IEEE PC.57.170 Condition Assessment Guide Working Group Meeting Minutes

Date and Venue: 10:25-11:40 AM CST, Apr 27th, 2021 (Virtual Meeting)
Total Attendees: 121
Quorum Poll: Members- 49 (out of 84) 58% quorum achieved; Guest- 64; Guest Requesting Membership- 21; No answer- 8 and Total Attendees- 121.

1. The chair outlined the IEEE Patent disclosure policy and no disclosure was noted.
2. The chair outlined the IEEE Copyright Policy.
3. A membership quorum was polled, and a quorum was established.
4. Adoption of Fall 2020 Meeting Minutes: Approved Unanimously by acclamation.
5. Adoption of Spring 2021 Meeting 2020: Approved Unanimously by acclamation.
6. The four task force met a few times in the past few months and reports on the proposed sections for this guide were presented by leaders Dr. Luiz Cheim for TF#1(Section 1-2), Saramma Hoffman for TF#2 (Section 3-4-5), Jonathan Sinclair for TF#3 (Section 6-7-8) and Alan Sbravati for TF#4 (Section 9 and Annexes). The basic guide structure as presented by the TF leaders are as follows:

6.1. **Task Force 1**:

6.1.1. **Section 1: Fundamentals of Transformer Condition Assessment**

- Asset management strategies
- Transformer failure modes
- Condition assessment
- Indices utilized in transformer condition assessment (Intro)
- Post-Mortem analysis and feedback

6.1.2. **Section 2: Transformers condition assessment indexes (*TCAI*)**

- Main objectives of implementing/developing a *TCAI* (business drivers)
  - Fleet screening
  - Maintenance and operations
  - Budget allocation
  - Repair/replacement
  - System expansion
- Overview of most common approaches – parameters to consider
- Advantages and disadvantages of most common approaches
- Case studies
  - Common approach to fleet screening (example)
  - Common approach to support maintenance and operations
  - Common approach in support of repair/replace strategy
  - Common approach on system expansion application

6.2. **Task Force # 2:**

6.2.1. **Section3: Dealing with uncertainty in information**

- Dealing with uncertainty (old data, data entry etc.) with available information

- Dealing with missing data
  - Stop assessment, or ignore missing data and manually assess
  - Use a default value
  - Use a default with a range
  - Use of statistical inference on limited number of parameters
  - Use of statistical inference on many input parameters
  - Imputation using external and local circumstances
  - Machine learning imputation (remark only)
  - Examples

6.2.2. **Section 4: Criticality and Consequence of Failure**

- Assessing critically & developing a criticality index

6.2.3. **Section 5: Transformer Active Part**

- Solid insulation degradation assessment
- Dielectric assessment
- Mechanical assessment

6.3. **Task Force #3**:

6.3.1. **Section 6: Bushings and Cable Boxes**

- Transformer bushings
  - Test and diagnostics
  - Failure mode assessment
- Transformer cable boxes
  - Test and diagnostics
  - Failure mode assessment

6.3.2. **Section 7: OLTC (LTC) & DETC**

- Failure Modes -> IEEE C57.140
- Tests and diagnosis

6.3.3. **Section 8: Cooling System, Transformer Tank, & Ancillary Components**

- Cooling System
  - Failure Modes
  - Tests and Diagnosis
- Transformer Tank
  - Failure Modes
  - Tests and Diagnosis
- Ancillary Components
  - Failure Modes
  - Tests and Diagnosis

6.4. **Task Force #4:**

6.4.1. **Section 9: Insulating Liquids**

- Recommend that the mineral oil assessment follow C57.106. May need to refer to other documents related to other insulating fluids (esters, silicon, less flammable hydrocarbon liquids).

- Include insulating liquid condition in the general condition assessment indexes (TCAI)

6.4.2. **Annex A Transformer Condition Assessment Tables (Requires inputs from all sections)**

6.4.3. **Annex B How to develop a TCAI (Requires inputs from all sections)**

6.4.4. **Annex C Literature overview**

7. After the presentations were completed, the floor was opened for questions and discussions about those Sections.
   - There was very good discussion about the presentations made.
   - Several recommendations were made regarding the presentation provided. The chair noted that we need to ensure that we do not duplicate the work of other existing IEEE guides but use them only for reference purposes only.
   - Since the PAR expires in 2023, Bill Griesacker and Hemchandra Shertukde raise the question regarding timeline for the work require to be completed under each TF. The Chair commented that he plans to discuss the timeline with each TF and report back a timeline during the next WG meeting.
   - Tony McGrail suggested considering having a section about the financial aspects of condition assessment. Tim Raymond and Saramma Hoffman stated that this was discussed in Task Force # 2. The Chair suggested that TF #2 further discuss this suggestion within their TF and report back to the WG.
   - Lance Lewand raise the concern about the use of the word moisture in the presentation of TF#4. He suggested the use of the word water for transformer oil in Section 9. Alan agreed with the suggestion.
   - Several guests / members volunteered to join the four task forces (Clauses 1-2, Clause 3-4-5, Clauses 6-7-8 and Clause 9 and three annexures) via the chat section on WebEx.
   - The chair noted that each TF lead and team must request copyright permission of use of any Cigre / IEEE documents and provide references to these documents while writing the guide.
   - A consolidated list of TF volunteer members (with Sections assigned) is being sent with attached with the meeting minutes.
   - There were no new items for consideration.
   - The meeting was adjourned at 11:40 am.

List of attendees (membership status shown during quorum poll):

First Name	Last Name	Member	Guest	Guest Req. Memb.	Company
Raj	Ahuja	X			Raj Ahuja Consulting
Edmundo	Arevalo				Not Known
Hugo	Avila		X		Not Known
Chris	Baumgartner		X		We Energies
Enrique	Betancourt			X	Prolec GE

William	Boettger	X			Boettger Transformer Consulting LLC
Jeremiah	Bradshaw		X		Bureau of Reclamation
Erich	Buchgeher	X			Siemens Energy
Luiz	Cheim	X			Hitachi ABB Power Grids
James	Cross	X			Kinectrics
John	Crouse		X		Roswell Alliance
Eric	Doak			X	D4EnergySolutions LLC
Don	Dorris	X			Nashville Electric Service
Lee	Doyle			X	Vaisala
Zach	Draper		X		Delta-X
James	Dukarm		X		Delta-X
Samragni	Dutta Roy	X			Siemens Energy
Arnold	Elise				SGB-SMIT Group
Evgenii	Ermakov			X	Hitachi ABB Power Grids
Marco	Espindola		X		ABB Enterprise Software Inc.
Roger	Fenton			X	Fenton Solutions
Norman	Field	X			Teshmont Consultants LP
Bruce	Forsyth	X			Bruce Forsyth and Associates LLC
Michael	Franchek		X		Retired
George	Frimpong	X			Hitachi ABB Power Grids
Eduardo	Garcia		X		Siemens Inc
James	Gardner	X			SPX Transformer Solutions, Inc.
Jonathan	Garrity				Tagup
Monty	Goulkhah			X	Kinectrics
Jeff	Gragert		X		Xcel Energy
James	Graham	X			Weidmann Electrical Technology
Taylor	Gray		X		Not Known
Bill	Griesacker	X			Duquesne Light Co.
Ismail	Guner	X			Hydro-Quebec
Niklas	Gustavsson				Hitachi ABB Power Grids
Attila	Gyore	X			M&I Materials Ltd
Thomas	Hartmann				Pepco Holdings Inc.
Roger	Hayes	X			General Electric
Kyle	Heiden	X			EATON Corporation
Giovanni	Hernandez		X		Virginia Transformers Corporation
Gary	Hoffman	X			Advanced Power Technologies
Saramma	Hoffman	X			PPL Electric Utilities
Derek	Hollrah		X		Burns & McDonnell
Paul	Jarman		X		University of Manchester
Toby	Johnson		X		Pacificorp
Akash	Joshi	X			Black & Veatch
Laszlo	Kadar		X		Hatch

Gael	Kennedy	X			GR Kennedy & Associates LLC
Stacey	Kessler			X	Basin Electric Power Cooperative
Suleman	Khan		X		Ontario Power Generation
Egon	Kirchenmayer	X			Siemens Energy
Peter	Kleine	X			US Army Corps of Engineers
Dmitriy	Klempner		X		Southern California Edison
Axel	Kraemer		X		Maschinenfabrik Reinhausen
Michelle	Kutzleb		X		Not Known
Donald	Lamontagne	X			Arizona Public Service Co.
John	Lackey		X		PowerNex Associates Inc.
Aleksandr	Levin			X	Weidmann Electrical Technology
Lance	Lewand	X			Doble Engineering Co.
Weijun	Li		X		Braintree Electric Light Dept.
Mario	Locarno	X			Doble Engineering Co.
Darrell	Mangubat	X			Siemens Power Operations Inc.
Kumar	Mani	X			Duke Energy
Robert	Mayer		X		Siemens Energy
Matthew	McFadden	X			Oncor Electric Delivery
Tony	McGrail			X	Doble Engineering Co.
Susan	McNelly	X			Xcel Energy
Zach	Millard			X	Great River Energy
Emilio	Morales-Cruz	X			Qualitrol Company LLC
Ed	Not Known			X	Not Known
Anatoly	Mudryk			X	Camlin Power
Ali	Naderian				Metsco
Anthony	Natale		X		HICO America
Kristopher	Neild	X			Megger
Joe	Nims				Allen & Hoshall, Inc.
Rodrigo	Ocon			X	Industrias IEM
Anastasia	O'Malley	X			Consolidated Edison Co. of NY
Poorvi	Patel	X			Electric Power Research Institute (EPRI)
Nitesh	Patel				Hyundai Power Transformers USA
Branimir	Petosic			X	Boiler Inspection & Insurance of Canada
Patrick	Picher	X			Hydro-Quebec IREQ
Klaus	Pointner		X		Trench Austria GmbH
Chris	Powell		X		Intermountain Electronics
John	Pruente		X		SPX Transformer Solutions, Inc.
Kevin	Rapp			X	Cargill, Inc.
Timothy	Raymond	X			Electric Power Research Institute (EPRI)
Larry	Rebman		X		EMLS, Inc.

John	Reagan		X		Oncor Electric Delivery
Jonathan	Reimer				FortisBC
Oleg	Roizman				IntellPower Pty Ltd
Timothy	Rocque				SPX Transformer Solutions, Inc.
Mickel	Saad	X			Hitachi ABB Power Grids
Lina	Sandsten				Hitachi Power Grids
Alan	Sbravati	X			Cargill, Inc.
Eric	Schleismann		X		Southern Company Services
Devki	Sharma		X		Entergy
Hemchandra	Shertukde	X			University of Hartford
Kunal	Shukla		X		PECO Energy Company
Jonathan	Sinclair	X			PPL Electric Utilities
Kenneth	Skinger			X	Scituate Consulting, Inc.
Adam	Smith		X		Commonwealth Associates, Inc.
Markus	Soeller				Power Diagnostix
Maricio	Soto			X	Hitachi ABB Power Grids
Arthur	Speegle				Entergy Services, Inc.
Tommy	Spitzer				City Transformer Service Co.
Mike	Spurlock		X		Consultant
Brad	Staley	X			Salt River Project
Charles	Sweetser		X		OMICRON electronics Corp USA
Janusz	Szczechowski			X	Maschinenfabrik Reinhausen
Troy	Tanaka		X		Burns & McDonnell
Marc	Taylor		X		Cogent Power Inc.
Juan Carlos	Cruz Valdes	X			Prolec GE
Rogerio	Verdolin	X			Verdolin Solutions Inc.
Vijayan	Krishnamurthy		X		PTI Transformers
Pragnesh	Vyas	X			Sunbelt-Solomon Solutions
Dieter	Wagner		X		Hydro One
Sukhdev	Walia	X			New Energy Power Co.
Alan	Washburn		X		Burns & McDonnell
Joe	Watson	X			JD Watson and Associates Inc.
Peter	Werelius	X			Megger
Daniel	Weyer	X			Nebraska Public Power District
Leon	White		X		H2scan
William	Whitehead	X			H2scan
Jeffrey	Wright	X			Duquesne Light Co.
Peter	Zhao	X			Hydro One
Kris	Zibert		X		Allgeier, Martin and Associates
Zlatan	Fazlic		X		Camlin Power
Pugal	Selvaraj				Virginia Transformer Corp

Kumar Mani Chair	James Cross Vice Chair	Akash Joshi Secretary