Request for Input on Use of Transformer Dissolved Gas Analysis Data

**CIMug Asset Health Focus Community**

August 2013

The CIM Users Group, in conjunction with the IEC TC57 Working Groups responsible for the CIM (Common Information Model), has established an Asset Health Focus Community, whose purpose is to develop CIM standards support for asset health. The intent is to develop use cases and requirements for a CIM standards framework to support best-of-breed practices that might include integration of data from various data sources, including operations, maintenance, and condition monitoring sources; application of analytics to this multi-faceted data set; and launching notifications and work orders.

Utility input into the work of the Focus Community is crucial to the development of a high quality model, useful for solving real-world integration problems. **Dissolved gas analysis (DGA) has been chosen as the first area of data model development and your assistance in providing insight into both the sources and uses of DGA data at your utility would be very much appreciated.**

**Oil sampling for DGA**

1. How frequently are DGA oil samples taken from transformers for DGA testing? (if frequency varies by type or current health of transformer, please explain)

   - GSU’s > 10MVA: 3months
   - GSU’s < 10MVA: 6 months
   - Transmission Autotransformers: Yearly
   - All other Transmission & Distribution transformers <230kV High Side: Yearly

2. What lab(s) do you utilize for DGA analysis of oil samples?

   Alabama Power Company has its own in-house laboratory for testing DGA samples. The data is automatically trended by the lab and notification given of out-of-limit conditions.

3. Is there any data other than the following that you receive from the lab(s) or track related to a given sample/test:

   - Lab Name/ID
   - Test equipment ID
   - Asset ID (xfmr and tank)
We monitor Ethylene to Acetylene ratio for arcing Load Tap Changers.

4. How do you utilize sample DGA test information in maintenance-related decision-making?

   Trending is used to identify any increases in gas levels. Key gases are reviewed in order to determine the potential source of the increase and decisions made to either continue to monitor on an accelerated interval or remove the equipment from service for further investigation.

5. Do you utilize DGA testing on any devices other than transformers (and their Load Tap Changers (LTCs))? 

   We do perform DGA analysis on our larger three phase and single phase regulators. On occasion we may sample an oil filled bushing based upon a suspected problem but we do not do this routinely.
On-line DGA monitoring

6. Do you have any on-line DGA monitoring capability?

Yes. They are installed on all of our 400MVA transformer banks and a few Generator Step Up Transformers.

7. If so, what field device(s) are used to do the monitoring?

We use the Kelman Transfix and the Hydrocal 105.

8. What is the frequency of monitoring?

Samples are taken automatically two times per hour. Devices are called up manually via an IP address. Plans are to poll this data automatically in the future and store within the Data Historian.

9. Where or how and for how long is the history of the monitored data stored?

The Kelman Transfix and Hydocal units are capable of storing months of data. Ultimately this data will be pulled routinely from the device and saved indefinitely in our Data Historian for trending analysis and automated alarms. This is an ongoing program to create a Monitoring & Diagnostics Center for Southern Company Transmission.

10. How is on-line monitored DGA used in maintenance-related decision-making?

The data is monitored for changes in trends. If a sample shows any increase we will take a confirmation sample via a manual syringe and likely increase the sampling rate based upon what the confirmation test reveals.

General

11. How are on-line DGA data and sample DGA test data used together to provide insight into asset health?
Because Online DGA is not a certified test via a Gas Chromatograph we treat this data as an alarm point which triggers further investigation via syringe and Lab testing.

12. What other information is useful in conjunction with DGA data for determining asset condition or driving maintenance decisions?

Infrared monitoring is performed on the transformer tank, bushings, LTC’s and surge arresters. On-line ZTZ bushing monitors are also installed on many transformers to accelerate the interval of capacitance and power factor testing of transformer bushings.

13. Please identify and describe existing use cases and methods for exchanging DGA data between systems.

Please return answers via email to Gowri Rajappan, Doble, at grajappan@doble.com or Pat Brown, EPRI, at pbrown@epri.com. Or mail hardcopy to: Pat Brown, 4912 W 159th Terrace, Overland Park, US 66085.

If you would be willing to discuss your answers during one of the Focus Community’s bi-weekly calls, please let Gowri or Pat know.

The Asset Health Focus Community is open to any interested party (utility, vendor, consultant) and working collaboration calls are held bi-weekly. For more information, visit CIMug Asset Health Focus Community. To join, contact Gowri Rajappan, Doble, at grajappan@doble.com.