IEEE/PES

Transformers

Committee

**Fall 2012**

**Meeting Minutes**

**Milwaukee, Wisconsin**

**October 21-25, 2012**

**Unapproved**

**(These minutes are on the agenda to be approved at the next meeting in Spring 2013)**

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The following people signed up to attend this Fall 2012 meeting in Milwaukee.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Attended | Last Name | First Name | Company Name | Membership Type |  |
| 1 | **X** | Ahuja | Raj | SPX Transformer Solutions, Inc. | Committee Member |  |
| 2 | **X** | Albers | Timothy | ABB Inc. | Interested Individual |  |
| 3 |  | Allen | Abbey | Baron USA, Inc. | Interested Individual |  |
| 4 |  | Allen | Jerry | Metglas Inc. | Active Participant |  |
| 5 | **X** | Almkvist | Marten | ABB Inc. | Interested Individual |  |
| 6 | **X** | Anderson | Gregory | GW Anderson & Associates, Inc. | Committee Member |  |
| 7 | **X** | Angell | Don | Doble Engineering Co. | Active Participant |  |
| 8 | **X** | Ansari | Tauhid | ABB Inc. | Active Participant |  |
| 9 | **X** | Anthony | Stephen | Pepco Holdings Inc | Interested Individual |  |
| 10 | **X** | Antosz | Stephen | Stephen Antosz & Associates, Inc | Committee Member |  |
| 11 | **X** | Antweiler | James | Schneider Electric/Square D | Active Participant |  |
| 12 | **X** | Arora | Sandeep | Schneider Electric | Interested Individual |  |
| 13 |  | Arpino | Carlo | A-Star Electric Co. | Committee Member |  |
| 14 | **X** | Asano | Roberto | ABB | ~~Active Participant~~, **new CM** |  |
| 15 | **X** | Atef | Kahveh | San Diego Gas & Electric | Interested Individual |  |
| 16 | **X** | Avelino | Paulo | Siemens Ltda | Interested Individual |  |
| 17 | **X** | Ayers | Donald | Ayers Transformer Consulting | Committee Member |  |
| 18 | **X** | Ayers | Roy | Nashville Electric Service | Interested Individual |  |
| 19 |  | Bailey | Anne | A-Line E.D.S. | Interested Individual |  |
| 20 |  | Baker | Steve | Serveron | Interested Individual |  |
| 21 |  | Baldwin | Mark | Dominion | Interested Individual |  |
| 22 | **X** | Ballard | Robert | ABB Inc. | Committee Member |  |
| 23 | **X** | Balma | Peter | Peter M Balma Engr Consulting PC | Committee Member |  |
| 24 | **X** | Baranowski | Derek | Baron USA, Inc. | Active Participant |  |
| 25 |  | Bartek | Allan | C-K Composites | Active Participant |  |
| 26 | **X** | Bartley | William | Hartford Steam Boiler | Committee Member |  |
| 27 | **X** | Baumgartner | Christopher | We Energies | Interested Individual |  |
| 28 | **X** | Beaster | Barry | Delta Star Inc. | Committee Member |  |
| 29 | **X** | Beauchemin | Claude | TJH2b Analytical Services | Committee Member |  |
| 30 |  | Becker | Scott | American JST | Interested Individual |  |
| 31 | **X** | Behrens | Tammy | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 32 |  | Bennett | Gregory | Xcel Energy | Interested Individual |  |
| 33 | **X** | Bercea | Emil | ABB | Interested Individual |  |
| 34 | **X** | Berler | Zalya | ZTZ Services International, Inc | Active Participant |  |
| 35 | **X** | Bernesjo | Mats | ABB Inc. | Interested Individual |  |
| 36 |  | Bertolini | Edward | Richards Manufacturing Co. | Active Participant, IEEE Life |  |
| 37 | **X** | Berube | Jean-Noel | Neoptix Inc. | Interested Individual |  |
| 38 | **X** | Betancourt | Enrique | Prolec GE | Committee Member |  |
| 39 | **X** | Bhatia | Paramjit | Moloney Electric Inc. | Interested Individual |  |
| 40 | **X** | Bhatt | Vivek | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 41 | **X** | Bin | Jackie | Magnetics Design, LLC | Interested Individual |  |
| 42 | **X** | Binder | Wallace | WBBinder Consultant | Committee Member |  |
| 43 | **X** | Blackburn | Gene | Gene Blackburn Engineering | Committee Member |  |
| 44 |  | Blake | Dennis | Pennsylvania Transformer | Interested Individual |  |
| 45 | **X** | Blaydon | Daniel | Baltimore Gas & Electric | Committee Member |  |
| 46 | **X** | Boettger | William | Boettger Transformer Consulting LLC | Committee Member |  |
| 47 | **X** | Bolliger | Alain | HV Technologies | Active Participant |  |
| 48 | **X** | Boman | Paul | Hartford Steam Boiler | Committee Member |  |
| 49 | **X** | Bozich | Bradford | EFACEC | Interested Individual |  |
| 50 | **X** | Bradford | Ira | TBEA USA | Interested Individual |  |
| 51 |  | Brafa | John | ABB Inc. | Active Participant |  |
| 52 | **X** | Breckenridge | Thomas | TB TCS Ltd | Interested Individual |  |
| 53 | **X** | Brender | David | Copper Development Assoc. Inc. | Active Participant |  |
| 54 | **X** | Brien | Matthew | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 55 | **X** | Brinkman | Steve | Cindus Corporation | Interested Individual |  |
| 56 | **X** | Britton | Jeffrey | Phenix Technologies, Inc. | Active Participant |  |
| 57 | **X** | Brocke | Lars | Haefely Test AG | Interested Individual |  |
| 58 |  | Brodeur | Samuel | ABB Inc. | Interested Individual |  |
| 59 | **X** | Bromley | Adam | Fort Collins Utilities | Interested Individual |  |
| 60 | **X** | Brown | Darren | Howard Industries | Interested Individual |  |
| 61 |  | Brown | Duane | Measurements International Ltd. | Interested Individual |  |
| 62 | **X** | Brush | Edwin | BBF & Associates | Committee Member |  |
| 63 | **X** | Buchanan | Paul | Moloney Electric Inc. | Committee Member |  |
| 64 | **X** | Buckmaster | David | Shaw Power Group | Active Participant |  |
| 65 | **X** | Burde | Jagdish | Virginia Transformer Corp. | Active Participant |  |
| 66 | **X** | Bush | Carl | Pemco Corporation | Committee Member |  |
| 67 | **X** | Callsen | Thomas | Weldy-Lamont Associates | Committee Member |  |
| 68 | **X** | Campbell | James | Dominion Virginia Power | Interested Individual |  |
| 69 | **X** | Carlos | Arnaldo | A.G. Carlos Inc. | Active Participant |  |
| 70 |  | Caronia | Paul | Dow Chemical Company | Active Participant |  |
| 71 |  | Carroll | Patrick | We Energies | Interested Individual |  |
| 72 |  | Caskey | John | NEMA | Active Participant |  |
| 73 | **X** | Castellanos | Juan | Prolec GE | Committee Member |  |
| 74 |  | Catugas | Marcelo | Nuclear Elect. Insur/Nuclear Serv Org. | Interested Individual |  |
| 75 | **X** | Cavallini | Andrea | University of Bologna / Techimp HQ Spa | Interested Individual |  |
| 76 | **X** | Chadderdon | Philip | Weidmann Electrical Technology | Interested Individual |  |
| 77 |  | Chai | Na | Shenyang Hongyuan Magnet Wire Co. | Interested Individual |  |
| 78 |  | Cheatham | Jonathan | General Electric | Active Participant |  |
| 79 | **X** | Cheng | Cheng | Moloney Electric Inc | Interested Individual |  |
| 80 | **X** | Cherry | Donald | ABB Inc. | Committee Member |  |
| 81 | **X** | Chisholm | Paul | IFD Corporation | Active Participant |  |
| 82 | **X** | Chiu | Bill | Southern California Edison | Committee Member |  |
| 83 | **X** | Chouhan | Bhushan | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 84 | **X** | Chu | Donald | Consolidated Edison Co. of NY | Committee Member |  |
| 85 | **X** | Chyla | David | CL Sales | Interested Individual |  |
| 86 | **X** | Claiborne | C. Clair | ABB Inc. | Committee Member |  |
| 87 | **X** | Colopy | Craig | Cooper Power Systems | Committee Member |  |
| 88 | **X** | Corkran | Jerry | Cooper Power Systems | Committee Member, IEEE Life | |
| 89 | **X** | Costa | Florian | Corimpex USA, Inc. | Active Participant |  |
| 90 | **X** | Cox Jr | Jerry | Efacec | Interested Individual |  |
| 91 | **X** | Craven | Michael | Patterson & Dewar Engineers | Active Participant |  |
| 92 |  | Crawford | Christy | Reinhausen Manufacturing, Inc. | Interested Individual |  |
| 93 |  | Crotty | John | ABB Inc. | Committee Member |  |
| 94 | **X** | Cruz Valdes | Juan Carlos | Prolec GE | Interested Individual |  |
| 95 |  | Cunningham | Kelcie | EFACEC | Interested Individual |  |
| 96 | **X** | Daniels | Timothy | HV TECHNOLOGIES Inc. | Active Participant |  |
| 97 | **X** | Darovny | William | Siemens Canada | Committee Member |  |
| 98 | **X** | Davies II | Arthur | The Gund Company | Interested Individual |  |
| 99 | **X** | Davis | Eric | Burns & McDonnell | Committee Member |  |
| 100 | **X** | Davydov | Valery | Mr. Valery Davydov | Active Participant |  |
| 101 |  | de la Cruz | Dan | Ocampo-Esta Corp. | Interested Individual |  |
| 102 | **X** | Del Rio | J. Arturo | Trench Limited | Active Participant |  |
| 103 | **X** | Denzer | Stephanie | General Electric | Interested Individual |  |
| 104 | **X** | Dhawan | Anil | ComEd | Interested Individual |  |
| 105 |  | Diaby | Mohamed | EFACEC | Interested Individual |  |
| 106 | **X** | Digby | Scott | Progress Energy | Active Participant |  |
| 107 | **X** | Dix | Larry | Quality Switch, Inc. | Committee Member |  |
| 108 | **X** | Dorpmanns | Luc | SMIT Transformatoren B.V. | Interested Individual |  |
| 109 | **X** | Dorris | Don | Nashville Electric Service | Active Participant |  |
| 110 | **X** | Drees | Terry | Cindus Corp. | Interested Individual |  |
| 111 | **X** | Drobnick | Jason | Jordan Transformer | Interested Individual |  |
| 112 | **X** | Dukarm | James | Delta-X Research | Active Participant |  |
| 113 |  | Duval | Michel | Hydro-Quebec IREQ | Active Participant, IEEE Life |  |
| 114 |  | Ebbert | Alexander | HICO America | Interested Individual |  |
| 115 | **X** | Ebermann | Sabine | SGB USA Inc. | Interested Individual |  |
| 116 | **X** | Elliott | Fred | Bonneville Power Administration | Committee Member |  |
| 117 |  | Elliott | Robert | Griffith Power Systems | Interested Individual |  |
| 118 |  | Ellis | Keith | Electric Connection, Inc. | Committee Member |  |
| 119 |  | Euvrard | Eric | RHM International | Interested Individual |  |
| 120 |  | Evitts | Jeffrey | H-J Enterprises, Inc. | Interested Individual |  |
| 121 | **X** | Fairris | James | Nashville Electric Service | Active Participant |  |
| 122 | **X** | Faulkenberry | Michael | Georgia Power Co. | Committee Member |  |
| 123 | **X** | Fausch | Reto | Hubbell High Voltage Test | Active Participant |  |
| 124 |  | Fedor | Ken | SMIT USA | Interested Individual |  |
| 125 | **X** | Feghali | Pierre | N. American Substation Services | Committee Member |  |
| 126 |  | Fernandes | Tania | EFACEC | Active Participant |  |
| 127 | **X** | Field | Norman | Weidmann Diagnostic Solutions | Active Participant |  |
| 128 | **X** | Fitchett | Douglas | American Electric Power | Interested Individual |  |
| 129 | **X** | Foldi | Joseph | Foldi & Associates, Inc. | Committee Member, IEEE Life | |
| 130 | **X** | Fornasari | Luca | Techimp H.Q. SpA | Interested Individual |  |
| 131 | **X** | Forrest | George | Delta-X Research USA, Inc. | Active Participant |  |
| 132 | **X** | Forsyth | Bruce | Southwest Electric Co. | Committee Member |  |
| 133 | **X** | Foster | Derek | Magnetics Design, LLC | Committee Member |  |
| 134 | **X** | Foster | Mary | OMICRON electronics Corp USA | Interested Individual |  |
| 135 | **X** | Fradkin | Yuriy | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 136 | **X** | Franchek | Michael | Weidmann Electrical Technology | Committee Member |  |
| 137 | **X** | Frimpong | George | ABB Inc. | Active Participant |  |
| 138 |  | Frotscher | Rainer | Maschinenfabrik Reinhausen GmbH | Interested Individual |  |
| 139 | **X** | Gagnon | Jean-Philippe | Nomos Systems | Interested Individual |  |
| 140 |  | Galatic | John | HICO America | Interested Individual |  |
| 141 |  | Ganser Jr. | Robert | OTC Services | Interested Individual |  |
| 142 | **X** | Garber | Matthew | Doble Engineering | Interested Individual |  |
| 143 | **X** | Garcia | Eduardo | Siemens | Committee Member |  |
| 144 | **X** | Gardner | James | NRECA - International | Committee Member |  |
| 145 |  | Gaytan | Carlos | Prolec GE | Committee Member |  |
| 146 | **X** | Ghafourian | Ali | ERMCO | Committee Member |  |
| 147 | **X** | Girgis | Ramsis | ABB Inc. | Committee Member, IEEE Life | |
| 148 | **X** | Golner | Thomas | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 149 |  | Gomez | Rolando | ARTECHE | Interested Individual |  |
| 150 | **X** | GonzalezdelaVega | Jorge | Orto de Mexico | Active Participant |  |
| 151 |  | Grace | Eugene | Serveron | Interested Individual |  |
| 152 | **X** | Graham | James | Pike Energy Solutions | Committee Member |  |
| 153 | **X** | Graham | John | Siemens ETHP BU | Committee Member |  |
| 154 | **X** | Graham | Richard | Delta Star Inc. | Committee Member |  |
| 155 | **X** | Griesacker | Bill | Doble Engineering Co. | Committee Member |  |
| 156 | **X** | Griffin | Paul | Doble Engineering Co. | Interested Individual |  |
| 157 | **X** | Griffith | Steve | NEMA | Interested Individual |  |
| 158 | **X** | Gross | Detlev | Power Diagnostix | Interested Individual |  |
| 159 | **X** | Gruenewald | Brad | We Energies | Interested Individual |  |
| 160 |  | Guilbault | Frank | Cogent Power Inc. | Interested Individual |  |
| 161 |  | Guild | Alvin | Phenix Technologies Inc. | Interested Individual |  |
| 162 |  | Gutierrez | Juan | General Electric | Interested Individual |  |
| 163 | **X** | Haas | Michael | Instrument Transformers, Inc. | Committee Member |  |
| 164 |  | Haasz | Jodi | IEEE | Active Participant |  |
| 165 | **X** | Hakim | Shamaun | CG Power Systems UAS Inc | Interested Individual |  |
| 166 | **X** | Hamilton | Kendrick | Power Partners, Inc. | Interested Individual |  |
| 167 | **X** | Hammer | Mark | ALSTOM Grid | Active Participant |  |
| 168 |  | Han | Suh Joon | The Dow Chemical Company | Interested Individual |  |
| 169 | **X** | Hanson | David | TJH2b Analytical Services | Active Participant |  |
| 170 | **X** | Harden | Kenneth | Schneider Electric | Interested Individual |  |
| 171 |  | Harder | Steven | Siemens Energy | Interested Individual |  |
| 172 | **X** | Hardin | Michael | H-J Enterprises, Inc. | Committee Member |  |
| 173 | **X** | Harlow | James | Harlow Engineering Associates | Committee Member, IEEE Life | |
| 174 | **X** | Harris | David | SPX Transformer Solutions, Inc. | Committee Member, IEEE Life | |
| 175 | **X** | Hauschild | Wolfgang | Dr. W. Hauschild | Interested Individual |  |
| 176 | **X** | Hayes | Roger | ALSTOM Grid | Committee Member |  |
| 177 | **X** | Heathcote | Martin | Martin Heathcote Associates Ltd | Active Participant |  |
| 178 | **X** | Hennessey | John | Cindus Corp. | Active Participant |  |
| 179 | **X** | Henning | William | SPX Transformer Solutions, Inc. | Committee Member |  |
| 180 | **X** | Hernandez | Ronald | Doble Engineering Co. | Interested Individual |  |
| 181 | **X** | Herron | John | High Volt - Reinhausen | Active Participant |  |
| 182 | **X** | Herz | Josh | Qualitrol | Active Participant |  |
| 183 |  | Hinow | Martin | HIGHVOLT | Interested Individual |  |
| 184 | **X** | Hochanh | Thang | Hydro-Quebec IREQ | Committee Member |  |
| 185 | **X** | Hoffman | Gary | Advanced Power Technologies | Committee Member |  |
| 186 | **X** | Holdway | Timothy | Intermountain Electronics | Committee Member |  |
| 187 | **X** | Holifield | Thomas | Howard Industries | Committee Member |  |
| 188 | **X** | Holmes | Jill | Bureau of Reclamation | Interested Individual |  |
| 189 | **X** | Holsomback | Steve | Southern Company Services | Active Participant |  |
| 190 | **X** | Hopkinson | Philip | HVOLT Inc. | Committee Member, IEEE Life | |
| 191 |  | Inkpen | Jesse | BPLG - Serveron | Interested Individual |  |
| 192 | **X** | Jacob | Nathan | Manitoba Hydro | Interested Individual |  |
| 193 | **X** | Jacobsen | Dallas | Schweitzer Engineering Laboratories | Interested Individual |  |
| 194 |  | Jakob | Fredi | Consultant | Active Participant |  |
| 195 | **X** | James, Jr. | Rowland | Advanced Power Technologies | Committee Member |  |
| 196 | **X** | Jarman | Paul | National Grid | Active Participant |  |
| 197 |  | Jaroszewski | Marion | Delta Star Inc. | Active Participant |  |
| 198 | **X** | Jauch | Erwin | Beckwith Electric | Active Participant, IEEE Life |  |
| 199 | **X** | John | John | Virginia Transformer Corp. | Interested Individual |  |
| 200 | **X** | Johnson | Wayne | EPRI | Active Participant |  |
| 201 |  | Johnstone | Ted | Cogent Power Inc. | Interested Individual |  |
| 202 | **X** | Jordan | Stephen | TVA | Committee Member |  |
| 203 | **X** | Kadar | Laszlo | Hatch | Active Participant |  |
| 204 | **X** | Kang | Jinho | Hyundai Heavy Industries | Interested Individual |  |
| 205 | **X** | Kaufman | Michael | Petro-Canada | Interested Individual |  |
| 206 | **X** | Kennedy | Gael | Nebraska Public Power District | Committee Member |  |
| 207 | **X** | Kennedy | Sheldon | Niagara Transformer | Committee Member |  |
| 208 | **X** | Khalin | Vladimir | ABB Inc. | Committee Member |  |
| 209 |  | Kim | Dong | Southern California Edison | Active Participant |  |
| 210 | **X** | Kinner | Robert | First Power Group LLC | Interested Individual |  |
| 211 | **X** | Kirchenmayer | Egon | Siemens AG | Interested Individual |  |
| 212 | **X** | Kirchner | Lawrence | Siemens Energy | Interested Individual |  |
| 213 | **X** | Klaponski | Brian | Carte International Inc. | Committee Member |  |
| 214 |  | Knuth | Wesley | Salt River Project | Interested Individual |  |
| 215 |  | Kopf | Jon | Power Asset Recovery Corp. | Interested Individual |  |
| 216 |  | Kornowski | Marek | Polycast International | Interested Individual |  |
| 217 | **X** | Kraemer | Axel | Maschinenfabrik Reinhausen | Active Participant |  |
| 218 | **X** | Kraetge | Alexander | OMICRON | Committee Member |  |
| 219 | **X** | Kranich | Neil | Jordan Transformer | Interested Individual |  |
| 220 | **X** | Kremer | Daniel | Phenix Technologies Inc | Interested Individual |  |
| 221 | **X** | Kriege | Lawrence | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 222 | **X** | Kulasek | Krzysztof | ABB Inc. | Interested Individual |  |
| 223 | **X** | Kurth | Bernhard | Reinhausen Mfg. | Active Participant |  |
| 224 | **X** | Kyle | Randall | Southern Company | Active Participant |  |
| 225 | **X** | Lachman | Mark | Doble Engineering Co. | Interested Individual |  |
| 226 | **X** | Lackey | John | PowerNex Associates Inc. | Committee Member |  |
| 227 | **X** | Ladroga | Richard | Risk Management International | Committee Member |  |
| 228 | **X** | Landis | Ben | Transformer Protector Corp | Interested Individual |  |
| 229 |  | Lapota | Michael | Calumet Specialty Products Partners, L.P. | Interested Individual |  |
| 230 | **X** | Larochelle | David | NDB Technologies | Interested Individual |  |
| 231 | **X** | Lau | Michael | Weidmann Diagnostic Solutions | Committee Member |  |
| 232 |  | Lawless | Andrew | Siemens Energy | Interested Individual |  |
| 233 |  | Lawrence | Matthew | Doble Engineering Co. | Interested Individual |  |
| 234 |  | Lee | Min Jea | Hyosung | Active Participant |  |
| 235 | **X** | Leishman | Gary | American Electric Power | Interested Individual |  |
| 236 | **X** | Lemke | Eberhard | Doble Lemke GmbH | Active Participant |  |
| 237 | **X** | Lemm | Arthur | Cooper Power Systems | Interested Individual |  |
| 238 |  | Leslie | Brian | General Electric | Interested Individual |  |
| 239 |  | Lessa Bressan | Natalia | Siemens Energy | Interested Individual |  |
| 240 | **X** | Levin | Aleksandr | Weidmann Electrical Technology | Active Participant |  |
| 241 | **X** | Li | Weijun | Braintree Electric Light Dept. | Interested Individual |  |
| 242 |  | Lima | Jose | GE Prolec | Interested Individual |  |
| 243 | **X** | Livingston | Kerry | Great River Energy | Active Participant |  |
| 244 |  | Locarno | Mario | Doble Engineering Co. | Active Participant |  |
| 245 | **X** | Lopez-Fernandez | Xose | Universidade de Vigo | Committee Member |  |
| 246 |  | Lowdermilk | Larry | LAL International, LLC | Committee Member, IEEE Life | |
| 247 | **X** | Luksich | John | Cooper Power Systems | Interested Individual |  |
| 248 | **X** | Lyke | Richard | AK Steel Corporation | Interested Individual |  |
| 249 | **X** | MacMillan | Donald | Hunterdon Transformer | Active Participant |  |
| 250 | **X** | Mamede | Gabriel | Siemens (TUSA) | Interested Individual |  |
| 251 | **X** | Mamtora | Jitendra | Transformers & Rectifiers (India) | Active Participant |  |
| 252 |  | Mann | Shaun | Tri-State G&T | Interested Individual |  |
| 253 |  | Mao | Libin | Consolidated Edison Co. of NY | Interested Individual |  |
| 254 | **X** | Marek | Richard | DuPont | Committee Member |  |
| 255 | **X** | Marquardt | Bryan | AK Steel | Interested Individual |  |
| 256 | **X** | Martin | Nole | Cooper Power Systems | Interested Individual |  |
| 257 | **X** | Martin | Russell | M&I Materials | Interested Individual |  |
| 258 | **X** | Martin | Terence | GridSense | Active Participant |  |
| 259 | **X** | Matthews | Lee | Howard Industries | Committee Member |  |
| 260 |  | Mayer | Robert | San Diego Gas & Electric | Active Participant |  |
| 261 | **X** | McBride | James | JMX Services, Inc. | Active Participant |  |
| 262 |  | McCloskey | Scott | Amran Inc. | Interested Individual |  |
| 263 | **X** | McClure | Phillip | Weschler Instruments | Committee Member |  |
| 264 | **X** | McCullough | Douglas | Maxima / Hyundai | Interested Individual |  |
| 265 |  | McGrail | Anthony | Doble Engineering Co. | Interested Individual |  |
| 266 |  | McIver | James | Siemens Energy | Active Participant |  |
| 267 | **X** | McNally | Mark | KCBPU | Active Participant |  |
| 268 | **X** | McNelly | Susan | Xcel Energy | Committee Member |  |
| 269 | **X** | McShane | Charles Patrick | Cargill Inc | Committee Member |  |
| 270 | **X** | McTaggart | Ross | Trench Limited | Committee Member |  |
| 271 | **X** | Mehrotra | Vinay | SPX Transformer Solutions, Inc. | Committee Member |  |
| 272 |  | Mehta | Shirish | SPX Transformer Solutions, Inc. | Committee Member, IEEE Life | |
| 273 | **X** | Melle | Thomas | Siemens Energy | Active Participant |  |
| 274 | **X** | Miller | Kent | T&R Electric Supply Co. | Committee Member, IEEE Life | |
| 275 | **X** | Miller | Michael | Siemens Energy | Interested Individual |  |
| 276 | **X** | Miller | Michael | We Energies | Interested Individual |  |
| 277 | **X** | Miller | William | EDPR NA | Interested Individual |  |
| 278 | **X** | Millward | Paul | ITEC | Committee Member |  |
| 279 | **X** | Molden | Arthur | AMEESCO | Committee Member |  |
| 280 | **X** | Moleski | Hali | S.D. Myers Inc. | Active Participant |  |
| 281 | **X** | Moore | Harold | Harold Moore & Associates | Committee Member, IEEE Life | |
| 282 | **X** | Morakinyo | Paul | PSE&G | Interested Individual |  |
| 283 | **X** | Morales-Cruz | Emilio | Qualitrol | Interested Individual |  |
| 284 |  | Morem | Bruce | Olsun Electrics Corporation | Interested Individual |  |
| 285 | **X** | Morgan | Charles | Northeast Utilities | Interested Individual |  |
| 286 | **X** | Mukerji | Amitav | ABB Inc. | Committee Member |  |
| 287 | **X** | Mulkey | Daniel | Pacific Gas & Electric | Committee Member |  |
| 288 |  | Mullikin | Randolph | Meramec Electrical Products | Active Participant |  |
| 289 | **X** | Murphy | Jerry | Reedy Creek Energy Services | Committee Member |  |
| 290 | **X** | Murray | David | Tennessee Valley Authority | Active Participant |  |
| 291 | **X** | Mushill | Paul | Ameren | Active Participant |  |
| 292 |  | Mustacchio | James | NYCO America | Interested Individual |  |
| 293 | **X** | Naderian | Ali | Kinectrics | Interested Individual |  |
| 294 | **X** | Narawane | Aniruddha | Olsun Electrics Corporation | Interested Individual |  |
| 295 | **X** | Navarro | Martin | Siemens Ltda | Active Participant |  |
| 296 |  | Nazarko | Jeffrey | Tempel | Interested Individual |  |
| 297 | **X** | Nemec | Jeffrey | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 298 | **X** | Nguyen | Van Nhi | Hydro-Quebec | Committee Member |  |
| 299 | **X** | Niemann | Carl | Niemann Consulting | Committee Member, IEEE Life | |
| 300 | **X** | Niemerg | Ryan | Ameren | Interested Individual |  |
| 301 |  | Nikoley | Ingo | Siemens Energy | Active Participant |  |
| 302 | **X** | Nims | Joe | Allen & Hoshall | Active Participant |  |
| 303 | **X** | Nordman | Hasse | ABB Oy, Transformers | Active Participant |  |
| 304 |  | Nunes, Jr | Jayme | Nynas AB | Interested Individual |  |
| 305 |  | Nunn | Shawn | OTC Services | Interested Individual |  |
| 306 | **X** | Ogajanov | Rudolf | ABB Inc. | Active Participant |  |
| 307 | **X** | Olafsson | Gylfi | SPX Transformer Solutions, Inc. | Active Participant |  |
| 308 | **X** | Olen | Robert | Cooper Power Systems | Committee Member |  |
| 309 | **X** | Oriti | Samuel | Lanier Consultants | Active Participant |  |
| 310 |  | Ortiz | Jow | NextEra Energy | Interested Individual |  |
| 311 | **X** | Ostrander | David | Ameren | Active Participant |  |
| 312 |  | Panetta | Sergio | I Gard Corporation | Active Participant |  |
| 313 | **X** | Pardington | Chris | Xcel Energy | Interested Individual |  |
| 314 | **X** | Parkinson | Dwight | Cooper Power Systems | Active Participant |  |
| 315 |  | Patel | Dhiru | Hammond Power Solutions Inc. | Active Participant |  |
| 316 | **X** | Patel | Poorvi | ABB Inc. | Active Participant |  |
| 317 | **X** | Patel | Sheetal | ERMCO | Interested Individual |  |
| 318 | **X** | Patoine | Barbara | Weidmann Electrical Technology | Interested Individual |  |
| 319 | **X** | Patterson | Wesley | ABB Inc. | Committee Member |  |
| 320 |  | Pattou | Arnaud | JST Transformateurs | Interested Individual |  |
| 321 | **X** | Payerle | George | Carte International Inc. | Active Participant |  |
| 322 | **X** | Penny | Brian | American Transmission Company | ~~Active Participant~~, **new CM** |  |
| 323 | **X** | Perjanik | Nicholas | Weidmann Diagnostic Solutions | Interested Individual |  |
| 324 | **X** | Perlichek | Robert | Public Service Co. of New Mexico | Active Participant |  |
| 325 |  | Peterson | Alan | Utility Service Corporation | Active Participant |  |
| 326 | **X** | Pezzin | Justin | IFD Corporation | Committee Member |  |
| 327 | **X** | Pink | Tony | Dynamic Ratings, Inc. | Committee Member |  |
| 328 | **X** | Platts | Donald | Saucon Resources | Committee Member |  |
| 329 | **X** | Ploetner | Christoph | ABB Inc. | Committee Member |  |
| 330 | **X** | Pointner | Klaus | Trench Austria GmbH | Committee Member |  |
| 331 | **X** | Poulin | Bertrand | ABB Inc. | Committee Member |  |
| 332 |  | Powe | Steven | Kentucky Copper Inc | Interested Individual |  |
| 333 | **X** | Prevost | Thomas | OMICRON electronics Corp USA | Committee Member |  |
| 334 | **X** | Prince | Jarrod | ERMCO | Interested Individual |  |
| 335 | **X** | Progar | John | Jordan Transformer | Committee Member |  |
| 336 | **X** | Pruente | John | High Voltage Supply | Interested Individual |  |
| 337 |  | Quandel | Jennifer | HPN Global | Interested Individual |  |
| 338 | **X** | Radbrandt | Ulf | ABB | Committee Member |  |
| 339 |  | Rahangdale | Ravi | Pennsylvania Transformer | Committee Member, IEEE Life | |
| 340 | **X** | Rasco | Jimmy | Ergon, Inc | Interested Individual |  |
| 341 | **X** | Rasor | Robert | S.D. Myers Inc. | ~~Active Participant~~, **new CM** |  |
| 342 | **X** | Rave | Martin | ComEd | Committee Member |  |
| 343 | **X** | Ray | Jeffrey | JLR Consulting, Inc. | Active Participant |  |
| 344 | **X** | Razuvayev | Sergiy | Delta Star Inc. | Active Participant |  |
| 345 | **X** | Reeves | Jerry | EFACEC | Interested Individual |  |
| 346 |  | Rieger | Guenther | Maschinenfabrik Reinhausen GmbH | Interested Individual |  |
| 347 |  | Rijnsoever | Frank | SMIT Transformatoren B.V. | Interested Individual |  |
| 348 | **X** | Rinks | Timothy | Reinhausen Mfg. | Interested Individual |  |
| 349 | **X** | Rivers | Mark | Doble Engineering Co. | Interested Individual |  |
| 350 | **X** | Roach | John | Hartford Steam Boiler | Interested Individual |  |
| 351 | **X** | Robalino | Diego | Megger | Interested Individual |  |
| 352 |  | Roberts | Mark | N. American Substation Services | Active Participant |  |
| 353 |  | Rock | Patrick | ATC | Interested Individual |  |
| 354 | **X** | Roman | Zoltan | ALSTOM Grid | Interested Individual |  |
| 355 | **X** | Roussell | Marnie | Entergy | Committee Member |  |
| 356 |  | Runewicz | John | Weschler Instruments | Active Participant |  |
| 357 | **X** | Sahin | Hakan | ABB Inc. | Active Participant |  |
| 358 | **X** | Saldivar | Juan | Prolec GE | Interested Individual |  |
| 359 | **X** | Salvato | Orlando | Raytech USA | Interested Individual |  |
| 360 | **X** | Sankarakurup | Dinesh | Niagara Transformer | Committee Member |  |
| 361 | **X** | Sarkar | Subhas | Virginia Transformer Corp. | ~~Active Participant~~, **new CM** |  |
| 362 | **X** | Sauer | Daniel | Cooper Power Systems | Committee Member |  |
| 363 | **X** | Sauls | Roderick | Southern Company Services | Interested Individual |  |
| 364 | **X** | Sauzay | Mathieu | JST Transformateurs | Active Participant |  |
| 365 | **X** | Sawant | Anil | Virginia Transformer Corp. | Interested Individual |  |
| 366 | **X** | Scarborough | Mark | DuPont | Active Participant |  |
| 367 | **X** | Schappell | Steven | SPX Transformer Solutions, Inc. | Committee Member |  |
| 368 |  | Schickedanz | Frank | Reinhausen Group | Interested Individual |  |
| 369 | **X** | Schleismann | Eric | Southern Company | Interested Individual |  |
| 370 | **X** | Schneider | Jeffrey | Cooper Power Systems | Interested Individual |  |
| 371 | **X** | Schneider | Marc | American Transmission Company | Interested Individual |  |
| 372 | **X** | Schrammel | Alfons | Siemens Transformers Austria | Interested Individual |  |
| 373 |  | Schuetz | Carl | American Transmission Company | Interested Individual |  |
| 374 |  | Schweiger | Ewald | Siemens Energy | Committee Member |  |
| 375 | **X** | Scialdone | Mark | DuPont | Interested Individual |  |
| 376 | **X** | Selvaraj | Pugazhenthi | Virginia Transformer Corp. | Interested Individual |  |
| 377 |  | Sestito | John | TBEA USA | Active Participant |  |
| 378 | **X** | Sewell | Adam | Quality Switch, Inc. | Interested Individual |  |
| 379 | **X** | Sewell | Jeremy | Quality Switch, Inc. | ~~Active Participant~~, **new CM** |  |
| 380 | **X** | Shannon | Michael | Rea Magnet Wire | Interested Individual |  |
| 381 | **X** | Sharma | Devki | Entergy | Committee Member |  |
| 382 | **X** | Sharp | Michael | Trench Limited | Committee Member |  |
| 383 | **X** | Shem-Tov | Mark | Von Roll Transformers | Interested Individual |  |
| 384 | **X** | Shertukde | Hemchandra | University of Hartford | Committee Member |  |
| 385 |  | Shi | Lin | TBEA USA | Interested Individual |  |
| 386 | **X** | Shor | Andre | Von Roll Transformers | Interested Individual |  |
| 387 | **X** | Shteyh | Ibrahim | Eaton | Interested Individual |  |
| 388 | **X** | Shull | Stephen | The Empire District Electric Company | Committee Member |  |
| 389 |  | Siebert | Stefan | BROCKHAUS MESSTECHNIK | Active Participant |  |
| 390 | **X** | Sim | H. Jin | SPX Transformer Solutions, Inc. | Committee Member |  |
| 391 | **X** | Simmons | Charles | Progress Energy | Active Participant |  |
| 392 | **X** | Simon | Preston | Electrical Technologies | Interested Individual |  |
| 393 | **X** | Simonelli | Richard | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 394 | **X** | Singh | Kushal | ComEd | Interested Individual |  |
| 395 | **X** | Sizemore | Thomas | ABB Inc. | Committee Member |  |
| 396 | **X** | Smaglick Johnson | Laurie | SPX Transformer Solutions, Inc. | Interested Individual |  |
| 397 | **X** | Smith | Edward | H-J Enterprises, Inc. | Committee Member |  |
| 398 | **X** | Snyder | Steven | ABB Inc. | Committee Member |  |
| 399 | **X** | Solano | William | ABB Inc. | Interested Individual |  |
| 400 | **X** | Som | Sanjib | Siemens Industry Inc | Committee Member |  |
| 401 | **X** | Soni | Mahendrakumar | Virginia Transformer Corp. | Interested Individual |  |
| 402 | **X** | Sparling | Brian | Dynamic Ratings Inc | Active Participant |  |
| 403 |  | Speegle | Andy | Entergy Services Inc. | Active Participant |  |
| 404 | **X** | Spiewak | Erin | IEEE | Interested Individual |  |
| 405 |  | Spurlock | Michael | American Electric Power | Active Participant |  |
| 406 | **X** | Stahara | Ronald | Stahara Consulting | Committee Member, IEEE Life | |
| 407 |  | Stank | Markus | Maschinenfabrik Reinhausen | Active Participant |  |
| 408 | **X** | Stankes | David | 3M IPT | Active Participant |  |
| 409 | **X** | Steineman | Andrew | Delta Star Inc. | Active Participant |  |
| 410 |  | Steineman | Christopher | Meramec Electrical Products, Inc. | Interested Individual |  |
| 411 | **X** | Stenestam | Bengt-Olof | ABB | Active Participant |  |
| 412 | **X** | Stiegemeier | Craig | ABB Inc. | Committee Member |  |
| 413 |  | Strader | Adam | American Electric Power | Interested Individual |  |
| 414 | **X** | Stretch | Kerwin | SGB USA, Inc. | Interested Individual |  |
| 415 |  | Sullivan | Christopher | Heartland Solutions, Inc. | Active Participant |  |
| 416 | **X** | Sullivan | Liz | ABB | Interested Individual |  |
| 417 | **X** | Sundin | David | SVB Environmental Lubricants, Inc. | Interested Individual |  |
| 418 |  | Swan | Phil | ABB Inc. | Interested Individual |  |
| 419 | **X** | Swansey II | Michael | EDPRenewables, NA | Interested Individual |  |
| 420 | **X** | Sweetser | Charles | OMICRON electronics Corp USA | Active Participant |  |
| 421 | **X** | Swinderman | Craig | Mitsubishi Electric Power Products | Committee Member |  |
| 422 |  | Tafoya | Mauricio | Siemens Energy | Interested Individual |  |
| 423 | **X** | Tanaka | Troy | Burns & McDonnell | Interested Individual |  |
| 424 | **X** | Taousakis | Anastasios | PHI Inc. | Interested Individual |  |
| 425 | **X** | Tarlapally | Susmitha | ABB Inc. | Interested Individual |  |
| 426 | **X** | Tellez | Richard | Siemens S.A. | Active Participant |  |
| 427 |  | Tendulkar | Vijay | ONYX Power, Inc. | Interested Individual, IEEE Life | |
| 428 | **X** | teNyenhuis | Ed | ABB Inc. | Committee Member |  |
| 429 | **X** | Termini | Giuseppe | PECO Energy | Committee Member |  |
| 430 | **X** | Thiele | Mark | Kentucky Copper Inc. | Interested Individual |  |
| 431 |  | Thompson | Jim | T&R Service Company | Committee Member |  |
| 432 | **X** | Thompson | Robert | RST Consulting, P.C. | Committee Member |  |
| 433 |  | Tong | Lin | SYET | Active Participant |  |
| 434 |  | Topjian | Gregory | Doble Engineer | Interested Individual |  |
| 435 | **X** | Tostrud | Mark | Dynamic Ratings, Inc. | Interested Individual |  |
| 436 | **X** | Traut | Alan | Power Partners | Committee Member |  |
| 437 | **X** | Trivitt | Donnie | Oklahoma Gas & Electric | Active Participant |  |
| 438 |  | Troxell | Shawn | BPL Global | Interested Individual |  |
| 439 |  | Trujillo | Antonio | Cooper Power Systems | Interested Individual |  |
| 440 | **X** | Tuli | Subhash | Electrical T&D Apparatus Consultant Inc. | Committee Member |  |
| 441 | **X** | Utter | Gary | Consumers Energy | Interested Individual |  |
| 442 | **X** | Vailoor | Vasanth | Trantech | Interested Individual |  |
| 443 |  | van der Kolk | Stefan | Smit Transformers | Interested Individual |  |
| 444 | **X** | Varghese | Ajith | SPX Transformer Solutions, Inc. | Active Participant |  |
| 445 | **X** | Veens | Jos | SMIT Transformatoren B.V. | Interested Individual |  |
| 446 | **X** | Verdell | Joshua | ERMCO | Interested Individual |  |
| 447 | **X** | Verner | Jane Ann | Pepco Holdings Inc | Committee Member |  |
| 448 |  | Viereck | Karsten | Maschinenfabrik Reinhausen | Active Participant |  |
| 449 | **X** | Vinson | David | ABB Inc. | Interested Individual |  |
| 450 | **X** | Vir | Dharam | SPX Transformer Solutions, Inc. | Committee Member |  |
| 451 | **X** | vonGemmingen | Richard | Dominion | Active Participant |  |
| 452 | **X** | Wagenaar | Loren | WagenTrans | Committee Member, IEEE Life | |
| 453 | **X** | Walia | Sukhdev | Brookfield Renewable Power | Interested Individual, IEEE Life | |
| 454 | **X** | Wallace | David | ABB Inc. | ~~Interested Individual~~, **new CM** | |
| 455 | **X** | Wallach | David | Duke Energy | Committee Member |  |
| 456 | **X** | Walters | Shelby | Howard Industries | Active Participant |  |
| 457 |  | Wang | Fei | Shenyang Hongyuan Magnet Wire Co. | Interested Individual |  |
| 458 | **X** | Ward | Barry | Advantage T&D Consulting, LLC | Committee Member |  |
| 459 | **X** | Watson | Joe | HICO America | Committee Member |  |
| 460 |  | Weatherbee | Eric | PCORE Electric | Active Participant |  |
| 461 |  | Weathington | Larry | N. American Substation Services | Active Participant |  |
| 462 | **X** | Websper | Richard | ALSTOM Grid UK Limited | Active Participant |  |
| 463 | **X** | Werelius | Peter | Megger | Active Participant |  |
| 464 |  | White | Leon | GE Energy | Interested Individual |  |
| 465 |  | Whitten | Christopher | ABB Inc. | Interested Individual |  |
| 466 | **X** | Wicks | Roger | DuPont | Committee Member |  |
| 467 | **X** | Wilks | Alan | Consultant | Committee Member, IEEE Life | |
| 468 | **X** | Williams | Joe | Rea Magnet Wire | Interested Individual |  |
| 469 |  | Williams | Michael | ABB Inc. | Active Participant |  |
| 470 |  | Williams | Randy | ABB Inc. | Active Participant |  |
| 471 |  | Wilson | John | Alliant Energy | Interested Individual |  |
| 472 | **X** | Wimberly | Barrett | ALSTOM Grid | Interested Individual |  |
| 473 | **X** | Wimmer | William | Dominion | Committee Member |  |
| 474 | **X** | Wojtczak | David | American Transmission Company | Interested Individual |  |
| 475 |  | Woods | Deanna | Alliant Energy | Interested Individual |  |
| 476 | **X** | Wright | Melvin | LICA Consulting LLC | Interested Individual |  |
| 477 |  | Yalla | Murty | Beckwith Electric | Interested Individual |  |
| 478 | **X** | Yang | Baitun | Pennsylvania Transformer | Committee Member |  |
| 479 |  | Yang | Xuqing | Shenyang Hongyuan Magnet Wire Co. | Interested Individual |  |
| 480 | **X** | Young | Samuel | Reinhausen Mfg | Interested Individual |  |
| 481 | **X** | Young | William | ALSTOM Grid | Interested Individual |  |
| 482 | **X** | Yu | Jennifer | Pacific Gas & Electric | Committee Member |  |
| 483 | **X** | Yule | Kipp | Bechtel Power Corp | Committee Member |  |
| 484 | **X** | Zazueta | Filiberto | Comision Federal de Electricidad LAPEM | Interested Individual |  |
| 485 | **X** | Zhang | Jim | Arizona Public Service Co. | Active Participant |  |
| 486 |  | Zhang | Shibao | PCORE Electric | Active Participant |  |
| 487 | **X** | Zhao | Peter | Hydro One | Committee Member |  |
| 488 | **X** | Zhu | Hanxin | BC Hydro | Active Participant |  |
|  | **364** |  |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | For those not in the database above, sign in here: | | |  | | |
|  | Name | |  | Company | | |
| 1 | **Krishnamurthy Vijayan** | |  | |  | **CG Power Systems** | |
| 2 | **Mark Faulkner** | |  | |  | **Eaton** | |
| 3 | **Juan Carlos Garcia** | |  | |  | **Manitoba Hydro Int'l** | |
| 4 | **Z Cheim Luiz** | |  | |  | **ABB** | |
|  |  |  |  | |  |  | |
|  |  |  |  | |  |  | |
|  | Other walk-up registrants not on the above list | | | | | |
| 1 | Yongbae | Bae |  | |  | Hyosung | |
| 2 | Yong Tae | Sohn |  | |  | HICO | |
| 3 | Anthony | Zito |  | |  | Siemens Energy | |
| 4 | Michael | Bauer |  | |  | EFACEC | |
| 5 | Arturo | Nunez |  | |  | Mistras Group Inc. | |
| 6 | Jeffrey | La Marca |  | |  | Luminant Power | |
|  |  |  |  | |  |  | |
|  |  |  |  | |  |  | |

1. **Approval of Previous Minutes – Stephen Antosz**

The Minutes from the Nashville meeting were approved as written.

1. **Chair’s Remarks & Report – Bill Chiu**
   1. **Chair’s Remarks**

Good Morning and Welcome to Milwaukee!

For those of you who I have not had the pleasure of meeting in person, my name is Bill Chiu and it is my privilege to serve you in my capacity as the Chair of the Transformers Committee. My other full time job is with Southern California Edison where I am responsible for a variety of engineering activities from substation infrastructure, to generation interconnection facilities, to protection/control and automation for all of our bulk power assets within the substation fence.

I wish to express, on behalf of the Transformers Committee, our thanks to the local host team, Jin & Julie Sim, Tammy Behrens, and the rest of the hardworking team members from SPX for all that they have done in planning for this meeting and show us their hospitality. I had a great time mingling with some of you last night and hope you had an equally enjoyable time as well.

In the past we have started the week by going directly into working sessions and the Committee General Session was held on Thursday as we close out the meeting week. We started this new meeting format this year with our General Session for the Main Transformers Committee on Monday. Many of you have provided great feedback on this new format since our Nashville meeting and we are very pleased that this has met or exceeded your expectations. Our goal really is to continue to find ways to enhance the values -- that is the values that we collectively bring to you and thus making your participation and attendance of these meetings worthwhile.

There were several changes that we, the administrative subcommittee group, consist of the Committee officers and all of the technical subcommittee chairs, have decided on about this time last year. We have one additional change this time to complete the new meeting format. That is our Tuesday Luncheon. Starting at this meeting, our Tuesday luncheon will be dedicated to recognizing our contributors. It is a chance for us to sit down and enjoy a meal together while we give some well-deserved recognitions to our volunteers.

Speaking of the volunteers – I also want to spend a few minutes talking about many of you that made our committee so strong and unique and with our long tradition of excellence that we all treasure so much. In case you are new to the group and don’t already know, all of us, from officers to Working Group or Taskforce members, are all volunteers. No one here gets paid from IEEE to serve these roles. And thanks to many of you in this room, our Transformers Committee is one of the most successful technical committees in IEEE PES because of your selfish less dedication to our industry.

Because of our past awards and recognition practices, some of our volunteers could actually go on for years without some sort of more formal recognition. I do want to take few moments to acknowledge many of you who have been long-standing contributing members to our industry.

Without taking too much away from our Tuesday’s Awards Luncheon, we recognize that we do have room for improvements in giving some well-deserved acknowledgement and recognition to our hardworking volunteers and we are on our way to do just that that with this new dedicated awards luncheon on Tuesday, which is in the very good hands of our awards subcommittee chair Ed Smith. With this new program we will try to bring some story about how the work gets done and some of efforts that went on behind the scene, so please continue to support your fellow peers by attending this awards luncheon. And Phil Hopkinson – yes this means you won’t get to ask the presenter questions, but I’m confident you’ll find another outlet for your inquisitive mind.

Again, without preempting our Tuesday’s Awards Luncheon, let me try something here - I would just like for those of you in the audience to stand up if you have been contributing to the Transformers Committee standards development efforts for 30 years or more. This is an honor system and we do know some of you out there, so please don’t be shy and at least give us an opportunity express our thanks. Let’s give these dedicated folks a big round of applause. Thank you very much. Ok, how about those of you who have contributed for more than 20 years, but not quite reach the 30 years mark, would you please also stand and be recognized?

How about for those of you who have been contributing more than 10 years, but not quite reached the 20 years mark – would you stand and be recognized.

And finally, for those of you between 5 and 10 years, would you also stand and be recognized.

So, back to the subject of volunteers: I’d like to share a brief story – and it may give you an impression of how nerdy I was in my younger days – I am sure some of you still would think that of me – but that is ok, we’re among friends right?:-)

After I got my first job out of college in the late 80’s, I started to hear about the IEEE standards and decided to spend what little bit of savings I had left after paying back the tuition and the loans….. I decided to buy myself a gift – a fairly expensive one by the standards of those days. I purchased two IEEE Standard telephone book collections – it is the 1989 collection of C37 and C57 series of standards, and the entire IEEE Color Book series. Little did I know that it was one of the best investments I have made for myself next to the formal college education. Back then I really didn’t have a strong need to know about the inner details of how switchgear and transformers worked. But little by little, scanning through those standards invoked the curiosity from within and that curiosity coupled with an opportunity to oversee the manufacturing, and testing of a GSU got me hooked on transformers for good. It was sort of a perfect storm if you will. – where everything you could think of that could possibly go wrong did go wrong on that GSU from hell….. from winding resistance problem to switch impulse failure to stress cracks in the tank, you name it, it’s got it. The unit made it through the factory after having to be untanked twice and created the perfect storm of learning opportunity. It is sort of the beginning of my love story for transformers. Over the years I have benefitted so much from this great body of knowledge. No doubt that when I first got involved with the transformers committee, I did so more for my own personal benefit.

But as time goes on, I realized that I have an opportunity to give back to our community. There are many late nights and evenings at home where I’m working away on my laptop computer after dinner and my wife would ask me what are you working on anyway? You’re crazy – the company doesn’t pay you enough to do this. I would say to her yeah, you’re right; the company doesn’t pay me enough to do this. But this is not work work – this is IEEE Transformers Committee business and she gets it - - I do it not because I have to, but because I want to.

No doubt that when I first got involved with the transformers committee, I did so more for my own benefit. But as time goes on, I realized that I have a great opportunity to give back to our community. It is really about this paying back to this community for the tremendous benefits I received over the years.

So, what, you may ask, does this have to do what I was talking about before I ventured into this little story. My point is about asking yourself why are you here today. For some of us we got involved with the Transformers Committee because it is a great learning forum, for some it is the recognition of being associated with an industry leader group, for others it is leadership development opportunity as in the case of the many of us in an activity leadership roles, and for some others it could be job requirement for maintaining industry network and developing new leads for new business opportunities, and yet for others it may be a combination of the several factors I mentioned. Beyond the knowledge gained, the industry network, the recognition, I challenge each of you to think about would you have made it to where you are today in your career without benefitting from the knowledge that was pass-on by those before us in this committee? Think about all the withdraws that you have made all these years from this great body of knowledge. Let the earlier examples of the many long-standing hard working volunteers be an inspiration to you. I said to you, instead of continuing to make withdraws, it is also about given back to the community that nurtured you to where you are today.

Find that passion for what makes you devote the time and the energy to this important work that we do here. We need more of you to get energized around the reason why you are here in the first place and to get involved and contribute – your time and expertise. If you want to give money, that’s great too - - being a non-profit organization, we will gladly take your monetary donations. But what is more important, and what we really need is your commitment for your time and expertise – whether you are a subject matter expert in a particular field, or you are great with word processing to help edit our documents, or you have good organizational skills to help us compile the various valuable technical information from the workgroups for archival purpose. We ask for your contribution to help us to continue to make this one of the best technical committee within IEEE Power & Energy Society.

* 1. **Chair’s Report**

**3.2.1 IEEE Power & Energy Society Technical Council**

The Technical Council of the IEEE Power Energy Society (PES) is presently composed of the Chairpersons of the PES Technical Committees, plus the Chairpersons of Standing Committees reporting to it. The Power Energy Society is Division VII of The Institute of Electrical and Electronics Engineers (IEEE). For operating functions it is responsible to the IEEE Technical Advisory Board and for technical activities to the IEEE Technical Activities Board. Please see <http://www.ieee-pes.org/technical-committees/statement-of-purpose-and-scope-of-activities-for-the-pes-technical-council> for further details on the Statement of Purpose and Scope of Activities for the PES Technical Council. The membership of the Technical Council is listed below.

**TECHNICAL COUNCIL OFFICERS**

Damir Novosel, *Chair*Jeffrey H. Nelson, *Vice* *Chair*S. S. (Mani) Venkata, *Secretary*Rick Taylor, *Past* *Chair*

**STANDING COMMITTEES**

Awards Committee - John Randolph, *Chair*

Meetings & Marketing Committee - Jeffrey H. Nelson, *Chair*

Organization & Procedures Committee - Mani Venkata, *Chair*

Standards Coordination Committee - Bill Bartley, *Chair*

Technical Sessions Committee **-** Jeffrey H. Nelson, *Chair*

**COORDINATING COMMITTEES**

Emerging Technologies Coordinating Committee - Branislav Djokic, *Chair*

Intelligent Grid Coordinating Committee - Don Von Dollen, *Chair*

Marine Systems Coordinating Committee - Paul Bishop, *Chair*

Wind and Solar Power Coordinating Committee - Richard J. Piwko, *Chair*

**TECHNICAL COMMITTEES**

Electric Machinery Committee - Mike Sedlak, *Chair*

Energy Development and Power Generation Committee - Om Malik, *Chair*

Insulated Conductors Committee - John Smith, *Chair*

Nuclear Power Engineering Committee - S. K (Satish) Aggarwal, *Chair*

Power System Analysis, Computing, and Economics Committee - Sandoval Carneiro, Jr., *Chair*

Power System Communications Committee - Dan Nordell, *Chair*

Power System Dynamic Performance Committee - Nikos Hatziargyriou, *Chair*

Power System Instrumentation and Measurements Committee - R. Arseneau, *Chair*

Power System Operations Committee - William (Bill) Cassel *Chair*

Power System Planning and Implementation Committee - M. L. Chan, *Chair*

Power System Relaying Committee - Robert D. Pettigrew, *Chair*

Stationary Battery Committee - William (Bill) Cantor, *Chair*

Substations Committee - John D. Randolph, *Chair*

Surge Protective Devices Committee - Dr. A. J. (Tony) Surtees, *Chair*

Switchgear Committee - Ken Edwards, *Chair*

Transformers Committee - Bill Chiu, *Chair*

Transmission and Distribution Committee - S. J. Ranade *Chair*

**3.2.2 Highlights of PES Technical Council Activities**

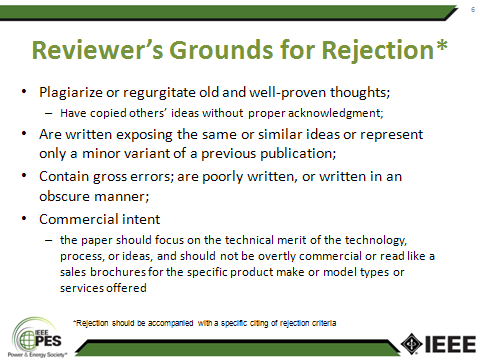
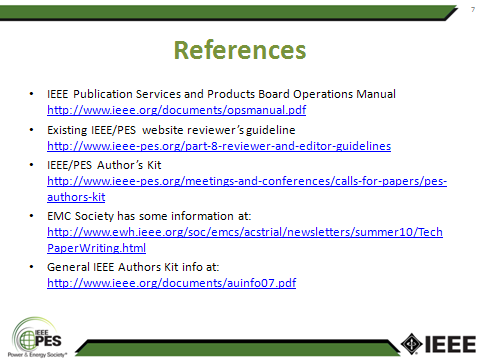
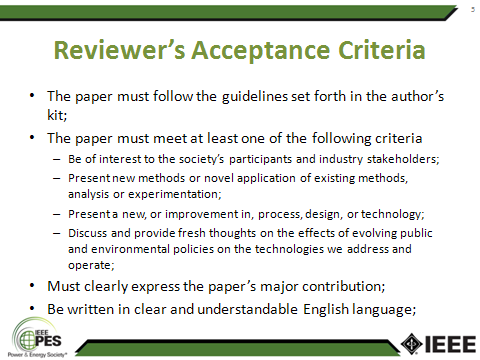
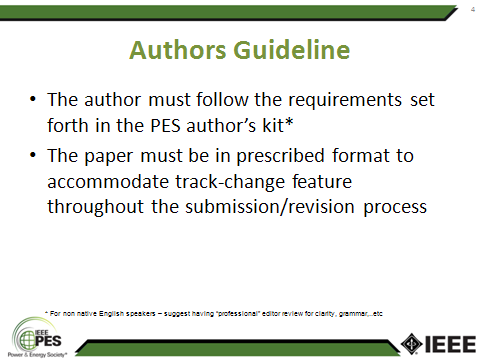
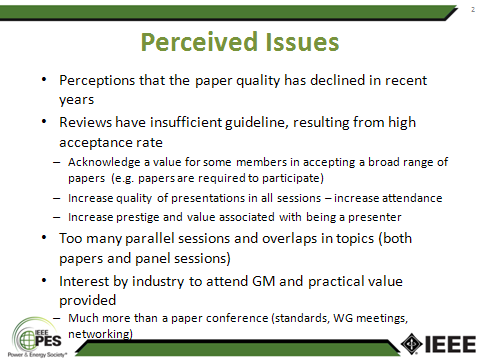
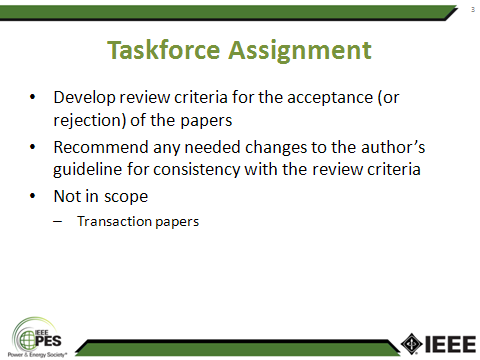
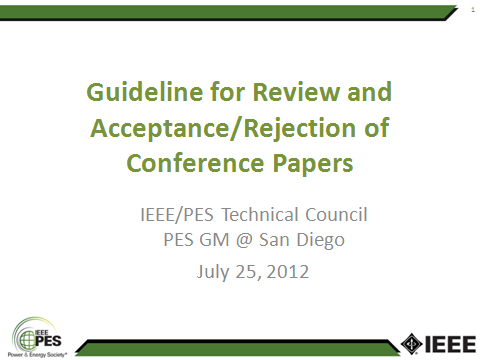
The most recent Technical Council meeting took place on July 25, 2012, at the PES General Meeting in San Diego, CA. Highlights of several activities of Technical Council and Committees are included below.

**3.2.2.1 Conference Paper Review/Acceptance Criteria**

Based on many of the feedbacks from the various technical committees within PES over the past several years, the Technical Council has identified an opportunity for improvement by providing consistent guideline for the review and acceptance of the PES sponsored conference papers. Over the course of the past year, there were additional efforts completed towards developing a general guideline. A taskforce was formed to address the paper review and acceptance criteria. Key members of this taskforce are representatives of the following technical committees:

* Power System Relaying Committee - Robert D. Pettigrew, *Chair*
* Transformers Committee - Bill Chiu, *Chair*
* Transmission and Distribution Committee - S. J. Ranade, *Chair*

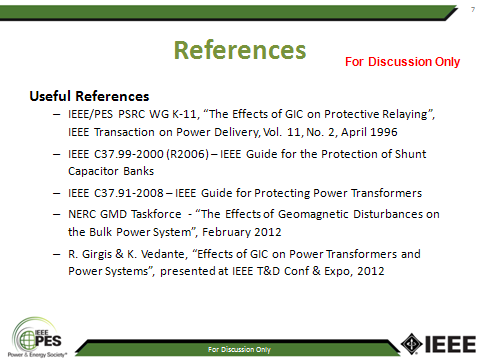
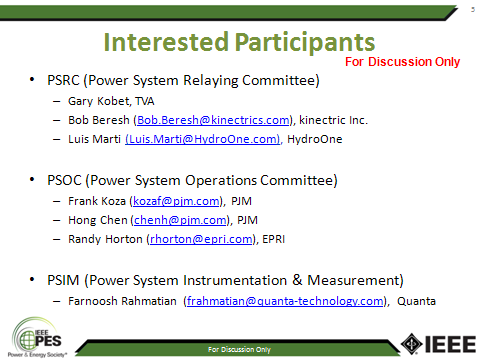
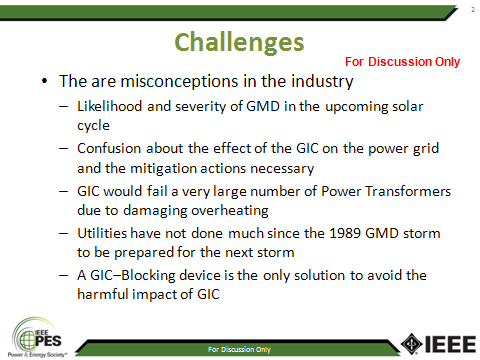
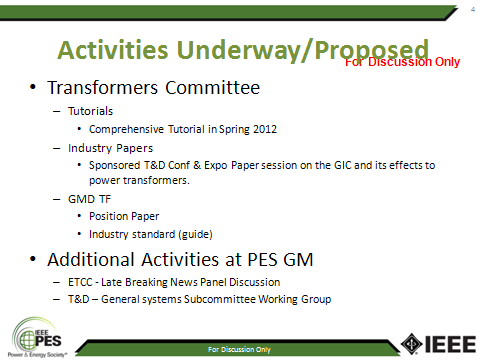
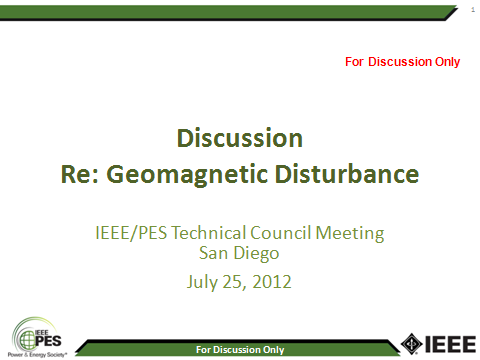
The deliverable of this Taskforce is a set of guidelines for paper review and acceptance criteria. The taskforce completed its work and reported its recommendation at the Tech Council meeting during the PES GM in San Diego that took place in July 2012. The recommendations included high level review and acceptance guideline for both the authors and the reviewers of the paper. The Taskforce’s recommendations were accepted by the Technical Council and criteria will be proposed to the IEEE PES Governing Board for final approval. The presentation slides were included below for reference.



The Chair notes with appreciation that many key contributors within the Transformers Committee have authored papers and also took active roles in reviewing conference papers over the years. They also offer their experience and perspectives in this effort and many of their suggestions were also incorporated in the final recommendations.

**3.2.2.2 Geomagnetic Disturbance (GMD) Taskforce**

As a follow up to the discussion at the Transformers Committee meeting in Nashville back in March 2012, the concerns expressed by the members of the Transformers Committee GMD Taskforce members in regards to the IEEE Spectrum article published in February 2012 were elevated to the officers of the PES Technical Council and the representatives of the various technical committees. Many of the other PES technical committees also expressed similar concerns. Upon further dialogues over the course of several months leading up to the PES General Meeting at San Diego in July, the PES Technical Council expressed interested in having a coordinated response. The presentation slides that were the basis of the discussion at the July, 2012 Technical Council meeting are included below for reference:



Following the discussion there was a motion made to form a Technical Council Taskforce to develop an industry white paper. The goal of this white paper is to provide additional technical information to demystify the many mis-information that has been circulating in various publications. The motion passed and subsequently the Transformers Committee Chair was appointed the Chair this Taskforce. The Technical Council also expressed its desire to have a joint white paper at the IEEE PES Technical Council level rather than independent efforts by the various technical committees.

**3.2.3 Transformers Committee Activities**

**3.2.3.1 Subcommittee Chairperson & Technical Editor**

Our current roster of the Subcommittee Chairs and Editor are:

* Bushings Subcommittee **Peter Zhao**
* Dielectric Test Subcommittee **Loren Wagenaar**
* Distribution Transformers Subcommittee **Stephen Shull**
* Dry-Type Transformers Subcommittee **Charles Johnson**
* HVDC Converter Transformers and Smoothing Reactors Subcommittee **Michael Sharp**
* Instrument Transformers **Ross McTaggart**
* Insulating Fluids Subcommittee **Susan McNelly**
* Insulation Life Subcommittee **Bruce Forsyth**
* Meetings Subcommittee **Gregory Anderson**
* Performance Characteristics Subcommittee **Ed teNyenhuis**
* Power Transformers Subcommittee **Tom Lundquist**
* Standards Subcommittee **William Bartley**
* Underground Transformers & Network Protectors Subcommittee **Carl Niemann**
* Technical Editor **Sanjib Som**

All of them have confirmed their commitment to serve the duration of the calendar year 2012. As we approach the end of 2012, the volunteer subcommittee leaders and editor will have the opportunity to reaffirm their desire to continue their service in the respective capacity in accordance with the established guideline in the Transformers Committee O&P Manual.

PES Technical Council was notified of the Subcommittee Chairs and Technical Editor appointments for the calendar year 2012 in accordance with guideline set forth in O&P Manual.

**3.2.3.2 Association Management (AM) System**

The AM system continues to serve important administrative functions in supporting the membership roster. This system is designed with self-administered features for updates of individual contact information. The system also serves to facilitate attendance record keeping and email distribution list for the various subgroups within the Transformers Committee.

All Subcommittees, Working Group (WG), and Taskforce (TF) Chairs are requested to use the AM system for assigning and tracking membership within their groups and for communication with their group members. All Committee members, active participants, and interested individuals are reminded also that you are responsible personally for maintaining the accuracy of your contact information, through the AM system, for Committee activities and communication. Keeping your contact information maintained in the AM system assures that the Chair of any Subcommittee, WG, or TF you are involved with will be able to contact you in a timely manner. Details on enrolling and maintaining your contact information in the AM system can be found on the Committee website.

**3.2.3.3 Committee Membership**

All are welcome to participate in the work of the Transformers Committee. Membership in the Committee provides recognition of your peers and indication to your co-workers and management of your active role in Committee work. If you are presently not a Main Committee Member, and you have been actively participating in our work for at least two full year – and can secure the acknowledgement and sponsorship of at least 3 activity Chairs (WGs, but must include at least one Subcommittee Chair) affirming that participation, the Committee will look forward to welcoming you as a member. Membership requirements and application forms can be found in the Organization and Procedures Manual posted on the Committee website.

As our organization is a 100% volunteer based organization, we are very much in need of all of your continued participation and sharing of your expertise towards our world-class standards development efforts. Many of our long-standing committee members have made tremendous contributions towards our standards development effort over the years and their contributions are greatly appreciated.

1. **Vice Chair’s Report – Donald Platts**

4.1 IEEE PES Calendar of Upcoming Events

The table below lists the upcoming PES sponsored conferences and committee meetings. Please check the PES website at [**www.ieee-pes.org**](http://www.ieee-pes.org) for further details.

2013 IEEE PES Joint Technical Committee Meeting (JTCM 2013)

*Jan 13 – 17, 2013, Memphis, Tennessee, USA*

[2013 IEEE PES Innovative Smart Grid Technologies Conference](http://ieee-isgt.org/)   
*24-28 February, 2013, Washington D.C., USA*

[PES 2013 General Meeting](http://pes-gm.org/2013/)  
*21-25 July, 2013, Vancouver, British Columbia, Canada*

4.2 Conference Papers presented since spring 2012

**4.2.1 2011 IEEE PES Power Systems Conference & Exposition**  
(Orlando, FL, May 7, 2012)

A total of 20 papers have been submitted. After review, 10 of these papers were presented in the Paper Session.

|  |  |
| --- | --- |
| ID | Title |
| 2012TD0052 | [**Low-Cost Amorphous-Metal Rolled-up-Core Distribution Transformer**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=52) |
| 2012TD0130 | [**Transformer Insulation Dry Out as a Result of Retrofilling with Natural Ester Fluid**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=130) |
| 2012TD0203 | Measurement and Computation of Transient Recovery Voltage of Transformer Limited Fault in 525kV-1500MVA Three-Phase Transformer |
| 2012TD0261 | [**Gas insulated transformer application for an environmentally-friendly power station upgrade**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=261) |
| 2012TD0311 | [**Statistical Insights into Furan Interpretation Using a Large Dielectric Fluid Testing Database**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=311) |
| 2012TD0383 | [**Construction of a High Voltage Test Facility**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=383) |
| 2012TD0454 | [**Power Grid Stability Protection against GIC Using a Capacitive Grounding Circuit**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=454) |
| 2012TD0463 | [**Effects of GIC on Power Transformers and Power Systems**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=463) |
| 2012TD0561 | [**Evaluation of Distribution Network Transformer Dissolved Gas Analysis (DGA) Data**](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=561) |
| 2012TD0590 | [FEM Analysis of the Transformer Insulation XY Model](http://submissions.miracd.com/TD2012/ChairSubmissionDetail.asp?mode=sbs&sbmID=590) |

4.2.2 2012 PES General Meeting (San Diego, CA July 23- 24, 2012)

A total of 12 papers were submitted. After review, 6 papers were presented in the Paper Session.

|  |  |
| --- | --- |
| ID | Title |
| 2012GM0281 | Demagnetization of a Large Power Transformer Based on Calculation of the Flux Linkage |
| 2012GM0693 | Effects of Iron-Core Topology on Inrush Currents in Three-Phase Multi-Leg Power Transformers |
| 2012GM0707 | Interpretation of Dielectric Response Measurements of Transformer Insulation under Temperature Variations and Transient Effects |
| 2012GM1155 | A Study on Suitability of Different Transformer Winding Models for Frequency Response Analysis |
| 2012GM1177 | Multivariate Analysis for Correlations among Different Transformer Oil Parameters to Determine Transformer Health Index |
| 2012GM1440 | Solid State Transformer Specification via Feeder Modeling and Simulation |

4.2.3 Upcoming Conference Papers Submitted for Review

**2013 PES General Meeting**

Unknown --The deadline for submission is in November 30 2012.

Changes to IEEE PES Conference Paper Rules

The IEEE PES explanation of these changes is published and can be reviewed at <http://pes-gm.org/2013/index.php/call-for-papers>.

**4.3 Conference Paper Submission Requirements**

The paper length has been reduced to 5 pages. Part 1 and Part 2 papers will not be permitted. The maximum paper length has been reduced to 5 pages. Part 1 and Part 2 papers will not be permitted

**4.4 Conference Paper Presentations**

There will be no Transformers Committee Paper Presentation sessions.

The majority of accepted conference papers will be scheduled for presentation at the Monday evening poster session. Presentation of an accepted paper at the conference is a requirement of publication. Any paper that is not presented at the conference will not be included in IEEE Xplore.

The top 60 to 80 accepted conference papers will be selected to be presented in a Conference Paper Session. Author(s) will be allowed 8 minutes to present their paper and will be allowed to use a maximum of 6 PowerPoint slides.

A few of the top 60 to 80 conference papers will be chosen and recognized as General Meeting Conference Prize Papers, during the Tuesday Awards dinner.

**Transactions Paper Presentations**

The PES Technical Committees will be selecting published Transactions papers for presentation at the 2013 General Meeting. An author of an accepted PES Transactions paper who is interested in presenting it at the 2013 PES General Meeting must upload the full paper, in addition to the paper's abstract, to the on-line submission and review site by the deadlines listed above. The appropriate Technical Committee Program Chair (TCPC) will determine if the topic of the paper is suited for presentation in one of the technical sessions.

**4.5 Special Issue Transactions Paper Presentations:**

Beginning in 2013, select papers from Special Issue PES Transactions will be presented at the PES General Meeting. The Special Issues have already been identified for 2013, but authors are encouraged to submit papers to future special issues. Information on planned Special Issue PES Transactions can be found at: [**http://www.ieee-pes.org/calls-for-transactions**](http://www.ieee-pes.org/calls-for-transactions)

**4.6 Panel Sessions**

The Transformers Committee will have the opportunity to sponsor panel session at future conferences. We have not yet considered this type of presentation at any future conference. Panelists will not be required to write summary papers to participate in panel sessions. Only PowerPoint presentations are required. Invited panelists are free to submit a conference paper on the topic they are asked to present, if they so choose, but it must be submitted to the on-line submission and review site by the conference paper submission deadlines listed above and it will be reviewed for acceptance under the same criteria as all conference paper submissions. Participation as a panelist does not guarantee that your conference paper submission will be accepted and published.

1. **Secretary’s Report – Stephen Antosz**

**5.1 Membership Review**

Voting Committee Members – Two new committee members were approved and added at the Nashville meeting as shown in the table below:

| **Name** | **Affiliation** | **Sponsor #1** | **Sponsor #2** | **Sponsor #3** | **Membership Category** |
| --- | --- | --- | --- | --- | --- |
| Baitun Yang | Pennsylvania Transformer | Pierre Riffon  WG Revision to Impulse Test (2+yrs) | Loren Wagenaar  SC Dielectric Test  (2+yrs) | Stephen Antosz  SC Performance Characteristics  (2+yrs) | Producer |
| Thomas Sizemore | ABB | Thang Hochanh  TF PD in Bushings, PTs, CTs (2 yrs) | Ross McTaggert  SC Instrument Transformers  (1.5 yrs) | Ross McTaggert  WG Requirements for Instrument Transformers  (6 months) | Producer |

The Transformers Committee AMS database of people currently has three general categories of participation in our activities. These are: **Interested Individual**, **Active Participant**, and **Committee Member**. Any one can join our AMS 123 system as the system is designed for self-registration. A new participant will automatically be assigned the role of Interested Individual when they first sign up. Based on the level of participation, the committee administrative staff will upgrade the participation status to “Active Participant” when appropriate. The Committee Member status however, can only be attained through a formal application with the sponsorship of minimum of three WG or SC chairmanships. Detail of the application requirements and approval process by the Administrative Subcommittee is outlined in our O&P manual.

The following table contains a count of the participants grouped by 3 general categories.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Membership Status | Oct-10 | Apr-11 | Oct-11 | Mar-12 | Oct-12 |
| Interested Individual | 843 | 997 | 1061 | 1132 | 1205 |
| Interested Individual - IEEE Life Member \* | 6 | 2 | 4 | 6 | 7 |
| **Total Interested Individuals** | **845** | **999** | **1065** | **1138** | **1212** |
|  |  |  |  |  |  |
| Active Participant | 227 | 230 | 218 | 232 | 231 |
| Active Participant - IEEE Life Member \* | 7 | 5 | 5 | 6 | 6 |
| **Total Active Participants** | **234** | **235** | **223** | **238** | **237** |
|  |  |  |  |  |  |
| Committee Member | 211 | 210 | 218 | 182 | 182 |
| Committee Member - Emeritus Member \* | 8 | 1 | 8 | 6 | 6 |
| Committee Member - IEEE Life Member \* | 26 | 31 | 31 | 29 | 30 |
| Committee Member - Corresponding Member | 1 | 1 | 1 | 0 | 0 |
| **Total Committee Members** | **246** | **243** | **258** | **217** | **218** |
|  |  |  |  |  |  |
| **TOTAL IN AMS DATABASE** | **1391** | **1478** | **1546** | **1593** | **1667** |

\* - indicates this member type receives a discounted registration fee.

The participant’s profiles in our AMS 123 system should reflect the correct status. It is the responsibility of each individual to keep his or her profile updated. Here is the link to our AMS 123 system. (<http://www.123signup.com/servlet/com.signup.servlet.org.ALogin?Org=ieee-transformers&Restart=1>)

**5.2 New Member Applications**

Six new applications for Committee Membership have been received since our previous meeting in Nashville. They will be submitted for approval at the Milwaukee meeting on October 21, 2012. Details of the membership applications and sponsors are listed in the following table.

| **Name** | **Affiliation** | **Sponsor #1** | **Sponsor #2** | **Sponsor #3** | **Membership Category** |
| --- | --- | --- | --- | --- | --- |
| Jeremy A. Sewell | Quality Switch, Inc | Carl Nieman  UTNP SC  (7yrs) | Phil Hopkinson  WG C57.157 DETC (7yrs) | Brian Klaponski  WG C57.12.40 Network Xfmr(7yrs) | Producer |
| Robert T. Rasor | S.D. Myers, Inc. | Susan McNelly  Insulating Fluids SC (3 yrs) | Richard Ladroga  WG C57.104 DGA (7yrs) | Tom Prevost  TF Furans  (3yrs) | General Interest |
| David Archie Wallace | ABB/Kuhlman Electric | Loren Wagenaar  Dielectirc Test SC (2 yrs) | Ross McTaggert  Instrumnt Trans SC (2 yrs) | Pierre Riffon  WG Rev to Impulse Tests (2 yrs) | Producer |
| Roberto Asano Junior | ABB | Don Platts/Bruce Forsyth  Insulation Life SC (4 yrs) | Peter Zhao  WG C57.156 Tank Rupture (2yrs) | Richard Marek  WG C57.154 High Temp Insul (4yrs) | Producer |
| Brian R. Penny | American Transmission Company | Jane Verner PC57.152 Field Test Guide(4 yrs) | Dave ?  WG PC57.139 DGA LTC(2 yrs) | Enrique Betancourt  TV/Stabilizing Wdg  (1 yrs) | User |
| Subhas S. Sarkar | Virginia Transformer Corp | Sheldon Kennedy  WG C57.12.52  (2 yrs) | Tim Holdway  WG C57.12.01  (2 yrs) | Chuck Johnson  Dry Type SC  (>2 yrs) | Producer |

The Committee welcomes and encourages active participants to become Members of the Committee. Requirements and application forms can be found in the Organization and Procedures (O&P) Manual, accessible on the Committee website. Subcommittee Chairs are encouraged to recommend new members, and to communicate the process of attaining membership through **active participation** and **contribution** in Committee work at the WG and SC level. WG and SC Chairs are reminded also that signing an application sponsoring a new member signifies their sponsorship that the applicant has met the requirement of membership and active participation for at least one year in the WG or SC they Chair. New member applications may be submitted to the Committee Secretary’s attention at any time. Applications will be collected for review and approval in batches at each Administrative Subcommittee meeting. For an application to be reviewed at the next meeting, the application will need to be received by the Committee Secretary a minimum of one week prior to the start of that meeting.

**5.3 Committee, Subcommittees, and Working Group Rosters**

In order to provide indemnification to working group and subcommittee members it is crucial that membership lists be maintained. Our AM system has these functions built-in to ease these administration tasks. It is important that each subcommittee and working group chair keep the rosters updated so that this information can be provided to the IEEE SA.

A similar main committee roster has also been developed to track attendance for the Main Committee meeting on Monday & Thursday. The data will be used to update participant’s membership profile.

**5.4 IEEE/PES and IEEE/SA Membership Requirements**

As a reminder, all members of the Transformers Committee must also be members in good standing of the Power & Energy Society (IEEE/PES) and the Standards Association (IEEE/SA). There are a number of Transformers Committee members who have lapsed and must renew their SA and/or PES affiliation. These memberships are renewed annually along with your IEEE Membership renewal, which typically occurs at the end of each year.

Reminder that WG Chairs must also be a member of the SC, PES, and SA.

There are a number of Transformers Committee Members who are not PES or SA members. They will be given a reminder to renew these required memberships. If they do not comply then they will be dropped as Members. It is not fair to the other Members who adhere to this rule and pay the annual fees. Moreover, a person CANNOT participate in any ballot activity if they are not an SA member, and this is one of the basic responsibilities of an active member.

**5.5 Consistent Guidelines for Membership Maintenance**

Due to varying application of removal of members from individual SC’s & WG’s, the Administrative Subcommittee will develop some guidelines for consistent application. The Transformers Committee Secretary will create a first draft and circulate to the Admin Members for comment. It was requested that each SC Chair forward to the Secretary whatever rules they have been using in their own groups.

**5.6 Essential Patent Claims**

The Transformers Committee is now asking each participant at the time of meeting registration if they are aware of an essential patent claim, and if so to provide details. An Essential Patent Claim is any Patent Claim the use of which was necessary to create a compliant implementation of the IEEE Standard when there was no commercially and technically feasible non-infringing alternative. In other words, if an IEEE Standard REQUIRES the use of a product or process that is already patented, then this could be an essential patent claim. For this Milwaukee meeting there were nine people who answered YES that they were aware of a potential essential patent claim. Four of the nine provided no details and were therefore not considered any further. The other five were reviewed and it was determined that they DO NOT have an essential patent claim. If they did, they would be instructed to have the patent holder’s legal team file a Letter of Assurance (LOA) with the IEEE-SA Standards Board Patent Committee. There is a link to this information on the transformerscommittee.org website.

**5.7 Meeting Minutes**

The minutes of the Nashville Transformers Committee meeting Spring, 2012 were posted to the committee website on June 25, 2012.

Subcommittee Chairs are requested to submit their SC Minutes from the Milwaukee meeting by December 15, 2012.

The minutes should be submitted via e-mail to the Committee Secretary, Stephen Antosz at [santosz@ieee.org], with a copy to Susan McNelly [sjmcnelly@ieee.org] for posting on the Committee website.

The submittal file should be saved as a Word document and should be formatted similar to this report, and as shown in the recent assembled Minutes. *The numbering for your report should match the numbering as indicated in the Main Committee Meeting Agenda*. Please indicate total attendance count for each Subcommittee, Working Group, and Task Force meeting in your Minutes. Please do not send a copy of the attendance listing for this attendance count.

Your full corporation and support in this matter is greatly appreciated.

1. **Treasurer’s Report – Gregory Anderson**

The finances of the Committee are in excellent condition. As of September 1, 2012 (end of this reporting period), the balance was $56,563.01. There were no assets (PC projectors, etc.) purchased during this reporting period. There was a small gain during this reporting period. See below "balance sheet".



1. **Awards Report – Ed Smith**

7.1 Committee Certificates of Appreciation

Transformers Committee Certificates of Appreciation have been obtained, with approval of the PES Awards & Recognition Chair, for the following Award recipients:

**7.1.1 General Service Awards**

H. Jin Sim Host - Fall 2012 Meeting, Milwaukee, WI

SPX Transformer Solutions Host Company - Fall 2012 Meeting, Milwaukee, WI

Richard Dudley Chair, HVDC Subcommittee

Loren Wagenaar Chair, Dielectric Test Subcommittee

? Distinguished Service Award

**7.1.2 Task Force Service Awards**

**Task Force on IEC Comparison**

H. Jin Sim Chair, Task Force on IEC Comparison

**Task Force on Instructions for IEC Coordination**

Jeewan Puri Chair, Task Force on Instructions for IEC Coordination

**Task Force on Stabilizing Windings**

Enrique Betancourt Chair, Task Force on Stabilizing Windings

Richard Amos Contributing Member, Task Force on Stabilizing Windings

Xose Lopez-Fernandez Contributing Member, Task Force on Stabilizing Windings

Sanjay Patel Contributing Member, Task Force on Stabilizing Windings

Vallamkonda Sankar Contributing Member, Task Force on Stabilizing Windings

Krishnamurthy Vijayan Contributing Member, Task Force on Stabilizing Windings

**Task Force on Dielectric Frequency Response**

George Frimpong Chair, Task Force on Dielectric Frequency Response

Peter Werelius Contributing Member, TF on Dielectric Frequency Response

Diego Robalino Contributing Member, TF on Dielectric Frequency Response

Mario Locarno Contributing Member, TF on Dielectric Frequency Response

Mary Foster Contributing Member, TF on Dielectric Frequency Response

**Task Force on DVP Grid Transformers**

Dr. Hemchandra Shertukde Chair, Task Force on DVP Grid Transformers

Matthieu Sauzay Vice Chair, Task Force on DVP Grid Transformers

Alexander Levin Secretary, Task Force on DVP Grid Transformers

**7.2 IEEE SA Standards Board Awards**

In addition to the Committee Awards above, the IEEE SA SB presents its own Award to the WG Chair upon publication of a new or revised document, and offers the WG Chair the opportunity to nominate significant contributors to the project for an IEEE SA SB Certificate of Appreciation.

IEEE SA Award Recipients:

**C57.91 IEEE Guide Loading Mineral-Oil-Immersed Transformers**

Don Duckett WG Chair, C57.91

Carl Arpino WG Vice Chair, C57.91

Susan McNelly WG Secretary, C57.91

Peter Balma Outstanding Contributor C57.91

William Bartley Outstanding Contributor C57.91

Bruce Forsyth Outstanding Contributor C57.91

**C57.131 IEEE Standard Requirement For Tap Changers**

William Henning WG Chair, C57.131

Craig Colopy WG Vice Chair, C57.131

Alex Kraemer Outstanding Contributor C57.131

James Harlow Outstanding Contributor C57.131

**C57.12.40 IEEE Standards for Requirements For Secondary Network Transformers**

Brian Klaponski WG Chair, C57.12.40

Larry Dix Outstanding Contributor C57.12.40

Giuseppe Termini Outstanding Contributor C57.12.40

**C57.16 IEEE Standard for Requirements, Termonology, and Test Code for Dry-Type, Air-Core Series Connected Reactors**

Richard Dudley WG Chair, C57.16

Pierre Riffon Outstanding Contributor C57.16

**C57.154 IEEE Standard for the Design, Testing and Application of Liquid-immersed Distribution, Power and Regulating Transformers Using High Temperature Insulation Systems and operating at Elevated Temperatures**

Richard Marek WG Chair, C57.154

Waldemar Ziomek WG Vice Chair, C57.154

H. Jin Sim Outstanding Contributor C57.154

Gary Hoffman Outstanding Contributor C57.154

Roberto Asano Outstanding Contributor C57.154

John Luksich Outstanding Contributor C57.154

Hasse Nordman Outstanding Contributor C57.154

Radoslaw Szewczyk Outstanding Contributor C57.154

**C57.143 IEEE Guide for Application for Monitoring Equipment to Liquid-Immersed**

**Transformers and Components**

Donald Chu WG Chair, C57.143

Andre Lux WG Vice Chair, C57.143

Tony Pink Secretary, C57.143

Brian Sparling Outstanding Contributor C57.143

Claude Beauchemin Outstanding Contributor C57.143

**C57.12.91 IEEE Standard Test Code for Dry-Type Distribution and Power Transformers**

Derek Foster WG Chair, C57.12.91

Robert Ballard Outstanding Contributor C57.12.91

Marcel Fortin Outstanding Contributor C57.12.91

Mark Gromlovits Outstanding Contributor C57.12.91

Timothy Holday Outstanding Contributor C57.12.91

Roger Wicks Outstanding Contributor C57.12.91

7.3 IEEE Standards Association (SA) Awards and Recognition

The IEEE SA sponsors additional awards besides the WG Chair Awards reviewed above. Discussion of these awards can be found on the IEEE SA Awards web pages (<http://standards.ieee.org/sa/aw/>). Note particularly the IEEE SA Standards Medallion. Excerpting from the website: “The Standards Medallion is awarded for major contributions to the development of standards. Examples of such contributions may include leadership in standardization of new technologies, assuring achievement of standards development goals, identifying opportunities to better serve the needs of standards users or other such contributions viewed as deserving of this award…” Please review, and if you have suggestions for nominations see our Committee Awards Chair.

**2012 Standards Medallion Award**

We are very pleased to announce that Mr. Phillip Hopkinson has been nominated by the Transformers Committee and will receive a Standards Medallion award for his many accomplishments and years of dedicated service to the Transformers Committee, IEEE, PES and our industry as a whole.

7.4 PES Transformers Committee Distinguished Service Award

We will continue to present our PES Technical Committee Distinguished Service Award each year to one of our members who is recognized by his peers as having contributed significantly and consistently to Committee Standards activities.  Excerpting from the PES Awards website: “Each Technical Committee is encouraged to make one award for outstanding service. This personal recognition acknowledges the efforts of those individuals whose sustained performance, over many years, has contributed to the advancement of the committee technology.” Please see the Awards Chair if you have suggestions for future recipients. We are seeking nominations for this award.

7.5 PES Working Group Recognition Awards

In addition to the Technical Committee distinguished service Awards, PES sponsors Working Group Recognition awards. The awards are related to “outstanding and timely” publications of technical reports, or of standards and guides. Excerpting from the PES website (http://www.ieee.org/portal/site/pes/) Awards pages:

“The PES Working Group Recognition Awards recognize “the most outstanding and timely publications” by a PES Working Group (or Committee or Subcommittee) from among the nominations. The PES Recognition Award is divided into two categories: 1) for technical reports; 2) standards and guides. Each Technical Council Committee may nominate one report from each category, published by IEEE, during the previous three year period.”  This award consists of a plaque which will be presented to the Working Group Chair at the PES Summer Meeting Awards Luncheon. A framed certificate will be presented to each Working Group member at a designated meeting of the parent Technical Committee.

7.6 Transformers Committee Meritorious Service Awards

There is also a process of additional recognition for Meritorious Service and Outstanding Contributions to the Committee. Suggested qualifications have been developed from a review of similar awards presented by other IEEE Technical Committees or Societies. General examples for qualification for the awards include the following:

* To recognize continuing exemplary service in notable technical contributions to multiple Committee projects/documents over a sustained period of time
* To recognize an achievement of major value and significance to the Committee. The achievement can be a specific, concisely characterized accomplishment, as opposed to a collection of different efforts.
* As with the IEEE Education Society Meritorious Service Award – “to recognize pioneering contributions to the administrative efforts of the Society over a period of years, as evidenced by dedication, effort, and contributions.”

If you have any additional thoughts on qualifications for Meritorious Service Awards, and if you have potential nominees to suggest, please contact me. Award nominees will be reviewed by the Awards Chair and the SC Officers.

7.7 Member Certificates

All Framed Transformer Committee Membership Certificates will be available for distribution during our Milwaukee meeting. All Transformers Committee members should make sure to pick-up your certificate sometime during the Milwaukee meeting. If you know of any member that is not present in Milwaukee and you have the ability to deliver his/her certificate, please consider taking it to them.

This program is one small way of recognizing your support for the Committee.  The Certificates represent the appreciation of the Committee, and of your Committee Officers, for your service to the Committee, to IEEE, and to our Industry. We hope you will display your Membership Certificate proudly at your place of business, and encourage others to join us in our work.

7.8 Nominations for IEEE, PES, and Technical Council Awards

Regarding IEEE Fellow Nominations, we need to think about nominations for 2013. Borrowing from the IEEE Awards web page . . . (<http://www.ieee.org/web/membership/grade_elevation/grade_elevation.html>): “The grade of Fellow recognizes unusual distinction in the profession and shall be conferred only by invitation of the Board of Directors upon a person of outstanding and extraordinary qualifications and experience in IEEE-designated fields, and who has made important individual contributions to one or more of these fields.”  Nominations, including references by at least five present IEEE Fellows and optional additional endorsements, must be completed and submitted by March 1 of each year for the following year’s Class of Fellows.

1. **Administrative SC Minutes – Bill Chiu, Chair; Secretary, Stephen Antosz**

Introductions

The attendees were asked to introduce themselves. The chair asked each attendee to state his/her affiliation. If the attendee is a consultant, the attendee must state if he is representing a company other than his own consulting interest. Introductions were made by members and guests.

Attendance

Members present: Members absent:

Gregory Anderson Thomas Lundquist

Stephen Antosz Charles Johnson

William Bartley

Ed teNyenhuis

Bill Chiu Guests present:

Ross McTaggart Peter Balma

Susan McNelly Erin Spiewak

Carl Niemann Joe Watson for Tom Lundquist

Donald Platts Casey Ballard for Chuck Johnson

Michael Sharp Jin Sim

Stephen Shull Tom Prevost

Edward Smith Ramsis Girgis

Loren Wagenaar

Peter Zhao

Bruce Forsyth

* 1. Approval of Previous Meeting Minutes

The Chair asked for comments from the Nashville Administrative Subcommittee meeting minutes. Hearing no comments or requests to change the draft minutes, the Chair asked for a motion to approve. Vote Approved.

* 1. Approval of Agenda

The Chair reviewed the draft agenda with the attendees. There were no comments and the Chair declared the agenda approved. The agenda follows:

Meeting Call to Order 2:00pm

1. Introduction of Members and Guests (:05) All
2. Approval of Spring 2012 Minutes – Nashville, TN (:03) B. Chiu
3. Additions to and/or Approval of the Agenda (:02) B. Chiu
4. Chair’s Report (:05) B. Chiu
5. Vice Chair’s Report (:05) D. Platt
6. Secretary’s Report (:10) S. Antosz
7. Treasurer’s Report (:05) G. Anderson
8. Awards Report (:10) E. Smith
9. Meeting Planning (:10) G. Anderson
   1. Milwaukee Meeting Arrangements & Host Update
   2. Future Meetings
10. Standards Report (:20) B. Bartley
11. IEEE Staff Update (:05) E. Spiewak
12. BREAK (:10)
13. Old Business
    1. Corresponding Members and Meeting Quorum (:10) S. Antosz
    2. WG Data – Confidentiality, Storage, Access, & Use (:10) S. McNelly/E. Spiewak
    3. Access to Tutorial Presentations & Copyright release (:10) TBD
    4. GMD/GIC Position Paper (:05) R. Girgis/B. Bartley/B. Chiu
    5. Committee O&P, WG P&P Manual Update & Learnings (:05) P. Balma
14. New Business
    1. Meeting Schedule – Thursday General Session & Tutorial Sequence (:10) S. Antosz/G. Anderson
    2. Confirmation of Liaison Appointments (:05) B. Chiu
       1. IEEE SA SCC18 – Edwin (Ned) Brush
       2. CIGRE – Raj Ahuja
    3. Transformers Committee History and Award History (:05) P. Balma
15. Subcommittee Reports - Roundtable
    1. Bushings (:05) P. Zhao
    2. Dielectric Test (:05) L. Wagenaar
    3. Distribution Transformers (:05) S. Shull
    4. Dry Type Transformers (:05) C. Ballard (for C. Johnson)
    5. HVDC (:05) M. Sharp
    6. Instrument Transformers (:05) R. McTaggart
    7. Insulating Fluids (:05) S. McNelly
    8. Insulation Life (:05) B. Forsyth
    9. Performance Characteristics (:05) E. teNyenhuis
    10. Power Transformers (:05) J. Watson (for T. Lundquist)
    11. Underground Transformers & Network Protector (:05) C. Niemann
16. Adjourn
    1. Chair’s Report – Bill Chiu

See section 2.2.

* 1. Vice-Chair’s Report – Don Platts

See section 4.0.

* 1. Secretary’s Report – Stephen Antosz

See section 5.0.

* 1. Treasurer’s Report – Greg Anderson

See section 6.0.

* 1. Recognition and Awards Report – James Edward Smith

See section 7.0.

* 1. Meeting Planning Report – Greg Anderson

No written report.

* + 1. Milwaukee Meeting

No written report.

* + 1. Future Meetings

No written report.

* 1. Standards Report – Bill Bartley

The report was presented and discussed. It is extensive. See section 9.2 and website for report.

* 1. IEEE Staff Update – Erin Spiewak

**IEEE/IEC Updates**

- The PAR for the joint revision of IEC 60076-16 - Standard Requirements for Wind Turbine Generator Transformers, was approved in June 2012.  There will be a working group meeting on Tuesday, 23 October at 9:30 am.  More information as to the status of the joint working group will be discovered at that meeting and the lunch meeting with Paul Jarman on Wednesday, 24 October.

- The PAR for 60076-57-1202 - Standard Requirements for Liquid Immersed Phase-Shifting Transformers, was approved in June 2012.  There will be a meeting during the Transformers meeting series on Tuesday, 23 October at 11:00 am.  The New Work Item Proposal has passed in IEC - it was necessary to find a member from the US National Committee to participate in the project in order for the NP to pass and that member has been found.

- At the last Subcommittee meeting of HVDC Converter Transformers and Smoothing Reactors, there was a discussion of possible merging IEEE C57.129 with IEC 61378-2.  Jodi notified both Paul Jarman and Bill Chiu of this interest and this will be discussed at the subcommittee meeting.  Jodi will be in attendance at that meeting.

**Central Desktop --** New Online Collaboration Tool

* + Presentation at Monday Luncheon
  + Help Working Groups plan projects
    - Document editing and sharing
    - MS Word Plug-ins
  1. Old Business
     1. Corresponding Members and Quorum – Stephen Antosz

Corresponding members do not count towards quorum (in numerator or denominator) if not present at a meeting. Corresponding members do count towards quorum (in numerator or denominator) if present at a meeting.

Steve will develop some guidelines for member removal, and circulate to the members for comment, in an effort to apply consistent removal rules across all SC and WG’s.

* + 1. WG Data – Confidentiality, Storage, Access, & Use – Susan McNelly / Erin Spiewak

Motion by Stephen Shull to endorse a plan (to be determined later) as a committee to upload valuable intellectual property to an IEEE folder to be controlled through Chair, Vice-Chais, and the webmaster of TC. Seconded and approved.

* + 1. Access to Tutorial Presentations & Copyright release

Should we give technical presentations to PES website so they can sell? After discussion we decided No. They need copyrighted; plus we lose ownership. We will put on our TC website, behind password protected wall.

Bill Chiu will continue to exchange correspondence with PES staff to determine if there is any new path forward. So we will continue our current course, and await an official reply from the PES Resource Center.

* + 1. GMD/GIC Position Paper – Ramsis Girgis/Bill Chiu/Don Platts

As a follow up to the discussion at the Transformers Committee meeting in Nashville back in March 2012, the concerns expressed by the members of the Transformers Committee GMD Taskforce members in regards to the IEEE Spectrum article published in February 2012 were elevated to the officers of the PES Technical Council and the representatives of the various technical committees. Many of the other PES technical committees also expressed similar concerns. Upon further dialogues over the course of several months leading up to the PES General Meeting at San Diego in July, the PES Technical Council expressed interested in having a coordinated response.

* + 1. Committee O&P, WG P&P Manual Update – Peter Balma
* IEEE – SA approved new baseline documents for preparation of P&P for sponsors and working groups.
* Will utilize these to develop new draft of P&P & working group P&P before end of year.
* P&P highlight - expectation for minutes
* The minutes shall record the essential business of the working group, including the following items at a minimum:
  + Name of group, Date and location of meeting
  + Officer presiding, including the name of the secretary who wrote the minutes
  + Attendance, including affiliation , Call to order, Chair's remarks
  + Approval of minutes of previous meeting, Approval of agenda
  + Technical topics
* Brief summary of discussion and conclusions
* Motions, including the names of mover and seconder
  + Items reported out of executive session, Next meeting--date and location
  1. Subcommittee Reports

|  |  |  |
| --- | --- | --- |
| Subcommittee | Report | Hot Topic |
| Bushings – P. Zhao |  | Need Standard for Distribution Transformer bushings |
| Dielectric Test – L. Wagenaar |  | DFR TF was in PCS and is now in Diel Test. Peter Werelius was Chair but he is an equipment manufacturer, so will be Vice-Chair instead. |
| Distribution Transformers – S. Shull |  |  |
| Dry Type Transformers – C. Johnson |  |  |
| HVDC – M. Sharp |  |  |
| Instrument Transformers – R. McTaggart |  | Have too many manufactuers and not enough users on WG for PD requirements for MV IT’s. |
| Insulating Fluids – S. McNelly |  |  |
| Insulation Life – B. Forsyth |  |  |
| Performance Characteristics – E. teNyenhuis |  | New TF for transient interactions in medium or high voltage applications |
| Power Transformers – T. Lundquist |  | New WG for dual logo joint development Standard Requirements for Phase Shifting Transformers |
| Underground Transformers & Network Protector – C. Niemann |  |  |
| Standards SC – Bill Bartley |  | New TF for consistency of fluid terminology to write white paper |

* 1. New Business

8.13.1 Meeting Schedule – Monday/Thursday General Session & Tutorial Sequence – S. Antosz/G. Anderson

There was some discussion about moving Part 2 of the General Session to be BEFORE the tutorials instead of AFTER. It was decided to keep the current schedule for one or two more meetings and then reevaluate. We don’t want to lose people from the tutorials since the presenters go to great efforts to prepare the tutorials.

8.13.2 Chair Liaison Appointments

* Ned Edwin Brush is appointed liaison to Standards Coordinating Subcommittee SCC18.
* Raj Ahuja is appointed liaison to CIGRE.
* Tom Prevost is appointed as unofficial liaison to ASTM D9 insulating fluids

8.13.3 Committee History & Awards Update – Peter Balma

* On Tuesday 9:30 AM there will be a meeting to discuss Transformer Committee History.
  + Review of history collected to date
  + Assess interest to continue to meet and to seek members interested in digging in or contributing to our history
  + Solicit input and confirmation of history by those present
  + Awards
  + Transformer Committee fellows
    - * 1912 – 1913 first, 79 total to date, approx. 65% confirmed
  + Collecting all award history
  + Posting of awards
  + Observation other PES committees & awards
  1. Adjourn

Yes

1. **Standards SC Minutes & Report – William Bartley**
   1. **Standards Subcommittee Minutes**
2. **Opening Remarks**

The Chair, William Bartley opened the meeting and summarized the recent activities of the Transformer Standards activity for the six-month period of April 1, 2012 to October 1, 2012. In the last six months, 1 new Standard, and 1 Revision were approved by Standards Board /REVCOM. In addition, we currently have 6 Standards on the agenda for December Standards Board meeting. In this same period, Standards Board /NESCOM approved 5 PARs for new standards, 3 PARs for Revisions, and 2 PAR extensions. We also have 2 PARs on the December agenda. The Transformer Committee is responsible for almost 100 standards, plus over 55 PARs, projects for new standards and revisions. For the full Standards Report see the TC website via the following link:

<http://www.transformerscommittee.org/meetings/F2012_Milwaukee/Minutes/F12-StandardsReport.pdf>

An overview of the upcoming new 10 year maintenance cycle change presented at the Standards Luncheon was given. The change will extend the revision (reaffirmation) cycle from 5 years to 10 years after the last date of approval or maintenance action. The Chair stressed there would be no extensions. It is suggested to review the full presentation at:

<http://www.transformerscommittee.org/info/F11/F11-IEEE-StndsPolicyChanges.pdf>

1. **Meeting Attendance**

The Standards Subcommittee met on Wednesday, October 24, 2012, at 4:30 PM. A role call showed 30 members in attendance constituting a quorum at the start of the meeting. Overall there were 106 attendees, with 30 members, with 76 guests, including 6 that requested membership upon tabulation of the circulated rosters.

1. **Approval of previous meeting minutes**

The Chair asked if there were any comments or corrections to the previous meeting minutes, and motioned for approval. There where no comments to the meeting minutes of the Spring 2012 meeting in Nashville, Tennessee; and the minutes were approved.

1. **Working group reports.**
   * **Cont. Revision of C57.12.00 – Steve Snyder** reported the following:

The purpose of this WG is to compile all the work being done in various TF/WG/SC’s for inclusion in the continuous revision of C57.12.00 in a consistent manner. This WG coordinates efforts with the companion Standard C57.12.90 so that they publish together. The goal is to issue new Standards every 2 to 3 years.

Standard C57.12.00 was published September 2010. A new PAR was requested in April 2011 and approved June 16, 2011 to cover the ongoing work for the continuous revisions. This PAR is good through December 31, 2015.

The Performance Characteristics Task Force working on stabilizing windings has finished their work, which will result in a small revision to the document. There are three (3) other PCS issues underway at present, and those topics should be fully addressed by the middle of 2013. There were a few negative ballot comments from the prior ballot pertaining to Dielectric Tests, Insulation Life, and Insulating Fluids. I am aware of progress occurring on the dielectric test tables, but I am unaware of what’s occurred in the other Subcommittees. I think those items should be completed or reviewed before we move forward with a new revision.

At this meeting (Milwaukee), I was informed of a possible equation error in standard C57.12.00. This issue will be investigated by me and a few ballot resolution “volunteers” to determine appropriate action, if any. Additionally, I learned of some discrepancies in the neutral BIL, column 13 of Table 5. The Dielectric Tests Subcommittee is discussing the necessary changes, which they’ll forward to me when complete. They have requested a Corrigendum to obtain more rapid implementation.

In mid-2013 I will solicit input from all Subcommittees to determine if they have changes ready for inclusion in the next revision cycle.

Respectfully submitted, by Steven L. Snyder, WG Chair, on March 14, 2012

* + **Cont. Revision of C57.12.90-2010 – S. Antosz** reported the status:

This is essentially a working group of one person. There was no meeting held. The purpose of the WG is to keep track of the work being done in various TF / WG / SC for inclusion in the continuous revision of C57.12.90 in a consistent manner.

**Summary**

The new PAR was approved on June 15, 2011. It is valid until Dec 31, 2015. There has not been much activity since March 2012.

***Future Revisions***

Changes *already approved* for the next revision:

* New subclause 10.2.5 Connection of neutral terminal during switching impulse tests by Pierre Riffon’s WG Revision to Impulse Test in Dielectric Test Subcommittee. Submitted on 4/27/09.
* Revisions to Clause 12 Short-circuit tests and new Annex on Connections diagrams for testing three-phase transformer using alternate single-phase source by Marcel Fortin’s Task Force in the Performance Characteristics Subcommittee. Submitted in Fall 2009.
* Revision to subclause 10.3.2.4 Tap connections during lightning impulse test by Pierre Riffon’s WG Revision to Impulse Test in Dielectric Test Subcommittee. Submitted on 10/28/10.
* Revisions to subclauses 10.2.1,10.3 and 10.3.3 which increases the number of full wave impulse waves applied from one to three. This is the same as IEC
* Revisions to Clauses 6 & 7 Polarity & Phase-relation and Ratio tests from Mark Perkins’ PCS WG for Revision of C57.12.90. Final survey circulated Sept 2011.

**Pending work**

* Revision to Clause 11 Temperature-rise tests by Paulette Payne Powell’s WG in the Insulation Life Subcommittee.
* Revision to Clause 13 Audible Sound by Ramsis Girgis’ TF in the Performance Characteristics Subcommittee.
* Other possible revisions to subclauses 10.2 to 10.4 from Pierre Riffon’s WG for revision of impulse tests.
* Other possible revisions to subclauses 10.5 to 10.10 from Bertrand Poulin’s WG for revision of low frequency tests. Maybe some change due to Class II PD testing on 69 kV, xfmrs >15 MVA.

Respectfully submitted by Stephen Antosz, WG Chair, on December 2, 2012

* **WG on Revision of IEEE PC57.152 (old 62) – Jane Verner** –

The Working Group met on October 23, 2012 and began with introductions of all. A total of 105 people with 68 guests were in attendance, including 37 members. We had a quorum.

The Nashville spring 2012 meeting minutes were approved with motions by Dave Harris and John Herron and approved by the WG.

Since the Nashville meeting the working group reviewed Draft 5.0. Comments were incorporated into Draft 5.1. The survey of the working group gave an approval to ballot the document. IEEE MEC and Legal review of Draft were completed and Draft 5.2 was balloted formally.

The ballot closed on September 8. The ballot pool had 151 people with 127 people casting ballots. More than 90 percent approved the document however 285 comments were received with 11 voters casting disapproval comments. The ballot resolution committee has been working thru the comments and revising the draft accordingly.

A PowerPoint with some of the comments that were received multiple time or needed further input was shown and discussed.

The plan is to recirculate Draft 6.0 for ballot in early November. Voters for the recirculation were reminded that comments can only be made on the changes to the document. A vote for PC57.152 is a vote to replace IEEE 62 which is more than 15 years old.

Our PAR extension to 2013 has been requested and is on the IEEE Standards Board agenda for their December meeting. A special thank you to the volunteers on the ballot resolution

* Kipp Yule
* Loren Wagenaar
* Mario Locarno
* David Murray
* Wally Binder
* Peter Balma
* Dave Harris
* Gary Hoffman
* Dave Wallach

The meeting was adjourned at 8:45 AM.

Respectively submitted by Jane Verner – WG Chair

* **TASK FORCE on Recommendations to IEEE Transformer Committee (TC) on Changes, Deletions, & Insertions Related to Normalizing the References of Insulating Liquids Throughout the TC Standard Series – P. McShane**

The taskforce met for the first time. The officers were determined through volunteers from the gathered group. Patrick McShane as Chair, David Harris as Vice-Chair, Stephen Shull as Secretary, Sue McNelly as Insulating Fluids SC Coordinator, Jerry Murphy as Standards SC Coordinator, Dave Hanson as Chemical & Material Technical Consultant, Dave Harris as Power and Distribution Transformer Technical Consultant, and Nick Perjanik as Liaison of TF to ASTM. Patrick McShane presented to the group the purpose of the paper. Patrick stated in a general discussion that the goal of the white paper was to provide guidance from which to form some consistency in the terms for fluids and their application in the transformer standards. BillBartley, as Standards Subcommittee Chair, added that this document would be used as a recommendation to Transformer’s Committee Administrative Subcommittee to help them formula a policy on the use of these terms in standards.

Patrick went on to explain the issues with examples of the mixing & matching of various terms for fluids in the Transformer Standards. It was pointed out that the cooling class used the “O” from oil in the abbreviations. Patrick guided the group to understand that this was not in the scope of the white paper and these would not be address. The discussion led to Patrick asking if David Harris could generate a note to this effect which would be included in the document. David agreed to draft this and submit to the group.

The group reviewed and discussed the first draft of the white paper and its key annexes. Several attendees offered to be review leaders for the parts of the document. The annexes were discussed. Annex C consisted of a spreadsheet of standards to be reviewed. Various volunteers were added to this to review each standard for possible changes that would provide consistency.

Patrick stated that Steve would update the documents and post them on the web site as soon as possible for comments. All attendees were encouraged to recruit additional individuals to review the standards which currently do not have a reviewer assigned.

Patrick reminded everyone that, as has always been the policy, to be a TF member, the individual must be a contributor to the work. One of the most critical activities is to be a standard reviewer. Patrick emphasized that others must be solicited to get this done.

With this the meeting was called to adjournment.

Respectively submitted by Steve Shull – TF Secretary

1. **Old Business**
   * None
2. **New Business**

* None

1. **Adjournment**

The motion to adjourn by Chair made and hearing no objections; the meeting adjourned around 5:05PM.

Respectfully submitted by Jerry R. Murphy, Secretary Standards SC

* 1. **Standards Report**

The Standards Report is a separate document, and is usually posted on the transformerscommittee.org website. An extra copy is attached here at the end of these minutes. It is titled “F12 Standards Report”.

1. **Meetings Planning SC Minutes & Report – Gregory Anderson**
   1. **Meetings Subcommittee Minutes**

No written report.

* 1. **Meetings Report**

No written report.

1. **Minutes of Technical Subcommittees**
   1. **Performance Characteristics SC – Ed teNyenhuis, Chair; Craig Stiegemeier, Secretary**

**Introduction / Attendance**

The Performance Characteristics Subcommittee (PCS) met on Wednesday, October 24, 2012 at 3pm with 135 people attending. Of these, 66 were members and were 69 guests. Prior to this meeting, the total membership of PCS was 112 members; therefore, quorum was achieved with 59% of the membership in attendance.

There were 10 guests requesting membership.

**Chairman's Remarks**

A review of the PCS standard expirations and PAR expirations was reviewed. The majority of the standards do not expire until after 2018.

**Administrative Subcommittee Notes**

Upcoming IEEE – PES Meetings

* PES General Meeting: July 2013, Vancouver, BC, Canada.
* Next Transformer Committee meetings:
* Spring 2013, Munich, Germany; hosted by Reinhausen
* Fall 2013, St. Louis, Missouri; hosted by HJ Enterprises
* Spring 2014, Savannah, Georgia; hosted by Efacec

**Approval of Meeting Minutes**

The minutes of the last meeting in Nashville TN were approved as written.

**Special Reports**

Dielectric Frequency Response – The Chair noted that George Frimpong and his Task Force had finished their work and made recommendations reported at the Nashville meeting.

Frequency Response Analysis (FRA) Guide PC57.149 - Chuck Sweetser reported that all the issues were resolved by Sept. 4th, a month before the deadline for submission to RevCom.

**Unfinished (Old) Business**

No old business.

**New Business**

No new business.

Meeting was adjourned at 4.15 pm.

**Working Group (WG) and Task Force (TF) Reports**

**11.1.1 WG on Loss Evaluation Guide C57.120 – Alan Traut, Chair; Don Duckett, Vice-hair**

PAR Status: PAR Approved

PAR expiration Date: 12/31/2014

Current Draft Being Worked On: D12

* Attendance
  + 63 Total
  + 11 of 21 Members
  + 43 Guests
  + 9 Guests requesting membership
* The meeting was called to order at 11:00 am on Tuesday, October 23, 2012.
* Attendance of membership was taken and a quorum was established.

Chair Report

* Al Traut outlined the PAR status and expiration and noted that we need to go to ballot no later than immediately after the Spring 2014 meeting.
* Don Duckett will not be able to attend our meetings in the future but will continue to assist in the development of our document outside of the meetings.
* In light of Don’s new status, Al asked for volunteers to serve as Secretary to our WG. Immediately following the meeting Dave Harris volunteered to serve as Secretary of the WG. The Chair also recognized Kendrick Hamilton for taking the minutes of this meeting.
* Bill Bartley gave an explanation of the usage of dollars in IEEE documents.
  + The anti-trust policy for IEEE states that you may not use currency in any documents.
  + The solution to this issue is to use variables in place of currency.
* Don Platts suggested that there will be an issue with posting the spreadsheet to the IEEE website, because since it is not an official IEEE document it is not under the indemnification of IEEE. We may need to email the spreadsheet to our members to avoid this issue

Old Business

* Dave Harris motions to adopt minutes the Spring 2012 Nashville meeting as submitted. Don Platts seconds this motion. Minutes are unanimously approved
* Bill Bartley suggests that the bibliography will be either in the first annex or the last annex, but cannot appear in the middle.
* Comment: The title of “acronyms” and/or “definitions” may be used according to Bill
* Comment: The acronym LM is changed to only L in another place in the document, but both of these occurrences should match. Al will edit the draft accordingly.
* Comment: Al Traut states that we should remove all specific year references from the document and make it generic.
* Comment: Don brings up issue that the basic assumptions and equations to the system capacity chart that is presently in the Figure 1 (Generation Expansion Planning Using Reserve Margin) do not apply to de-regulated utilities. Adam Bromley and Wesley Kurth have volunteered to look into this issue.
* Jeff Schneider asks, “Are these models going to include other types of energy generation like solar and wind?” At this time, with a finite time to finish the document, we will not overtly address those items.

New Business

* The Chair introduced a spreadsheet tool to assist users in performing the calculations specified in the Guide. The spreadsheet is not officially part of the Guide but can serve as a companion to the Guide.
* Bill Bartley suggests that the working group is going to have to state the source for any numbers or calculations that are carried out in the spreadsheet.
* Steve Shull states that if these methods are collaborative, then we need to reference each of the sources that contributed to this spreadsheet
* The next meeting will be in Munich, Germany in March 2013.
* The meeting was adjourned at 12:01 pm on Tuesday, October 23, 2012

**11.1.2 PCS WG on “Test Code C57.12.90” – Mark Perkins, Chairman; Craig Stiegemeier, Secretary**

1. Introduction of members and guests

Mark Perkins was not able to attend the meeting due to business commitments. Craig Stiegemeier filled in as Chair and Ramsis Girgis volunteered to take notes

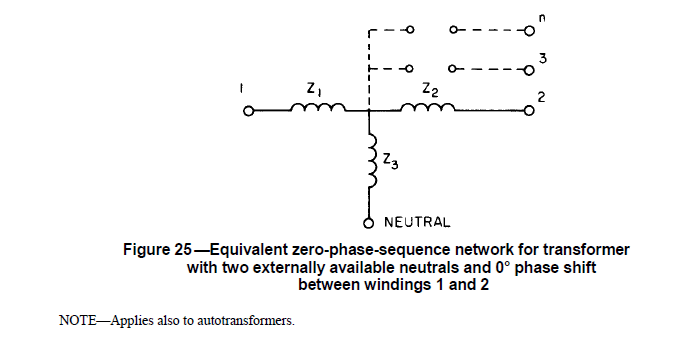
1. Patents - A review of the IEEE-SA Standards Board PatCom requirements was conducted.
2. Approval of minutes of the Nashville meeting

The Spring 2012 Nashville minutes were reviewed. The only correction suggested was a change in the meeting completion time from 12:14am to 12:14pm. Unanimous approval was made on a motion by Joe Foldi and second by Ramsis Girgis.

1. Old Business

The main task of the working group was to develop guidance for zero sequence testing. The following figure and comments were offered as a result of discussions at the Nashville meeting:

* Draft Clause 9.5.3 Zero Sequence Testing on wye-wye transformer



1. Note for wye-wye transformers or autotransformers without a delta tertiary: For 5 leg core form and for shell form transformers, Z3 is very large and the zero sequence impedance is equal to the positive sequence impedance
2. For three leg core form transformers, the Z3 value is typically 5-10 times the Z12 measured value due to the "phantom delta" effect of the tank and/or tank wall shielding. The Z3 value should be taken into account in short circuit calculations involving the zero sequence impedance. Measurements should be made at different current levels to establish the non-linear curve for all four different measurements. Care should be exercised in performing this test and the current should usually not be more than 20% of nominal since the return flux from the core goes through the tank wall or tank wall shielding and can cause severe overheating at higher current levels.Z3 is very large and the zero sequence impedance is equal to the positive sequence impedance for 5 leg core form and for shell form.

The following notes were taken during a review of the figure and suggested comments:

* Joe Foldi stated that the significance of having the user needs an accurate value of Z0 to use for fault current calculations. Under fault conditions, the core would be saturated. Dr. Ramsis Girgis responded that, under fault conditions, the core would have a higher flux density but likely would not be saturated by the leakage flux caused by the fault current. So, determining Z0 under test conditions typically used by manufacturers should be sufficiently close to the value at fault conditions. The same applies to the claim that Z0 for 5 limb cores is sufficiently close to the Z+ because core saturation under fault conditions is not a possibility.
* It was suggested to make some editing to the proposed text such that one paragraph deals with 3 phase 3 limb cores and the other with 5 limb cores. The following modified notes were developed using the recommendation in the PowerPoint presentation as a starting point:
  + Note for wye-wye transformers or autotransformers without a delta tertiary: For 5 leg core form and for shell form transformers, Z3 is very large and the zero sequence impedance is equal to the positive sequence impedance levels. Z3 is very large and the zero sequence impedance is equal to the positive sequence impedance for 5 leg core form and for shell form
* For three leg core form transformers, the Z3 value is typically 5-10 times the Z12 measured value due to the "phantom delta" effect of the tank and/or tank wall shielding. The Z3 value should be taken into account in short circuit calculations involving the zero sequence impedance. Measurements should be made at different current levels to establish the non-linear curve for all four different measurements. Care should be exercised in performing this test and the current should usually not be more than 20% of nominal since the return flux from the core goes through the tank wall or tank wall shielding and can cause severe overheating at higher current levels
* The statement in the proposed text regarding the possibility of tank overheating if the applied current is > 20 % of rated current needs to be examined to determine if it accurate. Also, a recommended limit based on the outcome of that investigation should be developed for the allowable current during the Z0 test..
* Dr. Ramsis Girgis stated that the reason manufacturers typically use levels between 10% and 20% of rated current for the Z0 test in a YY with no Delta designs is that the Z0 from the individual windings to the tank is typically is in the range of 4 – 8 times the Z+.

1. New Business - There was no new business
2. Attendance roll call – Before the meeting, the Working Group had 386 members & guests, broken down as the following:

67 Members

2 Corresponding Members

317 Guests

After a review of the attendance rosters and the tallying of those attending, along with a change in membership from “Member” to “Guest” of those who have not attended the past 3 meetings and removal of either “Terminated” membership or participation status, the following is the composition of the Working Group:

67 Members – 38 attending the meeting (57% - a quorum)

2 Corresponding Members

311 Guests – 51 attending the meeting

1. Adjournment - Meeting adjourned at11:55 am

**11.1.3 PCS WG on “General Requirements C57.12.00” – Steve Snyder, Chairman; Enrique Betancourt, Secretary**

The Working Group met at 4:45 PM on Monday, October 22, 2012, with 32 members, and 50 guests present. As the current Working Group membership stands at 72 members, we did not have a quorum. The following eleven (11) guests requested membership, which will become effective only after confirmation of attendance at two (2) consecutive meetings:

Tauhid Ansari ABB

Scott Digby Progress Energy

Ali Naderian Kinectrics

David Ostrander Ameren

Mahendrakumar Soni Virginia Transformer

Raj Ahuja Waukesha Electric

Juan Carlos Cruz Valdes Prolec GE

Paul Jarman National Grid

William Solano ABB

Michael Spurlock American Electric Power

Hanxin Zhu BC Hydro

The Chairman reviewed the statement of purpose for the Working Group. As we did not have a quorum, the minutes from the Nashville Meeting could not be approved. The chairman will perform a survey among the Group membership seeking approval of those minutes, and will review the roster to remove members that have not participated in the last three meetings.

Following introductions, the request was made for changes to the agenda. There being none, the presented agenda was followed and the following three (3) items were discussed:

Old Business

A. WG Item 87, Table 15 Short-Circuit Apparent Power of the System

- Discussion on Results from the second survey

Change Requested by: Pierre Riffon – 2006 Ballot Comment

Requested Change: To provide more realistic values for default short circuit currents on Table 15, to avoid unnecessary overdesign.

As agreed in the last meeting, a new version for Table 15 was proposed and a survey conducted among 258 members of the PCS and the WG which delivered 78 responses, 81% affirmative and 5% negative. The comments show two extremes among which to define the default values: either to consider maximum rating of currently available circuit breakers for system short circuit current, or, on the other extreme, to recommend consideration of an infinite bus. Another comment pertained to the example which suggested a possible pre-fault voltage of 1.05 PU, but one individual suggested 1.10 PU. Those in attendance maintained the 1.05 PU as shown in the survey.

Other comments were related to the need to indicate on the nameplate the design short circuit level of the transformer. In the absence of a quorum, the chairman proposed to make further adjustments based on these comments, and conduct a new survey before the next meeting.

B. WG Item 96, Table 18 Resistance Measurements for All Taps on Power Transformers – Discussion on Survey Results

Change Requested by: Joe Foldi – 2009 Ballot Comment

Requested Change: Resistance measurements should be done on all taps for Power Transformers, as a very important quality verification. Currently, Table 18 calls for resistance measurement of all windings only on the rated voltage tap and at the tap extremes of the first unit of a new design.

A “study group” put forth modified wording for the resistance measurements in Table 18. Their proposal was surveyed within PCS and the WG, with these results: 259 Invitations sent, 58 Responses (22.4%), among them 62% Affirmatives and 24% Negatives.

The proposed wording modifies Table 18, by leaving Resistance Measurements requirements unchanged for Distribution Transformers, and stating for Power transformers: “routine test on all DETC voltage taps and all LTC tap leads”. With the addition of a note stating that: “In case a Series Transformer is used, temporary provisions shall be made for measurements on all LTC tap leads of the internal circuit.”

As many of the responses from the survey showed misunderstanding of proposed changes, Joe Foldi explained in detail all background information for his proposal.

The comments collected from the survey were discussed among the meeting attendees. In view of some participants, the text on Table 18 should remain as is, leaving the proposed resistance measurements on all taps as a manufacturer’s QA test, to be specified by users only for the case of complex units. On the other side of the issue, some people felt the test should be specified in Table 18 to be performed on as many positions as required to assure good contact of all tap leads from the windings to the tap changer. Many of the arguments previously presented in the Nashville meeting were brought up again by the participants. Concerns related to the timing for the test, the heating effects of DC test currents, the possibility of capturing bad contacts during heat run, the criteria to interpret differences among phases, etc., make it more a diagnostic test rather than a routine test.

The chairman closed the discussion with the conclusion that a more succinct text was required from Joe Foldi, and then a new survey will be conducted before the next meeting.

C. WG Item 97, Table 18 Operational Tests of LTC Equipment - Discussion on Survey Results

Change Requested by: Joe Foldi – 2009 Ballot Comment

Requested Change: Describe in Table 18 the requirements for the operational tests on the LTC equipment under full voltage (during No-Load test) and under full current (during Load loss test). The details of the LTC operational test should be described in C57.12.90, but the requirement for it added here in C57.12.00.

As for the previous two items, a “study group” put forth modified wording for the operational test requirements for the LTC in C57.12.00, Table 18. This proposal was surveyed within PCS and the WG with these results: 259 surveys sent, 58 responses (22.4%), 58.6% Affirmative and 24.1% Negative. The survey proposal and results were discussed during the meeting.

It was clear from the survey responses that there was some confusion about the proposal. With a lot of good discussion during the meeting, several manufacturers have offered to provide more input to Joe Foldi as to practical ways to conduct these tests. Some of the comments collected during the discussion made reference to practical limitations of test laboratories to supply reactive power along the whole range of taps because of potentially large impedance swings. An adjustment of the test current to as low as 60% might be necessary to prevent overloads during the test.

The chairman closed the discussion with the conclusion that more work is required to the proposal. Joe Foldi will refine his proposal based upon the new information, and a new survey will be conducted before the next meeting.

New Business

As time expired, no new business items were discussed.

The meeting adjourned at 6:00 PM.

**11.1.4 WG on “IEEE Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices”, PC57.32 – Sheldon Kennedy, Chairman; Tom Melle, Vice-Chair**

The Neutral Grounding Devices working group was called to order at 3:15 PM on October 23, 2012. There were 23 attendees present.

1. Quorum was established from new membership survey - 11 working group members were present with 12 guests.
2. Minutes from last meeting approved
3. New officers for the working group are:

Chair: Sheldon Kennedy

Vice Chair: Tom Melle

Secretary: Fred Elliott

1. Don Ayers presented a comparison of IEC and IEEE 32 methods for calculating short time heating in a grounding transformer resulting from system faults. A decision on which approach to use in the new document will be tabled until after the working group participants have had time to review the two approaches in more detail.
2. Peter Balma located some early papers discussing grounding transformer ratings and calculations. The papers will be scanned and posted on the transformers committee website for review by the working group participants.
3. The 1972 version of IEEE 32 is available in electronic form from IEEE SA store.
4. Development of the new PC57.32 needs to move quickly because of the December 31, 2015 deadline for completion.
5. The existing draft 11 of PC57.32 will be posted on the transformers committee website.
6. Guidelines for development of PC57.32 discussed in the meeting include:

a. Referencing definitions and general information that is not critical to the devices being specified.

b. Consolidating information about the different types of devices in separate sections.

c. Minimizing the use of large tables covering all devices.

1. The prior decision to exclude neutral grounding capacitors was confirmed. These devices appear to no longer be used.
2. Volunteers to work on the various sections of the document are:

a. Reactors – Mike Sharp (with possible assistance from Richard Dudley).

b. Ground fault neutralizers – Klaus Pointner (with possible assistance from Klaus Papp)

c. Grounding Transformers - Don Ayers, Sheldon Kennedy, Fred Elliott

d. Resistors – Sergio Panetta, Peter Balma

e. Combination Devices – Sergio Panetta, Peter Balma

The meeting adjourned at 4:20 pm.

**11.1.5 WG on Tertiary/Stabilization Windings PC57.158 – Enrique Betancourt, Chairman; Steve Snyder, Secretary**

The Chair called the WG meeting to order at 9:45 am on October 22, 2012. There were 18 members in the meeting, out of 32 counting members, therefore we had a quorum. 47 Guests attended also, and 9 of them requested membership.

Andre Schorr Von Roll Transformers

Dharam Vir SPX

James P. Campbell Dominion

Jim McIver Siemens

Joseph Foldi F&A Inc.

Marnie Rousell Entergy

Michael Spurlock AEP

Peter Zhao Hydro One

Vijay B. Tendulkar Onyx Power

The Minutes from the Nashville meeting were presented and approved.

1. Old Business

1.1 PAR Application.

The Chair presented the details of the WG PAR application, which was approved last May by NESCOM, and opened the floor for comments and discussions.

Betrand Poulin commented that TV requirements should be decided by systems people and not by transformer people - the Chair clarified that from his discussion with system people, they only need zero sequence impedance details. So we can develop our guide, and of course need support from system people.

Paul Mushill commented that, sometimes even if utilities do not specify TV, manufacturer provide it and this has to be considered in the system studies - The Chair clarified that the Guide will cover criteria for requirement of buried TV.

Betrand Poulin suggested that our Guide should include how transformer behaves with or without TV – The Chair clarified that the Guide would include how TV affects performance of transformer and also performance of system.

Prof. Xose Lopez-Fernandez suggested that the Guide should include how to determine size of buried TV - The Chair clarified that Guide will cover this.

1.2 As next Agenda Item, the Chair presented a proposed Table of Contents and elaborated on how the guide is intended to benefit the users, system engineers, maintenance personnel, manufacturers and consultants.

Shamaun Hakim suggested that the guide should include how to calculate the fault current for different conditions of fault - The Chair said that requirements C57.12.00 is adequate but additional details can be considered in the guide.

K.Vijayan suggested that we should also consider situations when units with a TV and without a TV are paralleled – The Chair said, this can be addressed in the guide.

Sam Oritti suggested that details of possible design and construction aspects of TV can be added in guide. Also how TV current can be used for protection relay operation can be added.

Brian Penny suggested that test requirements need to be covered in the guide. - The Chair said we would consider some recommendations on this. Also some recommendations on terminals to be brought out and requirement of grounding would be included in the guide.

1.3 As next Agenda Item, the Chair elaborated on further work planned for this WG.

So far there have been received 15 technical papers. He wanted to know how to share this with other members.

Ed teNyenhuis suggested getting permission from the authors to share these.

Steve Antosz suggested that papers can be placed in IEEE website with password protection.

The Chair called for volunteers to lead development of the (preliminary) seven chapters of our Guide. Following attendees volunteered to participate in development of the different topics: Steve Anthony, Jagdish Burde, Krzystof Kulasek, Profr. Hemchandra Sherktukde, David Harris, Ajit Varghese, Profr. Xose Lopez-Fernandez.

The groups will be completed by invitation to the members to participate, based on their background and areas of interest. In order to facilitate the process, the Chair will provide each group with a chapter scope, as well as a cross reference of available literature.

1.4 As last Agenda Item, Prof. Dr. Xose López-Fernandez made a presentation of his paper on the topic on Tertiary Stabilizing Windings presented at an International Conference for Electrical Machines this year, dealing with the subjects of: Part1 on TV Sizing Requirements. Part2 Effect on tank over-heating in the absence of TV.

2. New Business - Brian Penny volunteered to become Secretary of the WG.

There being no new business, the meeting was adjourned at 11:00 am.

**11.1.6 TF on “Audible Sound Revision to Clause 13”, C57.12.90 – Ramsis Girgis, Chairman**

The WG met at 1:45 PM on Monday, October 22, 2012 with a total of 57 in attendance. Of those in attendance, there were 13 Members, 3 Corresponding Members, and 41 Guests. The membership had been rationalized prior to the meeting to 28 members. With the addition of members and corresponding members, 16 of 28 members were present. A quorum was present. Nine guests requested TF membership. After the introductions of attendees and circulation of attendance sheets the unofficial minutes of the spring 2012 Nashville meeting were presented. At meeting time, a request for any corrections was raised without the knowledge of the number of corresponding members in attendance. Since no objections were raised to the minutes’ correction request, the Nashville fall 2012 meeting minutes will stand as approved.

Prior to the meeting, the Chairman circulated updates to Clause 13 of C57.12.90, a proposed meeting agenda, and the Unapproved Nashville meeting minutes. Two members returned comments that will be addressed by the Chairman via email.

After the nominal introductions, and circulation of meeting rosters, the next item on the Agenda was the summary review of the prior agreements of the TF. This important review tracks the TF progress and helps to focus on new unresolved topics needed for incorporation into the Standard.

The review highlighted the following agreements:

- Making the Wall sound reflection correction

Per IEC but limit correction to 4 dB and test room cases to 4 rather than 7

- Using the “Sound Intensity Method”

As a second method to be considered with the sound pressure method

Use newly developed correction for 4 < (Lp – Li ) < 6 dB

Consider the sound intensity method invalid for (Lp – Li) > 6 dB - Use, instead, the Sound Pressure method with the identified correction

- Measuring Load Noise

When requested by purchaser

Can measure at current 60 % < I rated < 130 % and correct per IEC

- Changing the ONAF measuring contour

Per IEC, 2 m all around transformer

- Determination of Total Noise level of a transformer

By adding Load and No Load noise levels, Per IEC

Next item on the agenda was a report provided by Dr. Chris Ploetner on the status of the work by the IEC WG revising the IEC transformer noise measurement Standard and the application Guide. The report highlighted the following:

* The IEC WG is trying to deal concurrently with the same issues in both documents.
* Needed to align the Sound Pressure and Sound Intensity methods. A set of simple application rules was targeted without losing accuracy.
* Attempting to harmonize with the corresponding IEEE Standard as much as possible.
* Standardizing on a 1 meter ONAN measuring contour and 2 m for ONAF.
* Formula for calculation of measuring surface “S” unified.
* Sound wall reflection correction is clarified but the limits and the maximum allowed value kept same.
* The walk – around procedure during test is now the standard.
* New templates are implemented in the test report for the “Sound Pressure” and “Sound intensity” methods
* The height of the measuring surface will be from the bottom of the transformer rather than from the floor to minimize the effect of floor reflections
* The 1/3 Octave band will be the Standard going forward. The rational is that most sound measuring equipment is capable of making these measurements and, at the same time, one gets more detailed transformer noise measurements.
* In the Application Guide, the effect of current harmonics is explained. Voltage harmonics are typically small and have a small effect on transformer noise because harmonics in the flux are of a much lower magnitudes than those in the voltage wave – shape.
* A special attention is paid in the Application Guide to explain the use of partial sound panels.

The next item on the agenda was addressing proposed additions / changes to the text of clause 13 as agreed upon in the spring 2012 TF meeting. The proposed wording presented was not contested.

Some of those attending the meeting questioned the need to use the proposed corrections. The chairman explained that the goal of these corrections to the measurements, when using the Sound Pressure method, is to correct for the errors introduced in the measurements by ambient noise, sound wall reflections, and near field effects.

The chairman also explained that the basis for specifying a sound level for a transformer is to satisfy a limit on the sound level at nearby residential areas. The concept of applying the corrections to the noise measurements, when using the sound pressure method, simulate what would be measured in the field; where, there is no sound wall reflections and where the near – field reactive sound power does not propagate far from the transformer region.

In responding to a question by Robert Mayer of SDG&E, the chairman emphasized that the sound wall reflection correction is made based on a standard formula that has the surface area of the transformer, the test room area, and the sound absorbing coefficient of the walls, as parameters that produce the proper correction for the specific test room and specific transformer. This correction, for a certain size transformer, can be 0.5 dB for a sound room to 2 – 3 dB in a typical test room in the factory to account for the higher sound reflections in such test rooms. This is similar to the ambient noise correction whose magnitude depends on the difference between the transformer noise level and that of the ambient noise. This correction can be in a range of 0 – 1.6 dB. The 1 dB near – field correction applies in all cases.

Responding to questions by Paul Morakinyo of PSE&G, the chairman stated that:

1. Customers can ask for either the Sound Intensity method or the Sound pressure method to be used.

2. The sound intensity method is more accurate as long as the proposed conditions are met and the proposed corrections are made.

3. The proposed corrections in either of the two methods apply to, the total dB (A) and the individual frequencies, 1/3 Octaves, and Full Octaves.

The Chairman reiterated that the goal of developing measuring standards is to allow performing measurements that are accurate and represent the true performance of the transformer using the technology improvements achieved along with state – of – the – art measuring equipment. The chairman stated that the proposed improvements in the IEEE Noise measurement Standard have been presented and explained in detail in previous TF meetings and the basis for these have been published in 3 IEEE papers. It was suggested by Steve Antosz that these papers be added to the IEEE Standards web site so that it is available to all.

A question was raised on how these corrections might impact the NEMA standard TR1 noise limits. The chairman responded that in general today’s transformers have no load noise levels several dB (s) below, or much below, the NEMA levels. The NEMA levels represent those of transformers designed with cores using regular grain oriented steel, no step – lap joints, and operating at the highest rated flux densities allowed.

The plan was to discuss the new section on the “Determination of total Noise level of a transformer” and to discuss two items submitted by TF members before the TF meeting. However, time of the TF meeting was up. These items are postponed to the spring meeting in Munich.

Meeting adjourned at 3:00 PM.

**11.1.7 WG on Wind Trubine Generator Transformers. PC57.12.16, – David Buckmaster, Chairman; Vice Chair: Phil Hopkinson; Secretary: Steve Griffith**

The Working Group on Wind Power Transformers was called to order at 9:30 AM. There were 109 attendees, 45 members, 64 guests. A quorum was present.

1. Chairman Remarks - Introduction of WG board members:

Chairman: Dave Buckmaster

Vice-chairman: Phil Hopkinson

New Secretary: Steve Griffith

A remark was made that committee members who volunteered to assist with this document should follow-up on their commitments. It was also mentioned that this would now be a joint standard with the IEC document.

2. Minutes of the Spring 2012 meeting were accepted as written

3. Open Issues

• Task force report on IEC Plenary meeting in Manchester, UK- at that meeting it was confirmed that this would be a joint standard with the IEC. A working group has been set up. The next stage will be a call for US experts.

• Stress Enhancement Points/Gas Analysis- there was no report as it was noted that Mr. Bartnikas was not present. This was the 2nd consecutive meeting which he wasn’t in attendance. He will be adjusted on the roster to a non-participating member.

• The chairman noted the issues below that need to be included in this document

Factory tests including partial discharge during induced tests

Importance of gas in oil tests and interpretation

Loading expectations and impact on nameplate rating

Harmonics, their sources and impact on specifications

Loss Evaluation techniques to reflect proper importance for relationship between load loss and no load losses

Proper BIL for both the transformer and the accessories

Overvoltage due to switching, lightning and proper protection

Arc-Flash Protection by switching sequences or other

4. New Business

• Mr. Hopkinson lead a presentation on core grounding/or screening- it was agreed that there needs to be a section of the document that addresses this. Mr. Hopkinson to provide a draft section by March 1st, 2013

5. Next Steps

• The table of contents was presented for the IEC 60076-16 Standard. The chairman solicited volunteers to serve on a task force to draft/update sections of this document. The chairman noted that drafts on the sections need to be completed by March 1st, 2013.

1. It was agreed that Section 1 did not require any updates

2. The normative references in Section 2 have already been provided

3. The terms and definitions in Section 3 are not needed at this time

4. Mr. Ayers volunteered to be the chair for task force to update Section 4; Mr. Field volunteered to assist on this section. It was mentioned that there should be IEC experts involved in this section.

ACTION: Mr. Breckenridge to forward the list of IEC experts to the committee secretary

5. Mr. Navarro volunteered to be the chair for the task force to update Section 5; Mr. Patel, Mr. Parkinson, & Ms. Tarlapally volunteered to assist on this section.

6. Mr. Buckmaster volunteered to be the chair for the task force to update Section 6.

7. Mr. Tuli volunteered to be the chair for the task force to update Section 7; Mr. Stretch and Mr. Garber volunteered to assist.

6. Open forum discussion and Q&A

There were no additional questions

7. Next meeting

Next in person meeting will be at the Spring IEEE Transformer Committee meetings in Munich Germany during the week of March 17-21st, 2013.

8. Adjournment

The meeting was adjourned @ 10:40AM

**11.1.8 - WG on “Distributed Photo Voltaic (DPV) Grid Transformers” PC57.159, Chairman Hemchandra Shertukde; Vice Chairman: Mathieu Sauzay; Secretary: Sasha Levin**

The Working Group met in the Mitchell room of the Hilton Milwaukee City Center Hotel. This is the first meeting of the WG. The meeting was called to order at 8:00 am by Chairman Hemchandra Shertukde.

The meeting was convened with 37 participants present, 17 participants requested and granted membership. 3 non-present people asked for the membership plus one person would like to be a corresponding member.

Old Business

Nashville’s meeting minutes were approved.

New business

1. After introduction and roster distribution, Chairman updated the WG on the background of formation of WG PC57.159 as a result of the work of the previous TF. The PAR application, including WG scope has been reviewed.

2. The chairman informed the TF Position Paper has been submitted for publication either in the IEEE transaction or conference. The editors requested the revision of the paper as for matching IEEE standard for publications. M. Navarro volunteered to help with this (action).

3. The WG PC57.159 documents placed and will be placed on the IEEE web-site under Performance Characteristics SC and will be organized as a separate WG PC 57.159 web-page (action).

4. WG then reviewed the contribution to the Guide Chapters received from the assigned Chapter’s Task Forces (specifically Chapter 2 and 6). H. Shertukde reviewed data on the invertors received from the manufacturer of invertors.

5. S. Levin presented the matrix table combining the topics of interests, identified in the Position Paper and additional input; characterization of the topics as for the uniqueness and relevance to the DPV-PGS application and sorting of the topics in the Guide’s Chapters. This matrix intends to help the Chapter TF leaders with the list of the identified topics.

6. The following technical discussion then took place revolving around the question of what technical problems are specific for DPV-PGS transformers and what information is available within WG:

- A. Mukerji noted that he is not sure that we can work on all Chapters in parallel as the WG first needs to be advised what topics are specific for the application and need to be addressed in the Guide.

- S. Sarkar supported this opinion and proposed to have a tutorial for the WG where the specifics of such systems can be described to the WG. The Chairman asked J. Schneider, J. Yu, E. Betancourt, J. Memtora to prepare this tutorial for the presentation to WG at Spring IEEE TC meeting.

- J. Mentora commented on the specific issues when 2 secondary windings in one transformer feed 2 invertors: the criteria of voltage differences need to be defined, otherwise this can result in the problem with a core saturation and eddy losses (add to the topic list – action).

- J. Schneider – adequate impedance is important in case of the multiple secondary windings design. Some application aspects are still in the development and need to be reflected in the Guide, e. g. the latest trend to keep the DPV-PGS transformers energized in the night.

- E. Betancourt – the adequate impedance of the transformer can mitigate the problem of the voltage differences mentioned above.

- J. Yu informed that there is an observation of the premature failure of solar power transformers without clear root cause. Jennifer continues working with her Renewable Power department to identify the possible issues for the WG consideration.

One of the issues that surfaced is “White Cloud” effect – abrupt energy spike related to the solar activity.

We encouraged all participants to collect relevant information and look for the experts (users, specifiers) to share the experience.

- J. Sim – IEC did a survey of end users on the frequency of the “energize / de-energize” operations in solar power systems and found that there are much more operations in these systems compare to the recommended in a standards. Review of IEC 60007? (action).

- J. Roach heads the Task Force on Chapter 5 “Transformer diagnostics, monitoring and maintenance”. He and N. Field commented that more research and input from OEMs and end users are necessary to decide whether some additional and/or special actions are required and beneficial for these transformers. John also commented that the transformers are often supplied as a part of the inverter package with very limited transformer specification. We need to see how the results of our work can reach the right audience in this case.

- S. Kennedy confirmed his agreement to lead the TF on Chapter 3 “Transformer construction”, but relies on the members of his TF for active participation.

With no new business the Meeting adjourned at 9:15 AM.

**11.1.9 TF to Investigate the Interaction between Substation Transients and Transformers in HV and EHV applications – Chairman Jim McBride**

Task Force Meeting took place on Tuesday at 4:45pm

56 people in attendance

15 requesting membership

The below goals for the group were reviewed. There were no significant changes to these items.

Goal:

Prepare a TF report on the need to revise the C57.142 guide to extend to HV and EHV applications.

Deliverables:

TF report and recommendation on forming a WG to revise the Guide (or not)

TF Objectives

• Establish the present target voltage class range of the C57.142 guide

• Gather field data, reports and literature on HV and EHV failures related to substation transients and transformer interaction

• Get input from the other technical committees concerning the interactions between substation transients and transformers at HV and EHV applications

• Review IEC and CIGRE standards

• Recommend if there is sufficient need to revise the guide and if WG should be formed.

• Recommend high level changes to the guide (if it should be revised)

• Prepare final report to the SC and present work in SC or tutorial session

There was discussion of whether GIS systems were included in the C57.142 document. Based on your scope including HV and UHV systems this work would possible fall into the scope of the TF defined above. The group recognizes the fact that high frequency transients definitely exist in GIS equipment. No particular failures associated with these transients were noted during the meeting. As we investigate failures experienced by users, this information will be requested in order to evaluate whether GIS interactions may be important information for inclusion in the scope of the work.

Jim McBride presented slides showing transients measured from lightning and switching events on 765kV and 500kV systems where high frequency transient monitors are present. The information presented indicated that transients with frequency content up to 2MHz are present on these systems. The long term effect of these transients has not been investigated. However, the signal levels present on the system were at sufficient levels to provide good FRA characterizations to frequencies up to 2MHz.

Art De Rio presented slides showing evidence of arcing damage between cotton insulated draw leads and the inner wall of the transformer bushing. This arcing damage indicates that high frequency transients at the transformer terminals have caused significant voltage across the draw lead insulation to produce arcing between the draw lead and the inner tube of the bushing. The bushing shown was a 230kV 900kV BIL draw lead bushing.

It was suggested that we survey utilities for information on any suspected cases of transient damage at HV and EHV levels.

Scott Digby presented a case where failures have been experienced with shunt reactors on the tertiary of 500kV autotransformers. The problem seemed to be related to the transients from the vacuum breaker used to connect the reactor to the system. Analysis indicates that the failures are associated with the transients produced by switching the reactors. Although failures of the reactors have been experienced, failure of the transformer winding associated with these events has not been typical with the events. Initial mitigation was to place snubbers on the breaker switched end of the reactors. No additional switching related failures have been experienced.

It was noted that neither of these two interactions have been included in the existing version of C57.142.

One member was asking about providing tutorial information on how to mitigate transient induced over voltages, which in my view is jumping the gun a bit and beyond our scope at the moment. It could well be included in the scope of a working group if one was to be formed.

Meeting was adjourned 5:40 pm.

* 1. **Power Transformers SC – Tom Lundquist, Chair; Joe Watson, Vice-Chair**

The Power Transformers Subcommittee met on Wednesday, October 24th, 2012 at 1:30 p.m. with sufficient attendance to reach a quorum.

The minutes from the Spring 2012 meeting in Nashville, Tennessee were approved.

* + 1. **WORKING GROUP AND TASK FORCE REPORTS**

**11.2.1.1 TASK FORCE FOR CORRIGENDA FOR C57.12.10 PARAGRAPH 5.1.9 – Gary Hoffman**

The task force formed received 100 % approval for the change. The new document was submitted to RevCom for approval at the December 4th meeting.

* + - 1. **WORKING GROUP FOR REVISION OF C57.17, REQUIREMENTS FOR ARC FURNACE TRANSFORMERS – Robert Ganser, Chairman**

Draft 5 has been approved and the standard has been submitted to RevCom.  Review is set for the 4th of December.

* + - 1. **WORKING GROUP FOR REVISION OF C57.93, IEEE GUIDE FOR INSTALLATION AND MAINTENANCE OF LIQUID-IMMERSED POWER TRANSFORMERS – Mike Lau, Chairman**

Chair Mike Lau called the WG meeting to order at 11:19 am on March 12, 2012. There were 45 attendees in the meeting with 15 attendees requesting membership.

The Chair outlined the meeting agenda and then updated on the PAR request submittal and approval status. The meeting discussion opened with the sections that needed to be revised. Mike Lau updated the forum that since transportation guide is well established the paragraphs on transportation will be removed.

Title currently says IEEE Guide for Installation of Liquid Immersed Power Transformers and the discussion whether this needs to be updated to include Ester and all other fluids. So should liquid be replaced with fluid? Patrick McShane has worked on terminology and so he needs to be contacted for clarification on Fluid/ liquid. Tom Lundquist informed that ASTM has or is in the process of changing all terminologies from oil to liquid and the revision to C57.93 should include all fluids commonly used.

Scope currently does not include testing. Should testing be included or does it come in the purview of maintenance? Should Class I and II classifications be included? Attendees felt that it was too early to follow on such pattern. Besides opinion were expressed that classifications based on voltages only should not be followed.

Drying Method – following were suggested:

* Hot oil circulation
* Pump hot air for tanks that cannot withstand vacuum
* Low Frequency method (an option)
* On Line systems
* Hot oil spray
* Impedance

Drying method should make reference to C57.140- Life Extension of Transformers.

Safety

* Inspection of transformers
* Oil processing
* Handling

Opinions were made whether air flow required inside transformer prior to entry in the tank for inspection should be made. This was largely felt that it would become a liability issue since come under regulatory bodies which could be either State or Federal Government rules. Bill Bartley and Tom Lundquist both were emphatic that this was not in the best interest of IEEE and so the discussion came to an end.

There being no new issues, the meeting was adjourned at 12:37 PM.

* + - 1. **WORKING GROUP FOR REVISION OF PC57.116, GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS – Gary Hoffman, Chairman**

1. Roster & Membership  
   Members – 19 of 24 in attendance.  
   Guests – 39  
   Guests requesting membership – 2  
   Total attendance – 56
2. Attendance taken of Members & quorum was achieved.
3. Agenda for the meeting was approved.
4. Minutes of Nashville Meeting Were Approved.
5. Draft D1.31 Review & Recommendation
   1. Clause 6 – Motion to Approve by Mark Baldwin, second by Peter Balma was approved
   2. Clause 11 – Motion to Approve by David Harris, second by Richard vonGemengen was approved
6. Next Steps were discussed. Motion was made by Wallace Binder seconded by Dave Harris to initiate a straw ballot of the next draft D1.4. An amendment to the motion was made by Jin Sim to circulate the straw ballot to the PT SC Members. Mr Binder withdrew his motion and Mr. Sim’s motion was seconded by Joe Watson. The motion carried 13 for, 2 against, 4 abstain.

At the conclusion of the Milwaukee meeting the Chair will initiate the Straw Ballot of Draft 1.4 to PT SC Members. The Chair indicated that the SA Sponsor Ballot spreadsheet will be used by straw balloters to make comments.

1. New Business – None
2. Motion Approved by unanimous consent to Adjourn at 5:12 PM
   * + 1. **WORKING GROUP FOR REVISION OF PC57.125, GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION, ANALYSIS AND REPORTING FOR POWER TRANSFORMERS AND SHUNT REACTORS – Wally Binder, Chairman**

Quorum was established - 28 working group members were present.

2. Minutes were approved for the Spring 2012 meeting.

3. Chairman's Remarks – (Wallace Binder)

a) Discussed membership requirements.

b) Discussed and presented updated schedule and discussed key dates of the schedule.

4. Motion by John Roach & 2nd by Bill Bartley was passed to form a Task Force to review and make recommendations concerning the incorporation of C57.117 into C57.125.

5. Motion by Tom Melle & 2nd by Bruce Farris was passed to form a Task Force for new work concerning C57.125.

6. CIGRE Coordination Activities – (John Roach) It was determined Christoph Kuen, in no longer the conveneor of A.2.45. Marie-Claude Lessard is the new conveyor of A.2.45. WG will contact Ms. Lessard to determine if there is an interest in working together. In addition, Mr. Raj Ahuja will be contacted to determine a point of contact for the summary of CIGRE A.2.37 survey results.

7. TF Report on merger of C57.117 – (John Roach)

Work to Date – Original C57-117 has been updated and the incorporation location into C57.125 D2 has been proposed. Draft 2 is located on the WG’s webpage. Changes include revised formatting, updated figure 1-form1, the addition of a table to clarify terms used in figure 1-form 1, and updated references and definitions to eliminate duplications with C57.125.

8. Motion by John Roach and 2nd by Tom Melle was passed to insert material from C57.117 into C57.125 as clause 7 in C57.125 D2.

9. TF Report on New Work – (Tom Melle)

Work to Date – TF has reviewed current C57.125 document and did not find many items which will require modifications, deletions, or additions.

10. New topics discussed:

a) The establishment of a database of transformer related failures. Mr. Mark Rivers volunteered to assist with the database discussion. The attendees were informally surveyed to determine user interest and several users responded they would support the database with failure information. Mr. Rivers agreed to make the database public.

b) The use of the term “insulating liquid” was discussed to replace the various similar terms used throughout the current document. A survey will be sent to the working group members requesting they review the document and comment.

c) A survey will be sent to the working group members requesting they review the updated references and definitions and comment.

11. Meeting was adjourned.

* + - 1. **WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jin Sim, Chairman**

The WG met from 11:00 AM to 12:15 PM in the Mitchell meeting room at the Hilton Milwaukee City Center Hotel.

Welcome announcements were made. Introductions of all in attendance were done.

Since this is the first meeting of the working group, there are no members. A sign up sheet was circulated, and those requesting membership were automatically accepted and added to the roster. 52 people in attendance; 24 requested membership. See the last page for list.

The Chair presented slides. The file is available on www.transformerscommittee.org website, on the Power Transformers Subcommittee page there is a section for this Working Group. <http://www.transformerscommittee.org/>Following are some highlights of the presentation:

Introduction & Update on WG formation

* IEC approved the New Work Item Proposal 14/725 for dual logo standard on "Liquid Immersed Phase Shifting Transformers
* IEEE also approved the PAR 60076-57-1202 for developing the New standard on “Standard Requirements for Liquid immersed Phase Shifting Transformers” in June 2012 and appointed Raj Ahuja as the Working Group Convener for IEEE and IEC meetings
* Steve Antosz has been appointed as the Secretary for IEEE WG
* Dr. Dietrich Bonmann has been appointed as the Co-Chair for IEC WG meetings
* Paul Jarman has been appointed as the Secretary for IEC WG (and Vice-Chair for the IEEE WG).
* Sanjay Patel has been nominated as the US Expert for the IEC WG
* Reference Document – IEEE Guide for the Application, Specification and Testing of Phase Shifting Transformers C57.135 which has been adapted as IEC 62032 document
* Request for participation in WG
* IEEE and IEC remain committed to working together to create international standards. Joint development agreement is a big step forward
* Cooperation between committees is key
* Target Dates
  + 1st CD March 31st 2014
  + CDV October 2014
  + IS/TS March 31st 2015, 1 Year Extension possible if needed
  + PAR Expires 12/31/2016
* Meeting Schedule:
  + 1st meeting on Oct 23rd 2012 at Milwaukee USA
  + 2nd meeting in Jan 30th - 31st 2013, at London
  + 3rd Meeting in March 2013, at Munich on Thursday A/N
  + 4th meeting in June 2013, TBD – Finalize 1st WG Draft
  + 5th meeting in Oct 2013, at Milwaukee during IEC TC 14
  + 6th meeting in Oct 2013, at St Louis USA, during IEEE
  + 7th meeting in Jan 2014 TBD
  + 8th meeting in March 2014 TBD – Finalize Draft for Circulation to Power Transformers SC and IEC members

Some discussions ensued. Here are the highlights.

* We will use the new IEEE Central Desktop to manage this WG from the IEEE side.  And will use the IEEE AMS system to keep track of members and rosters.
* We have 5 documents to use as the starting point and format for the new Standard; C57.12.00, C57.12.90, C57.135, 60076-5-1, 60076-5-3.   These documents will be put on our website, with password protection, for use of the members to work on the new Standard.
* One comment was that it will be a challenge to manage the ballots and avoid negative votes from the IEEE side.   IEEE staff will help us to monitor the process and keep the project moving forward.
* The WG Secretary will send an email to the Members (and Guests) in the next few weeks, seeking commitment from some to attend the next meeting in London at end of January.  Will also send the meeting minutes, roster, and other information needed to get started.  Members will be asked to review the 5 reference documents and give comments on what they see as the issues that we will need to be addressed in the draft.
* Here are preliminary issues that some thought might be potential problems:
  + Too many Normative references.  It was suggested to put two sets of references, one for an IEC application, and the other for IEEE.
  + Specification of the PST to increase or decrease current flow
  + Test guidelines, particularly low frequency tests.
  + Tap changers will not be covered in this document; they have separate standards.
  + Figures, illustrations, drawings will need to be redrawn by IEC Staff.  IEEE people typically use Visio.
* Jin Sim said he is encouraged by the good showing of people in the room and the content of this first IEEE WG meeting.
  + - 1. **WORKING GROUP FOR THE REVISION OF PC57.140, GUIDE FOR EVALUATION AND RECONDITIONING OF LIQUID-IMMERSED POWER TRANSFORMERS – Roland James, Chairman**

The meeting was called to order to order at 1:37 pm on October 23, 2012.

The Chair welcomed all, introduced himself followed by the Secretary and the attendees. Roll call of only the members was taken to verify if the group had a quorum. The Chair announced that a quorum was not present.

There were 19 members in the attendance and 7 corresponding members (downgraded after the spring 2012 meeting). In addition, there were 3excused absences. There were 27 guests of which 3 requested membership.

There were no comments on the minutes of the spring 2012 meeting.

These minutes will be transmitted along with the fall 2012 minutes to the working group prior to the spring 2013 meeting.

Ajith Varghese, chair of the Task Force for the review of the CIGRE WG A2.34 Guide for Transformer Maintenance for incorporation into this Guide recommended that this guide be added as a reference to this guide.

Due to a lack of a quorum a straw vote was not taken. A straw vote ballot will be circulated the working group voting members and the results will be provided to the working group prior to the spring 2013 meeting.

The floor was opened for discussion. There was none.

There being no new business, the meeting adjourned at 1:55 P.M.

* + - 1. **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**

No meeting this week. The document went to RevCom in August, sections discussing cost evaluation were rejected, the approach was changed to a “per unit” evaluation. A recirculation ballot was conducted in September. All work is done on the Guide and it will go to RevCom for the December meeting.

* + - 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**

No meeting held. Document submitted to NesCom for approval, waiting on comments.

* + - 1. **WORKING GROUP FOR DEVELOPMENT OF PC57.153, GUIDE FOR PARALLELING TRANSFOREMRS – Tom Jauch, Chairman**

43 total attendees

21 of 32 members were present (1 corresponding) – Quorum was established

22 Guests (11 new)

1 attendee requesting membership was attending their first meeting and will be added as a guest

* Introductions were skipped to save time
* Minutes from Nashville were reviewed and approved
  + Gary Hoffman – Motion
  + Jim Harlow – 2nd
  + Motion carried
* Prior to the meeting, the latest draft of the paralleling guide was distributed to guests and members on record. Proposed changes were reviewed during the meeting. The following changes were discussed:
  + Motion to revise the wording for the “Goal of Paralleling Control Method”
  + Hemchandra Shertukde – 1st
  + Jim Graham – 2nd
  + Motion carried
  + During the discussion, a motion was made to further revise the wording for the “Goal of Paralleling Control Method” to include the “The desirable goal”
    - Jim Harlow – 1st
    - Gary Hoffman – 2nd
    - No – 3, Abstain – 1, Yes - 11
  + Final wording – “A desirable goal of all transformer paralleling control systems is to minimize the loading difference (circulating current) between paralleled transformers relative….”
  + Section 4.4 – Motion to accept the proposed change in 4.4.
  + 1st - Daniel Sauer
  + 2nd – Hemchandra Shertukde
  + Discussion – Jim Harlow recommended adding the word apparent to the proposed change.
  + Additional discussion was held on whether the section was required at all.
  + Motion denied ( No – 14, Yes – 3)
  + Section 4.2, Page 9, line 35
  + Motion to add the wording in line 35
  + Motion denied (No – 10, Yes – 2)
  + Page 11, line 31
  + Additional changes were discussed and agreed to by the group – run back relay
  + Page 13, line 1
  + Comment was made that the references in the proposed addition are incorrect. Need to change the figure being referenced or remove the reference
  + Page 14 – no change – motion denied previously
  + Page 17 – no change – motion denied previously
  + Page 19 - need to check the numbers quoted. Jim Harlow recommended referring to an IEEE transaction paper. Remove the @ signs.
  + Page 22 – line 37 - agreed
  + Page 23 Line 15 – agreed
  + Page 27 – Recommended to refer to the reader to C57.12.10 rather than duplicating information in this guide
  + Page 29 – line 7 – agreed
  + Page 27 – 6.3.4 – remove – agreed
* The following members volunteered to assist with providing updates to the guide:
  + Review and update sections 2 – Normative References and 3 – Definitions - . Normative – Hemchandra Shertukde
  + Update the guide to meet the requirements of the 2012 style guide – Jim Graham
  + Review and update drawings – Stephen Anthony

6pm motion to adjourn

* 1st – Daniel Sauer
* 2nd – Hemchandra Shertukde
* Motion carried

Following the working group meeting a task force meeting was held to report operational examples of different paralleling methods in separate source applications.

* + - 1. **WORKING GROUP FOR DEVELOPMENT OF PC57.156, GUIDE FOR TRANSFORMER TANK RUPTURE MITIGATION OF LIQUID-IMMERSED POWER TRANSFORMERS AND REACTORS– Peter Zhao, Chairman**

The meeting of the Working Group for the Guide for Tank Rupture Mitigation convened Monday afternoon at 1:45pm. Chairman Peter Zhao presided.

Attendance was 56 (16 members, 40 guests, with 1 guest requesting membership).

Minutes for the Spring 2012 meeting in Nashville were approved.

Chairman Zhao provided introductory remarks and previewed the agenda to be covered for the meeting.

* The basic schedule for completion of the guide was reviewed. A first draft must be sent out by the fall of 2013. Therefore we have basically two more meetings to get it done.
* Attendees were informed that the latest draft of the guide is posted on the IEEE website.

Samuel Brodeur of ABB presented a report of his investigation of data for oil velocities relating to PRD’s. Sam recommended that manufacturers be requested to generate and provide to the WG data for oil velocity data as relating to PRD’s. A discussion ensued of the need for involvement of a PDR manufacturer. Josh Herz agreed to collaborate with Sam. They will bring results to the next meeting.

Discussions continued from the last meeting regarding the comments received from the review of the guide:

1. Comments in regard to excessive demands on manufacturer for the design review and test requirements lacked specificity. Jos Veens agreed to have reviewers reconsider and provide updated comments.
2. Matthew Brien and Arnaldo Carlos are to review sections (6.3- Design Manual, 6.4- Operation and Instruction Manual, 6.5- Proposed Information Requirements and 7- Acceptance Evaluation) and report findings.
3. Value of illustrations of example physical design modifications was discussed and consensus was that including such detail might be problematic.
4. Question of applicability of a check valve for conservator pipe was resolved by reference to a “flow-rate-dependent” check valve

Meeting was adjourned at 3:00 PM.

* + - 1. **WORKING GROUP FOR DEVELOPMENT OF PC57.157, GUIDE FOR CONDUCTING FUNCTIONAL LIFE TESTS FOR DE-ENERGIZED TAP CHANGER CONTACTS – Phil Hopkinson, Chairman**

The Working Group on Life Tests, De-energized Tap Changers was called to order at 8:00 AM on October 23rd, 2012.

1. Introductions

The chairman welcomed attendees and introduced the new secretary. After a count of the members present it was determined that a quorum was not present. There was some discussion concerning active members. A comment was made from a member that if person missed 2 to 3 consecutive meetings they should be removed as an active member. It was determined that the roster needed to be adjusted to remove active members that have missed consecutive meetings. A comment was made that the total number of members should be around 20. It was decided for the purposes of this meeting that a quorum was present.

1. The minutes were approved from the March 13th, 2012 meeting in Nashville, Tennessee
2. Mr. Dix conducted a review of the following sections on Draft 3 of the Guide for Conducting Functional Life Tests for De-Energized Tap-changer Contacts used in Dielectric Fluid Filled Transformers

The accelerated aging text in Section 4.4 was reviewed.

Section 4.5-Application of Specific Switch Characteristics to test- there were no comments from the group.

Section 5- General Test Setup

Section 5.1- Safety Considerations- there were no comments from the group

Section 5.2.1- Items for test-switch components- there were no comments from the group.

Section 5.2.2- Items for test-fluids- a comment was made that Synthetic Esters needed to be included in the last sentence.

Section 5.2.3- Items for test-fluid containment chamber- a comment was made that fluid should be used versus oil in the last sentence

Section 5.3.1- Monitoring locations-switch components- there were no comments from the group. Subsection 5.3.1.1-temperature- a comment was made to spell out all acronyms. Subsection 5.3.1.2-voltage- there were no comments from the group. Subsection 5.3.1.3-current-there were no comments from the group

Section 5.3.2- Monitoring locations-fluid, a comment was made concerning placement of the probe. There are other IEC/IEEE standards that call out placing it greater than 1” of contact pair under test. There was a brief technical discussion concerning this, it was agreed to leave the text as is.

Section 6- Test procedure- a comment was made that the ambient fluid surrounding the contacts should be at a temperature not greater than 30 degrees C (versus 20 degrees C) at the time the test begins.

Section 7- Test data recording- a comment was made that it should be shown in the definitions section of the document where the formula came from.

Section 8- Pass/Fail Criteria- a question was raised if the 25% increase from base resistance is acceptable as a pass criteria. A proposal was put forward to revise this to a table form that indicates pass criteria depending on the type of the contact. This proposal was accepted.

A comment was brought up from the chairman as to whether this guide will include diagrams/and photographs. It was stated that since this is a black and white guide it will only include diagrams once the verbiage has been agreed upon.

A comment was brought up from a member that this guide needs to be consistent it terminology throughout the document.

The chairman noted Larry Dix should be applauded for the work presented thus far on this guide.

1. New Business - There was no new business
2. Adjournment

The meeting was adjourned at 9:20AM

* + - 1. **WORKING GROUP FOR REVISION OF IEEE STD 638-1992, IEEE STANDARD FOR QUALIFICATION OF CLASS 1E TRANSFORMERS FOR NUCLEAR POWER GENERATING STATIONS – Craig Swinderman, Chairman**

The Working Group for revision of IEEE 638 did not meet during the Milwaukee session in October 2012.

Draft 9 of the document has just completed the initial round of balloting. Out of 87 balloters, a 79% response rate was achieved, with 94% Affirmative rate and 2% Abstain rate. 56 comments were received, including 4 Negatives.

The working group is now actively involved in comment resolution and the document will be submitted for the recirculation ballot shortly.

A PAR Extension request has been submitted to NESCOM for the Standards Board December agenda, in order to allow time for the comment resolution process and recirculation ballot in order to complete the work for submitting the standard.

* + - 1. **WORKING GROUP FOR DRAFTING IEEE/IEC 60076-57-1202, STANDARD REQUIREMENTS FOR PHASE SHIFTING TRANSFORMERS – Raj Ahuja, Chairman**

The WG met from 11:00 AM to 12:15 PM in the Mitchell meeting room at the Hilton Milwaukee City Center Hotel.

Welcome announcements were made. Introductions of all in attendance were done.

Since this is the first meeting of the working group, there are no members. A sign up sheet was circulated, and those requesting membership were automatically accepted and added to the roster. 52 people in attendance; 24 requested membership. See the last page for list.

The Chair presented slides. The file is available on www.transformerscommittee.org website, on the Power Transformers Subcommittee page there is a section for this Working Group. <http://www.transformerscommittee.org/>Following are some highlights of the presentation:

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* Sanjay Patel has been nominated as the US Expert for the IEC WG
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* Request for participation in WG
* IEEE and IEC remain committed to working together to create international standards. Joint development agreement is a big step forward
* Cooperation between committees is key
* Target Dates
  + 1st CD March 31st 2014
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* Meeting Schedule:
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  + Specification of the PST to increase or decrease current flow
  + Test guidelines, particularly low frequency tests.
  + Tap changers will not be covered in this document; they have separate standards.
  + Figures, illustrations, drawings will need to be redrawn by IEC Staff.  IEEE people typically use Visio.
* Jin Sim said he is encouraged by the good showing of people in the room and the content of this first IEEE WG meeting.
  + 1. **OLD BUSINESS**

None.

* + 1. **NEW BUSINESS**

None.

* + 1. **STATUS OF “INACTIVE” GROUPS**

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

This group is not meeting; major work on this document is complete; waiting for publishing.

**TASK FORCE FOR WIND FARM TRANSFORMERS – Joe Watson, Chairman**

Work of this group is complete; the task force is inactive.

**TASK FORCE FOR EVALUATING THE NEEDS OF TRANSFORMERS USED WITH SVC – Peter Zhao, Chairman**

Fall 2009 - The work of this task force is concluded. A report was issued and it is being considered if an educational paper should be published.

**TASK FORCE FOR WIND GENERATOR STEP-UP TRANSFORMERS – David Buckmaster, Chairman**

This task force was moved to Performance Characteristics Subcommittee.

**WORKING GROUP FOR REVISION OF C57.12.10, STANDARD REQUIREMENTS FOR LIQUID IMMERSED POWER TRANSFORMERS – Gary Hoffman, Chairman**

The standard was published.

**WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jin Sim, Chairman**

The working group completed its work and the guide was published in 2011.

**TASK FORCE FOR DVP-GRID TRANSFORMERS PC57.169, – Hemchandra Shertukde, Chairman**

This task force was moved to Performance Characteristics subcommittee.

* 1. **Underground Transformers & Network Protectors SC – Carl Nieman, Chair; Dan Mulkey, Vice-Chair**

**Introduction/Attendance**

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, October 24, 2012, in the Regency room of the Hilton Milwaukee City Center Hotel in Milwaukee, Wisconsin, at 11:00 AM with 10 members and 18 guests present.

**Membership**

Quorum was achieved with 10 out of the 13 members attending; 2 guests requested membership.

**Approval of Minutes**

The minutes of the March 14, 2012, meeting in Nashville, Tennessee, were approved as submitted. Al Trout motioned; Rich Graham seconded; vote was unanimous.

**Working Group Reports**

**10.3.1 Underground Single Phase Transformers (C57.12.23) – A. Traut, Chairman**

The WG did not meet. The document was published in April 2009 and is valid until 2018. After the WG on Tank Pressure Coordination lead by Carlos Gaytan, concludes this standard will need to be revised and it is planed that this group will alternate revision cycles with C57.12.24, starting Spring of 2014

**10.3.2 Three-Phase Underground-Type Transformers (C57.12.24) – Giuseppe Termini, Chairman**

The chairman welcomed members and guests to the meeting which was called to order at 9:45 AM in the Oak Room at the Hilton Milwaukee City Center Hotel in Milwaukee on October 22, 2012. George Payerle acted as the recording secretary. Introductions were made and an agenda was presented. It was noted that consultants should identify who they consult for. The meeting was attended by 9 members and 26 guests. There was a quorum present at this meeting. The minutes from the previous meeting in Nashville were reviewed and approved. Libin Mao, Paul Chisholm, Adam Bromley and Ibrahim Shteyh requested membership.

Bob Kinner of First Power Group gave an excellent presentation on corrosion considerations for underground transformer design. This presentation will be posted in the IEEE Transformers Committee website and will also be sent to the working group guests and members.

After the last meeting the survey was sent out to the Underground Network Forum Group managed by Bob Landman to solicit input from additional end-users of three-phase, submersible transformers. George Payerle compiled the results received from 10 additional end-users. The updated results of the survey include responses from 23 utilities that are summarized in the table attached to the minutes. The Chairman presented the results of the survey. The rest of the meeting consisted of reviewing and discussing the results of the survey. As a result of these discussions, the requirements for the components listed below will be included in the next standard revision:

• Loadbreak switch – Dan Mulkey volunteered to write a section on the requirements for a loadbreak switch.

• Tank material. The Chairman will work with Bob Kenner and other end-users to write a section to identify the minimum requirements for tank material. Ed Bertolini indicated that selection of tank material may change the size of the tank. The Chairman will work with manufacturers to address this concern.

• Fuses – The Chairman will work with Dan Mulkey to write a section to determine fusing requirements.

• Pressure Relief Valve (PRV) – The Chairman will work with Christopher Sullivan, Bill Wimmer and Cory Morgan to write a section to determine PRV requirements.

• Protective covers for the high voltage bushings – The Chairman will work with manufacturers to include requirements for protective covers that do not degrade due to weather exposure.

The inclusion of the above components in the next standard revision were voted on and approved by the members present at this meeting.

There was a discussion related to the effectiveness of the cathodic protection installed inside manholes to minimize tank corrosion when the anodes are subjected to wet and dry “cycling” conditions. Brian Klaponski stated that there is not enough information on cathodic protection to minimize tank corrosion. He suggested that the standard should include, perhaps in the appendix, a section to address cathodic protection. Libin Mao of ConEd and Tas Taousakis of Pepco volunteered to provide construction standards used in their company that show the installation of cathodic protection inside manholes. It was also suggested that the cathodic protection requirements be addressed by the UG Transformers and Network Protectors Sub Committee (SC) since they will impact the other standards within the SC. The Chairman will bring this suggestion at the SC meeting.

The meeting was adjourned at 11:30 a.m. with the next meeting set for Munich, Germany on March 18, 2013.

**10.3.3 Liquid Filled Secondary Network Transformers (C57.12.40) – Brian Klaponski, Chairman**

The WG met on Monday, October 22, 2012 at 11:15 am with 10 members and 11 guests.

The minutes of the March 22, 2012 meeting in Nashville, TN, were reviewed and approved. Carl Niemann made a motion to approve the Meeting Minutes and Rich Graham seconded the motion and they were approved.

Four guests (Libin Mao, Charles Morgan, Liz Sullivan and Tas Taousakis) requested membership.

The Chair stated that the PAR has been approved with the title change as discussed at the last meeting. Work on the standard can now proceed.

The Chair stated that Bob Kinner gave a presentation of tank corrosion at the C57.12.24 WG meeting.

From business arising from the previous meeting Jeremy Sewell suggested that the last sentence of section 6.2.2.2 be changed to read: “The peak current value for each of the three phases shall be equal to or greater than 107 kA.”

Larry Dix pointed out that test requirements shown in Table 5 of C57.12.00, 2010 do not meet the BIL test requirements for the network transformers and probably do not meet the BIL requirement for distribution transformers. Larry volunteered to revise Table 2 of C57.12.40 to reflect the BIL test requirements as shown in the old version C57.12.00 dated 2000.

A suggestion was made to review the audible sound levels shown in Table 4 of C57.12.40.

A suggestion was made to look at adding additional drawings to Figure 1 of C57.12.40 to show a transformer without a primary network switch with perhaps different primary bushing locations.

The remaining of the meeting consisted of the review of ballot comments received that were comments valid for future consideration but not incorporated in the latest revision.

a. Comment 1 – This is a valid comment to be considered to address the location of the filling plug as not to be directly above the HV windings and leads.

b. Comment 4 – This comment caused us to review if each interlock coil needed testing and we agreed that this was what was intended.

c. Comments 5 & 6 – The top oil thermometer range will be reviewed by the Chairman based on commercially available gauges.

d. Comment 8 – This comment is worthy of further discussion in the development of the next revision.

e. Comment 9 – This comment is worthy of further discussion in the development of the next revision.

f. Comment 13- This comment is a valid comment worthy of further discussion.

The meeting was adjourned at 12:30 pm with the next meeting set for Munich, Germany, in March 2013.

**10.3.4 Secondary Network Protectors (C57.12.44) – Bill Wimmer, Chairman, Mark Faulkner, Secretary**

* **PAR Date: 06/17/2010 PAR Expiration Date: 12/31/2014, PAR Status: Approved**
* **Current Standard Date: 06/07/2006**
* Current Draft Being Worked On: Draft 1 Dated: NA
* Meeting Date: 10/22/2012 Time: 1:45 – 3:00
* Attendance: Members 5, Guests 4, Total 9
* Guests Requesting Membership 1

The meeting was called to order and a review was made of the members present.

Introductions were made of all members and guests present.

The Nashville minutes of 3/12/12 were reviewed and approved with spelling corrections.

Discussion of Changes to the Document

Results of Draft 8 ballot:

* 91 eligible people in ballot group
* 71 votes received for a 78% returned
* 68 votes for affirmative for 98%
* 2 negatives
* 42 comments with 6 that have to be satisfied
* 21 out of 42 related to conversion format error (50%)

The remainder of the meeting was spent reviewing comments:

37 comments were reviewed during this meeting out of 42 total:

1 comment was rejected: Rejected comment regarding section 3.13 with the recommendation of “avoid referring to protectors as breakers.”

Larry Dix suggested that the manufacturers of protectors look into the use of thermistors versus the use of thermocouples due to the better accuracy that Quality Switch experienced in testing. In addition, suggested changing the word “thermocouple” to a general less restrictive term relating to a component used for thermal readings in the standard. This will be considered in the next revision of the document.

**10.3.5 Ventilated Dry-Type Network Transformers (C57.12.57)**

This standard has been withdrawn by IEEE. There was discussion around new sealed dry type and it was reported that Siemens in Brazil has developed a submersible dry type of network transformer.

**New Business**

Larry Dix made a motion to express concern over applied voltage (high-pot) testing that is now in Table 5 of C57.12.00, 2010 document:

* 25 kV, 150 kV BIL applied voltage test level changed from 50 kV (2000 version) to 40 kV (2010 version)
* 34.5 kV, 200 BIL applied voltage test level changed from 70 kV (2000 version) to 50 kV (2010 version)

What is the rationale and is there any documentation around these changes as there continue to be very early life failures from insulation breakdown at the traditional levels?

How would proposed elimination of distribution class in C57.12.00 affect the induced voltage levels of distribution transformers?

Seconded by Brian Klaponski; approved unanimously

Giuseppe Termini discussed where/how should the cathodic protection be addressed? This has possible impacts to standards – subsurface transformers, pad-mounted transformers, enclosure integrity standards.

Possible solutions are a guide, a new standard, or an addition to existing standards? Giuseppe will collect more information and develop the idea further for more discussion at the next meeting.

**Old Business**

None

**Adjournment/Next Meeting**

The meeting was adjourned at 12:19 PM with the next meeting set for Munich, Germany, in March 2013

* 1. **Bushings SC – Peter Zhao, Chair; Eric Weatherbee, Secretary**

**11.4.1 Introduction/Attendance**

Chair opened the meeting at 9:30 AM and welcomed the members and guests. There were 110 attendees, 87 guests with 23 of 40 members present. A quorum was reached.

**11.4.2 Chairman’s Remarks**

1. Next meeting will be held in Munich, Germany on March 17th through March 21th hosted by Maschinenfabrik Reinhausen
2. Reviewed the current status of all the bushing standards and future dates
3. The Chair indicated what is needed to become a Transformer Committee Member. Informed the group that they needed to be IEEE-PES members first.
4. The Chair informed that technical presentations are welcome and please contact the Chair for review of the presentation materials prior to presenting. The technical presentations on new technology and new products will be uploaded to the IEEE website.

**11.4.3 Working Group (WG) and Task Force (TF) Reports**

**11.4.3.1 WG - Revision of C57.19.00 - Keith Ellis, Chair**

No meeting held, Mr. Ellis informed the group that he would like to step down as Chair.

**11.4.3.2 WG - Revision of C57.19.01 – Arturo Del Rio, Chair**

**WG Revision C57.19.01 Standard Requirements for Bushings.**

The working group met on Tuesday October 23, 2012, at 9:30 am with a total of 57 participants. Of those, 17 members and 40 guests with 4 guests requesting membership.

Working Group membership is 27 Members.

* The meeting was opened with introductions and the presentation and approval of the minutes from the previous meeting.
* Old business (to be referred to C57.19.00):
  + Definition for epoxy-resin impregnated paper (ERIP) bushings: Florian Costa has volunteered to identify and tabulate technical differences comparing to RIP bushings. Is there a need for a separate ‘type of construction’ for bushing? (to be referred to C57.19.00).
  + Clarification on the definition given in C57.19.00 2004 for solid type bushing and cast insulation bushing is needed: still pending. (to be referred to C57.19.00).
* The scope of the standard has been updated to include the use of “liquid-filled” as opposed to “oil-filled” transformer and reactors.

***Scope***

*This standard covers electrical, dimensional, and related requirements for outdoor, power apparatus bushings that have basic impulse insulation levels (BILs) of* ***200 kV*** *and above. It provides specific values for dimensional and related requirements that are to be interpreted, measured, or tested in accordance with IEEE Std C57.19.00. Bushings covered by this standard are* ***5,000-amp or less rated continuous current*** *and intended for* ***use in free air*** *as components of* ***liquid-filled*** *transformers and reactors.*

* The main topic for the meeting was the presentation of the results of the survey on the C57.19.01 2000 revision, “how did it affect your company?” by Mario Locarno, Doble Engineering.
  + 6 survey questions.
  + 112 survey participants.
  + > 80 companies.
  + Results of the survey will be distributed to the WG members and guests for consideration before a decision is made regarding nominal system voltages for bushing. Also, survey results will be posted on the TC web page.
* Meeting was adjourned at 10:30 am.

Minutes by: Arturo Del Rio, WG Chair.

e-mail: arturod@ieee.org

Milwaukee, October 23, 2012.

**11.4.3.3 WG - Revision of C57.19.100 – Tommy Spitzer, Chair**

No meeting, par expires at the end of the year. There was a comment from Mario Larcano that the Chair had informed him the standard is complete.

**11.4.3.4 WG PC57.19.04 – GSU Bushings – Carlo Arpino, Chair – JD Brafa, Vice Chair**

1) Attendance:

a) 39 Attendees:

i) 17 of 28 Members were present. At the beginning of the meeting the membership list was presented, and by rising of hands, the members were counted. At that time just 10 members were present, so it was deemed a quorum was not reached. No official business was conducted.

ii) 22 Guests

(1) 14 New Guests, 8 Repeat Guests

2) Agenda:

Meeting minutes from the Spring 2012 meeting in Nashville were presented and no objections were noted. Due to the lack of a quorum at the time the minutes were presented, the minutes were not officially approved.

* Title, Scope, and project plan to completion were presented
* The working group is currently on track to complete the work before the expiration of the PAR in December 2015.
* IEEE C57.116 Section 10, from revision D1.1, was reviewed between S12 and F12 meeting by Phil Swan and deemed acceptable in technical content. Discussion was made to ask for reference to PC57.19.04 in this section. Mr. Randal Kyle agreed to make this request of the C57.116 WG.
* Request was made of the membership for nominations of Secretary. None were received.
* The following topics were discussed to determine the consensus of the WG:

1. Test tap standardization (against)

2. Cantilever strength requirements (should be higher than C57.19.01)

3. Partial discharge limits, Power factor, and capacitance limits (same as C57.19.01)

4. Standardization of Creep (Heavy ‐ 44 mm/kV L‐G)

5. CT pocket standardization (300mm)

6. Lower terminal configuration (single or double flat spade)

7. Upper terminal configuration (consideration of “round” terminal with machined flats vs. square orientation of individual flat spades)

8. Voltage classes to include (only 15kV, 25kV, and 34.5kV)

* Agreement was made to disseminate 1st draft of this standard to the members and guests before S13 meeting in Munich
* W. Knuth will discuss with a bus manufacturer to see if they would be willing to give a presentation on thermal considerations of enclosed bus design as well as expected short circuit forces during for Fall 2013 meeting in St. Louis.

3) Adjournment: Meeting was adjourned at 2:59pm.

**11.4.3.5 C57.19.03, future IEC/IEEE65700.19.03 DC - Bushing Standard – Les Recksiedler (IEEE) and John Graham (IEC), Chair**

SC36A MT5 is working with The IEEE Bushing subcommittee with a joint working group to produce a dual logo document.

A Committee draft (CD) was circulated in May 2011 for comment to IEC and IEEE members. Comments have been received from both groups, IEC comments were discussed in Melbourne. Most comments from IEEE concerned the presentation of the document in IEC format with mainly IEC references. IEC Central Office and IEEE Program Manager have stated that IEC format takes precedence. Due to work pressures on the joint conveners’ there has been little recent progress over the last year. A working draft containing earlier comments was circulated to the IEC/IEEE group members in September prior to a document for voting.

No meeting was planned for Milwaukee.

**11.4.4 IEC Bushing Standards Activity - John Graham**

The IEC bushing committee SC36A met during the IEC General Session in Melbourne, Australia on October 21st 2011. The next meeting is planned for October 2013 in New Delhi, India, target dates for individual working groups are based around provision of documents for discussion in New Delhi.

SC36A Chairman, Lars Johansson (SE) is retiring and John Graham (UK) will take over as Chairman from Nov 1st 2012.

**IEC60137 “Insulated Bushings for Alternating Voltages above 1000V”**

In April 2011 on a new revision of the document was started with the main purpose to include test values for UHV bushings (above 800kV rating) in line with the latest edition of IEC60071-1: Insulation Co-ordination. A draft was circulated in May 2011 which provoked more comments than expected unfortunately due to business circumstances of Convenor this work has not progresses.

In Melbourne it was decided that a joint working group should be formed for the AC and DC bushing standards including experts from TC14 (Transformers). A Request for Experts was circulated by IEC in January 2012 and the extended group has been announced.

Previous comments have now been reviewed and circulated to the new JMT5 for further comment prior to the preparation of a Committee Draft (CD). Due to changes in SC36A Chairman a new Convenor will be found for JMT5.

**Other Work** –

IEC61463 Seismic qualification of bushings – a new maintenance team MT6 has been formed and held it’s first meeting in Milan on October 9th. The team will review other existing standards including IEEE693 to strengthen the document. It is hoped to have a CD by March 2013.

IEC61464 Dissolved gas analysis of oil impregnated paper bushings – no work planned until IEC TC10 completes revision of the main DGA standard IEC60599. The bushing subcommittee will be responsible for interpretation of analysis with TC10 responsible for methods.

IEC61639 Bushings for direct connection transformer/GIS – this is under review by the switchgear committee SC17C MT27 and has been re-numbered IEC62271-pt211.

TC36 SPG (standards planning group) also met in Milan in October to review the work of the insulator subcommittees and plan for the New Delhi meeting.

**Cigré:**

There is a Cigré working group A2: 43 Bushing Reliability chaired by Antun Mikulecky from Hungary. The group has held two meetings this year in Dubrovnik, Croatia in May and at the General Session in Paris in August

The group has three task forces;

1. Questionnaire on bushing failure rates and data.
2. Drafting of technical brochure sections – definitions, failure modes, mechanisms.
3. Drafting of technical brochure sections - diagnostics and monitoring methods, including theory, measurement method and decision criteria.

It is aimed to publish the brochure during 2013.

John Graham

October 16th 2012

**11.4.5 IEEE 693 - Interaction of Bushings and Transformers during Seismic Events – Eric Weatherbee**

Next meeting will be held in April at PG&E headquarters in San Francisco. Dr. Anshel Schiff is preparing papers for comment on his current approach for the next iteration of the standard. Distribution to the OEM transformer and bushing manufacturers will be through the transformer committee by the end of the year. Next version of the standard is on-target for 2014 completion.

Short presentation showing videos of an OIP porcelain bushing subjected to 1g, 2g and 2.5g shake table testing was presented by Eric Weatherbee

**11.4.6 Task Force on PD Measurement on Bushings & CTs - Thang Hochanh, Chair**

The task force on Partial Discharge in Bushings and PTs/CTs met on Monday October 22nd, 2012, at 4:45pm with 41 attendees. Of those, 14 members and 27 guests with 7 guests requesting membership.

* The meeting was opened with attendance sheets and introductions.
* The minutes for the S12 Nashville meeting were presented.
* The TF Chair requested comments on the version #2-C of the guide which was distributed by e-mail prior to the meeting. 5 discussion groups were formed for focused discussiones on:
  + PD in Instruments Transformers, led by Vladimir Khalin.
  + Annex A- PD Test circuits, led by Eberhard Lemke.
  + Annex B- Shielding and Grounding, led by Wolfang Hauschild.
  + PD in Bushings, led by John Graham.
  + Generalities and Definitions, led by Eberhard Lemke.
* After the discussions, each group presented a summary of comments and suggestions from their discussion that will be considered in the next draft. Follow up by the group leaders with comments on the discussed draft #2-C. The TF Chair will provide e-mail addresses to the leaders to facilitate direct communication.

Minutes by: Arturo Del Rio.

Nashville, October 22nd, 2012.

**11.4.7 Unfinished Business**

Keith Ellis proposed that a definition needs to be added to C57.19.00 for solid dielectric bushings, RIP already exists therefore he would like to develop new nomenclature for epoxy resin impregnated paper bushings.

* Presentation “Distribution Transformer Bushings – A Manufacturers View” by Paul Buchanan.
  + Mr. Buchanan discussed the lack of mechanical requirements. The Chair commented that their needs to be defined quality checks to maintain the longevity of the products. The Chair asked Mr. Buchanan to summarize his thoughts and suggestions for the next meeting.
* Presentation “IEEE Transformer Gas Bushings” – John Graham
  + Mr. Graham proposed that a standard needs to be developed. The Chair asked for volunteers to help Mr. Graham ID the differences between IEEE C57.19 and IEC to send out to the users and manufacturers to determine if these bushings should be made to a standard.

**11.4.8 New Business**

**11.4.9 Adjournment**

The meeting adjourned at 10:45 AM.

* 1. **Dry Type Transformers SC – Charles Johnson, Chair; Secretary Casey Ballard**

## Acting Chair Tim Holdway

## Acting Secretary Sheldon Kennedy

* + 1. **Introductions and Approval of Minutes**

The Subcommittee met on October 24, 2012 at 1:30 PM. There were 20 members (therefore we had a quorum) and 7 guests present.

The minutes of the Nashville, TN meeting were approved.

* + 1. **Working Group/Task Force Reports**

The next order of business was the presentation of the reports of the various working groups and task forces. See the following sections for the individual reports:

* + - 1. **IEEE PC57.12.01 - Dry Type General Requirements Chair Tim Holdway**

The working group met in the Mitchell Room of the Hilton Milwaukee City Center Hotel.

The meeting was called to order at 1:45 PM by Chairman Tim Holdway

The meeting was convened with 16 members (out of 24 – therefore a quorum was reached with 67% attending) and 12 guests present with 4 requesting membership.

The minutes of the Nashville March 12, 2012 meeting were approved.

Motion: Subhas Sarkar Second: Phil Hopkinson

**Old business**

Proposed Changes by Marcel Fortin

* Table 5 -- A motion was made by Casey Ballard to remove Note 2 and was seconded by Jim McBryde. The motion did not carry. The group agreed to remove the superscripts from the notes: S, 1, 2.
* Section 7.1 -- Proposal rejected – will remain ‘as-is’
  + Section 7.3.3.1 and 7.3.3.2 -- Proposal accepted as circulated via email
  + Section 7.3.6.1 -- Proposal accepted as circulated via email
  + Section 7.6 -- Proposal rejected – will remain ‘as-is’
  + Section 7.8 -- Proposal rejected – will remain ‘as-is’
  + Section 7.10 -- Proposal accepted as circulated via email
  + Section 8.1 -- Proposal accepted with use of ‘other accredited labs’
  + Table 17 -- Proposal rejected – will remain ‘as-is’

Proposed Changes by Aleksandr Levin

* + Section 5.10.3.5 -- Proposal accepted in previous WG meetings
  + Table 9 -- Proposal accepted as circulated via email
  + Section 5.11.1 -- Tim to send proposal to WG members
  + Sections 5.11.2.1, 5.11.2.2, and 5.11.2.3 -- Tim to send proposal to WG members
  + Section 5.11.3 -- Tim to send proposal to WG members
  + Section 7.5d -- Proposal rejected – will remain ‘as-is’
  + Table 5 -- Addressed earlier in WG meeting

Proposed Change by Shankar Nambi

* + Section 1.2 -- Proposal accepted with addition of ‘and manufacturing’

Altitude correction

* Proposal was accepted when circulated by email with the change of ‘When specified for installation and/or testing above 1000 m (3300 ft),’
* A lengthy discussion followed that detailed that the values in Table 1 are not just for air clearances – nor are they just for solid insulation.
  + The Table 1 values will not require a large enough air clearance correction for terminals or bushings if the initial design is a minimum clearances.
  + IEEE Std 4 should be used for air only clearances such as terminals, taps, and bushings.
  + The Chair will attempt to contact Don Kline to determine the origin of the values in Table 1 upon the suggestion of Wes Patterson
  + There was concern that the application of Table 1 to all different types of dry type transformers would lead to higher cost for certain winding types and/or insulation systems that are not as dependent on air for dielectric clearances.

**New business**

Phil Hopkinson made a motion to have all medium voltage windings for dry type transformers to have a ‘QA’ impulse test as a routine test with the ‘QA’ test consisting of a reduced (50%) wave and a full (100%) wave with a 1.2x50 micro second wave shape. The motion was seconded by Jim Atwiler, but no vote took place as the discussion was cut short by time limitations. Phil will make a written proposal to the Chair who will distribute it to the group for a vote.

Next meeting: Spring 2013, Munich Germany, March 17-21

With no further business, the meeting was adjourned at 3:00 PM.

Motion: John K. John Second: Jim McBryde

* + - 1. **WG Dry Type O&M Guide C57.94 Chair Dave Stankes**

The meeting for the revision of IEEE C57.94 took place at 4:45PM on Monday, October 22, 2012 in the Oak Meeting Room at the Hilton City Center, Milwaukee, WI. Introductions were made and an attendance sheet was circulated. This was the second meeting of the C57.94 working group. There were 21 participants including 12 members. (Quorum achieved). Three attendees requested membership.

The minutes from the Spring 2012 Meeting in Nashville were approved.

Chairman reviewed the proposed agenda, and announced that (time permitting) Dr. Valery Davydov would present his findings on effect of moisture on failure of dry type transformers, which was presented at a recent technical seminar in Las Vegas.

The chairman provided a brief history of C57.94 WG and showed activity since Boston meeting which included two teleconferences (8/28 and 10/02). He also pointed out that Reaffirmation Comments obtained from 2006 and 2011 ballots provided a good starting point for needed changes to the document.

A summary slide containing page, clause, comments, etc. leading to current Draft 4 of document was reviewed. Areas of change included clause 4.4, 4.9.3, 4.10.1, and fair amount of changes to Clause 6 for Testing. There were several changes to references, with a new bibliography section being created for those not directly referenced in document.

The chairman presented Draft 4 of the document with included changes from the previously discussed summary slide.

There was very active and rich participation from members – special mention is made of Vijay Tendulkar, Casey Ballard, Robert Thompson, and Roger Wicks. The group discussed insulation resistance, and the possible inclusion of additional information on how age and test conditions may affect measured insulation resistance. Vijay stated that insulation resistance can change as it ages from new transformer to when the same transformer is five or more years old. He also stated that in his experience insulation resistance should not be measured at greater than 50% of the applied test voltage. Casey pointed that sufficient information on conducting insulation resistance testing is covered in C57.12.91, and is referenced in C57.94.

It was recommended that a reference to the the safe operation of tests be included in the document. Vijay said that their organization eliminated core strap to avoid mistakes at site and now permanently ground the core. He also added that if shield is used, winding terminals must be ground to discharge the collected charge. (Both AC and DC test.)

The need for more thorough review of Audible Sound clause was targeted for future discussion. It was stated that the information found in this clause is consistent with information found in manufactures guides that were reviewed by the WG.

An earlier comment from Sheldon Kennedy (from last WG meeting in Nashville) was discussed regarding the need for a comment about contacting the original manufacturer for more information when retro-filling a Freon Filled transformer. There was also some discussion regarding the presence of transformers with Freon, SF6, etc.

The WG meeting concluded with Dr. Valery Davydov presenting Moisture Related Failure in Dry Type Transformer at an Australian Utility. The presentation discussed the possible influence of contamination dust and high humidity on failure of an OVDT transformer.

The WG meeting adjourned at 6:00PM.

* + - 1. **WG Dry Type Loading Guide C57.96 Chair Rick Marek**

The sixth meeting of the working group was held on Tuesday, October 23, 2012 in the Oak Meeting Room of the Hilton Milwaukee City Center at 3:15 P.M. With 15 guests and 11 of 20 members in attendance, there was a quorum. The minutes of the last meeting were approved as submitted. Three guests requested membership.

Comments to draft 4 were submitted by Paulette Powell, Martin Navarro, Sanjib Som and Sasha Levin. Sasha’s comments were used as the basis for review of the document.

* + - Sealed transformers as defined in the latest version of C57.12.80 will be added to the definition clause
    - The meaning of “zero gauge pressure” as referred to non-ventilated transformers was explained by the group
    - It was decided to add the term “per unit load” to the definition clause as defined in C57.12.80
    - Remove the word ‘define’ that was present in the Time constant section
    - The reference to the exponent ‘m’ was determined to be confusing and Sasha agreed to provide a clarified revision for the next draft
    - The need for a forced air cooling equation was questioned to accompany equation 13 and the chair agreed to determine if it was omitted by error
    - The chair requested the group to crosscheck the numbers in Table 2 which is based on Table 3
    - A note was requested limiting Table 3 to 15000ft, corresponding to the latest proposed revision of C57.12.01
    - The dashed versus solid line for Figure 1 was questioned and the chair agreed to verify, but noted that all of the figures were re-drawn and needed to be reviewed closely by the group
    - It was agreed to make several changes to Table 4:
    - Add Resin Encapsulated to the Vacuum Cast label and possibly add 200C as well
    - Change the % label to P.U. and move the second P.U. column next to the first
    - Expand the title to include “not exceeding maximum hot spot temperature”
    - Define H and K and the halving constants for Tables 5 and 6 and explain the inclusion of the 8 halving constant
    - There was a discussion concerning the removal of the curves in favor of equations and the group was requested to compare the previous version
    - A suggestion was made to use ln(a) in the headers of Tables 5 and 6
    - Juan Jose Gutierrez suggested adding an example of how to make a curve from Table 5 and 6 and agreed to submit a proposal

Tim Holdway motioned to adjourn at 4:35 PM and John John seconded the motion.

* + - 1. **IEEE PC57.12.52 - Sealed Dry Type Power Transformers Chair Sheldon Kennedy**

There was no meeting of the working group as all activity of the working group was completed. The recirculation ballot was successful and the standard was submitted for the REVCOM December meeting.

* + 1. **Old Business**

There was no old business.

* + 1. **New Business**

Future Meetings were announced:

Spring 2013 - Munich, Germany

Fall 2013 - St. Louis, MO

Spring 2014 - Savannah, GA

There was a call for tutorial proposals.

* + 1. **Adjournment**

Being no further business, the meeting adjourned at 2:05 PM

* 1. **Distribution Transformers SC – Stephen Shull, Chair**

**Chairman: Stephen Shull**

**Meeting Date: 10/24/2012 Time: 9:30 – 10:45**

**Attendance:**

|  |  |
| --- | --- |
| **Members** | **28** |
| **Guests** | **45** |
| **Guests Requesting Membership** | **12** |
| **Total** | **85** |

**Meeting Minutes / Significant Issues / Comments:**

Steve opened the meeting; rosters were passed out, introductions were made & by a show of hands of members listed on screen showed we had quorum with 28 of the 43 members in attendance at the start of the meeting.

The minutes of the fall 2012 meeting of the subcommittee were presented and a motion was made by Ron Stahara, seconded by Lee Matthews to approve the minutes; the motion carried by unanimous acclamation.

The following are the reports that were submitted by the Working Groups and Task Forces.

* **C57.12.36 –Distribution Substation Transformers**

Jerry Murphy called the meeting to order. Introductions were made. The names of the members were projected on the screen. By a show of hands, a quorum was established by having 14 of the 26 members present.

The minutes of the Spring 2012 meeting in Nashville were presented. Ron Stahara made a motion to approve the minutes as written, seconded by Paul Buchanan. It was approved unanimously.

Jerry announced about the formation of a Task Force for Dielectric Fluid Terms Normalization to resolve the proper use of the terms like fluid and liquid.

A review of the Draft 2 of the C57.12.36 standard was then started.

Sections 5.1.3 and 5.1.4 for liquid and winding temperature indicators were reviewed with proposed modifications made by Gary Hoffman.

The discussion of these sections covered the requirements for digital displays. The proposed changes were according to the current standard C57.12.10. Among the changes, the height of the characters was removed and the display colors were included.

Figure 1 was reviewed. Discussed about the use of terms like “Available when specified” and “As required” for some of the items. Gary Hoffman suggested to adopt “S” for “standard” and “A” for “available when specified”, as in C57.12.10.

There was discussion about the use of pressure relief valves, pressure relief devices and pressure vacuum bleeder valve. Some concerns about the possibility of moisture ingress.

Gary Hoffman mentioned a potential issue since the scope of this standard covers 50 Hz, and section 5.11.2 which covers fans only includes characteristics of 60 Hz motors. He suggested following what was done in C57.12.10 to include characteristics of 50 Hz motors with IEC standard voltages.

Regarding the use of the terms fluid or liquid, Steve Shull mentioned that the new Task Force is developing a white paper on this subject. Gary Hoffman suggested requesting a consensus with the IEEE Transformers Committee Membership.

Jerry mentioned that the draft with the changes from this meeting would be posted soon after the meeting, and encouraged the group to review it and provide comments.

The meeting was adjourned at 10:55 AM

* **C57.12.20 – Overhead Distribution Transformers**

Introductions of members and guests were made.

A quorum of the Working Group’s members was present (27 out of 36).

The minutes of the Spring 2012 Nashville meeting were approved as submitted.

Al Traut reported that NESCOM approved a PAR in June of 2012. The PAR expires on December 31, 2016.

Al Traut reported that there is a new Task Force led by Patrick McShane that will review changes needed to support the change from “mineral-oil immersed” to “liquid-immersed” throughout the IEEE transformer documents. Al Traut will represent C57.12.20 on this task force and report back to the WG at our next meeting.

A recent survey on whether Annex A is needed was discussed. Feedback from the WG was that only Type C support lugs should be covered in Annex A and that the crossarm hangers and kickers could be eliminated. Chuck Simmons will follow-up with two survey replies that wanted Annex A left intact in its entirety.

A survey of whether Users currently require or potentially want to include in the standard specific impedance and/or regulation requirements was discussed. Chuck Simmons will compile the responses regarding specific suggestions on impedance and regulation from the survey results.

A recent survey on whether the standard should have temperature requirements for gaskets was discussed. The WG indicated a desire that all affected components should be included in any temperature requirements. Al Traut will put together proposed language on temperature range requirements for the WG to consider.

Josh Verdell and Marty Rave reviewed low voltage bushing mounting and stud dimensions. Josh and Marty will survey manufacturers for LV bushing stud size and tank mounting hole requirements.

Gael Kennedy discussed work needed to add additional low voltage ratings to the standard. The changes would essentially revise information in the standard to include voltages of 600 Volts and less. Chuck Simmons will include Gael’s suggestions in a new draft D1 for the next meeting.

Al Traut discussed a recent concern raised by a User that transformer base requirements for platform mounted overhead transformers aren’t included in the current standard. This will be addressed at a future meeting.

Meeting was adjourned at 12:30 PM.

* **C57.12.38 – Single Phase Padmount Transformers**

Twenty-eight of thirty-seven working group members were present and a quorum was established.

A motion was made by Kent Miller to approve the minutes from the Spring 2012 meeting, seconded by Ron Stahara, and passed unopposed by the working group members.

Low voltage bushing arrangements were added to Draft 1.3 of the document as Figure 5 at the last meeting. Tom Holifield discussed revisions made to Figure 5 since the last meeting. Also, Tom discussed new Figure 6, the low voltage bushing dimensions, which was added to the document in Draft 1.4 for this meeting. Alan Wilks made a motion that we accept Figure 5 and Figure 6 as shown. The motion was seconded by Ron Stahara, and the motion passed unopposed.

In response to a request at the last meeting the following line was added to the first paragraph of Clause 7.4 in Draft 1.4: “The hinge assembly shall include a captive means, such as a roll pin, to prevent accidental removal of the door or doors when they are in the open position.” Ron Stahara made a motion that the line be accepted as written in the document. It was seconded by Steve Shull and passed unopposed.

A discussion about how to incorporate natural ester fluids into the document was briefly held. Steve Shull stated that there should be some guidance coming on how this should be done from the subcommittee.

The last major item to be resolved is how to address low voltage bushing cantilever strength requirements. Chuck Simmons presented requirements from his company’s specification. Chuck was assigned to prepare verbiage for the document that the working group will consider at the next meeting.

Michael Miller presented videos from his company showing how they have revised the angle of the parking stand to make it work better for the crews. After some discussion, the working group decided to leave the parking stand drawings as they currently are in the document.

Still not revised in the document is verbiage to address concerns about the tank pressure requirements that contributed to the formation of the task group and now working group C57.12.39. A concern was raised that the C57.12.39 working group probably would not be finished with their work before our document’s PAR expires. It was decided to leave this subject as currently written. It will be revised with the next PAR after the C57.12.39 working group completes their work.

The next meeting will be held in Munich, Germany, and by a show of hands, not many working group members knew for sure they would be able to attend. Another few knew they definitely could not come, and the vast majority was not sure if they could attend, leaving concern that a quorum may not be possible in Munich.

* **C57.12.34 – Three Phase Padmount Transformers**

Ron Stahara called the meeting to order. To establish a quorum, the member list was displayed on the screen and those who saw their names were asked to hold up their hand. From this count of hands, a quorum was declared. Ron asked that everyone introduce themselves by giving their name, company and location. Also, an attendance roster was circulated. A motion was made by Gael Kennedy and seconded by Ali Ghafourian to accept the minutes of the past meeting. It was approved by acclamation with no corrections.

Ron stated that we had reviewed the document and corrected the cabinet dimensions which were discussed last time. Ron intent was to bring this document to the working group with a recommendation of taking this to ballot. However, an application was brought to the attention of the working group of when a grounding‑impedance is place in between the neutral bushing and the ground to limit the neutral fault current. Dwight Parkinson, Cooper, stated that he had seen this specification from customers and that when this occurs, the clearances and BIL levels of the H0, X0 or H0/X0 bushing that we current specify in the document would not be correct. After some discussion, the following correction was made to the document.

**Section 8.7.4.2 Neutral Terminal – Greater than 600 Volts.**

When provided *and effectively grounded*, the neutral bushing may be two insulation classes below that of the phase bushings. *Otherwise, the neutral bushing shall be the insulation class of the phase bushings.*

A motion was made by Dwight Parkinson and seconded by Dan Mulkey to make this modification. It was passed by acclamation with no dissenting voices. This statement was reflected by changes in Figures 2, 3, 6, and 7. Each drawing was corrected by a motion and approving acclamation vote without any descent as shown in the table.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Motion Made | Seconded | Figure | Motion Made | Seconded |
| Dwight Parkinson | Ali Ghafourian | 6 | Dwight Parkinson | Adam Bromley |
| Dwight Parkinson | Ali Ghafourian | 7 | Dwight Parkinson | Adam Bromley |

The details of these changes are shown in Draft 4 of the document. It was determined that Steve Shull would by the next meeting make these modifications and post the new version.

After we went through this discussion and voting, Jeff Schneider, Cooper, brought up another issue of the location of the H0, X0 or H0/X0 for dead front construction. Ron Stahara formed a TF to study where the location of this bushing should be placed on the faceplate of the transformer. The Chair of this TF was named to be Jeff Schneider. The members of this TF were Donnie Trivitt, OG&E, Chuck Simmons, Progress Energy, and Sheetal Patel, ERMCO. Jeff requested the drawings for these be sent to him so that the TF could work on this dimensioned drawing. Steve stated that he would send these to him. The TF will report at the next Working Group meeting.

This concluded the meeting.

* **C57.12.38 – Tank Pressure Coordination**

Twenty-eight of thirty-seven working group members were present and a quorum was established.

A motion was made by Kent Miller to approve the minutes from the Spring 2012 meeting, seconded by Ron Stahara, and passed unopposed by the working group members.

Low voltage bushing arrangements were added to Draft 1.3 of the document as Figure 5 at the last meeting. Tom Holifield discussed revisions made to Figure 5 since the last meeting. Also, Tom discussed new Figure 6, the low voltage bushing dimensions, which was added to the document in Draft 1.4 for this meeting. Alan Wilks made a motion that we accept Figure 5 and Figure 6 as shown. The motion was seconded by Ron Stahara, and the motion passed unopposed.

In response to a request at the last meeting the following line was added to the first paragraph of Clause 7.4 in Draft 1.4: “The hinge assembly shall include a captive means, such as a roll pin, to prevent accidental removal of the door or doors when they are in the open position.” Ron Stahara made a motion that the line be accepted as written in the document. It was seconded by Steve Shull and passed unopposed.

A discussion about how to incorporate natural ester fluids into the document was briefly held. Steve Shull stated that there should be some guidance coming on how this should be done from the subcommittee.

The last major item to be resolved is how to address low voltage bushing cantilever strength requirements. Chuck Simmons presented requirements from his company’s specification. Chuck was assigned to prepare verbiage for the document that the working group will consider at the next meeting.

Michael Miller presented videos from his company showing how they have revised the angle of the parking stand to make it work better for the crews. After some discussion, the working group decided to leave the parking stand drawings as they currently are in the document.

Still not revised in the document is verbiage to address concerns about the tank pressure requirements that contributed to the formation of the task group and now working group C57.12.39. A concern was raised that the C57.12.39 working group probably would not be finished with their work before our document’s PAR expires. It was decided to leave this subject as currently written. It will be revised with the next PAR after the C57.12.39 working group completes their work.

The next meeting will be held in Munich, Germany, and by a show of hands, not many working group members knew for sure they would be able to attend. Another few knew they definitely could not come, and the vast majority was not sure if they could attend, leaving concern that a quorum may not be possible in Munich.

* **C57.12.28 – Pad- Mounted Equipment – Enclosure Integrity**
* Page 1 Normative References – added title of ASTM B117
* Page 8 Section 4.3.6 Operation Test – reviewed , no change
* Page 8 Section 4.3.7 Test Repetition – motion carried unanimously to revise to:
  + These design tests shall be repeated whenever the enclosure design is changed so as to modify performance, or at least every five years whichever is shorter.
* Page 14 Annex B Pry Bar footnote #9 – motion carried unanimously to revise to:
  + The plunger has been designed to fit into a100ft-lb, 1/2” drive, dial-type Snap-On® model TE100 torque wrench. At the time of publication of this standard, Snap-On® was an example of this technology. This information is given for the convenience of users of this standard and does not constitute an endorsement by the IEEE of this product. Equivalent technology may be used if it can be shown to lead to the same results.
* Page 18 Bibliography additions and changes
  + Added C57.12.38
* Motion and Vote to go to IEEE Balloting
  + Steve Shull motioned, Gael Kennedy seconded, passed unanimously
* **C57.12.28 – Pad- Mounted Equipment – Enclosure Integrity for Coastal Environments**
* Page 6 Normative References – added title of ASTM B117
* Page 8 Added Section 4.1:

4.1. Galling

Steps need to be taken to prevent galling, as follows:

4.1.1. Use of dissimilar materials in threaded joints such as silicon-bronze with stainless steel, brass with stainless steel, etc.

4.1.2. Use of anti-seize compounds or materials

* Page 9 Section 4.2.8 – made the same as Section 4.1.8 in C57.12.28
* Page 12 Section 4.4.6 – made the same as Section 4.3.6 in C57.12.28
* Page 12 Section 4.4.7 – made the same as Section 4.3.7 in C57.12.28
* Page 14 Section 5.3.2 – revised the frequency of outdoor exposure testing:

For all except the Outdoor Exposure Test, this data shall be resubmitted whenever there are changes in the substrate or coating system method and/or materials, or at least every two years. The Outdoor Exposure Test shall be resubmitted whenever there are changes in the substrate or coating system method and/or materials, or at least every five years.

* Page 15 added Munsell color footnote to 5.4 same as in C57.12.28
* Page 15 Section 5.51 Added “Outdoor” to “Exposure Test”
* Page 15 Section 5.5.1.1 – Added Kennedy Space Center
* Page 17 Section 5.5.3 – Added ASTM Blistering evaluation method per C57.12.30
* Page 17 Section 5.5.5 – remove crazing and add cracking per C57.12.30
* Page 17 Section 5.5.7 – Make chip rating the same as C57.12.30
* Page 20 revised torque wrench footnote to match C57.12.28
* Pages 24 and 25 Bibliography additions and changes
  + Added C57.12.38
* Motion and Vote to go to IEEE Balloting
  + Steve Shull motioned, Gael Kennedy seconded, passed unanimously
* **C57.12.31 – Pole- Mounted Equipment – Enclosure Integrity**

Bob Olen reported discovering an error in Section 4.5.6 Simulated Corrosive Atmospheric Breakdown (SCAB) Page 8. It should require 10 SCAB cycles not the 15 that is stated in the 2010 Standard. The 2002 standard had 10 SCAB cycles. A motion to issue an IEEE Core Agenda to correct this error was passed. Bob Olen will initiate a Core Agenda.

* **C57.12.37 – Bar Coding for Distribution Transformers and Step-Voltage Regulators**

The WG met on Tuesday, October 23, 2012 at 9:30 am in the Walker Room of the Hilton Milwaukee City Center Hotel in Milwaukee, WI.

An agenda was presented and introductions were made. There was a quorum present at this meeting. The Meeting Minutes from the previous meeting in Nashville, TN were reviewed. After a brief discussion, the minutes were approved.

A question was asked in regard to which utilities uses the bar code on purchased transformers. From the end-users present at this meeting, only one stated that they currently use the bar coding.

The Chair asked if anyone had any additional comments or changes to be made on the standard. There were no additional comments made.

Bob Olen made a motion to ballot the standard, Ron Stahara seconded the motion. The motion was unanimously approved.

The meeting was adjourned at 11:05 am.

* **C57.12.37 – Electronic Reporting of Distribution Transformer Data**

The meeting was called to order at 4:45pm. Introductions were done. Roster was taken, and a quorum was met. Minutes from the meeting on 3/13/2012 in Nashville, TN were reviewed and approved.

The draft standard is posted on the website. Issues from the current standard besides the DOE required data were requested. None were mentioned. The chair asked that the standard be reviewed before the next meeting to insure that no issues existed. He stated that the DOE have not finalized their ruling. Any changes to the DOE section of the standard will wait until the next meeting once the DOE ruling has been published.

Dan Mulkey, Pacific Gas and Electric, gave a presentation on the way his company uses electronic data reporting. Dan showed various manufacturers data files. He indicated that the when CSV or excel files are provided they are easy to open and require little repair. However, he pointed out that merged cells and headers were particularly troublesome. He said that this might be something that we could address in the standard. He also pointed out that text files do not import quite so easily due to alignment of the data as the file is imported. He indicated that this type of import requires a careful examination of each column of data. Dan demonstrated the import of data into the access database that he had developed for his company. He pointed out that he had used this database since 1990. The program can help the user spot outliers. Dan stated that he provides an average impedance value from this database every 5 years as well as minimum impedances for fault current calculations to his company’s designers. He added that his company targets a maximum 6 volt drop on the primary and another 6 volts on the secondary. Dan stated that he would be glad to provide a blank Access database for those who would want to start using this type of analysis in their own company. He stated that those interested could contact him directly.

The meeting was adjourned at 5:25pm

* **Task Force on Department of Energy Activity on Energy Efficiency of Transformers**

The Task Force on DOE Energy Efficiency of Transformers was called to order at 1:45 PM on October 23rd, 2012. The new secretary was introduced. A hand count of the members was made and a quorum was declared. The chairman briefly reviewed the contents of the minutes. A motion was made and seconded to approve the minutes; the motion was approved.

The chairman informed the TF that he does not expect the DOE final ruling on the NOPR until after the elections. The chairman reviewed the history of the NOPR that was issued by the Department of Energy. He walked through the tutorial he had prepared on the NOPR. He further highlighted some key elements. In the new NOPR the reference to TSL is not the same as efficiency level and that Table 3 is not the same as appears in the 2010 law, particularly separating single phase (reducing losses from 6.2% to 12%) and three phase (reducing losses from 5.2% to17%) transformers and reducing losses in liquid and low voltage dry type transformers.

In Table 4 he noted that anything > 25-30% in 3 phase reduction appears to be very excessive and needs attention. In further discussion he mentioned that the reaction to the NOPR issued 10 Feb 2012 was favorable from NEMA, EEI, Utilities, and conventional steel manufacturers. A concern was expressed regarding the crossover between M3 and Amorphous, and the fact that the DOE never understood this concept.

Negotiations were completed. NEMA had prepared and submitted comments by the 28 June 2012 deadline. The chairman asked Mr. Caskey from NEMA to give a presentation on the negotiation process. He made a few observations on the negotiating process. Both the manufacturers and utilities were honest and forthright in providing the consultants valid data for their models. Going forward these consultants will now have better data that they can use to improve their models. A better understanding was achieved with the other participant’s. Finally, the process in itself was valuable even w/o a negotiated settlement. The chairman asked Mr. Patterson to provide his comments and any known status. He mentioned that an agreement was reached on medium voltage dry, and that when the NOPR does finally come out there might be some new proposed standards for product classes that fall outside the proposed efficiency levels. There was no new status to report on when the date for the final rule is expected.

A comment was made from a member that the life cycle cost analysis that had been completed previously by the chairman be included in the minutes as it was felt that the DOE version is inadequate. The Chairman would provide analysis and it would be posted. A comment was made from an IEC delegate that they are seeing a similar issue in Europe; this is in the early stages. There was no new business. The next meeting will be held in conjunction with the IEEE Transformer Committee meeting in Munich Germany during the week of March 17-21st, 2013.

The meeting was adjourned at 3:00 PM.

At the conclusion of the report by Phil Hopkinson, Marty Rave asked if anyone was questioning DOE’s methods for setting efficiency. Phil said that there has been. Wes Patterson of Navigant concurred with this. He continued to make further comments on the DOE analysis indicating that it was the same process that they had used to analysis other products for energy efficiency. He said that it was very complicated and difficult to follow.

Steve Shull asked if there was any old business to review and none was presented.

Steve Shull made the following comments:

* Steve solicited from the group ideas for technical tutorials. He asked that these be passed to Tom Prevost.
* Steve commented that a TF on terminology of fluid had been formed. Its purpose was to give consistency to the terms that referenced fluids in our standards. He asked members to assist Jerry Corkran in reviewing our standards for these terms.
* Steve reminded members that balloting notification requires proper selection of interest under MyProject. These are located under the individual preference. It is from this list that email notifications are generated for standard activities.
* Steve requested a show of hands from attendees who were considering making the next meeting in Munich, Germany. A number of hands went up. Steve emphasized the benefits of collaborating with our European counterparts who have an interest in these standards.

Steve Shull asked if there was any new business. With this request Phil Hopkinson came to the front and presented a PowerPoint on hydrogen gassing in wind farm transformers. He pointed out that this phenomenon was not just isolated to wind power units but can exist on certain type of transformer designs where 35 kV high side voltage is present. This presentation discussed the possible cause and suggested a couple of solutions. Ron Stahara asked if presentation could be posted. Steve believed that this was an excellent idea and would see that this was done. He also requested the group review the information for further discussion. He pointed out that some thought also be given to what to do with this information.

Steve adjourned the meeting with unanimous consent at 10:48am.

* 1. **Dielectric Tests SC – Loren Wagenaar, Chair; Thang Hochanh, Vice-Chair; Dennis Marlow, Secretary**

The Dielectric Tests Subcommittee (DISC) met on Wednesday, October 24 at 11:00 am with a record 181 persons in attendance. There were 79 of 123 members, and 46 of the 108 guests present were new. Eight of the 73 returning guests requested membership and will have their participation status reviewed prior to acceptance. The Secretary, Dennis Marlow, was not able to attend this meeting. Eric Davis served as the Secretary.

**11.7.1 Chair’s Remarks**

1. The Chair briefly reviewed highlights of the Administrative Subcommittee meeting held on Sunday afternoon. The main points have already been discussed in the Main Committee meeting on Monday and were not repeated
2. The following meetings of the TC are:
   * 1. Spring March 17-21,2013 – (Dolce Munich ($190, £142 with breakfast) Munich, Germany – hosted by Reinhausen
     2. Fall October 20-24, 2013 – St. Louis, MO – hosted by H-J Enterprises

Additional meeting sites are listed on the main committee website.

**11.7.2 Quorum and Approval of Minutes**

1. The membership list was shown and a show of hands of committee members present showed that a quorum was not present at the start of the meeting. The chair assumed that a few more people would come in during the course of the meeting, and the presence of 79 who signed the attendance register shows that this was a correct assumption.
2. A motion to approve the minutes of the spring 2012 meeting in Nashville was made by Don Saur and seconded by Thang Hochanh. The minutes were approved as written.

**11.7.3 Working Group Reports**

**11.7.3.1 Working Group on External Dielectric Clearances, Eric Davis, Chair; Dennis Marlow, Secretary**

The Task Force met on October 22, 2012 at 9:45 am with 48 people attending the meeting; eight members, one corresponding member, and 39 guests. Since a quorum was not present, no official business was conducted. The membership list will be reviewed to include only those members who have attended at least one of the last 2 meetings.

The proposed clearance table for 1.2 through 230 kV was discussed. The table is based on the existing C57.12.00, Table 11 with BILs shown by voltage. The BILs match those included in the existing C57.12.00 Tables 4 and 5. Phase to ground clearances for distribution and power transformers were also added. These clearances were taken from the NEMA TR1-1980 as previously agreed to by a survey of the Dielectric Test Subcommittee.

The clearances are about 10% higher than the 50% withstand clearances with two exceptions. The 110 kV and 125 kV BILs for distribution transformers are right about the 50% withstand clearances. Those in attendance felt these two values should be increased so they are consistent with the other values. These two values will be increased and the proposed table included in a survey to the Dielectric Test Subcommittee.

A few of the proposed values were compared to the existing IEC clearance values contained in IEC 60076-3. The IEC values are much higher than those proposed in the table. Paul Jarman pointed out that the IEC values are conservative and to be used if the User does not provide any requirement. It is expected that most IEC users will specify smaller clearances. It was also pointed out that the IEEE values are a minimum recommended clearance.

The bushing to bushing clearances were discussed. The majority of the folks in attendance felt that these clearances were useful and should be retained. At this time, we do not know how the existing clearances were established. We will continue to research this issue.

The BSL basis for clearances was also discussed. The BSL basis for the existing BSL clearances in C57.12.00, 345 kV+, is based on a switching surge factor (SSF) of 3.8. The BSL values contained in C57.12.00 Table 6 have SSFs ranging from 2.4 to 3.3. Those in attendance felt that the User was responsible for selecting the correct BIL and BSL for their system and application. The clearances given in Table 11 should be based on the BSLs listed in Table 6.

Meeting adjourned at 11:00 am

Respectfully submitted, Eric Davis

**11.7.3.2** **Working Group on Revision of Low Frequency Tests; Bertrand Poulin, Chair; Bill**

**Griesacker, Secretary March 13, 2012, 1:45 pm**

# There were 52 attendees, 22 members and 30 guests, present at the meeting; two guests requested membership. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present at the meeting.

# A motion was made by the chairman to approve the minutes from the Spring 2012 meeting in Nashville, TN; the minutes were approved.

# TF - PD in Bushings and Instrument Transformers:

# Significant progress was made in changes to the document, a final draft is expected to be ready by the next meeting.

# A small modification to the PAR will be required since it has been recognized that a change in terminology is needed to harmonize with IEC. The term “PD detector” will be changed to “PD measuring instrument”. “Detection” will be replaced with “measurement” throughout the document.

1. Proposal to change selection of LTC tap position during the induced voltage test:
   1. Clause 10.8.1 –Wording was proposed that would require bridging type load tap changers to be tested in a bridging position so that the PA (preventive autotransformer) is energized with elevated volts/turn during this test. Yang Baitun stated 1) that there may be some test equipment that will not be able to supply the additional exciting current (i.e. additional energy), 2) for neutral connected PAs, the main windings will act as an inductive filter between the measuring points and a possible PD source in the PA. The working group plans to survey the Dielectric Test Sub Committee immediately, Class II and Class I transformers will have separate test proposals. Bill Boettger requested to change wording so that the test is based on the worst case tap position when there are un-equal regulating winding taps, another asked that series transformers be tested on the LTC tap extremes and in bridging position to excite the turns at higher voltages.
   2. 10.8.2 – Propose to measure PD on line terminals 69 KV (15 MVA 3-ph, 10 MVA 1-ph) and greater.
   3. Paul Morakinyo requested that PD is recorded on 1 min. intervals in place of the present 5 min. interval.
2. C57.12.00-2012 Table 5: Propose to revert to the 1.5 and 1.7 multipliers (of the maximum system voltages) that were used historically; Note 2 of the table would need to be changed. This would only affect the 500 kV row in the table. The “Low Voltage” section of the table should be listed “for reference only”, or a similar note; the present wording in the table presents possible conflicts in meeting both HV and LV winding requirements in the table due to the induction effect of the transformer.
3. The meeting adjourned at 2:50 p.m.

Submitted by Bill Griesacker, Secretary

# Reviewed and approved by Bertrand Poulin, Chairman

**11.7.3.3 Working Group for Revision of the Distribution Impulse Test Guide C57.138,**

**Recommended Practice for Routine Impulse Test of Distribution Transformers;**

**John Crotty, Chair**

Opened meeting at 11am

Took Roster - Only 6 of the 16 members attended.

No Quorum

Minutes were reviewed but not approved

Old Business. Reviewed items from the last meeting that were from the reaffirmation in 2005

* Tolerances - 5.1.2 – Chair to rewrite for review at next meeting.
* Analog Detection – 7.3.1 – The group suggested moving to the appendix. Manufacturer present stated they use digital detection
* GL 2050 Tube – 7.3.1 – Dan Sauer to research if this tube still exists and how to change the drawing.
* Drawing Updates – Various - to be done by the St Louis Meeting
* Standards References – To Be Done by St Louis Meeting

Chair will post standard for members to review for next meeting.

Meeting adjourned at 11:55am

**11.7.3.4 Working Group on Revision of Impulse Tests – Pierre Riffon, Chair; Peter Heinzig, Vice-Chair**

As neither Chair Pierre Riffon and Vice Chair Peter Heinzig was able to attend the meeting, Loren Wagenaar served as chair and called the meeting to order at 3:00 p.m. Bill Griesacker volunteered as secretary for the meeting. There were 75 attendees, 14 members and 61 guests present; 13 guests requested membership. More than 50 % of the working group members were in attendance at the meeting, therefore a quorum was present at the meeting.

# The chair asked for a motion to approve the meeting minutes from the Spring 2012 meeting in Nashville, TN. A motion for approval was made by Dave Wallace and seconded by Raj Ahuja. The motion was approved unanimously.

# The committee first reviewed WG/SC survey results to revise clause 5.10.7.2 of IEEE Std. C57.12.00 concerning switching impulse tests. The 1980 revision of the standard, when switching impulse voltages were initially well defined, essentially stated “switching impulse tests to the HV terminals shall be controlling, even though such voltages on other windings may exceed their designated BSL.”

# “When the application of the switching impulse to the HV terminals result in a voltage on another winding less than the BSL requirement, no additional test is necessary to demonstrate switching surge insulation withstand capability on that winding.”

# This requirement continued until the 2006 revision, when “less” was replaced by “greater,” which means that the LV and other terminals shall be tested to their rated voltage capability. No one can remember why the word was changed, and a WG/SC survey was sent out to change the word back to “less.” This received a combined approval rate of 84 %. Raj Ahuja stated at the meeting that IEC is changing to require the transformer taps to be adjusted so that the largest voltage results within the transformer, and the group was reminded that the latest revision of the Impulse Guide, C57.98, states the “less” requirement.

# Bertrand Poulin offered a motion to make the LV test voltage to be “less” than the LV terminal capabilities; Vinay Mehrotra offered a second to the motion; a vote was taken and 20 to 1 voted in favor of the motion. The change will be referred to the chair of WG on Revision of C57.12.00.

# A WG/SC survey proposal to require routine impulse tests on 15 MVA 3-phase and 10 MVA 1-phase, 69 kV transformers passed with an approval rate of 90 %. Loren Wagenaar has already made a proposal to Bertrand Poulin regarding the wording changes required on an identical proposal for the low frequency tests. That proposal will be updated and surveyed within the Dielectric Tests SC.

# Another WG/SC survey proposal to require 3 full waves, no chop waves on all other Class I transformers did not pass an e-mail ballot. The approval rate was 65 %, and was considered to have failed. About half of the negative votes did not wish to make any tests on remaining 69 kV transformers and the other half thought that chopped waves should be included.

# A proposal was made in the above survey to leave the choice of dielectric testing per Class I or Class II to the purchaser by introducing a new designation, Class I and Class II tests. Some users are presently specifying some or all of the individual tests required for Class II on transformers rated less than 115 kV. Under the proposal, users would simply specify whether transformers are to be tested as Class I or Class II transformers. This proposal did not receive any support at the meeting on the basis that many purchasers would become confused by the new designation.

# The meeting adjourned at 3:50 p.m.

**11.7.3.5 Task Force on Dielectric Frequency Response – Peter Werelius, Temporary Chair**

The TF on DFR met on Monday, October 22, 2012, at 3:15 PM. 14 members out of 25 and 72 guests were present. 7 guests requested membership.

The minutes from the Spring 2012 meeting in Nashville, TN were approved as written. It was announced that the Task Force completed the scope of work and is now under the Dielectric Tests Subcommittee.

PAR Proposal. A discussion followed regarding the wording of the proposed Title, Scope and Purpose. Summary vote of the members present agreed on the following:

* **Title:**Guide for the use of Dielectric Frequency Response for estimation of moisture in solid insulation of transformers.
* **Scope:**This guide is applicable to the methods of Dielectric Frequency Response (DFR) of liquid immersed transformers. The guide includes recommendations for instrumentation, procedures for performing the tests and techniques for analyzing the data. This guide can be used in both field and factory applications.
* **Purpose:**The purpose of this guide is to provide the user with information that will assist in performing Dielectric Frequency Response measurements and interpreting the results from these measurements.

The next course of action will be to submit the PAR proposal including title, scope and purpose to the Dielectric Tests SC and request approval to create a new working group dedicated to what is described in the title, scope and purpose of the PAR proposal.

The meeting was adjourned at 4:10 PM

**11.7.4 Liaison Reports**

**11.7.4.1 High Voltage Test Techniques (HVTT), IEEE Standard 4 - Arthur Molden**

IEEE Standard 4 working group has completed the editorial changes suggested in comments from the first ballot and the document is now ready for a second ballot. The recirculation ballot will probably occur in November with publication in the early part of next year.

**11.7.5 Old Business**

**11.7.5.1 Comments from C57.12.00 Ballot on Dielectric Test Tables**

Phil Hopkinson reported that Columns 12 and 13 of Table 5 were incorrectly labeled as “Impedance grounded wye.” Column 12 should be labeled “Grounded wye” and Column 13 “Impedance grounded wye.”

Jin Sim pointed out that the applied test values in Table 5, Column 4 do not match the Neutral BIL values listed in Table 5, Column 13 for 36-kV, 48-kV and 73-kV when compared to the values contained in C57.12.00-2006, Table 6.

Col 1 (kV) Col 13(kV Crest) Col 13 (Proposed)

36 125 150

48 150 200

73 200 250

The DI SC Chair directed that comments on Table 5 be submitted to Phil Hopkinson by the end of the year.

Don Platts made a motion that the DI SC immediately prepare a Corrigenda correcting Table 5. The motion was seconded by Ajith Varghese. During discussion on the motion, Stephen Antosz pointed out that the committee has a WG on the Continuous Revision of C57.12.00. The motion was modified that the WG on the Continuous Revision of C57.12.00 immediately prepare a Corrigenda correcting Table 5. This motion was approved.

**11.7.5.2 Front of Wave Table in Annex A**

The changes to the Front of Wave Table and text in Annex A were reviewed. The latest SC survey results were:

Affirmative 61 76.3 %

Affirmative with Comment 12 15.0 %

Negative 2 2.5 %

Abstain 5 6.3 %

Total 80

The chair suggested that the following revised wording be used:

“Annex A (Informative)

“Front-of-wave test levels

“With improved arrester technology, front-of-wave tests are no longer necessary or standard for distribution or power transformers, so these tests were removed as a requirement from IEEE Std. C57.12.00. Gapped silicon carbide arresters have switching characteristics that closely mimic front-of wave shapes. Metal oxide varistor (MOV) surge arresters have clamping characteristics that more nearly emulate full-wave and chopped-wave conditions. They have replaced silicon carbide arresters, negating the need for front-of-wave testing. However, a few users continue to specify front-of-wave tests, and as a historical reference, the table below lists the front-of-wave test levels published in IEEE Std C57.12.00-1980.”

|  |  |  |  |
| --- | --- | --- | --- |
| **Front-of-wave test, voltages in kV**  The front-of wave test is no longer specified in IEEE C57standards,  but is documented for historical purposes | | | |
| Application | BIL, kV | Minimum Crest Voltage, kV | \*Specific Time to Sparkover, μs |
| 30  45  60  75  95  125  150  200  250  350 |  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
| 45  60  75  95  110  150  200  250  350  450  550  650  750  825  900  1050  1175  1300  1425  1550  1675  1800 |  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | 165 | 0.5 |
|  | 195 | 0.5 |
|  | 260 | 0.5 |
|  | 345 | 0.5 |
|  | 435 | 0.5 |
|  | 580 | 0.58 |
|  | 710 | 0.71 |
|  | 825 | 0.825 |
|  | 960 | 0.96 |
|  | 1070 | 1.07 |
|  | 1150 | 1.15 |
|  | 1240 | 1.24 |
|  | 1400 | 1.40 |
|  | 1530 | 1.53 |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
|  | -- | -- |
| 1925 |  | -- | -- |
| 2050 |  | -- | -- |
| 2175 |  | -- | -- |
| 2300 |  | -- | -- |
| 2425 |  | -- | -- |

\*Tolerance on time-to-flashover is minus 0.1 and plus 0.3 μs

During the discussion on the motion, Phil Hopkinson pointed out that multiple high frequency transients were more likely to produce killer waves than a front of wave which is typically a single occurrence. He also pointed out that the standards do not have a test for the high frequency transients at this time.

After the review, Don Saur made a motion to revise the wording of the paragraph. Jim Graham seconded the motion.

The motion to revise the wording passed. The annex will be referred to the WG on Continuous Revision of C57.12.00.

Adding 975 kV back into the Annex A Table was raised. The chair stated that it was removed because it has been removed from Table 6 in C57.12.00. Discussion indicated that it was not necessary to leave it in.

**11.7.5.3** Tutorial on IEEE 4 Revision

The tutorial on IEEE 4 Revision will be held Thursday, October 25, 2012.

**11.7.5.4** Class I/Class II Classification for Transformers

The Chair identified four (4) changes that would be required in C57.12.00 and C57.12.90. These changes will be circulated in the subcommittee.

Bertrand Poulin asked if changes to Table 5 should be done now by Corrigenda. After discussion, it was agreed to wait to make the changes.

**11.7.6 New Business**

Loren Wagenaar, the DI SC Chair, announced that, after 18 years, he was stepping down as Chair. Someone has been identified to replace him and has accepted contingent on approval of his employer.

The DI SC thanked Loren for his service with a standing ovation.

**11.7.7 Meeting adjourned 12.15 PM.** Minutesrespectfully submitted by Eric Davis

* 1. **HVDC Converter Transformers & Reactors – Mike Sharp, Chair; Ulf Radbrandt, Secretary**

On October 22, 2012, the HVDC Converter Transformers and Smoothing Reactors S.C. met at 3:15 p.m., in the Oak Meeting Room of the Hilton Milwaukee City center Hotel, in Milwaukee, Wisconsin. There were 9 members and 31 guests present. One of the guests requested membership. The following are the highlights of the meeting:

1. Introductions were made and the attendance list circulated.
2. The total membership of the SC is 23, but currently that includes 5 corresponding members. If a corresponding member is not present at the meeting, then he/she is not included in the evaluation for the quorum. No corresponding members were present at this meeting. That means that at least 9 members (50% of 18) should have been present in order to get quorum and that was precisely met. The chairman, Mike Sharp, will go through the membership list again to see if it should be reduced further in order to facilitate quorum in coming meetings.

The minutes from the Nashville meeting (Spring 2012) were approved.

There was not quorum at the Nashville meeting so the minutes from the Boston meeting (Fall 2011) could not be approved. These minutes have been approved later via e-mail.

1. The converter transformer standard IEEE C57.129 will expire 2018 and the Smoothing reactor standard IEEE 1277 will expire 2020.
2. Harmonization with IEC.

Paul Jarman explained the present situation for IEC standards, which are related to converter transformers.

* IEC 60067-3 “Power transformers – Part 3: Insulation levels, dielectric tests and external clearances in air” is in the final process for revision. Some controversial issue from Cigré regarding Polarity Reversal test (with considerably longer times for design tests) and oil conductivity are being discussed.
* IEC 61378-2 “Convertor transformers – Part 2: Transformers for HVDC applications”, the revision process will start soon. Anders Lindroth is the convener.

Jodi Haasz (Standards Strategist at IEEE) gave a presentation regarding IEC/IEEE Dual Logo Agreement, which allows for the joint development of documents between both organizations. For a joint standard, there are two parallel processes (one for IEC and one for IEEE) but with a lot of cooperation. The cooperation can be done via joint meetings and/or correspondence. During the process both organizations can decide whether to proceed for a dual logo standard or to go for separate (but more harmonized) standards. Dual logo standards are under development for transformers for nuclear power applications, phase shifting transformers and DC bushings. It may be less difficult to develop dual logo standards for special applications versus for the general transformer standards. Converter transformers can be considered to be a special application. The IEC-IEEE Joint Development Agreement is available at: <http://standards.ieee.org/develop/intl/iec_admin22.pdf>, A Guide to IEC/IEEE Cooperation – Clause 4 is available at: <http://standards.ieee.org/develop/intl/iec_ieee_coop.pdf>

Should we go for a joint standard and by that join IEEE C57.129 and IEC 61378-2 into a dual logo standard? One big advantage is that converter transformers then would be specified in the same way independent of to where in the world they will be delivered. One problem is that the different documents are parts of a series of standards which are arranged in different ways for IEC and IEEE. This can be solved by creating completely new document numbers. Another problem is that the two converter transformer standards refer to many other standards in IEC and IEEE respectively. Considerable discussion will likely be required to obtain consensus regarding the preferred cross references.

It may be too difficult to create a dual logo standard but all agreed we should, in any event, do as much harmonization as possible. That work can eventually lead to a joint standard.

IEC & IEEE do now have different definitions of rated current and rated power. IEC does not include harmonics but IEEE does. IEC do plan to revise that to include harmonics.

We voted among the SC members at the meeting if we should try to form a joint TF with IEC to evaluate the interest to create a joint WG (for a joint standard) or to go for harmonization. The result was 9 for and 0 against. Volunteers to participate were Paul Jarman, Eric Davis, Fred Elliott and Ulf Radbrandt.

1. Klaus Pointner gave a good presentation regarding converter reactors for different topologies for voltage source converters (VSC). This showed that converter reactors are more similar to series reactors (IEEE C57.16) than to smoothing reactors (IEEE 1277).

However, during the discussion afterwards it was decided that text regarding converter reactors should be incorporated in IEEE 1277 which should get a new title in order to include both smoothing reactors and converter reactors. The converter reactor section in this standard will then refer where applicable to IEEE C57.16. This is also in line with IEC 70076-6 (Power transformers – Part 6: Reactors), which also includes both smoothing reactors and converter reactors. Mike Sharp and Klaus Pointner will start the work to create a first new draft of IEEE 1277.

1. Ulf Radbrandt showed the changes that he had done in the Annex regarding insulation coordination. The changes were mainly due to comments from Les Recksiedler prior to the Nashville meeting and an added clause on dc grids. All changes were accepted and no further modifications were proposed.
2. Les Recksiedler has checked if the Cigré guide 406 covers life assessment and life extension for converter transformers. It does not, but Peter Heinzig advised by e-mail that the Cigré Brochures: 227 (Life Management Techniques for Power Transformers), 342 (Mechanical Condition Assessment of Transformer Windings) and 291 (Guidelines for Meteorological Icing Models, Statistical Methods and Topographical Effects) do. Also IEC 62622 contains relevant information. The SC will consider this regarding creation of a guide on life assessment and life extension for converter transformers.
3. The meeting was adjourned at 4:30 p.m.
   1. **Instrument Transformers SC – Ross McTaggart, Chair**

* The Instrument Transformer Subcommittee met on Wed October 24 at 8:00 AM.
* 11 of the 20 members plus 15 guests attended
* 5 guests requested membership

Chair’s Remarks & Announcements

* The schedule for future meetings was presented
* The previous meeting’s minutes were approved as written
* The status of all C57.13 standards was reviewed

11.9.1 Task Force Report: PARTIAL DISCHARGE IN BUSHINGS AND VTs/CTs

The task force on Partial Discharge in Bushings and PTs/CTs met on Monday October 22nd, 2012, at 4:45pm with 41 attendees. Of those, 14 members and 27 guests with 7 guests requesting membership.

* The meeting was opened with attendance sheets and introductions.
* The minutes for the S12 Nashville meeting were presented.
* The TF Chair requested comments on the version #2-C of the guide which was distributed by e-mail prior to the meeting. 5 discussion groups were formed for focused discussiones on:
  + PD in Instruments Transformers, led by Vladimir Khalin.
  + Annex A- PD Test circuits, led by Eberhard Lemke.
  + Annex B- Shielding and Grounding, led by Wolfang Hauschild.
  + PD in Bushings, led by John Graham.
  + Generalities and Definitions, led by Eberhard Lemke.
* After the discussions, each group presented a summary of comments and suggestions from their discussion that will be considered in the next draft. Follow up by the group leaders with comments on the discussed draft #2-C. The TF Chair will provide e-mail addresses to the leaders to facilitate direct communication.
* Meeting was adjourned at 5:50 pm.

11.9.2 Working Group on Current Transformers with mA range (PE/TR/PE/TR/Instrument-WG C57.13.7) - Henry Alton

The WG met on Tues October 22 with 17 people attending The Chair was not able to attend so there was only a short informal discussion. Vladimir Khalin explained the latest correspondence between himself and the WG Chair concerning burdens and a brief discussion followed. He will follow up with an email response.

* + 1. Working Group for Revision of IEEE C57.13 Instrument Transformers -

R. McTaggart

The WG met on Tues October 22 with 16 of the 21 members present (Quorum attained) along with 24 guests - 5 of whom requested membership. This will be dependent on participation.

A brief history of the WG was presented along with the future milestones. The results of the most recent survey were summarized and the request made to submit comments on the new draft by Jan 15. No objections were heard so this will be the due date. It was also emphasized that the comments needed to include solutions, not just point out problems. There are some parts of the draft which WG members are still working on, particularly the SSVT and BCT annexes. These will be distributed as they are completed, no later than the end of 2012. The reference publications in Annex A were discussed and members asked to provide details on more recent books and papers.

A discussion of the Medium Voltage partial discharge requirements in the new draft took place next. Concerns were expressed that the in the current draft the PDEV values are too low for cases where line to ground connected instrument transformers may be exposed to ground potential shifts. The point was made that virtually all US systems are solidly grounded. Examples to the contrary were cited, including one from Carl Schuetz where isolated sections of the system are supplied by distributed generation and are not effectively grounded. This is a relatively new consideration that should not be ignored. Paul Millward pointed out that if these system conditions are known to the manufacturers they can provide the appropriate equipment, including line to line rated VT’s in some cases. The Chair pointed out that the standard already differentiates Voltage Transformers by overvoltage requirements and that possibly this should be carried over to the PD requirements for VT’s and CT’s. Early feedback from a user was presented and discussed. He felt that the prestress voltages were adequate but that the extinction voltages should be raised from 1.2 to 1.5.

The discussion turned to the requirements for 115 kV and above, which in the current draft are the same as in C57.13.5. A majority of survey respondents had accepted this but the reduced prestress and extinction voltages allowed for routine tests was questioned – if the PDEV can be 1.5 x operating voltage for 362 kV and above then why not for lower voltages? There is a footnote under the table which indicates that the reason for the reduced values is that some test facilities are not capable of achieving the higher levels. Paul Millward demanded a further explanation of this and the Chair offered to try to determine the original thinking behind it.

Under New Business, Peter Balma brought up the subject of thermal ratings and overloading of CT’s. The current draft does not have much information on this subject and it should be possible to make improvements for the next revision.

The Chair will resend the email with instructions to retrieve the draft along with the new password when it is available

Adjournment

* 1. **Insulating Fluids SC – Susan McNelly, Chair; Jerry Murphy, Vice-Chair; C. Patrick McShane, Secretary**

**11.10.1 Introduction/SC Member Roll Call/New SC IF Members**

The Chair started the meeting with a welcome and asking the attendees to state their names and affiliations. The Chair explained that it is an IEEE requirement for attendees to indicate their respective affiliations. The AMS data base for the SC and WG rosters must be kept up to date.

The member roll call was made. This was followed by the special role call for those that recently requested membership status. Four of the twelve were present as indicated with an asterisk below and welcomed as new members. The quorum requirement was met with 30 of 45 members present.

Anthony McGrail \*

Paul Mushill

Nicholas Perjanik \*

Melvin Wright \*

Shawn Galbraith

Ken Kampshoff

Jayme Nunes Jr. \*

Marc Cyr

Thomas Melle

James Mustacchio

Prabhu Soundarrajan

Guest requesting membership at this meeting:

Paramjit Bhatia

Dave Hanson

James Rowland

Robert Kinner

Jeffery La Marca

Mark McNally

Jimmy Rasco

Russell Martin

Two members have requested that their status be changed to Corresponding Member:

Tom Lundquist

Thomas Spitzer

**11.10.2 Approval of the posted minutes from Spring 2012**

A motion was made for approval of the minutes. It was seconded and approved.

**11.10.3 Working Group and Task Force SC Reports and Submitted Unapproved Minutes**

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

**WG Chair: Rick Ladroga, Vice-Chair: Claude Beauchemin, Secretary: Sue McNelly**

**The WG Report at the Sub-Committee Meeting, presented by Rick Ladroga:**

The WG had a quorum. Participation in the WG has been active. Approximately a million sets of data have been received.

The new schedule to complete the guide is somewhat aggressive. Several meetings between the S12 and F12 meeting have occurred. The next meeting will be in January in Long beach. The plan is for the 1st draft to be ready in February. Six task forces met Tuesday.

One new business item was discussed on the need to consider stray gassing due to moderate core heating. Rick emphasis that the Data provided by users will be stored securely.

There was no discussion or questions from the attendees.

**The Minutes (unapproved) of C57.104 WG Meeting as Submitted:**

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

**Tuesday, October 23, 2012**

**Milwaukee, Wisconsin**

**Minutes of WG Meeting**

The meeting was called to order by Chair Rick Ladroga at 3:15pm. Vice Chair Claude Beauchemin and Secretary Susan McNelly were also present.

There were 49 of 87 members present. There were 62 guests, and 10 guests requesting membership. A membership quorum was achieved. Guests attending the WG meeting for the first time who request membership will be deferred until the next meeting attended.

Guests requesting membership were (those identified with an asterisk (7 of the 10) will be added as WG members):

Vivek Bhatt\* Tim Albers

Jagdish Burde\* Rainer Frotsches

Jonathan Cheatham\* Paul Griffin

Jeffrey LaMarc\*

Michael Miller\*

Pugazhenthi Selvaraj\*

Sukhdev Walia\*

**Agenda**

1. Attendance Roster Circulation
2. Member Roll Call & Quorum Check
3. Approval of the Spring 2012 minutes
4. Chair's Remarks
5. Task Force Chair Reports
   1. Bibliography – Jerry Murphy
   2. Case Studies – Paul Boman
   3. Data – Luiz Cheim
6. New Business – Core Steel Heating
7. Adjournment

The minutes from the spring 2012 Nashville, Tennessee meeting were approved as written.

**Review of recent activities:**

* Chair’s Remarks
  + Restatement of WG History, Goals, and Objectives  
    Task Force Structure
    - Framework – Jim Dukarm, Dave Hanson, Rick Ladroga
    - Data – Norman Field, Luiz Cheim, Claude Beauchemin
    - Diagnostic Methods – Michel Duval, David Wallach
    - Case Studies – Paul Boman, Arturo Nunez
    - Arc Furnace Transformers – Tom Lundquist
    - Bibliography – Jerry Murphy, Tom Prevost
  + Data Update
  + Data Security Measures and System Development
  + Timeline Review
    - Data Analysis Complete – December 31, 2012
    - Offsite Meetings (Stowe, Montreal, Newport Beach – Jan 22-23, 2013) – Review Draft V1

Rick gave a summary of recent activities and indicated that offsite meetings/webinars will be held between TR Committee meetings. The next offsite meeting will be held in January 22 & 23, 2013 in Newport Beach, California.

Security and archival of the data used in development of the Guide is important. Work on this is progressing and it is expected that this will be available in the near future.

Timeline: The PAR expires in 2014, so time is moving very quickly.

* + Resolve Draft Issues, Issue Draft V1 to WG members – February, 2013
  + Discuss Draft Comments and Feedback – Munich, March 17 – 21, 2013
  + Issue Straw Ballot – May, 2013
  + Resolve Straw Ballot Comments – June/July/Aug 2013
  + Issue V2 for Ballot, September, 2013
  + Discuss Ballot Negatives, Resolve Comments - Fall 2013 Meeting, October 20-24, St Louis
  + Issue V3 for Recirculation Ballot December, 2013

**Task Force Chair Reports: All report have been posted on the website**

* + Case Studies – Paul Boman
  + Bibliography – Jerry Murphy
  + Data – Luiz Cheim

**New Business**

* + (Craig Stiegemeier) I've attached a note I just sent to Steve Snyder for consideration into C57.12.00 based on the results of the work of the Core Over-Excitation Requirements Task Force. As part of the Task Force's suggestions, a future revision of C57.104 should include the following:
  + A guideline that low levels (in terms of ppm/day) of gas generation with a H2/CH4 ratio in the range of 6-8 in transformers filled with mineral oil can be caused by moderate core overheating
  + Text should be included to note that moderate core overheating doesn't place the transformer at risk

Mechanism: (Ramsis Girgis – Found out in some TRs, when the core hot spot reaches 110C and above you get a ratio of H2/Methane of about 7 to 1. At these low levels of temperature, because of the thin film you get H2 and Methane.

There are four papers that will be posted to the web.

Michel Duval indicated that you can also get this from other parts, not just from the core. It may be due to corona/PD as well.

Ramsis indicated that when this does happen, it is fairly uniform.

Comment from Fredi Jacobs that we can’t look at TCG, it should be weighted. He indicated that there is a paper available that addresses this.

The meeting was adjourned at 4:40 pm.

Rick Ladroga

WG Chair

Claude Beauchemin

WG Vice-Chair

Susan McNelly

WG Secretary

**11.10.3.2 C57.106 - Guide for the Acceptance and Maintenance of Insulating (Mineral) Oil - Chair: Bob Rasor**

**The WG Report Given at the Sub-Committee Meeting, presented by Bob Rasor:**

The WG met on Monday, with 48 attendees. A quorum was achieved. Four new member requests were received. Since 1st meeting in Nashville, the WG has held five conference calls. The draft document was reviewed. No Discussion or questions.

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

**Monday, October22, 2012 4:45 PM**

**WG C57.106 IEEE Guide for Acceptance and Maintenance of Insulating Mineral Oil in Electrical Equipment**

**Monday, October 22nd, 2012 4:45 PM**

The meeting was called to order by Chair Bob Rasor at 4:50PM. Introductions were given and roll was taken. There were 48 attendees. Quorum was reached as 17 of 24 members were present.

Attendees requesting membership were:

1. Michael Kaufman
2. Marcelo Catugas
3. Tom Melle
4. Sukhdev S. Walia

Minutes from the Nashville meeting were approved unanimous. A quick review of past activities including 5 conference calls since Nashville was given. There are written rolling minutes from the conference calls available.

Draft document was reviewed

* No change in abstract or keywords
* Some minor wording changes
* Replace service-age with in-service and some discussion following. It was left for further discussion as it may have some distinction as to how long it has been in the transformer or whether it is in a tank or the transformer.
* Discussion on removing ‘factory-fill lines’ and agreement reached to remove it.
* Discussion on removing ‘re-refined’. It was left for further discussion as the suggestion was made it may have contaminants not in new oil.
* Discussion on if Table 1 should match ASTM D3487 since refineries need only meet this criteria. Water content and acidity are both more stringent in C57.106, but refineries are only required to meet ASTM. This poses an issue with some manufacturers as the strict water content denies the ability to buy oil in drums without further processing due to its tendency to have higher water content than 25 ppm. There was disagreement whether a drum with 35 ppm water would pass the dielectric D1817. There was also discussion on how the neutralization number is stricter in C57.106. It was mentioned that if oil from the refinery met ASTM D3487, it could still need corrected prior to putting in a transformer. This would not be able to be done without a filtering media such as fuller’s earth. Refineries present said that new oil always comes at 0.01acid, so not an issue. Tom Prevost made a motion that Table 1 reconcile with ASTM. The motion was seconded. During discussion there was concern about the neutralization number also being changed and a request to amend the motion to address only Karl Fischer Moisture. The motion was not amended and a vote was taken. 13 for and 3 negatives. Motion was approved.
* Meeting was adjourned.

**11.10.3.3 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 C57.130 WG Report Given at the Sub-Committee Meeting:**

Jim Thompson presented The WG met on October 23 and quorum was achieved. There were 58 people in attendance, of which 11 were members, and 4 requested membership. The PAR was issued in 2010, and the WG group is on Draft 3. In the document, it reflects more of a guide, not trial-use. The draft guide will posted be available for straw ballot.

Discussion by attendees: An attendee stated that there is still a need to change the PAR title from “Oil-Immersed” to “Mineral Oil Liquid-Filled” to adhere to the pending guidelines. It was noted that these are at present just expected recommendations, but that it was likely this would be the direction in which to move.

**The Minutes (unapproved) of C57.130 WG Meeting as Submitted:**

October 23, 2012

Unapproved Minutes Working Group Meeting for IEEE PC57.130

IEEE “Trial-Use Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors”

Chair Jim Thompson

The working group meeting was conducted on October 23, 2012 at Milwaukee, Wisconsin with 58 people in attendance, including 11of the 14 current working group members. Prior to the meeting the membership was reduced based on prior attendance. Four new guests requested membership and will be considered.

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 presently in draft 3.

The previous minutes from S11 (spring 2011), F11 (fall 2011), and S12 (spring 2012) were presented for approval with a working group quorum. The S11 minutes approval, motion by Don Cherry and second by Tom Prevost, was followed by unanimous approval. The F11 minutes approval, motion by Susan McNelly and second by Don Cherry, was followed by unanimous approval. The S12 minutes approval, motion by Don Platts and second by Bill Darovny, was followed by unanimous approval.

Tom Prevost’s previous motion at the F11 meeting to change the guide from a trial use guide to that of a guide and add the word “mineral” to “oil” in the title was discussed. After a motion by Bill Darovny and second for the change by Don Platts the motion was discussed regarding the document as a guide. Tom mentioned that this would help get the document in place as a guide more quickly. The vote was unanimous in favor.

Discussion included the introduction material to be revised to pertain to a guide document rather a trial use document. A note in draft 19 uses zero as a value in the text and the wording will be changed to “non-detectable.”

Then discussion included precision for Analysis of Gases Dissolved in Electrical Insulating Oil by Gas Chromatography. It was mentioned that the parts per million in oil are cumulative over the temperature rise test and so the levels are higher than the minimum detection levels.

Other discussion included changing the document to add a note that it is common practice to take backup samples and also to provide data reports for the factory test values to the user. The document will be posted on the web site, provided to the working group members for straw ballot, reviewed by Susan McNelly for conformance with the IEEE formatting requirement, and then the plan is submit it to the MEC for review and then to ballot.

Respectfully submitted,

Chair Jim Allen Thompson

**11.10.3.4 C57.139 - Guide for Dissolved Gas Analysis of Load Tap Changers**

**WG Chair: David Wallach, Secretary: Sue McNelly:**

**The C57.139 WG Report Given at the Sub-Committee Meeting:**

The goal of the WG is to be able to develop generic design category norms for different LTC types. However, based on data collected so far, this may be difficult to do because of variations between users on loading, maintenance, and temperatures. IEEE has indicated that the WG is not able to obtain a list of users and contact them to inquire if they would be willing to share data.

A presentation on “Experience with Use of C57.139 LTC DGA Guide” was presented by John Pruente and is available for review on the web. This was used to analyze a specific manufacturer’s LTC. The analysis emphasized the previous concerns regarding loading, maintenance, and temperature differences.

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

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

**Tuesday, October 23, 2012**

**Milwaukee, Wisconsin**

**Minutes of WG Meeting:**

Chair Dave Wallach called the WG meeting to order at 11:00am. WG Secretary Susan McNelly was also present. There were 33 of 57 members present (Quorum requirement was met). There were 60 guests present with 8 guests requesting membership. Guests attending the WG meeting for the first time who request membership will be deferred until the next meeting attended.

Guests requesting membership were (those identified with an asterisk (4 of the 8) will be added as WG members):

Marcelo Catugas\* Filberto Zaweta

Han Suh Joon\* Tim Rinks

Robert Kinner\* Rainer Frotscher

Egon Kirchenmayer\* Larry Kirchner

**Agenda:**

1. Introductions/Member Roll Call
2. Approval of minutes from past two meetings
3. PAR & Schedule Review
4. Task Force Updates
5. User feedback and Guide improvements
6. New Business
7. Adjourn

Dave asked that if anyone was interested in the open Vice-Chair position, to please see him after the meeting. Following the meeting, Mark Cheatham indicated interest and will serve as WG vice-chair.

Minutes from the spring 2012 Nashville, Tennessee and the fall 2011 Boston, Massachusetts meetings were approved.

**PAR & Schedule**

1. Working group meetings until next revision needs to begin ballot:
   * 1. Fall 2012
     2. Spring 2013
     3. Fall 2013, and
     4. Spring 2014
2. Balloting process – Mid 2014
   1. Straw Ballot
   2. MEC
   3. Form Ballot Pool
   4. Ballot
   5. Ballot Resolution
3. PAR expiration – December 31, 2015

Submit balloted document to REVCOM by October 15, 2015 deadline

**Task Force Updates**

* Tasks
  + Develop generic design category norms for Appendix A LTC Types
    - Gather data by type and operating conditions
    - Begin attempts to develop generic design category norms
  + Variation of norms between users due to loading, maintenance, temperatures
* Data sources – we contacted IEEE and we are not able to obtain a list of users of this Guide to contact them to inquire if they would be willing to share data (legal/privacy).
* REPORT: Suggested set of LTC DGA data fields, vetted by data task group.

Jim Dukarm indicated that they plan to put out a list of items that people should collect when collecting data. Jim indicated that there are some issues due to the extreme differences in results for different populations that may make it difficult to develop norms.

* Other Diagnostic Method - Duval Triangle

Dave indicated that Michel is working on draft text to add to document. We may want to look at putting this into the main body of the document.

* Other Topics
  + Presence of Benzene and Toluene
  + Use of word “fault” with DGA

**Presentation: Experience With Use of C57.139 LTC DGA Guide,** presented by John Pruente from SPX (presentation posted on the web in entirety)

**Outline**

* Background of UZD DGA Study
* Summary of Data Reviewed
* Results of Study to Date
* Suggestions for Revisions / Additions to C57.139 Guide for Consideration

**Background:**

* Began with request from Midwest utility in March 2010
* Too many “false positives” with code 4 DGA results from oil lab.
* Utility needed a better way to analyze and use DGA data as a predictive maintenance tool.
* Grown to include 5 utilities located in different regions around the United States:
  + Northeast
  + North Central
  + South Central
  + North Western
  + South Western
* Utility selection criteria
  + Have 50+ UZD’s in service
  + Sample LTC for DGA annually (minimum)
  + Have historical DGA database to work with

**Objectives**

* Determine calculated DGA limits for each utility population based on the C57.139 guide applied to the historical data.
* Verify limits by correlating DGA diagnosis to maintenance inspection “as found” condition.
* Develop universal UZD DGA criteria for use by UZD owners (if possible).
* Develop a more consistent approach and analysis method (algorithm) for UZD DGA.
* Investigate “false positives” and identify a way to recognize them at the analysis stage.
* Identify most effective next steps to be taken when a UZD is outside the norms.
* Identify which maintenance activities are most critical for the UZD model.
* Learn as much as possible about operational performance of the UZD model LTC.

**Results to Date**

* Wide variation in limits between utilities
  + Differences in maintenance practices
    - Length of maintenance cycle
    - Replace vs. reuse oil
    - Use of on line filtration
    - Desiccant breather maintenance
  + Transformer loading
  + Frequency of operation
* False Positive “Maverick” Units Identified
  + Ethylene / Acetylene ratio outside calculated limits (>1)
  + First noticed at Utility A (< 7% of population)
  + Indicative of “Severe Contact Heating” classical DGA diagnosis
  + IR Scans while in service and internal inspections revealed no issues
  + Further research needed to identify source of elevated Ethylene
  + Trend using Duval Triangle 2² to verify stability

**UZD Best Practices**

* For units flagged outside the DGA norms established
  + Retest oil to verify trend and rate of change
  + Check Duval Triangle 2² trend
  + IR scan to check LTC tank temp and look for localized heating
  + Check N2/O2 to verify breather open (ratio should be < 4)
  + Check for recent change in loading and / or frequency of operation
  + Review past maintenance history for previous problems (repeating problem)
* After performing maintenance
  + Replace old oil with new , clean, filtered oil
  + Sample after oil filling and before energization (benchmark)
  + Re-sample again within one week of energization to verify no issues

**Summary**

* Universal DGA limits for UZD LTC’s not possible
* C57.139 Guide works well for given utility / LTC model population
* Application of U1 / U2 limits good start for alert and alarm levels
* Application 95% / 99% limits for key ratios worked well for identifying units outside the norm and with real problems
* N2/O2 ratio on free breathing LTC’s works well for identifying breathers in need of maintenance
* Identified “Maverick” gassing pattern for UZD’s and method of recognizing it
* Use of Duval Triangle 2² for trending LTC’s headed towards failure very useful

**Suggested Changes**

* Add suggestion on what to do when calculated limits are too low
  + Suggest using C2H4/C2H2 boundary limits of Duval Triangle 2:
    - <.35 – normal and in “N” Zone continue operation
    - > .35 and <1.2 – increase sample frequency / trend (Quarterly)
    - >1.2 and < 4.0 - increase sample frequency / trend ( M`onthly / Weekly)
    - >4.0 – Consider outage and inspection
  + And/or apply Stenestram Ratio¹ limits for UZD, UZE, UZF, or UZG models
* Encourage utilities to correlate calculated limits to LTC inspection observations for refinement of initial limits
* Add use of Duval Triangle 2 for trending , possibly include case study example in Annex C
* Consider adding mention of importance of N2/O2 ratio for Free breathing LTC’s or breath through a desiccant (dryer).
  + Ratio > 8 indicate plugged air path with high degree of confidence
* Add recommendation on how often limits should be recalculated and updated.
  + Suggest every 5 years or after any major maintenance initiatives involving multiple units of a given model are completed
* Add recommendation for replacing oil in LTC when maintenance performed
  + Due to length of time between maintenance intervals
  + Filtering used oil does not remove gasses, can cloud after maintenance benchmark
* Recommend “sanity” limits for individual gasses set at 5 – 10 X U2 calculated limit to catch cases where :
  + Breather is plugged and gas concentrations increase significantly
  + Excessive LTC operations due to faulty controller
  + Mechanical binding causing slow operation and longer than normal arc duration

Discussion of the presentation followed.

**Future Activities**

* Begin document revision using Central Desktop
  + Begin incorporation of Triangle write-up by Michel Duval.
  + Once we get a new draft started we can begin to make it available to the working group.
* Data Task Force
  + Consider how we should address generic design category norms
  + Generate draft position statement if needed to address ability or inability to create generic design category norms
  + Consider addition of case histories

**New Business**

No new business was discussed.

The meeting was adjourned at 11:45am.

Dave Wallach, Chair

Susan McNelly, Secretary

**11.10.3.5 Working Group PC57.147, Guide for the Acceptance and Maintenance of Natural Ester Fluids in Transformers**

**TF Chair: Patrick McShane, Vice-Chair: Clair Claiborne, Secretary: Jim Graham**

**The C57.147 WG Report Given at the Sub-Committee Meeting:**

Patrick McShane presented. The WG’s objectives, issues to consider in the revision, responsibilities of the several TFs, and TF chairs and members have been determined. He expressed his appreciation for the high interest and number of volunteers that have joined this WG.

All of the TFs, but one, are behind schedule, so conference calls between the TC meetings will be required. He thanked Don Cherry for having his TF draft completed.

The current standard will be made available to WG members.

**Minutes (unapproved) of the PC57.147 WG meeting as submitted:**

**PC57.147** **October 22, 2012, Milwaukee, WI**

* Call to Order was made at 3:15 PM.
* Introductions/Membership Attendance/Quorum Check
* The attendance
  + 24 of 34 members
  + 56 guests
  + total attendance = 80
  + 9 guests requesting membership
* A motion to approve the Spring 2012 minutes was made by Don Cherry, seconded by Jerry Murphy. The Spring 2012 Minutes were approved
* Chair's Remarks, Patrick McShane:
  + Welcome of new members
  + WG membership requirements & responsibilities were reviewed
* The Chair proposed expanding section 9, Safety and Environmental Care Procedures by detailing the Environmental, Health & Safety (EHS) properties of natural ester fluids. One user comment supported the expansion, stating that if a customer specifies NE fluid for safety or environmental reasons the guide should define EHS capabilities. Some comments were made against this proposal, including an insulating manufacturer, primarily because there are too many different regulation bodies at the local, state or provincial and national levels to be able to specifically state a particular fluid meets a particular requirement or regulation. However, meeting regulations is not the objective raised by the Chair, rather setting a few key property values, such as biodegradability similar to the US EPA’s Design for Environment (EdF) program, and the Federal BioPreferred product purchase program based on percent of bio-based content. This would be similar to having limits on flash and fire points in current standard related to fire safety.
* Task Force Reports
  + Revised task force rosters were given to the task force chairs
  + Don Cherry reported TF1 has met by teleconference and completed a first draft of recommended revisions to section 4 of the guide. This draft was submitted to the Chair.
  + TF Chairs were asked to meet with their volunteers after the WG meeting adjourned to schedule future TF efforts.
  + All task force Chairs were directed by the chair to prepare their recommended revisions and submit them before the spring 2013 meeting.
* Items of Interest for this revision of the guide previously identified were assigned to the task forces to evaluate and resolve. No additional items were added to the listing. The issue assignments are attached to these minutes.
* WG officers will review the C57.93 Installation Guide to determine if any items of interest for revision would be more appropriately addressed in the installation guide.
* Old Business (None)
  + TF volunteers will be contacted by the TF chair and advised of upcoming TF meetings
* New Business
  + The Chair advised a Word copy of the active C57-147-2008 guide would be made available to the task force chairs to aid in their review and revision proposals.
* A motion to approve the Spring 2012 minutes was made by Jerry Murphy, seconded by Don Cherry. The adjourned at 4:17 pm.

Respectively submitted,

Jim Graham, Secretary

***C57.147 Minutes Annex I: Item of Interest for Revision and Respective Task Force Assignments***

**TF 1: Section 4 - Fluid Tests & Significance**

* Low Temperature Properties TF1 & TF2
* Particle Count limits - statement addressing lack of data by TF1
* Partial discharge inception TF1 & TF2
* Furan analysis TF1
* DGA (coordination with NE DGA WG) TF1

**TF 2: Section 6 - Handling & Evaluation of NEF used in field filling**

* Testing evaluating oxidation stability - TF2
* Dielectric performance. (Is ASTM D6871 sufficient?) TF2
* Large Gap and Creep Withstand TF2
* Highly non-uniform fields TF2
* Low Temperature Properties TF1 & TF2
* Different minimum values of dielectric breakdown for totes and drums as received vs. bulk shipments TF2
* Flash point limits for vapor phased and retro filled transformers TF2
* Partial discharge inception TF1 & TF2

**TF 3: Compatibilities of NE Fluids with Components & Accessories**

**(includes Current Section 7 - Evaluation of NEF in New Equipment)**

* No section on load tap changers (unlike C57.106) TF3

**TF 4: Section 8 - Maintenance of NEF**

* Additive level evaluation

**TF 5: Annex B (Misc. Technical Issues)**

**TF 6: Field Application Guide & Equipment Evaluation**

* Determining new loading limits for retro filled xfmrs - TF6.
* Online monitoring/diagnostics sensors (dissolved gas, moisture, temperature)
* NE Fluid Handling vs. Mineral Oil
* Transportation and Storage Requirements for NE Fluids vs. Mineral Oil
* Retro-Filling Existing Equipment
  1. NE Fluid Filling Procedures
  2. Post Fill Procedures – Recommended Tests \*
  3. Start-Up Procedures
  4. Key Properties Change of NE fluid as it ages
* Filling New Equipment

1. NE Fluid Filling Procedures
2. Post Fill Procedures - Recommended Tests \*
3. Start-Up Procedures
4. Key Properties Change of NE fluid as it ages

* Cold Start Operations
* Recommended Monitoring
* Proper NE Fluid Disposal Procedures
* Nameplate changes and/or informational labels

**\* May need to bring in relevant transformer subcommittees**

**TF 7: All other sections - Miscellaneous**

* Consolidation SC IF Fluids Guides impact on revision process.- TF7
* Should guide include environmental values TF7
* Joint participation with IEC TC10 / TC14 TF1 & TF2
* Research relevant published papers & update bibliography

**C57.147 Task Force Rosters** 30 October, 2012

**TF 1: Section 4 - Fluid tests & Significance**

**Chair: Don Cherry**

Members: Dave Hanson Jimmy Rasco

Mel Wright Paul Caronia

Mark Scialdone Marcelo Catugas Andrea Cavallini

**TF 2: Section 6 - Handling & Evaluation of NEF used in field filling**

**Chair: Lance Lewand**

Members: Clair Claiborne Derek Baranowski Rich Simonelli

Juan Castellanos James Gardner

**TF 3: Compatibilities of NE Fluids with Components & Accessories**

**(includes Section 7 - Evaluation of NEF in New Equipment)**

**Chair: Jerry Murphy**

Members: Tony Reiss Sheldon Kennedy

Marshall Stewart Greg Stem

James Gardner Dave Harris

Christopher Sullivan Rowland James

**TF 4: Section 8 - Maintenance of NEF**

**Chair: Stephanie Denzer**

Members: Libin Mao Nick Perjanik

Mel Wright

**TF 5: Annex B**

**Chair: David Sundin**

Members: S. Joon Han Dave Hanson

Paul Caronia Bob Kinner

Mark Scialdone Jesse Inkpen

**TF 6: Field Application Guide & Equipment Evaluation**

**Chair: John Luksich**

Members: Roberto Asano Dave Harris Rowland James

Jane Verner Scott Reed

Thomas Spitzer Bob Kinner

**TF 7: All other sections - Miscellaneous**

**Co-Chair: Patrick McShane**

**Co-Chair: Jim Graham**

Members: Sue McNelly

**11.10.3.6 WG PC57.155 Natural Ester and Synthetic Ester DGA Guide**

**Chair: Paul Boman, Secretary: John Luksich**

**The C57.155 WG Report Given at the Sub-Committee Meeting:**

John Luksich reported in place of Chair Paul Boman. The WG is finishing laboratory experiments. Evaluation of about 4800 in service TRs is being performed. There were discussions on the interpretation and the validity of using laboratory data and it was suggested that this data should be put in an Appendix rather than in the main document. There was also a suggestion that the guide be changed to a Trial-Use Guide. No decision to make this changes was made.

**Minutes (unapproved) of the WG meeting as submitted:**

**Meeting Date: October 23, 2012 Time: 9:30 AM**

Attendance: 22 members out of 57 members were in attendance, total attendance was 82 and 6 people requested membership.

- Quorum not present

- intend to approve minutes on-line or at next meeting with quorum

- review Spring 2012 minutes; no comments or corrections

Reviewed plan to adjust Workgroup membership for non-attendance and non-participation

Continued business

PAR Approved March 2010 and expires on Dec 31, 2014

Chair feels that enough information is available to move forward with Guide

Timeline for guide process:

* Draft Guide for Workgroup review
* Maybe several sections of Guide may be send out for Workgroup comment prior to Draft
* Comment resolution
* Mandatory IEEE Review
* Voting pool maybe around Spring 2013 meeting depending on the number of comments
* Ballot

The question of a dual logo standard came up. Jin Sim suggested that the ASTM TC10 liaison (Kevin Rapp) be contacted for dual logo discussions. Michel Duval mentioned that IEC 60599 may contain information on liquids other than mineral oil, and that IEC interest will be low.

Proposed Guide Structure presented with no comments.

Guide Section 4 on Theory

* The Chairman asked for feedback on the theory section.
* Will push for a draft by December and ballot pool before the Spring meeting.
* The 90th percentile results for 4800 transformers will be sent out
* Patrick McShane suggested borrowing the oxygen discussion from the silicone gas guide. Jerry Murphy, who did the last revision, stated that there isn’t much there.
* Joon requested an expanded discussion of the pyrolysis steps for the laboratory tests.
* Luis stated that the carbon oxides ratio is essential and would like a discussion of the carbon oxide ratios.
* Jin Sim does not want to see carbon oxide limits in the guide, but would like a discussion of such limits.
* Bob asked about the water content of the laboratory tests, as the water gas shift chemistry affects the results. He also wondered if CO was produced directly or formed from a reduction of CO2.
* Q. What was the laboratory test cell material? A. stainless steel.
* Patrick McShane suggested, due to insufficient data and round robin testing, that this document be changed from a guide to a trial use guide.
* Judy said that the trial use guide has a life of 2 years and can be revised or elevated to a full use guide.
* There was some concern expressed about the amount of laboratory data. Fredi Jacob stated that the laboratory data are critical for application and ratio development.
* Jerry Murphy suggested that the laboratory data be in an appendix.
* Typical values 90th percentiles: Jin Sim expressed concern with giving typical levels without adequate wording

Moved to adjourn

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

**WG Chair Jim Thomson, Vice-Chair TV Oommen**

**The C57.637 WG Report Given at the Sub-Committee Meeting:**

Jim Thompson presented. There were 32 attendees at the meeting. The WG has 15 members of which 11 were present so the quorum was achieved. Draft 3 will be posted soon. There was an issue of voltage class division that did not coincide with C57.106, so that will be changed to match. Sue McNelly volunteered to help assure it meets the IEEE format. The goal is to have approved before the 2014 expiration.

No questions or comments were made.

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

October 23, 2012

Unapproved Minutes Working Group Meeting IEEE PC57.637, IEEE PES, Transformer Committee, Insulating Fluids Subcommittee, Working Group for the “IEEE Guide for Reclamation of Insulating Oil and Criteria for Its Use”

The working group meeting was conducted at 8 am on October 23, 2012 at Milwaukee, Wisconsin with 32 people in attendance and with 11 of the 15 current working group members present. This document was reaffirmed in 2007 and the PAR for revision was approved December 10, 2008. A PAR extension request was approved this summer until December of 2014. Working Group member Jim Thompson (chair) conducted the meeting.

The minutes for the F11 (fall 2011) meeting and the S12 (spring 2012) meeting were both reviewed. The F11 minutes approval, motion by Don Cherry and second by Dave Sundin, was followed by unanimous approval. The S12 minutes approval, motion by Don Cherry and second by Ed Tenyenhuis, was followed by unanimous approval.

The final sections were submitted by the volunteers and reviewed as draft 3 at this meeting. Sue McNelly offered to post the current draft on the IEEE Transformer Committee website. The ASTM document text in this document was revised to eliminate the dates of revision. The DBPC document reported by Mark McNally has been updated from the ASTM D27 series publication. The voltage class divisions in table 1 will be reviewed for revision to change the table heading value from 288 KV to 230 KV to reconcile with IEEE C57.106-2006. Sue McNelly volunteered to help ensure the document meets the IEEE and SA formatting requirements. The document will be provided to the working group members for straw ballot with a goal to submit it to the MEC review and approval and then for ballot.

Respectfully submitted,

Chair: Jim Thompson

Vice Chair: TV Oommen

**11.10.3.8 TF on Particle Count Limits in Mineral Oil**

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

**The TF Report given at the Sub-Committee Meeting:**

Mark presented. No meeting was held in Milwaukee.. Mark is working with Tom Lundquist on a section in C57.152 which discusses particle count. The conclusion of TF was that results were too scattered to set limits. Tom Prevost stated in the end there was no correlation to be found. Valery Davydov indicated from a scientific point of view, that a negative result is still is a result and that maybe a document should be worked on. Arnold Carlos indicated that maybe we are looking at the wrong issues. Mel Wright indicated that D1816 is sensitive to particles. He indicated that sample procedures are insufficient. There are issues with cleanliness of the sample bottles and lab variance issues. Claude Beauchemin talked about the sample issue and that it is very difficult to find a supplier of bottles meeting requirements.

A question was asked about what is the future direction of the TF. Mark indicated he didn’t have an opinion. Jim Thompson made a motion that the TF should create a report of findings as its deliverable. The motion carried.

**11.10.3.9 TF on Moisture in Oil**

**Chair: Bob Rasor**

**The TF Report given at the Sub-Committee Meeting presented by Bob Rasor:**

The core group of participants drafted 10 questions and sent out as a survey to 63 TF members with only 17 respondents. The survey results show that a majority of respondents use oil testing for moisture content.

Valery Davydov commented that the color chart can also be used as a method for determining moisture content if used correctly, but only for new oil. It was emphasized that present methods are only estimates of moisture content, and that while they may not be perfect, they can give indication of a unit’s moisture content.

After much discussion, a motion was made and passed to have the TF continue its work. If and when the TF under the Insulation Life SC becomes an official WG, then we will review at that time the possibility of moving this work into that WG.

**The TF Meeting Minutes (unapproved) as Received:**

**TF Moisture in Oil**

**Tuesday October23rd 2012 4:45 pm**

**Milwaukee, Wisconsin USA**

The meeting was called to order by Chair Bob Rasor at 4:55pm. There were approximately 102 attendees. 27 of the 63 members were present. Two requested membership.

Attendees requesting membership:

Leon White

Emilio Morales Cruz

1. Roster was distributed
2. Introductions were given. There was not a quorum to approve minutes.
3. Minutes to last meeting were discussed briefly but not approved.
4. Scope was reviewed with a brief history of the TF

Discussion and review of past data was given – 6 slides

Slide1: Relative saturation is important to consider

Slide2: Response of moisture in oil to temperature. Valery Davydov explained the graph in detail

Slide3: Shows fluctuation of ppm values in winter vs. summer. Data is based on Karl Fischer (KF), with percent saturation being calculated.

Slide4: Again, shows seasonal variation of KF but with more than 20,000 sample points.

Slide5: Shows response of relative saturation with two different percentages of moisture in solid insulation examples. This was explained by Valery Davydov. Data was done in a test laboratory at a University, not a transformer. Percent moisture in the solid insulation was done by pulling paper samples. The idea was to show if temperature is constant, equilibrium curves may apply.

Bob Rasor stated that the group has been asked “where do we see the task force going”? The core group of participants drafted 10 questions and set them in a survey to the TF members. There were 8 questions with a 1 (disagree) to 10 (fully agree) choice for the survey. The questions prompted discussion.

Of interest is the fact that a large number of people use oil testing. Valery further explained the color chart and it was shown as an example of an industry method. Valery clarified this chart is only for Karl Fischer samples and only for new oil. Solubility limits differ for used oil and there are different coefficients for the saturation equation for used oil.

Bob reiterated that they are tools to only estimate moisture. They may not be perfect, but can give indication – especially for transformer owners than cannot put an online monitor on each transformer and can only pull samples for KF analysis. Further discussion on the color chart included:

* For aged oil, the solubility curves must change for saturation. Valery said three charts would be necessary to account for the different solubility limits and will be provided in the new TF Moisture in Insulation Systems. Jim Thompson commented there was 200% error reported in this method.
* Valery said the error is improved to 100% when taking solubility limits into account with three charts. And applying more data points reduces the error another 50%. The method is a reliable tool for estimation of the moisture condition in a transformer.
* A question was asked if bubble evolution is addressed. Valery gave an example of how saturation increased to near 100 % saturation and resulted in the creation of water droplets in that extreme load and temperature situation.
* Question 8 & 10 were not a 1-10 format, but comments. These were shared with group.

Comments were then opened to the floor again.

* Jin Sim - relative saturation is important. However in the 2002 version of C57.106, the values were too strict, and laboratories flagged these and it caused problems as the transformers were dry.
* Valery - % saturation is measured with a moisture sensor. Also we need a Karl Fischer test to verify the meter. KF must only be done with a correct solubility limit and a correct temperature.
* Jin – How many transformers actually have these meters?
* Valery – Probably less than 1%. Use of color chart is then important. But it must be done correctly.
* Claude B - Should not just take 1 sample. There is a very high risk of error and oversimplifying.
* Jim Thompson - The 2002 version of C57.106 had an issue in that it gave moisture in the paper limits, and moisture in the paper cannot be estimated from the oil. Sensors cannot tell the moisture in the paper.
* Claude – that is the point he was trying to make. The problem is you cannot take the sample without the temperature. If you have the correct temperature, it can be done, but you must get the correct parameters.
* Jim T – Do the case studies presented have the temperature of the paper?
* Another comment from the floor was regarding looking at the moisture from a mass balance perspective.
* Valery D – this is extremely difficult in a real transformer because there are two types of moisture transition.
* Bob – How do members see the TF future as there is now a new TF on moisture in insulation systems?
* Valery –TF Moisture in Oil is a part of what they are doing in the new TF and this work is still very important. Getting data and case studies is still valid work.
* Don Platts – What was the goal of this group? Were the objectives met?
* Bob referenced the scope and said that case studies were provided, however the group is not yet ready to provide guidance. Saturation values can help estimate transformer condition.
* Jim - C57.106 is only an oil guide and is not supposed to do that. Guidance is found in other documents.

Meeting was adjourned at 6:00 pm

**11.10.3.10 TF on Consolidation of Insulating Fluid Guides**

**Chair: Tom Prevost**

**The TF Report given at the Sub-Committee Meeting presented by**

Tom Prevost presented. No TF meeting was held. Nothing to report.

**Questions and Discussion:**

The SCIF Chair asked Tom what is the plan for moving forward?

Tom stated that the concept is to bring all insulating fluids into one document. This was a result of a survey outcome and the basis to create his TF for the consolidation project. The SCIF needs to make sure the standard revisions and documents are a priority and current activity should continue. It is known that there are concerns with its practicality. A time slot for the S13 meeting will be requested.

**11.10.4 Old Business:**

**Tutorials for future meetings Tom is still looking for ideas.**

No topics were brought forth.

**IEEE TC Data Archiving**

The Chair stated that the TC is working to provide a secure location for archiving data obtained for the development of standards.  Access issues still need to be resolved as some data is provided under the understanding that it be kept confidential and be accessible only to those working on standard revisions.

**11.10.5 New Business:**

**New Revision of C57.121 Guide for HMWH – Dave Sundin**

Dave Sundin addressed the SCIF that the High Molecular Weight Hydrocarbon insulating liquid guide recently underwent the reaffirmation process successfully. However, it is based on an old guide having very few updates since it first published (1998). Dave made a motion that a TF be formed to develop and submit a PAR to revise the Guide. Jim Thompson seconded.

Tom Prevost commented that this could impede progress on the consolidation of the insulating fluid guides. Several others joined in the discussion. It was determined that if progress on consolidation TF goes well, any PAR issued for C57.121could be cancelled and the work transferred to a new WG for consolidation of the guides. The motion carried.

New motion was made by Dave and Jim Thompson seconded. This second motion carried.

**Call for other new business.**

No additional requests received.

**IFSC Adjourned at 4:15PM**

**Respectfully Submitted:**

**Susan McNelly, Fluids SC Chair**

**Jerry Murphy, Fluids SC Vice-Chair**

**Patrick McShane, Fluids SC Secretary**

* 1. **Insulation Life SC – Bruce Forsyth, Chair**

The Insulation Life Subcommittee met in Milwaukee on October 24, 2012 at 8:00 AM.

A hand count of the members revealed that a quorum was present. David Harris proposed a motion to approve the minutes of our meeting in Nashville, TN on March 14, 2012 as written. Kent Miller seconded the motion. There was no discussion and the motion was unanimously approved.

The attendance rosters show that the meeting was attended by 197 people, 58 of 91 members and 139 guests. 10 guests requested membership.

**11.11.1 Chair’s Report**

The Spring 2013 IEEE Transformers Committee Meeting will be held in Munich, Germany. The Fall 2013 meeting will be held in St. Louis, Missouri.

In order to ballot a standard, you must be a member of the Standard’s Association. In addition, you will be notified of ballots based on your profile in IEEE MyProject. All members and guests are encouraged to check and update their profile in MyProject.

Working Group Chairs must be a member of the Subcommittee.

The minutes for Activity Groups should record:

* The attendance including the number of members, the number of guests, and if a quorum was present
* The Chair or Acting Chair
* The Secretary or Acting Secretary
* The name of the member who makes a motion, the name of the Member who seconds the motion, and if the motion carried or was defeated.
* A summary of the discussion and comments.

The Administrative Subcommittee is looking at the membership requirements for Subcommittees. Until they provide guidance on membership, this Subcommittee will use the following criteria:

* You must have attended at least 3 of the last 4 meetings in order to be considered for membership.
* Existing members will be moved to guest status if they miss three meetings in a row. Once moved to guest status, former members will need to meet the requirements for new members.
* Guests will be removed from the roster if they miss 3 meetings in a row.

The Transformers Committee is looking for tutorial topics. Please talk to your subcommittee Chair if you have any suggestions for technical presentations.

**11.11.2 Project Status Reports**

**11.11.2.1 C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution Transformers**

C57.100 was recently approved. This standard is valid until 2021.

**11.11.2.2 C57.119 IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings**

C57.119 is valid until 2018.

**11.11.2.3 C57.154 Design, Testing and Application of Liquid-Immersed Transformers with High-Temperature Insulation**

C57.154 has been approved and should be published by October 30, 2012. The existing PAR expires in 2013.

**11.11.2.4 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators**

C57.91 was recently approved. This standard is valid until 2012.

**11.11.2.5 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers**

The 1276 PAR expires in 2016. The standard is valid until 2018.

**11.11.2.6 1538 IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformers**

1538 is valid until 2021.

**11.11.3 Working Group and Task Force Reports**

**11.11.3.1 Task Force on Winding Temperature Indicators - Phil McClure**

The meeting was called to order at 9:45 am. There were 7 members and 22 guests in attendance. There are now 8 members in the Task Force, so a quorum was achieved. Eight guests requested membership, but only two of these attended the Spring 2012 meeting.

The minutes of the Spring 2012 meeting in Nashville were emailed to the members before this meeting. The chair requested a motion for approval of the minutes and Dave Wallach made the motion. Juan Castellanos seconded the motion. The members voted approval and there were no dissenting votes.

**Old Business**

The Task Force membership has been reviewed and trimmed as was announced at the Nashville meeting. After the next meeting in Munich, the roster shall be reviewed again for the addition of new members.

**New Business**

The experiment was modified since the initial release and the changes were explained to the group. As a result of running the experiment’s first section, which determines thermometer time constant, section 2 of the experiment – thermowell time constant - was found to be unnecessary. Section 2 and other sections which were dependent on it were removed. The requirement for multiple fluid circulation speeds when measuring WTI system time constants with low (25 °C) fluid temperature was simplified to a single (medium) speed, since fluid velocity is not zero nor very fast as a thermal head is developing. Later data indicated that fluid velocity does not make a significant difference in the time constant. The section on 200% thermowell excitation was also removed, since the thermowell manufacturers warned that their products would be damaged if they were taken beyond their full scale ratings. The recommendation is that any overload be considered within the full scale rating of the thermowell.

There is one more WTI system that needs to be tested and it will be done in a few weeks when a high power ballast resistor is obtained.

The data for the static accuracy and response times of the thermometers was presented along with graphical plots of the data for the WTI systems. A discussion of the results and conclusions ensued. This information essentially answers the question that had been asked as the charter for the Task Force.

A discussion was had on how to introduce the results of the experiment, in order that they can be used as a reference for future documents and existing documents in the future. The suggestions at the prior meeting were reiterated and some new ideas presented. These will be pursued with greater urgency now that the experiment has nearly been completed.

The next discussion dealt with what to do with the existing paper, which has been written over a period of many years, while we attempted through several avenues to get data to answer the charter question. During these years Task Force members thought that the paper should also include descriptions of the types of WTI systems that were being investigated, how they are used and applied, how they are calibrated and maintained, what the consequences are of failure to accurately measure winding temperatures and what more recent or new technology might be applied to supersede the older technologies, in the event they are found to be problematic. These sections were added and as a result the paper contains many of the properties of a guide. The members of the Task Force and several guests expressed their opinions that the experiment should be published and the existing paper be completed to the level of a guide.

As a result of this discussion, the Chair requested a motion to bring the recommendations of the Task Force to a vote. Dave Wallach made the motion to complete and publish the experiment, then recommend to the Insulation Life Subcommittee that a working group be formed to write an IEEE guide for Winding Temperature Indicators. The motion was seconded by Josh Herz and all members present voted in favor of the motion.

The assignment to complete the experiment and remaining minor editorial work was accepted by the Chair. Guests Bruce Forsyth and Don Platts were asked to investigate persons they were acquainted with to help with ideas to get the paper published. Further assignments were held pending action of the Insulation Life Subcommittee.

The meeting was adjourned at 11:00 am.

***Respectfully Submitted***

Phil McClure, Chair

Task Force on Winding Temperature Indicators

**11.11.3.2 Task Force on Moisture Estimation in Transformer Insulation – Jin Sim**

Monday, October 22nd, 2012 11:15 a.m.

Approximately 65 in attendance

11 Members – 6 in attendance

1. Valery Davydov
2. Don Platts
3. Tom Prevost
4. Jin Sim
5. Brian Sparling
6. Barry Ward

Task force scope was reviewed and Jin pointed out that it does not align with the document (revision 13). He thought the goal was to define the moisture in the insulation at or near the hot spot, but that is not clear in the approved TF scope. Don Platts pointed out that the scope said at a minimum there are bullets to be addressed. Tom Prevost said that the recently revised draft 14 does not include the methodology of finding moisture in the insulation at the hot spot.

Oleg Roizman is the only member to provide written comments of Revision 14 so far

Jin stated that the TF failed as there is no information of moisture content for end users to apply to calculate the bubble evolution or thermal ageing. He asked for comments and opinions.

* Hasse Nordman – Oleg’s point is very clear and he thinks we need clear figures in order to give the industry anything useful.
* Tom Prevost said that Draft 14 does not address this issue directly. Despite all the work on the document, it should have been clear to align with the scope. From what he can tell, there is no measurement that directly correlates to moisture in the paper at the hot spot in Draft 14. Maybe the document can be expanded a chapter to address how close current methodologies can come.
* Claude Beauchemin asked if the recent paper from a moisture study in Germany has been reviewed. Tom Prevost confirmed that the study is in revision 14.

Jin proposed to ‘wrap this up’ and hand over to the TF Moisture in Insulation Systems. Bruce Forsyth stated that he did not see it as a failure but that it gave valuable information for the new group. Tom Prevost said there will be much discussion at the next TF Moisture in Insulation Systems meeting, but it does not address the scope and would not be right to combine the two. The document does not need much additional work to have published and it can be done between now and the next conference.

Don Platts stated that the document falls so short, it is not worth publishing. Logic is faulty and it needs many editorial corrections. It does not give guidance of how to use the information in the document.

Valery Davydov stated measuring the hot spot is difficult on its own and it may change depending on load. Brian Sparling stated the loading guide already has a method to determine the hot spot temperature. It is estimation.

Jin restated again that the TF failed because there is nothing for end user. The goal was to be plus or minus 50 percent on moisture content estimation. So the TF is not close to estimating moisture. The TF has a good collection of what the industry has, and can wrap up the next draft in six more months without addressing the scope. Bruce Forsyth would like to see the document finished with the current scope and will not personally support changing direction.

Jin stated that several groups that address moisture. Tom and Brian should produce revision 15 without increasing scope. Tom Prevost then suggested it should not discuss how moisture is removed in the field since it is not already in the document. Barry Ward suggested it be added but then refer to other documents that cover it in detail. Don Platts offered to provide his written comments on the document.

Jin asked for a time commitment to complete the document. Tom P suggested the following schedule:

* + - 1. All comments received by Dec 15th
      2. Tom and Brian will finish and have it to Jin by the end of January
      3. TF members will have it by February and can review until March end.

No additional comments were given and the meeting was adjourned at 11:55 a.m.

Minutes recorded by Hali Moleski for the chairman Jin Sim

**11.11.3.3 Task Force on Moisture In Insulation Systems – Tom Prevost**

Chair: Tom Prevost

Vice-Chair: Valery Davydov

The TF on Moisture in Insulating Systems met on Monday, October 22, 2012 at 1:45 PM with 152 people attending. 69 individuals attending this meeting indicated that they would be willing to serve as members of this task force.

This was the first meeting of this task force.

Introductions and statement of affiliation.

Introduction of goals of the task force- Tom Prevost

* Create membership
* Develop Title, Scope ad Purpose of document
* Create PAR for potential WG to be presented to Insulation Life Subcommittee Chair

Introduction of need for document- Valery Davydov

* Proposal
  + To develop a new reference document tentatively titled *"Moisture Phenomena in Insulating Systems of Dry, Gas Insulated and Liquid Immersed Transformers and Reactors"*
  + To consider an IEEE/IEC dual logo status of the document proposed
* Statement of the Problem
  + The current approach is that each existing IEEE standard or guide contains its own solution to the moisture related phenomena it is dealing with
  + The current approach is lacking benchmarking of the moisture state of insulation of transformers and reactors
  + The proposed approach is unprecedented in the series of IEEE/PES Transformers Committee standard documents
* It has been Proposed:
  + To consider the issue of Moisture in Insulating Systems of Transformers and Reactors as a whole
  + To develop a new document that would serve as a single knowledge base document for IEEE (and IEC?) standards and guides dealing with moisture
  + To consider the Insulation System of a transformer or reactor as one of the following physical complexes:
    - Solid-Gas (dry type, gas insulated & vacuum insulated units)
    - Solid-Liquid (liquid immersed units without headspace), or
    - Solid-Liquid-Gas (liquid immersed units with headspace)
  + To use the physical laws and mathematical equations for the Solid-Gas Physical Complex as the basis for all the three above listed physical complexes
  + Sections of New Document Proposed:
  1. Terminology and definitions
  2. Measurement and evaluation of moisture-in-gas insulation parameters
  3. Measurement and evaluation of moisture-in-liquid insulation parameters
  4. Measurement and evaluation of moisture-in-solid insulation parameters
  5. Evaluation of aging and end of life of solid insulation parameters
  6. Factory/workshop application of knowledge on moisture; benchmarking
  7. Field application of knowledge on moisture

The title, scope and purpose will be circulated in a survey ballot to the membership. During the meeting the following drafts for title, scope and purpose were developed:

Title:

(Recommended Practice) (Guide) (Trial-Use Guide) for the Interpretation of Moisture and Moisture Assessment Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors

Scope:

This document applies to dry, gas insulated and liquid immersed transformers and reactors and addresses:

* 1. The theory of moisture dynamics and methods of assessment of moisture and moisture assessment related parameters in solid-gas, solid-liquid and solid-liquid-gas insulating physical complexes
  2. The interpretation of measurements and evaluations of moisture and moisture related parameters
  3. The risks associated with moisture in operating transformers and reactors, and approaches to mitigate the risks
  4. The benchmarking of moisture and moisture assessment related parameters
  5. Trending (tracking) the changes against the benchmarks through the life of the transformer or reactor
  6. A bibliography of related literature

Purpose:

* There is a need for a new reference document, written in a proper scientific and engineering manner, which would serve as a single knowledge base for other standards and guides dealing with moisture and moisture related phenomena in dry, gas insulated and liquid immersed transformers and reactors.
* After such a reference document is developed, each existing guide or standard could refer to it and, if needed, build a higher level moisture related application on the basis of the comprehensive and up-to-date information presented in it.
* This document, therefore, recommends the ways of comprehensive assessment of moisture and moisture related parameters of transformers and reactors, their benchmarking at the factory or workshop, tracking the changes against the benchmarks throughout the life of the units in the field.

Proposed Next Steps:

1. Establish TF membership – today (October 22, 2012)
2. Establish working Title, Scope and Purpose – today
3. Survey Ballot TF – by November 30, 2012:
   1. Finalize the Title, Scope and Purpose
4. Prepare and submit PAR to IL SC Chair – by December 28, 2012
5. PAR reviewed at AdCom – on Sunday, March 17, 2013 (S13 Mtg)
6. PAR submitted to NesCom – before May 3, 2013
7. PAR is approved:
   1. New WG is formed – June 14, 2013 (Standards Board Mtg)
8. Establish WG membership – Monday, October 21, 2013 (F13 Mtg)
9. Four years to complete the new document

The meeting adjourned at 3:00 PM

**11.11.3.4 Working Group for Temperature Rise Test Procedures Section 11 of C57.12.90 - Paulette Powell**

The Working Group met in the Crystal Ballroom of the Hilton Milwaukee City Center Hotel in Milwaukee, WI on Tuesday October 23, 2012 at 11am. Present were thirteen (13) members and fifty-seven (57) guests. We had a quorum.

The minutes from the previous meeting in Nashville were approved as written.

The meeting focused on the revised loading-back-method proposal, section 11.1.2.2. The revised version included the comments received during the straw ballot. After some discussion, the following changes to the proposal were agreed:

1.- To delete the last sentence of second paragraph regarding correction of liquid temperature rises due to losses differences. Proposed by Mr. Tom Holifield.

2.- To change last sentence of first paragraph on second page to express that the excitation and loading power sources may be in phase or 120° out of phase. Proposed by Mr. Bertrand Poulin.

3.- To remove average voltage meter from figure 28. Proposed by Mr. Bertrand Poulin.

4.- To revise figure 29 in order to include metering equipment, similar to figure 28. A volunteer from the audience was asked to perform this task, but without response. After the meeting, Mr. Mohamed Diaby (mohamed.diaby@efacec.com) volunteered to do the changes.

The modified proposal will be sent for a straw ballot within the working group.

In response to Mr. Holifield request, the latest draft of section 11 including all changes so far will be sent to the working group. This is for information purposes.

Under new business, Mr. Hakan Sahin (hakan.sahin@us.abb.com) commented about the possibility of performing the heat run test at a different OLTC position than the anticipated highest temperature rise or highest losses, but with the preventive auto at a bridging position. The test results would be corrected based on losses. He will send a proposal for consideration by the working group.

Having no other new business, the meeting adjourned at 11:45am.

Respectfully submitted,

Paulette Powell, Chairperson

Juan Castellanos, Vice-Chair

**11.11.3.5 Working Group for Application of High-Temperature Materials IEEE P-1276**

Mike Franchek, Chairman

Roger Wicks, Secretary

Introduction and Rosters

The working group met on Tuesday, October 23, 2012 at 3:15 PM with 18 attendees requesting membership and 30 guests attending.

Chairman’s Remarks on WG Task

The chair reviewed the document history as well as some of the recent history of documents that have been developed since this document was last revised.

History - first in 1994 there was a background paper developed which outlined the current state of the art (at that time) for the use of higher temperature materials in transformer applications. At this time there were no industry standards, so this document contained some technical guidance like information and examples.

After completion of the background paper, a trial-use guide was developed in 1996 which covered the use of high temperature materials in power transformers. This document because an IEEE Guided in 1997. There were discussions regarding broader coverage, but the group agreed to limit to a narrow scope based on what was broadly in use at the time.

Then the chair detailed this scope and where a subsequent IEEE document that was just approved (IEEE C57.154). This standard covers subjects including limits, a variety of ways transformers are used (mixed hybrid, full hybrid, high temperature transformer, etc.) and it includes high-temperature dielectric fluids.

Discussion on History and Adjacent Documents

Sam Mehta asked a question related to test methods discussed in this document. Roger Wicks provided a feedback related to current methods described in IEEE C57.100 and IEC 62332. Note – in looking back over the document after the meeting – Sam may have been discussing the note in the 1276 document which describes sealed tube testing and a dual-temperature like test (62332 was not available at this time).

Hasse Nordman – commented that the more standard like the document the more useful. He also expressed concerns related to the purpose of this document vs. IEEE C57.154 and IEC 60076-14.

The Chair then noted that he will solicit additional options from other attendees either during the rest of the week or via email.

Patrick McShane noted that work on standards is has benefits/costs – how does this document measure against that. The Chair noted that one concern about not working on this document would be to lose a lot of good tutorial information. He noted that there is a lot of work needed, but that this would be worth the effort. Examples of some work needed including gassing tendencies, addition of new fluids/solids, and other improvements.

John Luksich then asked about loading guides – The Chair noted that this document should address this issue, how to apply existing loading guide separately.

There was an additional input (Jitendra Mamtora) related to transformer that operates at normal temperatures but allowing 30% overload.

Discussion of Scope for the Revised Document

The Chair reviewed the introductory parts of the 1997 version of the document (Overview, Scope) and then a revised Scope that was part of the revised PAR submission to begin this work (revised from the original scope to address input from NESCOM).

Areas of significant difference included removal of the overview, adding a specific comment related to average winding rise (75C to 115C rise units), and then removal of a note that limited the scope of the document to mineral oil.

Patrick McShane noted that lower rises might be needed for units like wind where the units are normally lightly loaded, but which allow a much higher overloads than typical.

Joe Foldi commented that it might be important to list higher hottest spot vs. higher rise as part of the scope (as the hottest spot limits the life typically).

Input (Jitendra?) related to reduced size needed in wind/solar applications – where loading is on average only 20 to 25% and the NL losses then become very important. For wind – the maximum load typically is concurrent with higher cooling capability. These types of units (broaden scope beyond power) would be useful.

Question related to strength of copper conductor under short circuit stresses.

Discussion related to core insulation (which could depend on maximum fluid temperature which would depend on fluids allowed in this document).

Joe Foldi mentioned that the life is based on hottest spot temperature – much more important than average (winding rise).

Question from audience related to allowing alternative fluids which allow higher top oil temperatures – scope wider – which would allow a broader range of applications to be discussed. The use of new fluids would benefit users.

Input related to higher gradients used with these high temperature materials and how to best take advantage of these materials in designs.

Sam Mehta mentioned it should include other fluids and many in the audience echoed this comment (David Sundin, Patrick McShane, etc.).

Patrick McShane noted that higher temperature fluid operation would require more detail on a number of other items (gaskets, bushings, LTCs, etc.). The Chair noted this was discussed in minor degree in our existing document and in more degree in IEEE C57.154. Will have to see to what extent this needs to be discussed when we finalize scope.

Joe Foldi mentioned that the scope needs to address evaluation of high temperature solid materials (just states high temperature materials in scope as submitted for the PAR).

Sam Mehta asked a question related to the use of high molecular weight hydrocarbons (mineral oil variation) operating at higher oil temperatures and the Chair noted this would be within the current scope.

The Chair then finished the discussion regarding the need to change the scope to include high temperature fluids – and that he would get a consensus of the group (new working group) as the document moves forward.

The meeting adjourned at 4:15 PM.

**11.11.4 Old Business:**

No old business.

**11.11.5 New Business:**

**11.11.5.1 Moisture in Insulation Systems – Discussion**

There was a discussion about the goal of the Moisture in Insulation Systems Task Force along with the number of task forces dealing with moisture? Key points of the discussion were:

* Moisture in transformers crosses the boundaries between subcommittees. Moisture in solid insulation is covered by the Insulation Life Subcommittee while moisture in oil is covered by the Insulation Fluids Subcommittee.
* The Moisture in Insulation Systems Task Force will try to pull the information together and create a reference for the other documents.

Jin Sim asked if the Task Force will produce a method for the utility to estimate the moisture in the transformer and apply it to aging and bubbles around the paper and hotspot. Tom Prevost replied that it was one of the goals along with providing a method for benchmarking.

**11.11.5.2 Winding Temperature Indicator – Discussion**

There was a discussion about taking the Winding Temperature Indicator (WTI) Task Force information and turning it into a Guide. Key points of the discussion were:

* The history of the Task Force was reviewed. The original scope dealt with WTI time constants with the goal of producing a guide. A few years later, the Task Force and Subcommittee agreed with changing the goal from creating a guide to writing a private paper.
* The main thrust of the Task Force is to capture the information gained on WTIs.
* A guide traditionally provides a procedure. The information on the WTI sounds more like a tutorial.

A straw poll of the subcommittee revealed that was not strong interest in creating a guide on WTIs.

The Chair directed P. McClure to complete the paper on the WTI tests and results.

**11.11.6 The meeting adjourned at 9:15 AM.**

1. **Editor’s Report – Sanjib Som**

Between Spring meeting and Fall meeting of 2012 a total of 75 new & resubmitted papers in the transformer area were submitted to IEEE Transactions on Power Delivery for possible publication. For all of these papers the recommendations were as follows:

Accept: 12

Revise and Resubmit: 30

Reject: 33

The above numbers include reviews managed by all three editors. The 12 papers accepted for publication are shown below:

|  |  |  |
| --- | --- | --- |
| **Num** | **Paper ID** | **Title** |
| 1 | TPWRD-00234-2011.R3 | Statistical Machine Learning and Dissolved Gas Analysis: A Review |
| 2 | TPWRD-00846-2011.R3 | Calculation of a Health Index for Oil- Immersed Transformers Using Fuzzy Logic |
| 3 | TPWRD-00865-2010.R3 | Advanced Thermal Modeling and Experimental Performance of Oil Distribution Transformers |
| 4 | TPWRD-01010-2011.R2 | Influence of Ambient Temperature on Transformer Overloading During Cold Load Pickup |
| 5 | TPWRD-00097-2012.R1 | A 15 kVA High Temperature Superconducting Partial Core Transformer: Part 2 - Construction Details and Experimental Testing |
| 6 | TPWRD-00096-2012.R1 | A 15 kVA High Temperature Superconducting Partial Core Transformer: Part 1 - Transformer Modeling |
| 7 | TPWRD-00151-2012.R1 | New Methods for Computation of the Inductance Matrix of Transformer Windings for Very Fast Transients Studies |
| 8 | TPWRD-01005-2011.R1 | A Feasibility Study on Application of Radar Imaging for Detection of Transformer Winding Radial Deformation |
| 9 | TPWRD-00865-2011.R2 | Topology-Correct Reversible Transformer Model |
| 10 | TPWRD-00241-2011.R3 | CT Saturation Detection Based on the Distance between Consecutive Points in the Plans Formed by the Secondary Current Samples and their Difference-Functions |
| 11 | TPWRD-00723-2012.R2 | Analytical calculation of leakage inductance for low-frequency transformer modeling |
| 12 | TPWRD-00548-2012.R1 | Preventing Transformer Energizing Resonant Overvoltages using Surge Arrester Temperature Rise Index and Controlled Closing Method |

Also with respect to Letters, no Letters were received.

I would like to thank all of the reviewers who volunteered for this effort and donated their time, and would like to encourage everyone associated with IEEE Transformers Committee activities to consider becoming a Reviewer. I would like to encourage those Reviewers that already have an account on IEEE Manuscript Central to keep their profile information updated and complete the areas for key words and areas of interest. We need more reviewers and I encourage any of you that have not signed up as reviewers to sign up per the instructions below.

It is important for all interested individuals to follow the norm for writing papers as provided in IEEE; the link is http://www.ieee.org/publications\_standards/publications/authors/authors\_journals.html and the link to upload the paper is http://mchelp.manuscriptcentral.com/gethelpnow/training/author/.

I would also like to take this opportunity to personally acknowledge some key reviewers involved in the transformer committee who have been regularly and consistently reviewing papers. This is an important contribution since it maintains the high standards for our papers and it gives back to the industry their expert knowledge. I realize there is a risk that I may miss someone but nonetheless I want to take this opportunity their major contribution. These persons are:

* David Sundin
* George Frimpong
* Clair Claiborne
* Phil Hopkinson
* Ramsis Girgis
* Bertran Poulin
* Hasse Nordman
* John Crouse
* Sheldon Kennedy
* Luiz Cheim
* Juan Castellanos
* Jack Harley
* Xose Lopez-Fernandez
* Robert Del Vecchio
* Charles Sweetser

Special mention must also go out to the editors who have worked hard to make this possible, they are Ed teNyenhuis, Dr Kulkarn, Francisco De Leon and Dr. Reza Iravani.

All members and attendees of the IEEE Transformer Committee are invited to review technical papers. Please sign up at: <http://tpwrd-ieee.manuscriptcentral.com/>

INSTRUCTIONS FOR SIGNING UP TO REVIEW IEEE TRANSACTIONS PAPERS

1. Before you create a new account, please check for an existing account by clicking on: "Check for Existing Account"
2. Assuming that you do not get an existing account notification email, click on "Create New Account" and enter in your information.
3. Please specify any “Specialty / Area of Expertise” according to the 5 numerical codes below:

13a: Power and Instrument Transformers

13b: Insulating fluids category

13c: Dielectric Testing

13d: Audible Noise and Vibration

13e: Transformer Modeling Techniques

1. Please specify any “Key Words” such as: distribution transformers, core losses, oil DGA, or thermal, for example.
2. Submit your information.
3. Click on "Request Reviewer Status" to be enabled as a reviewer.
4. **Liaison Reports**
   1. **Standards Coordinating Committee on Electrical Insulation No. 4 (SCC 04) – Paulette Payne Powell**

No Report.

* 1. **IEC TC14 Technical Advisor to USNC - Paul Jarman**

**IEC TC14 Power Transformers**

**Report to IEEE Transformers committee Fall 2012 Meeting Milwaukee**

* Last meeting Manchester UK 20-21st September 2012
* Next meeting Milwaukee 17-18th October 2013
* Website [WWW.IEC.CH](http://www.iec.ch/)/TC14
* Summary of projects and publications
* www.electropedia.org - comprehensive electrotechnical vocabulary reference

**IEC TC14 new documents published**

* **IEC 60076-18 Measurement of Frequency Response** 
  + Edition 1 published July 2012
* **IEC 60076-21 Standard requirements, terminology and test code for step voltage regulators**
  + Edition 1 published December 2011
  + IEEE document published as dual logo

**Revisions published**

* **IEC 62032 Guide for the application, specification and testing of phase shifting transformers** 
  + Edition 2 published June 2012
  + IEEE guide published as dual logo
* **IEC 61378-1 Converter transformers - Transformers for industrial applications** 
  + Edition 2 issued July 2011

**New documents in development**

* **IEC 60076-19 Rules for the determination of uncertainties in loss measurement** 
  + New document based in an existing CENELEC document
  + First draft completed, publish 2013
* **IEC 60076-20 Energy efficiency**
  + Work started but progress interrupted by work on EU regulation now to be two documents >36kV and <=36kV.

**IEC TC14 revisions in progress**

* **IEC 60076-3 Dielectric tests** 
  + Document has been simplified and many conflicts with IEEE removed - substantial change – many comments
  + Final Draft for vote to be issued very soon
* **IEC 60076-10 Determination of Sound Levels** 
  + Comments received on first committee draft - CDV November 2012
* **IEC 60076-10-1 Sound Level Application Guide**
  + Work started, first CD expected May 2013
* **IEC 60076-14 Transformers using high temperature insulation materials**
  + CDV circulated comments received
  + final draft and publication 2013
* **IEC 61378-3 Converter transformers – Application Guide**
  + CD issued comments received Sept 2012
* **IEC 60214 Tap changers** 
  + First committee draft comments received
  + CDV early 2013

**IEC TC14 / IEEE joint work**

* **IEC 60076-57-1202 Liquid Immersed Phase shifting Transformers**
  + New joint standard, work agreed and in progress
* **EC 60076-16 Transformers for wind turbines**
  + joint revision of IEC document into dual logo
  + Work started
* **IEC 61378-2 HVDC converter transformers**
  + Possible joint work to produce dual logo

**IEC TC14 proposals for new work**

* **Publish EN 50216 Transformer and Reactor Fittings as IEC documents**
  + Ad hock group recommended 3 parts
    - Protective devices (alarms and trips)
    - Cooling
    - Accessories (passive)
* **TR60616 Terminal and tapping markings**
  + Issue as IEC 60076-9
* **IEC 60076-7 Loading Guide**
  + Propose to start revision
  1. **CIGRE Liaison Report -- Raj Ahuja**

**Agenda — October 22nd, 2012**

* Overview of CIGRE 44th Session
* U.S. Representation in CIGRÉ Study Committees
* Details on A2 Study Committee
* Details on B3 Study Committee
* Details on D1 Study Committee

**Preferential Subjects Discussed in Paris 2012**

PS1 > Modeling and practical experience of the interaction of new generation/transmission technologies and related power electronics with the transmission and distribution systems

PS2 > Advanced tools and techniques for power system performance analysis with particular reference to stochastic methods

PS3 > Lightning protection and insulation coordination as it relates to new generation and transmission technology

**USNC Membership**

* + - **2008 2009 2010 2011 2012\***

**Individual** 380 319 332 394 459

**“Collective”** 29 27 28 32 32

Collective (18) (14) (14) (18) (18)

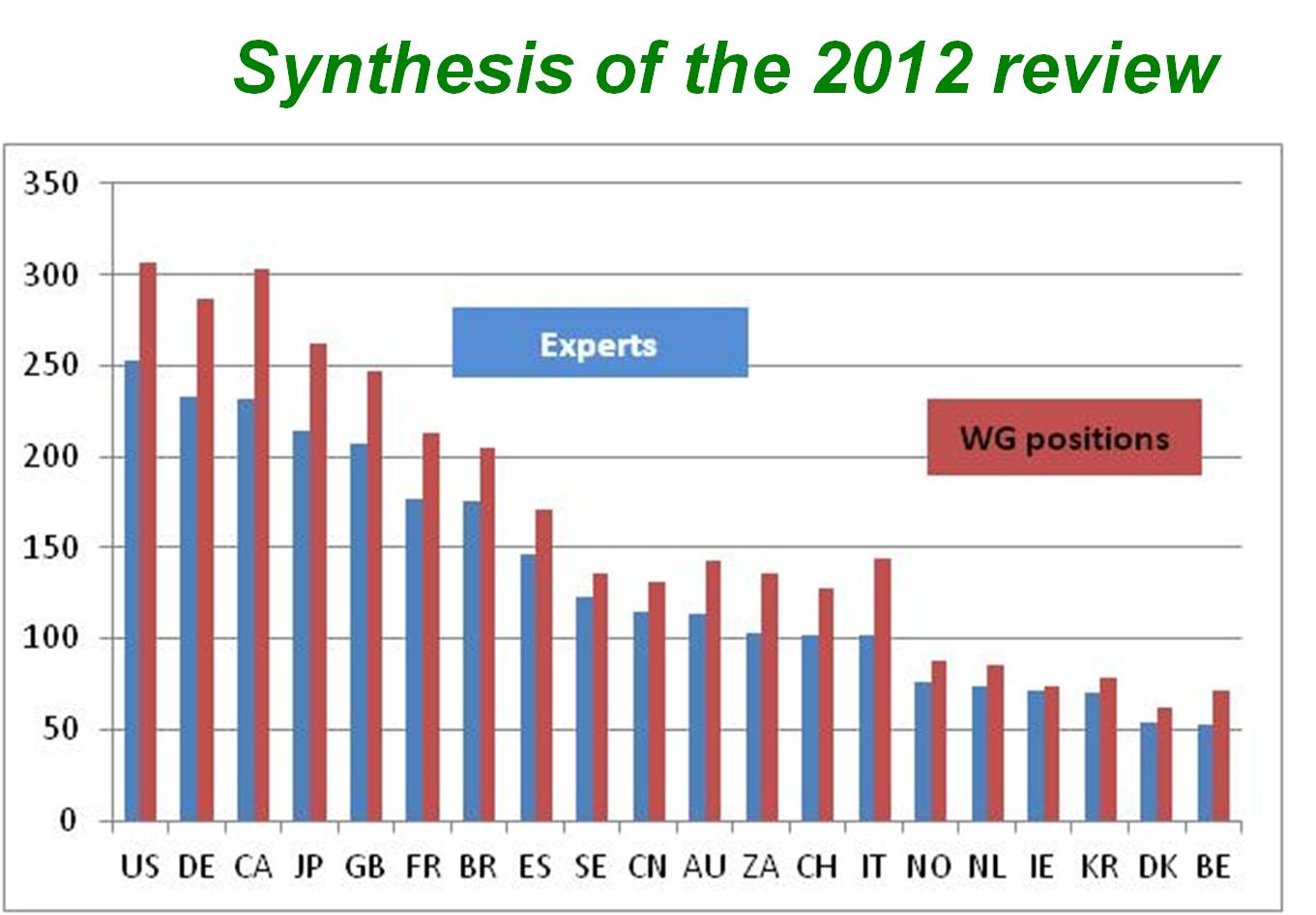
Sustaining (5) (7) (6) (6) (6)

Patron (6) (6) (7) (8) (8)

**Educational** (1)(1)(1) (0)(0)

**\* 2012 Data as of June, 2012**

**Number of experts/positions in the various countries**



**Info. on USNC Registrants**

* August 2012 Paris 44th Session & Technical Exhibition attended by ~ 3200 Delegates
* Sam Mehta received the Distinguished Member Award in July 2012, and completed 8 years as US National Delegate for A2 Study Committee
* USNC Paris Registrants – 143
  + - 122 in 2010
    - 117 in 2008
    - 110 in 2006
    - 98 in 2004

**U.S. Representatives to CIGRÉ Study Committees & Appointment Dates**

* A1-Sam Salem (GE Energy) – 2006
* A2-Raj Ahuja (SPX Transformer Solutions Inc.) – 2012
* A3-Mietek Glinkowski (ABB Inc.) – 2008
* B1-David Lindsay (EPRI) – 2008
* B2-Dale A. Douglass (Power Delivery) – 2006
* B3-John Randolph (PG&E) – 2012
* B4-Hamid Elahi (GE Energy) – 2010
* B5-Mark Adamiak (GE Energy) – 2008
* C1-Richard Wakefield (DNV KEMA) – 2007
* C2-Anjan Bose (Washington State Univ.) – 2006
* C3-John Oglevie (Power Engineers) – 2006
* C4-Ian S. Grant (TVA) – 2006
* C5-Andrew L. Ott (PJM Interconnection) – 2006
* C6-Roger Dugan (EPRI) – 2008
* D1-Andrew Phillips (EPRI) – 2012
* D2-Thomas E. Kropp (Nexant) – 2006

**A2 – Raj Ahuja (SPX Transformer Solutions)**

**Scope** : Design, construction, manufacture and operation for all kinds of power transformers, including industrial , DC converters and phase-shift transformers and for all types of reactors and transformer components (bushing, tap-changer…)

**Today**, the two Strategic Directions for A2 activities are :

* **Services to Customers** ( Reliability, Life management, Economics, Tutorials, ...)
* **Technology Issues** (Safety, New technologies and New concepts, Electrical environment, Pre-standardisation work, ...)

**Chairman: Claude Rajotte (CA) Secretary: Patrick Picher (CA)**

**Present SC A2 Activities**

* 24 regular members
* 19 observer members
* 9 WG's and 3 JWG's
* 272 experts from 39 countries
* 5 AG’s
* Meeting at Paris was attended by 60 delegates (50 members and 10 guests)

**Present SC A2 Working Groups**

**WG A2-33 -Fire Safety** (A. Petersen/AU)

* + Avoidance of tank rupture
  + Precaution to fire victim
  + Precautions to fire origin

Technical Brochure target date Dec12

**WG A2-36 Guide for Transformer Procurement** (T. Breckenbridge / UK)

* Capability assessment of transformer manufacturers
* Evaluation of technical competence and experience
* Review and update of the existing CIGRE A2 documents on procurement
* Expected completion in 2012

**WG A2-37 Transformer Reliability Survey** (S. Tenbohlen/DE)

* Review all existing national surveys and study different practices ; identify best practices
* Compile and present the information available in these national survey reports
* Make recommendations to improve the situation
* Final brochure Expected to be ready in 2013

**WG A2-38 Transformer Thermal Modeling** (J. Lapworth/UK)

* Describe the state of the art techniques in transformer thermal modelling to evaluate winding hottest spot as well as hot spots on other metallic parts
* Examples of application of hottest spot direct measurement and best practices
* Recommendation for improvement of standards
* Interim report for Electra – Dec 2012

**JWG A2/C4.39 - Electrical Transient Interaction between transformers and the Power System** (A.Rocha/BR)

* Assess and discuss the different types of electrical transient interaction
* Discuss the general increase in transformer dielectric failures in the system
* 1st Draft @ 70% complete

**WG A2.40 - Copper sulphide long-term mitigation and risk assessment** (J. Lukic/RS)

* Method, tools and diagnostic
* Metal passivator stability and efficiency
* Efficiency of existing on-site oil treatment
* Interim report by Dec. 2012
* Final Report expected in 2014

**JWG A2/D1.41 - Oil conductivity under DC condition** (A. Küchler/DE)

* Started under recommendation of WG A2/B4.28
* Review techniques and standards for measurement of conductivity of liquids
* Suggestions for new standards

**WG A2.42 - Guide on transformer Transportation** (A. Mjelve/NO)

* Typical conditions/forces during transport
* Specifications and design review
* Requirements on transportation issues
* Final report Expected by Dec 2013

**WG A2.43 Transformer bushings reliability** (A. Mikulecky/HR)

* Bushing failure definition
* Failure mechanisms for OIP, RBP, RIP
* Bushings failure rate
* Predicted life time, maintenance, diagnostic
* First survey will be sent by Dec 2012

**WG A2.44 – Transformer Intelligent Condition Monitoring** (C. Dupont/BR)

* Conversion of data to relevant information
* Demonstration of benefits
* Hardware/software/data integration
* Draft expected by Mid 2013

**WG A2.45: Transformer Failure Investigation and post-mortem Analysis** (C. Kuen/AT)

* Important information to collect
* Availability and significance of design data
* Documentation during the dismounting
* Paper sampling: how, where, precautions

**JWG A2/D1.46: Field experience with transformer solid insulating ageing markers** (R. Mertens/BE)

* Field cases: correlation between chemical markers and DP
* Design information relevant to ageing markers models
* Consideration of operation and maintenance records
* Influence of oil sampling conditions (ex: temperature)

**Recent CIGRE Brochures**

* *Scope Ref Year*
* Moisture Equilibrium in Transformer Insulation 349 2008
* Copper Sulphide in Transformer Insulation 378 2009
* Thermal Performance 393 2009
* HVDC Tr. – Test, ageing, reliability in service 406 2010
* HVDC Tr. – Guidelines for design review 407 2010
* Experience in service with new insulating liquids 436 2010
* Guide on Transformer Maintenance 445 2011

**Expected in DEC 2012**

* **Guide for Preparation of Specifications for Power Transformers**
* **Guide for Conducting Design Reviews for Power Transformers**
* **Guide for Conducting Factory Capability Assessment for Power Transformers**

**Future activities**

**Possible future WG - under discussions**

* Shunt Reactor
* Transformer health index
* Spare transformer policy
* Efficient and eco-design transformers
* Experience with utilisation of transformers in FACTs

**2012 Grid of the Future Symposium. October 28-30, 2012. Kansas City, MO**

http://cigre-usnc.tamu.edu/ngn/grid/

**2013 SC A2 Colloquium**

**Sept. 9th – 13th in Zurich, Switzerland**

**Joint Colloquium with C4**

* Interaction between transformer and the Power System
* Experience with the use of Phase-Shifting transformers
* Network planning in the context of an ageing transformer fleet

**B3 – John Randolph (PG&E)**

Study Committee B3 Joint plans for 2012:

* + Expert Round Table #2: “On-Line Condition Monitoring”, again held jointly with IEEE/PES Substations Committee, on May 21 in Raleigh, USA
  + Plans now for Panel Session at IEEE/PES General Meeting in Vancouver, Canada in July 2013: “On-Line Condition Monitoring”, to include other Technical Committees within Power & Energy Society

**B3 Activities for 2012**

**AA1 Concepts and Developments:**

* **SC B3.12**: Obtaining value from substation condition monitoring
* **SC B3.13**: Reducing replacement time of high voltage equipment
* **SC B3/C1/C2.14**. Circuit configuration optimization
* **SC B3.26**: Guidelines for the design & construction of AC offshore wind farms

**AA2 Gas Insulated Substations:**

* + - **SC B3.25**: SF**6** analysis for AIS,GIS and MTS condition assessment
    - **SC JWG B3/B1.27**: Economical aspects of GIL and underground cables
    - **SC B3.29**: Field test technology on UHV substation construction and operation
    - **SC B3.30**: Guide to optimize the use of SF6 during routine testing of electrical equipment

**AA3 Air Insulated Substations:**

* + - **SC B3.21**: Turn key substations
    - **SC B3.23**: Guidelines for uprating and upgrading of substations
    - **SC B3.31**: Design for severe climate conditions
    - **SC B3.32**: Saving through optimized maintenance

**AA4 Substation Management:**

* + - **SC B3.06**: Substation management
    - **SC B3.10**: Primary/Secondary system interface, modeling for total asset performance
    - **SC B3.34** Expected impact of future grid concept

**D1 – Andrew Phillips (EPRI)  
 *MATERIALS AND EMERGING TEST TECHNIQUES***

**Advisory Groups:**

* AG D1.01 Liquids and liquid impregnated systems L.Lundgaard
* AG D1.02 High Voltage and High Current testing and diagnostic – M.Muhr
* AG D1.03 Insulating Gases – U.Schichler
* AG D1.04 Solid Materials – S.Gubanski

**WG’s :** Total of 26. 22 D1 Working Groups, plus 4 Joint Working Groups with other SCs

**D1 - Working Groups**

* WG D1.19 Solid insulation endurance stressed by repetitive transient voltages caused by power electronics J. Holboell
* WG D1.23 Diagnostics and accelerated life endurance testing of polymeric materials for HVDC application G.C. Montanari
* WG D1.25 Application guide for PD detection in GIS using UHF or acoustic methods U. Schichler
* WG D1.27 Material Properties for new and nonceramic insulation J. Seifert
* WG D1.28 Optimized Gas insulated systems by advanced dielectric coatings and functionally graded materials H. Hama
* WG D1.29 Partial discharges in transformers J. Fuhr
* WG D1.30 Oxidation stability of transformer insulating oils I. Hoehlein
* WG D1.31 Dielectric performance of insulating liquids for Transformers L. Lundgaard
* WG D1.34 Condition assessment for oil-impregnated insulation used in ac cables S. herukupalli
* WG D1.35 Performance of high-voltage and high-current measurement systems for high voltage testing Y. Li
* WG D1.36 Special requirements for dielectric testing of UHV equipment U. Riechert
* WG D1.37 Maintenance and evaluation of measuring procedures for conventional and unconventional partial discharge E. Gulski
* WG D1.38 Emerging test techniques common to High Temperature Superconducting power applications M. Noe
* WG D1.39 Methods for diagnostic/failure data collection and analysis P. Morshuis
* WG D1.40 Functional Nanomaterials for Electric Power Industry M. Fréchette
* WG D1.42 Radiation Ageing of Polymeric Insulating Material T. Okamoto
* WG D1.43 Rotating machine insulation voltage endurance under fast repetitive voltage transients A. Cavallini
* WG D1.44 Testing of naturally polluted insulators I. Gutman WG D1.45 Testing of insulator performance under heavy Rain A. Pigini
* WG D1.48 Properties of insulating materials under VLF voltages E. Ildstad
* WG D1.50 Atmospheric and altitude correction factors of air gaps and clean insulators J. Rickmann
* JWG A2/D1.41 HVDC transformer polarity reversal – Oil conductivity A. Küchler
* JWG A2/D1.46 Field experience with transformer solid insulating ageing markers R. Mertens
* JWG D1/A2.47 New frontiers of DGA interpretation for power transformers and their accessories M. Duval
* JWG D1/B1.49 Harmonized test for the measurement of residual inflammable gases in insulating materials by gas chromatography J.P. Mattmann

1. **Unfinished (Old) Business**

None

1. **New Business**

None

1. **Meeting Schedule**

See attached F12 Schedule.