Asset Failure – Covid and Other Extenuating Circumstances

This is the tale of two 11kV Switches of the same brand & model (although separated by several years) experiencing Partial Discharge around the Cables / Bushings with the first successfully identified and replaced mitigating a future catastrophic failure, the second unfortunately was not.

By Greg Linton of HV Diagnostic Services in New Zealand.

Switch No. 1 - Photos received from client April 2017

This first Switch originally featured in Issue 4 of 2017 and to recap briefly, was anecdotally 3 years old when the defect was identified. The circuit had suffered a nuisance trip earlier in the year however sectionalising and testing failed to reveal a hard fault and it was returned to service without further incident. Ultrasonic activity was subsequently detected by HV Diagnostic Services and upon investigation the damage found was too severe to rescue despite it having 'hung-in' live since restoration (above). Detection was via EA Technology's award winning UltraTEV Detector and although this basic instrument does not provide absolute values, with the Ultrasonic light Red we can say that a signal of at least 12dBuV above the instruments zero point was present.

LACK OF FAMILIARITY

The second subject was similarly young - approximately 4 years old and ultimately failed on 21st December 2020 (below). There were

Subject No. 2 - Photos received from client December 2020

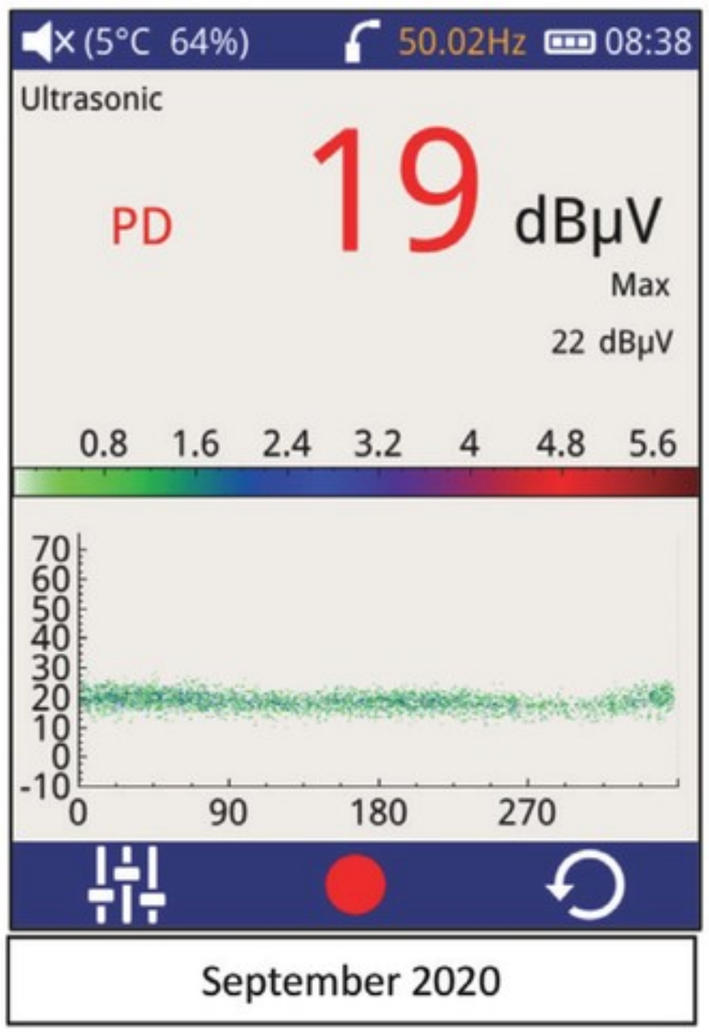
however some unfortunate circumstances surrounding the event as follows:

The regular Annual visit had to be postponed last year due to New Zealand's Level 4 Lockdown & continued uncertainty around the Pandemic and although the Asset owner organised to borrow an UltraTEV Detector from a third party and perform a survey themselves nothing was detected. Despite their best intentions a lack of familiarity / proper training means it is likely that activity could've been missed, while it's also possible that the Discharge was simply not active at the time they checked – of course we'll never really know for sure.

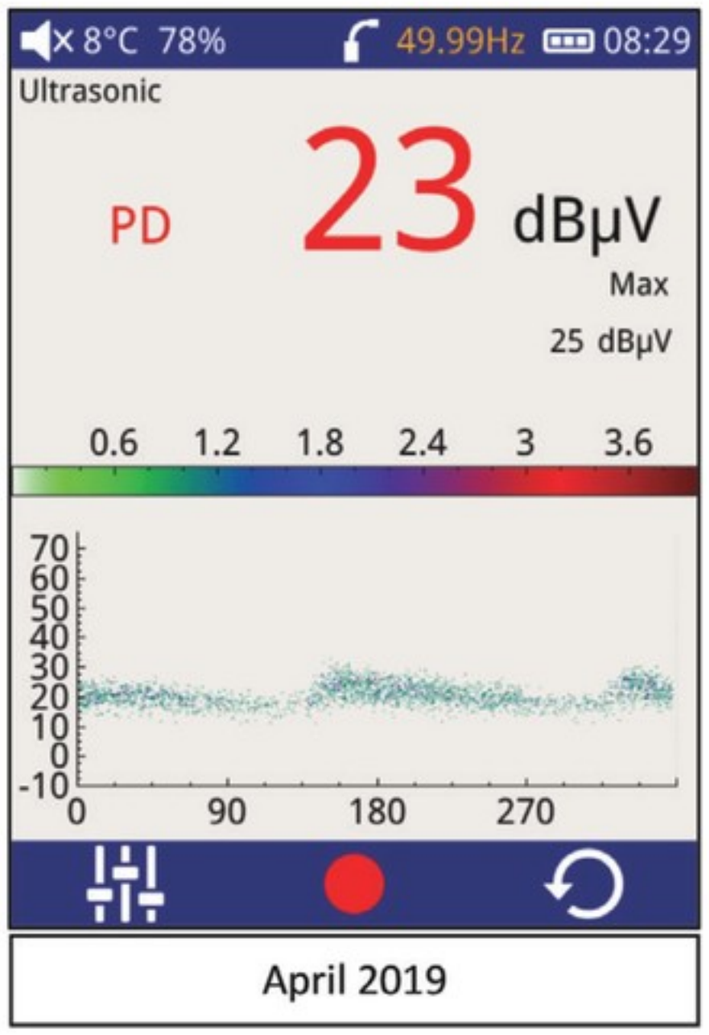
By the second half of 2020 with a lowering of Alert levels and domestic travel rebounding a full site survey was completed by HVDS in September and Ultrasonic Discharge measuring a maximum 22dBuV was identified from the Termination chamber. Turns out it was also reported in April the previous year and had been investigated during the 2019 winter season whereby a lack of gland plates allowed significant levels of condensation to form on Termination, Boot and Metalwork surfaces, all duly remedied. The phase plots opposite captured on both occasions by our own UltraTEV Plus[2] instrument display a similar likeness with subtle 'peaks' present 180 degrees apart confirming genuine surface Discharge, while the instruments own internal classification algorithms indicate 'PD' rather than 'noise'.

RAPID ESCALATION & DISASTER

Surface discharges are influenced by external stimuli and can lie dormant for long periods waiting for the 'right' conditions to become active, and unlike TEV activity don't often exhibit trend-able behaviour meaning failure can occur from seemingly innocuous levels of activity. Emissions can generate aggressive by-products quickly degrading an insulator's dielectric properties leading to rapid escalation and disaster.



September 2020



April 2019

Investigation findings from the Network Owner revealed waste water pipes running close to the cable ducts under the switchgear seemingly responsible for the condensation problems while the corrosion itself was considered to be chemical affected. Fortunately, a replacement switch was on hand minimising length of outage and a further check in February 2021 by HVDS confirmed a clear result however regular monitoring through continued online surveys will be crucial to prevent any reoccurrence.

PARTIAL DISCHARGE SPECIALIST

There is currently a plethora of choice in the market and it seems all the big name equipment manufacturers have their own PD gear but can a generic reseller, already with bulging instrument portfolios truly provide you the support, training or bespoke advice required for accurate and effective detection of Partial Discharge activity? Even with advances in technology as instruments become ever more capable and user friendly there is still no substitute for the hard-won knowledge amassed by a condition assessment professional, or detection equipment from EA Technology - the UK based pioneers of online Partial Discharge measurement.

Engaging an expert demonstrates your commitment toward good Asset stewardship, provides insight and access to a wider pool of knowledge and proves best practices were employed helping to defend the company from regulation should the worst occur. Whether you prefer to depend on the bonafide experience that a genuine Partial Discharge specialist can provide or wanting to instigate your own internal inspection program, HVDS with two decades of Partial Discharge know-how from right around New Zealand together with EA Technology (Australia) instruments should be your first and only port of call. PD

Visit HV Diagnostic Services or EA Technology for more information

www.hvds.co.nz

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