

PARTIAL DISCHARGE DETECTION AFTER CHRISTCHURCH (NZ) EARTHQUAKE

"Identifying PD by testing in live substations is critical," explains Peter Rhodes of High Voltage Solution. "Being able to monitor the condition of assets in a safe manner, without causing further outages or having to make special connections, is critical in situations such as Christchurch is currently experiencing."

By Peter Rhodes, High Voltage Solution

When a 7.1 magnitude earthquake hit Christchurch at 4:35 am on the 4th of September 2010, severe damage occurred to critical infrastructure for water, sewage and electrical transmission & distribution switchyards.

The problem that Christchurch faces is how to identify which high voltage substation asset (Outdoor switchyards structures contain CTs / VTs / disconnectors / post support insulators / GIS / bulk oil circuit breakers) has sustained either mechanical or electrical damage.

Finding sources of PD as early as possible reduces repair costs, helps keep HV apparatus operating efficiently, and maximizes unit lifespan. Being able to record and analyze the PD signals and make decisions for further actions is a big plus.

ACCELERATED AGING

Partial Discharge is a localized dielectric breakdown of electrical insulation and mainly caused by natural circumstances. If you add earthquakes of a magnitude of 7.1 into the mix, you may have accelerated aging of the HV insulation.

If undetected, it can lead to costly repairs and eventually complete electrical breakdown of HV apparatus; thus, testing for PD is an important part of a condition based maintenance (CBM) program for HV apparatus.



Location of fault (PD) in red circle

SUMMARY

Entire substations can be surveyed and analyzed. The results are recorded to allow future trending and therefore facilitate an assessment of individual HV apparatus insulation over time. It is recommended that a "foot print" is taken as part of commissioning new switchyards to prove that no defects exist and can be used as a base line for future CBM for HV apparatus.

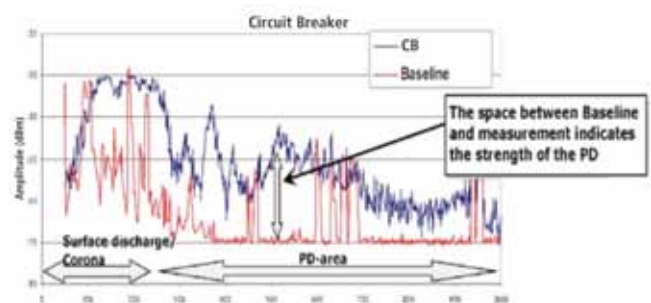
For further information, please contact Peter Rhodes on email: prhodes@highvoltagesolution.com

THE TECHNOLOGY OF RFI MEASUREMENTS

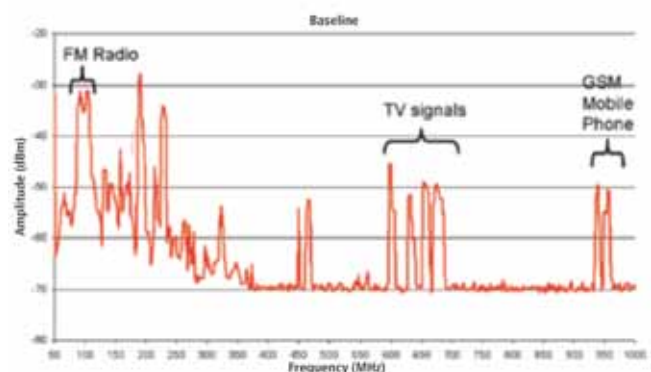
By walking around the HV switchyard using a hand-held RFI instrument to take measurements, sources of PD and external interference can be detected and identified. The instrument searches for PD in the radio frequency area; harmful PD will reveal itself by the electromagnetic energy emitted from the area where the activity is. By recording the electromagnetic energy in the RF spectrum, the recorded information can be analyzed and decisions for remedial actions can be made. Once repairs are complete a re-survey is undertaken to compare the previous RF spectrum with the current RF spectrum, thus insuring the fault has been rectified.



RFI survey being taken of a switchyard



Clearly Identifies PD from surface discharges & Corona



Typical baseline with telecommunication signals present.

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