

CASE STUDY: Justification to adopt continuous PD monitoring in hydrogenerator plants.

Company: ISAGEN Columbia

Plant: San Carlos P.S., Jaguas P.S.

Unit: multiple hydrogenerators

Ratings: 16.5 kV, 159 MVA, and 13.8 kV, 90 MVA, Epoxy-Mica,

Manufacturer: Toshiba, installed in 1980

Related Info: San Carlos - 17 start-ups/year, high variation in load and temperature.

Jaguas – 235 start-up/year, zero to maximum load reached in 5 minutes.

PD Sensors: Two 80pF couplers per phase installed in 1996 - 1997

Details: After two years of commercial operation the units at these plants were showing signs of advanced deterioration of the semi-conductive and grading coating systems. Off-line tests and inspections determined that PD activity was occurring on approximately 80% of the winding. The coatings were repaired and the manufacture agreed to replace the wedges where necessary. Approximately three years after this 92-day per unit maintenance outage, a strong ozone odor was again detected. The root cause of the PD activity in these hydrogenerators was due to a relatively high design electric stress (~ 3.8kV/mm) due to the thickness of the groundwall insulation (2.4mm at San Carlos and 2.1mm at Jaguas). Engineering personnel recommended the coils be continuously repaired and the units exhaustively inspected and tested for the life of the coils. The estimated revenue losses associated with this course equated to \$370,000 US per year. For these reasons it was decided to implement a continuous monitoring PDA system (GenGuard). Among the benefits provided by the GenGuard system were remote access (providing labor resource savings), and maintenance prioritizing based on unit condition rather than time (allowing for maintenance resources to be focused where needed the most while extending the overall time between maintenance outages). The installation of a continuous monitoring system allowed the utility to take tighter control of maintenance expenses, more closely monitor developing machine conditions, and as well, gave them the ability to validate the effectiveness of the maintenance work.