The Locomotive

Even New Transformers Need Oil and Gas Testing

Introduction
A new transformer is not immune to problems. In fact, it has a higher potential for problems due to design flaws or manufacturing quality control.

Finding the Cause of a Short
Dissolved oil gas analysis (DGA) provided by Hartford Steam Boiler’s Transformer Oil Gas Analyst (TOGA®) program helped a rural electric cooperative identify a problem that had the potential of losing 90 percent of the value from a transformer based on a 30-year equipment life. The 50 MVA, 138 kV distribution transformer had an abnormal gassing profile that indicated an unintentional core ground. It was in service less than three years with a replacement cost estimated at $360,000.

HSB recommended electrical testing, which showed a significant change in electrical characteristics since previous tests. The transformer was partially drained for an internal inspection and a direct core iron short to ground was identified.

Solving the Problem
The amount of visible area inside the transformer is limited, so an inspection requires a person familiar with transformers. The equipment manufacturer provided on-site assistance and HSB provided a video-type borescope. The manufacturer found dislodged metal support plates near the base of the coils that had been causing the unintentional core ground and the abnormal gassing. The manufacturer repair was provided under the original warranty.

Lessons Learned
New equipment monitoring including a routine oil-sampling program is critical for early fault detection and the operating life of a transformer. This is important, since transformers represent a large capital equipment expense and lead times for a replacement would normally be months.

Following the repair, additional oil samples were taken to verify operation and establish a new DGA baseline of data. The cost of transformer oil testing for this unit after it was installed to the time that action was needed was estimated at less than three-tenths of one percent of the transformer replacement cost.

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