Transformer Condition Assessment TCA™

Todd Energy
95 Customhouse Quay
Wellington, New Zealand

Location: Todd Energy
Bank & Phase: TAW T1
Serial Number: 31G3932/1
Manufacturer: GEC Alstom
Date Mfgd: 1995
Voltage Ratio (kV): 11/110
Rating (MVA): 28

Date: 28/08/12
Report Number: **6078656**
Order Number:
Fluid volume: 20625 L
Fluid type: Mineral Oil
Breathing: Free
Cooling: ONAN
Core & coil wt: 38400kg

		Sample Receipt Date:	08/08/12
		Sample Date:	27/07/12
		Laboratory No.:	6078656
		Container No.	
		Temperature:	12
ASTM D3612-PartA			
H2	Hydrogen	(ppm):	**203**
CH4	Methane	(ppm):	**25**
C2H6	Ethane	(ppm):	**<1**
C2H4	Ethylene	(ppm):	**12**
C2H2	Acetylene	(ppm):	**<1**
CO	Carbon monoxide	(ppm):	**386**
CO2	Carbon dioxide	(ppm):	**1492**
N2	Nitrogen	(ppm):	**54408**
O2	Oxygen	(ppm):	**13772**

Dissolved Gas Analysis results. Enables detection of faults such as Partial Discharge, Heating or Arcing. Also, CO & CO2 levels and ratios provide an indication on whether abnormal paper degradation is occuring.

Total (ppm):	**70298**	= Total Gas Concentration.
TDCG (ppm):	**626**	= Total Dissolved Combustible Gases
SHL (%):	**5.72**	= Safe Handling Limit in terms of combustible Gas levels in headspace
ETCG (% in blanket):	**1.02**	= Estimated Total Combustible Gases in headspace. If ETCG is greater than SHL, then precautions must be taken when handling fluid such as sparging with Nitrogen

Particles(Counts/100mL)		5 to 15 um:	**57405**
Particles(Counts/100mL)		15 to 25 um:	**3070**
Particles(Counts/100mL)		25 to 50 um:	**465**
Particles(Counts/100mL)		50 to 100 um:	**35**
Particles(Counts/100mL)		>100 um:	**0**

Particle Count detects activity such as fluid & paper degradation, rust formation, mechanical wear & coke formation.

D1533	Moisture	(ppm):	**9**
IEC 156	Dielectric BV	(kV):	**63**
D974	Acid Number	(mg KOH/g):	**<0.01**
D971	Interfacial Tension	(mN/m):	**43.1**
D1500	Color Number	:	**<1.5**
IEC 247	Dielectric Dissipation Factor	(% at 25C):	**0.035**
D2668	Oxidation Inhibitor	(%w/w):	**0.30**

Oil Quality parameters which have a direct bearing on transformer life or in extreme cases can lead directly to failure (eg. flashover from excessive moisture or sludge formation from high acid).

5 HMF	5 hydroxymethyl-2-furaldehyde	(ppm):	**<0.001**
2 FAL	2 furaldehyde	(ppm):	**0.005**
2 ACF	2-acetylfuran	(ppm):	**<0.001**
5 MEF	5 methyl-2-furaldehyde	(ppm):	**<0.001**
2 FOL	2 furfurol	(ppm):	**<0.001**

Furanic compound concentrations in oil which come from paper degradation. These values are used to calculate the Estimated Ave. Degree of Polymerization of the paper.

	Estimated Ave. Degree of Polymerization	:	**>1000** This is calculated from the above Furan levels
TCA Assessment			2

Transformer Condition Assessment Diagnostic Evaluation

TCA Assessment: 2 = Condition code which can be 1, 2, 3, 4 or 4* (1 = best, 4/4* = worst)
Sampling Interval: Retest in six months. Establish trends and confirm condition
Operating Procedure: Continue normal operation.
Comments: Partial discharge is indicated.
Field Comments: Fluid condition is within acceptable in-service parameters.
Paper condition is "as new" (based on furan levels).

The condition code is based on the relationship between all the parameters tested. An elevated code can be triggered by abormal levels of a single parameter or by any combination of numerous abnormal results.

Authorised by: **Frank Catela**

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Samples have been analysed as received **Fax: (613) 9574 7079**