

PARTIAL DISCHARGE IN THE PACIFIC



Greg Linton, with co-operation from Tonga Power presents a real world example from earlier this year and hopes to advance industry understanding around the benefits Partial Discharge Location surveys can bring. Recent issues have provided a plethora of opinion pieces, vague and unqualified case studies and tired /recycled scenarios when all Asset Managers and Engineers really want to see is irrefutable evidence detailing how Partial Discharge Condition assessment can assist with targeted fault detection and life-cycle planning.

By Greg Linton

A new circuit had been added to the primary Indoor 11kV switchboard at the main Generating Power Station in Nuku'alofa and as part of their normal commissioning tests it was found that megger readings were unacceptably low.



BACKGROUND CASE NOTES

One phase was only 1 M ohms to earth and after some cleaning and drying we had it up to 2 M ohms, still way too low. The other two phases are better but still not in the G ohms range.

The switchgear is in an air conditioned room, when these tests were done the board had been denergised for around 6 hours with the doors of the room open. There were signs of condensation on various parts in the buss chamber, which we dried out.

The insulators look ok visually but it was noted that about 4 years ago a breaking down insulator was replaced that corona had begun to eat away. Other corroded parts like earth switches were replaced at the same time.



The epoxy-resin Busbar Monoblock located directly underneath the Voltage Transformer was discovered during the subsequent investigation and most notably, was exactly where the activity was reported.

With replacement of the deteriorating component completed, HV Diagnostic Services were also asked to assist with the sourcing of Spares, placing TPL in a strong position to respond to any similar future issues.

Their installation contractor, based in New Zealand's North Island has an enviable track record in the Pacific Islands and suggested a Partial Discharge survey, recommending HV Diagnostic Services Limited of Christchurch.

Evidence of discharge (smell) was immediately recognised upon entry to the switchroom and the source safely and efficiently located while the asset was still in service.

Both TEV and Ultrasonic detection methods are considered of equal importance by world leading EA Technology as they provide the necessary complementary data, while our own experience shows that for any given issue only one type of emission may often be present.

CONTAMINATION TO THE INSULATING SURFACE

TEV readings were not exactly what you might call excessive although a sub-surface 'void' or material imperfection cannot be ruled out as part of the initiation process, eventually manifesting

itself into the surface damage shown.

Ultrasonic discharge, usually the result of contamination to the insulating surface, inadequate clearances between live phases and/or earthed parts or sharp metal protrusions / lack of stress control was measured at 36dBuV, Gain 80 which is high enough to warrant an inspection as soon as it could be arranged.

SUMMARY

This switchboard is a critical component and of great importance to the Asset owner, failure means that they would be unable to generate any power to the entire island. The Client recognised that specialist help was needed and should be commended for their pre-emptive handling of a serious situation mitigating the risk to both the equipment and potential loss of life, but also the harder to quantify damage to revenue, reputation and downstream costs of restoration following an unplanned outage.

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MEASURE, LOCATE AND QUANTIFY PD ACTIVITY IN SWITCHGEAR, CABLE AND OVERHEAD ASSETS

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