunteered for Sections 1 through 6 of the document. Sue McNelly volunteered to export the draft document into an IEEE template. The data request for DGA during factory temperature rise tests was discussed in terms of the various parameters of interest. These included: MVA, cooling type, test duration, voltage class, oil volume, different loading rates over time of the test, identification of laboratory used, permanent overload specifications, no load losses, and the difference between C57.90 and C57.119 regarding the factory tests at greater than one per unit rated load.

Jin Sim mentioned that the previous guide draft issues included – limiting the trial-use guide based on minimum gallons, gassing differences related to winding types (e.g. disc versus layer designs), various loading rates during factory tests, and relatively small gas values as opposed to reproducibility between labs.

The Power Point© presentation, the current draft of the document, and the previous negative ballot comments will be posted on the Insulating Fluids Subcommittee web site.

Respectively submitted,

Chair Jim Allen Thompson
Vice Chair TV Oommen

10.5.2.3. C57.139 WG Chair Fredi Jacob, Vice-Chair David Wallach, Secretary Sue McNelly

The WG Report Given at the Sub-Committee Meeting:

Presented by Dave Wallach.

No questions or discussions.

The Minutes (unapproved) of WG Meeting as Submitted:

C57.139 - Draft IEEE Guide for Dissolved Gas Analysis of Load Tap Changers

Tuesday, April 12, 2011
San Diego, California
Minutes of WG Meeting

Fredi Jakob called the WG meeting to order at 11:00am. WG Vice-Chair Dave Wallach and Secretary Susan McNelly were also present. There were 20 of 35 members (Quorum requirement was met). There were 59 guests present with 7 guests requesting membership.

Guests requesting membership were:

Josh Herz	Arturo Nunez
George Forrest	Dan Sauer
Jesse Inkpen	Prabhu Soundarrajan
George Leinhauser	

Fredi thanked the group for its efforts in getting the Guide through the ballot process. Fredi indicated that he can no longer guarantee that he would be able to attend. He has asked Dave Wallach to take over as chair of the WG.

Agenda:

1. Welcome and Introductions
2. Patent Disclosure Request
3. Approval of Minutes from Fall 2011 Toronto, Ontario, Canada
4. Guide Status
5. PAR to revise
6. Items for consideration in the next revision
7. Review Work Assignments.

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 Fall 2011 Toronto, Ontario, Canada meeting was requested. The minutes were approved as previously submitted.

Guide Status:

IEEE Std C57.130-2010 was published February 18, 2011.

PAR

PAR for revision has been drafted. The plan is to submit the request for PAR in the coming weeks and on approval, continue work in Boston in the Fall of 2011.

The need for the project: There are presently no industry guidelines to support user's trending of DGA data for load tap changers. The WG proposes the next revision to consider data collected in the industry from the initial issuance and further develop some concepts the WG could not consider with the development of the initial guide.

Concepts for the next revision:

Ballot comments that were not incorporated into the last document will be reviewed for inclusion in the next version.

Data - Additional data from the WG members will be needed to develop generic design category norms.

Is there a variation of norms between utilities (users) with the same type of equipment?

- Temperatures
- Loading practices
- Maintenance practices

What about inclusion of graphical interpretation methods?

- Triangle (Duval)
- Nomograms (Jakob-Dukarm)

Past suggestion; presence of Benzene and Toulene: The high ratio of Ethylene to Acetylene indicates problem of overheating. Then it is necessary to check for Benzene and Toulene. Presence of Benzene and Toulene indicates the contact wear and deformation of the metal contact in the Diverter chamber, which may be the cause of overheating (Submitted by Vijayakumaran, Senior Technical Expert, AREVA, Allahabad, India 211008).

A comment was made by Fredi that he would need to see some real justification for the addition of Benzene and Toulene.

General comment from ballot

- Just as we do with transformers we liberally use the word "fault" to encompass lots of things, some of which aren't faults in the truest sense (like coking, that's not a "fault"). We propagate this in the standard (there is a long history here).
- Should we consider "anomaly", a "potential hot spot" anything but a fault.
- Any discussions here would have to be coordinated with C57.104 and other DGA guides (e.g. Natural Esters).

Direction should come from Insulating Fluids Committee

Presentation by Jim Dukarm on Where do we go from here?:

Kinds of Statistical Limits:

The current statistical method for deriving LTC DGA limits provides a way to classify gas concentrations and gas ratios as: **Unexceptional** or **Unusually high** or **Extremely high** relative to a specific population of LTCs.

- In a clean population, "unusually high" might signify a fly speck. In a dirty population, it might signify a near-failure condition.

- What we would like is something more like this: **Normal** or **Medium** or H**igh** (probability of failure in near future)

This would require a good amount of failure data.

Use of Statistical Limits:

- Some with LTC field experience believe that it is advisable to require a certain amount of gas (beyond 10 ppm) before a gas ratio is taken seriously. Very low gas levels probably signify low operation frequency, so even if a ratio indicates bad contact condition, perhaps the actual risk of failure is still low.
- Confirmation of ratio-based fault indication is continued increase of ratio beyond "warning" level. We conjecture that this may be a way of distinguishing non-fault-related high ratios in resistive LTCs from fault-related ones.
- C2H4/C2H2 and CH4/C2H2 ratio limits can be plotted as straight lines on the LTC Duval Triangle as indicators of when an abnormal condition is "interesting" enough to motivate action.

Graphical Methods:

- The C57.139 Guide as it stands does not provide much guidance on fault detection. Duval Triangles (LTC for arcing-in oil and Transformer for vacuum types) may be useful for this.
- A gas ratio nomogram is also available.

There was discussion that in addition to DGA, a sentence or two should be added to the Guide regarding the fluid quality.

Work assignments

- Data – No specific assignments were made.

Fall 2011 Meeting Goal

- Approved PAR
- Schedule
- Work on updates

The meeting was adjourned at 12:07pm.
Fredi Jakob

Chair Dave Wallach
Secretary: Susan McNelly

10.5.2.4. C57. 146 – Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers - Jerry Murphy

Jerry Murphy presented at the meeting. No WG meeting was held in San Diego. The vote for reaffirmation was successful and the application for approval was submitted recently to IEEE SA.

BALLOT INFORMATION
General Interest 31, Users 27, Government 1, Producer 14

SUMMARY OF ELIGIBLE BALLOTS
Draft 1 Date Closed: December 21. 2010
Eligible Balloters 73, 100%
Ballots Returned 61, 83%
Affirmatives 59, 100%

10.5.2.5. Task Force (Study Group) PC57.147 Guide for the Acceptance and Maintenance of Natural Ester Fluids in Transformers

TF Chair Patrick McShane, Vice-Chair Clair Claiborn, Secretary Jim Graham

The Group Report Given at the Sub-Committee Meeting:

Patrick McShane presented at the meeting. He presented the background of the formed group for the purpose of developing a PAR submittal for the 1st revision of IEEE Standard Guide C57.147. There was some confusion on the proper term for such a group formation. Traditionally for **existing** standards reaffirmation and revisions they have been called WGs within the TC, but according to IEEE SA they should be called Study Groups until a PAR is issued, which should occure within 6 months of forming the SG. The plan is to finialise the PAR application and submit to IEEE SA asap. It will require at least one additional webcast meeting.

There was some discussion on whether the PAR should include synthetic esters. However, an IEC Standard exists specifically for synthetic esters and due to the limited use in North America, it was suggested that this may be a possiblitity for collaboration with IEC.

Non-Approved Minutes of TF Meeting:

The Task Force meeting was called to order at 8:15 AM on April 11, 2011. Introductions were skipped due to time limitations, and an attendance roster was circulated. As this was the first meeting of the task force, membership has not yet been established. There were 61 meeting participating, 21 of which requested joining the new Study Group for the development and submittal of a PAR to revise the current standard published in 2008. The chair asked if there were any patent disclosures, and none were disclosed.

The chair gave a summary of the issues raised in the balloting of the document, and the status of the ester fluids related task forces created by the original working group. The task force for field application of natural ester fluids submitted a PAR for working group status, but the application was rejected.

The chair presented a proposed scope for the revised document and asked for comments. Bill Chiu suggested deleting the last sentence re precedence of the guide's recommendations vs. manufacturer's instructions. This suggestion was supported by an affirmative straw vote. Tom Prevost raised an objection to including diagnosis of apparatus single this document is primarily a fluids guide. After a lively discussion pro and con, it was pointed out by John Luksich and confirmed by Loren Waagnar that field testing and diagnosis of ester fluid filled apparatus is being addressed by the C57.152 working group. The scope was amended to resolve Mr. Prevost's objection. The revised scope was affirmed by a straw vote of the attendees.

- Draft 1 Scope: This guide recommends tests and evaluation procedures, as well as criteria and methods of maintenance, for natural ester-based insulating fluids. These base fluids are also known as vegetable seed oils. Methods of reconditioning, field applications and diagnostics of natural ester-based insulating fluids are also described.

The chair then presented the proposed purpose, but due to time constraints only a limited discussion took place. The only comments from the floor suggested the purpose should be simplified and reduced in length. No action was taken.

The chair discussed the issues from the last ballot in more detail and outlined a plan to create a set of sub-groups each assigned to review and amend certain portions of the existing document. Sub-group members and chairs will be established once working group status of the parent task force is achieved.

Suggest Task Forces Pending PAR approval:

- TF 1: Section 4 - Fluid tests & … significance

- TF2: Section 6 - Handling & evaluation of NE as received
- TF3: Section 7 - Evaluation of NE as received in new equipment and after filling … on site.
- TF4: Section 8 – Field Maintenance of NE
- TF5: Annex B – Additional Technical Info
- TF6: Field Application Guide and Equipment Evaluation
- TF7: Miscellaneous - All other Sections

The meeting adjourned at 9:15 AM.

10.5.2.6. PC57.155 – Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester Immersed Transformers

Chair Paul Boman, Secretary John Luksich

Report given at the Sub-Committee Meeting by Paul Boman:

Paul requested additional data be submitted to the WG on any DGA of Natural and Synthetic Esters. One area of special interest is data from any failed power class transformers with esters, as reported at the last WG meeting, only one is on record that involved severe overheating after the first operation of a stuck non-energized tapchanger in a aged retrofilled GSU transformer. He thanked David Hansen for his presentation in Toronto on TJH2b's experiments with DGA analysis of natural esters.

Minutes (unapproved) of the WG meeting as submitted:

Meeting Date: April 12, 2011
Time: 9:30 AM

Attendance: Sixty attended, including 14 members out of 46 members. 5 people requested membership.

- Quorum not present
- intend to approve minutes on-line or at next meeting with quorum
- No patents
- review fall 2010 minutes; no comments or corrections

Continued business

- Fluid OEMs supplied fluid samples to TJ|H2b, Weidmann Diagnostic Services, and Doble Engineering. Some samples needed to be re-sent.

- Jerry Murphy supplied unused fluid from a 5-year old tote kept in his transformer yard. The tote was under a tarpaulin for the first three years, then in direct sunlight.

Presentation: Michel Duval showed a stray gas ternary plot using hydrogen, methane, and ethane and plotting soybean transformer fluid stray gases at various temperatures from unrelated sources. At 55C, mostly hydrogen was present. At 200C, mostly ethane was present. Michel suggests that it may be possible to detect overheating using these stray gases only.

Presentation: Dave Hanson showed follow-on results to data shown at the last meeting. Fluid from a tote exposed to diffuse sunlight for 2 ½ - 3 years showed low concentrations of gases attributable to photo-effect oxidation. Fluid exposed to direct sunlight for one week had significant concentrations of stray gases attributable to photo-effect oxidation.

Discussion
- Claude Beauchemin: The fluid exposed to sunlight for one week had quite high gas levels. Would exposure of a syringe to sunlight for an hour be enough to alter the gas concentrations?

- Chairman: Perhaps have a sunlight warning for post sample container handling in the guide.
- Fredi Jakob.: A first assumption is that the effect is linear. A week's worth of sunlight is about 70 hours. An hour's worth would be 1/70 of the concentration seen in the one-week sample. This is probably not significant. Ultraviolet light will not penetrate the glass syringe.

Dave Sundin.: The acid value in one of the samples seems high.

Michel Duval.: What was the temperature of the tote?

Jerry Murphy.: Probably around 30C.

Chairman: Tote samples went to two other labs. We're waiting for those results.

Update on 200 MVA transformer failure

- Michel Duval: the transformer was retrofilled with natural ester fluid, had complications (overheating) due to higher viscosity and required water spray, a frozen tap changer was forced, and elevated gas levels resulted shortly thereafter.

- John Luksich: The transformer was manufactured in 1968. Was told by the owner that the transformer was overheating shortly after installation and required water spray.

- Jim Graham: Is familiar with the transformer. It was not overheating. Someone put their hand on the tank, thought it was too hot, and added water spray. He could never convince maintenance that the transformer was not overheating and did not require water spray.

<u>Other Items</u>
- Marc Cyr: Have Ostwald coefficients been adequately established?
- John Luksich: EPRI presented their findings early on but have not yet issued a final report. Jocelyn Jalbert published a paper with his findings.

> Jalbert, J., Gilbert, R., Tétreault, P., El Khakani, M.A., "Matrix effects affecting the indirect calibration of the static headspace-gas chromatographic method used for dissolved gas analysis in dielectric liquids", Analytical Chemistry, Vol. 75, No. 19, October 1, 2003, pp. 5230-5239

- Michel Duval: For method C, CIGRE recommends using gas-in-oil standards to calibrate the equipment rather than using published partition coefficients.

- Marc Cyr: It would be helpful to include the coefficients calculated using the gas-in-oil standards along with the dissolved gas data so that WG members can review them. Labs should get the same coefficients if they operate using the same conditions (temperature, pressure). Including the coefficients with the data will allow the WG members to critique or correct the gas data we end up publishing in the guide.

Fredi Jakob: move to adjourn
Claude Beauchemin: second

10.5.2.7. WG PC57.637 Guide for the Reclamation of Insulating Oil and Criteria for Its Use

WG Chair Jim Thomson, Vice-Chair TV Oommen

The Minutes (unapproved) of the WG Meeting as Submitted:

C57.637 – IEEE Guide for Reclamation of Insulating Oil and Criteria for Its Use

Tuesday, April 12, 2011
San Diego, California, USA
Minutes of WG Meeting:

The meeting was called to order by Chair Jim Thompson at 8:00 am on Tuesday, April 12 at San Diego, California with 31 people in attendance and with 12 of 19 members present. This document was reaffirmed in 2007 and the PAR for revision was approved December 10, 2008. Working Group member Jim Thompson (Chair) conducted the meeting. There was a request for patent declarations regarding the PC57.637 document and none given.

There was a motion to approve the October 26, 2010 Working Group minutes by Dave Sundin and a second by Don Cherry. The approval of the minutes was unanimous. The discussion of the meeting included use of the IEEE template; deletion of dates associated with referenced published standards unless a specific document text was unique; referencing the moisture parameters in the C57.106-2006 guide that are similarly referenced in the IEEE C57.637 guide; moving the Askarel trade names to the appendix; and adding a footnote to the ASTM 4059 test method to make readers aware of additional PCB isomers that are not listed in that test method. There was also discussion about the media used in reclamation and possibly separating that text into different sections in the guide. The Power Point© presentation will be posted on the Insulating Fluids Subcommittee web site and Draft 2 will be emailed to working group members.

Respectfully submitted,

Chair Jim Allen Thompson
Vice Chair TV Oommen

10.5.2.8. TF on Particle Count Limits in Mineral Oil

Mark Scarborough– Chair, T.V. Oommen- Vice-Chair , Paul Boman - Secretary

The Report given at the Sub-Committee Meeting:

Mark Scarborough presented. There is significant interest in the issue of particle count in insulating fluids as there were 67 in attendance of the TF meeting, of which 8 requested membership. Mark briefly reviewed the purpose and scope of a potential PAR application. He then went into detail regarding the result of a survey on the topic sent to 475 persons, of which 71 responded. There was discussion about the possible posting of his Power Point presentation of the survey results. It was observed that 66% of the responders do not have particle limit requirements.

Discussion at the TF included pros and cons of setting a standard for new insulation fluids as received, new fluid in a new transformer, and limits for in service. A motion was made, but not seconded during the TF meeting to dismiss the TF. Clair Claiborne clarified the origins of the ASTM standard related to particle count. Harold Moore stated that it can be useful as a diagnostic tool.

TF meeting minutes (unapproved) as received:

Mark Scarborough– Chair, T.V. Oommen- Vice-Chair, Paul Boman - Secretary

Meeting Date: April 11, 2011
Time: 1:45 – 3:00 PM

Attendance: 19 members out of 36 members were in attendance, total attendance was 67 and 8 people requested membership. At the beginning of the meeting during roll call we only had 16 members present, so the meeting proceeded as without a quorum.

The meeting was called to order at 1:45 PM. Attendance rosters were circulated.

The following agenda was followed:

1. Introductions & Roster
2. Patent Disclosure
3. Origins
4. Activities Since Fall 2010 Toronto Meeting
5. Member List / Quorum
6. Approval of October 27, 2010 Minutes
7. Purpose / Scope
8. Survey / Survey Results
9. Summary of Survey
10. Next Steps / Discussion
11. Adjournment

The IEEE Patent Disclosure policy was reviewed. No patents were disclosed.

Attendee introductions were made by group.

Since we did not have a quorum at the beginning of the meeting, we were not able to vote on the approval of the October 27, 2010 Fall Meeting Minutes as written. The Chair sent out a survey request to all TF Members and asked them to vote. Only 5 have responded. All responses were positive. TF Members are requested to access survey sent via e-mail and vote on the approval or disapproval of the meeting minutes from October 27, 2010.

Purpose and Scope were reviewed and an on-line survey vote was e-mailed to TF Members. TF Members were requested to access the survey and respond by April 22, 2011.

The on-line Particle Counting Survey issued October 18, 2010 to 475 individuals received 71 responses as of 3/24/11.

Chairman reviewed particle count on-line survey responses question by question showing the results. The presentation has **not** been made available on the IEEE Transformer Committee – Insulating Fluids web site. Further discussion with the Insulating Fluids Chair on posting the results is needed.

The survey results have been normalized by the chairperson contacting individual respondents asking for clarification on responses. Not all respondents replied and it was noted on the presentation.

Sample bottle cleanliness standards were discussed. Additional review of this information needs to be performed by the TF.

Discussion comments after presentation:

Marc Cyr supplied information on bottle cleanliness as listed in ASTM D6786-08 Section 8.1 as repeated below.

8. Materials

8.1 *Particle-clean Bottles*, recommended sample containers are cylindrical bottles made of polypropylene, polystyrene, PET, or glass with flat bottoms, fitted with a suitable non-shedding threaded cap. Bottles should be at least 100-mL capacity. The bottles shall meet the cleanliness criteria of contributing less than 1 % of the total particles expected in the cleanest sample.

ASTM D6786-08 does have a sampling procedure. This is to be reviewed by the TF. TF is to looking into feeding back comments to ASTM on the standard.

Don Platts made comments concerning survey:

- About 66% of the respondents do not have particle limits.
- Does not agree with many of the results of the survey.
- Large number of survey questions invites confusions (>6 questions) and conflicting results.
- Respondent #4 under Question #24, 25, and 26 cited purchaser's specification has been written to help manufacturer to pass acceptance testing.
- Purchasers should not be dictating particle count limits to manufacturers. There are other tests such as ASTM D1816 that is sensitive to particles and particle counting should not be used as an acceptance test parameter.
- Supportive of particle counts as a diagnostic tool but not supportive using particle counts as part of an acceptance test.

Don Platts put forth a motion to disband the Task Force.

No one seconded the motion to disband the Task Force.

Others in the audience suggested that the Task Force step back and look at what is really valuable from particle counting.

Chair asked for origins of ASTM D6786 - Standard Test Method for Particle Count in Mineral Insulating Oil Using Automatic Optical Particle Counters

Clair Claiborne provided historical background on the ASTM method.

Harold Moore commented that particle counts are an important diagnostic tool but does not believe limits are needed at this time.

A request has made to several labs to mine their data bases samples that have been tested for particles.

Two other attendees stated that particles are very important to HVDC transformers.

10.5.2.9. TF on Moisture in Oil

Chair: Bob Rasor

The TF Report given at the Sub-Committee Meeting:

Sue McNelly presented for the TF. Congratulations were expressed for the TF Secretary Hali Moleski's new arrival, Ella. The meeting achieved a quorum. He stated that the TF has been

reviewing a lot of data that has been submitted including both from on-line monitors and lab results. Also several presentations of various studies have been made to the TF. The goal for the next meeting is present a summary of the information received to date. It was mentioned that additional data would be welcome, especially including temperature of the mineral oil at time of sampling and the dissipation factor.

The TF Meeting Minutes (unapproved) as Received:

TF on Moisture in Oil
Monday, April 11th, 2011 3:15 pm
San Diego, California U.S.

The meeting was called to order by Chair Bob Rasor at 3:20 pm. There were 72 attendees. 29 of the 48 members were present. Four requested membership.

Members attending were:

Bob Rasor	Dennis Allan
Claude Beauchemin	Paul Boman
Dinesh Chhajer	Stephanie Denzer
James Gardner	Jorge Gonzalez de la Vega
Gary Hoffman	Tony Pink
Donald Platts	Jin H. Sim
Brian Sparling	Jim Thompson
Mark Tostrud	Mike Cau
Juan Castellanos	Donald Cherry
David Hanson	Zan Kiparizoski
Terence Martin	Thomas Melle
Oleg Roizman	Barry Ward
Shuzhen Xu	Stephan Brauer
Beugh-Olof Stemestam	Jesse Inkpen
Ray Bartnikas	Valery Davydov

Attendees requesting membership were:
Clair C. Claiborne
Jitendra Mamtora
Paul Caronia
Marc Cyr

Agenda

1. Roster was distributed
2. No patents were disclosed after the documents were posted and the question posed
3. Role call was taken
4. Reviewed scope
5. List of recent conference calls were given
6. Presentation was given that included
    i. Brief description of task force
    ii. Review of minutes from previous conference were displayed (unanimously approved)
    iii. Summary of moisture in standards/guides
        iv. Review of past data
            1. Data from EPRI study from Drs. Roizman and Davydov with temperature, ppm an saturation
            2. KF and temperature data from Bob Rasor
    v. New data presented

1. Data examples from both online monitors, % sat, and moisture removal and calculation from Bob Rasor
2. On-Line monitor and Karl Fischer results were presented by Claude Beauchemin

In summary, the TF presented data to demonstrate the many trends that can be seen with moisture and how all data parameters may need to be considered.

Data was presented from online monitors and Karl Fischer testing. It was noted that top oil relative saturation can be much different than bottom oil relative saturation.

Data examples also demonstrated that moisture content (ppm) responds to temperature and that that season affects moisture data. Relative saturation was shown to stay relatively stable as compared to moisture content on these graphs. Data also supported that relative saturation could be more consistent when compared to only the water content (ppm).

When oil temperature increased, water content also increased dramatically, often shifting between acceptable and unacceptable levels within days.

7. A summary of concepts and plans for future data
8. Discussion and questions followed
9. Meeting was adjourned at 4:30pm

Comments provided at the end of the meeting regarding the presentation include the following:

- It was asked if is it possible to take dissipation factor (tan delta) into consideration with moisture data to observe correlation.

- It was suggested to perform a saturation study on a single transformer at various different and extreme temperatures in addition to the various transformer data.

- The shifts in calculated ppm vs. relative saturation appear to be different in the presented graphs. This is possible due to the time period of data, a larger time period graph will look different.

- It was asked if there was a standard deviation in the graphs demonstrating seasonal differentials.

- Some emphasis should be placed on what temperatures are being used for analysis (i.e. top, bottom or average oil temperatures).

- The increase in saturation after a demonstrated increase in temperature and ppm was explained because the temperature drops faster than the water reabsorbed- thereby increasing the saturation reading for a short period of time.

10.5.3. Old Business:

Patrick McShane is reviewing TC Standards and Guides for the various nomenclatures used for transformer dielectric coolants with the intent to create uniformity, obvious omissions of various alternative fluids in existing C57 standard, and areas where revisions may be necessary in existing standards based on the suitability, or unsuitability, of alternative fluids based on typical property differences with the standard mineral oil. The SC home for such a task force, while focused on insulating fluids, belongs in the Standards SC and the subject is scheduled to be discussed as new business at the 4-13-11 Stds SC meeting.

10.5.4. New Business:

SC IF Adjournment 4:15PM

Respectfully Submitted:

Susan McNelly, Fluids SC Chair
Jerry Murphy, Fluids SC Vice-Chair
Patrick McShane, Fluids SC Secretary