**IEEE/PES Transformers Committee
Fall 2006 Meeting
Montréal, Québec, Canada**

"Dissolved Gas Analysis (DGA) In Transformer Oil - Methods, Trending, & Assessment"
**-- Panel Presentation & Discussion --
Tuesday, October 24, 2006; 4:45 to 6:00 pm**

By Michel Duval, Lance Lewand, Donald Lamontagne

Sponsored by the Insulating Fluids Subcommittee

1. Abstract

Since its inception in the late 1960's, when its use as a tool to identify incipient faults or problems in oil filled power transformers got its start, Dissolved Gas Analysis (DGA) has evolved from a curious possibility into an industry standard for operation. DGA is performed on oil-filled transformers all over the world, and the main standards providing guidance for use, analysis, and applications are contained in ANSI/IEEE C57.104 and IEC 60599, commonly known as the "gas guides". The use of DGA as a powerful diagnostic tool is a critical and important aspect of determining the condition and health of a transformer, but it is still not entirely effective as most people tend to use it today.

This presentation will discuss advances in DGA technology, focusing on criticality of data trending, sampling frequencies, advanced analysis using Rogers and Doernenberg ratios, the Duval Triangle Method, and ultimately the use of Advanced Neural Networks in an expert system designed to maximize opportunities to identify faults before they lead to transformer failures.

2. Learning Objectives

- Current state of the art practices of Dissolved Gas Analysis methods and techniques.

- Discussion of IEEE and IEC guides, tables, threshold values, ratios, and action levels.

- Discussion of the use of constant online monitoring and the use of artificial intelligence expert systems to evaluate the data and notify the asset owner immediately when a problem develops.

3. Learning Outcomes

Attendees of this presentation will learn the current state of the art practices, methods, and assessment analysis of critical DGA data. Attendees will learn about historical developments and advancements in DGA analysis. The highlights of C57.104 and IEC 60599 will be presented, along with the use of various ratios and methods to evaluate data. Attendees will also learn about the use of on-line monitoring systems, along with Advanced Neural Networks and expert systems to vastly improve the success of DGA sampling, analysis and predictive maintenance.

4. Presenter's Biographies

Michel Duval: Michel Duval is a senior scientist with Hydro Québec's Institute of Research (IREQ) in Canada since 1970. His main topics of interest have been dissolved gas analysis, electrical insulating oils and lithium polymer batteries. A senior member of IEEE, he has authored numerous patents, scientific papers, book chapters and international standards and is very active in several CIGRE and IEC working groups. Mr. Duval obtained a B.Sc. in chemical engineering in 1966 and a Ph.D. in polymer chemistry in 1970. He may be reached at duvalm@ireq.ca.

Lance Lewand: Lance Lewand is the Laboratory Manager for the Doble Materials Laboratory. The Materials Laboratory is responsible for routine and investigative analyses of liquid and solid dielectrics for electric apparatus. Since joining Doble in 1992, Mr. Lewand has published numerous technical papers pertaining to testing and sampling of electrical insulating materials and laboratory diagnostics. Mr. Lewand was formerly Manager of Transformer Fluid Test Laboratory and PCB and Oil Field Services at MET Electrical Testing Company in Baltimore, MD for seven years. His years of field service experience in this capacity provide a unique perspective, coupling laboratory analysis and field service work. Mr. Lewand received his Bachelor of Science degree from St. Mary's College of Maryland. He is actively involved in professional organizations such as ASTM D-27 since 1989 and is a subcommittee chair. He is also the secretary of the Doble Committee on Insulating Materials.

Donald Lamontagne: Donald Lamontagne is the Section Leader of T&D Reliability Analysis and Management at Arizona Public Service Company. For the past five years, he has been responsible for all transmission, substation, and distribution outage collection and analysis, performance of root cause of failure analyses, failure data trending, and management and monitoring of all T&D reliability programs. Previously, Mr. Lamontagne worked seventeen years in the nuclear power industry in various engineering, reliability, licensing, and quality assurance capacities. He received his BSEE degree from Renssalaer Polytechnic Institute and is a member of IEEE.