

ELECTRICAL EQUIPMENT FLUID TESTING RESULTS

(testing provided by SD Myers, Inc.)

TC# _____

Owner	_____ Example Owner _____	Plant	_____ Example Plant _____	Page	_____ 1 _____
Unit No.	_____	Other	_____	Job #	_____ INSULATION FLUID _____
City	_____	Location	_____	Date	_____ 10/13/2014 _____
Substation	_____ INSULATION FLUID _____	Position	_____		_____ AUTOMATED _____

NAMEPLATE DATA

Manufacturer	_____	Equipment Type	_____	Radiators	_____	Conservator Tank	_____
Manufacture Date	_____	Transformer Class	_____	Fans	_____	LTC Compartment	_____
Serial No.	_____	Impedance %	_____	Water Cooled	_____	Bushing Location	_____
KVA Rating	_____	Phase/Cycle	_____	Oil Pumps	_____	Breather	_____
High Voltage	_____	Liquid Type	_____	Top FPV (inch)	_____	Hose Length (feet)	_____
Low Voltage	_____	Gallons	_____	Bottom FPV (inch)	_____	Service Online	_____
Weight (lbs)	_____	Other Access	_____	Insulation Type	_____	Power Available	_____

ADDITIONAL EQUIPMENT

VISUAL INSPECTION

DATE	LEVEL	SAMPLE TEMP	TOP TEMP	P/V	PAINT	LEAKS	DATE	FIELD SERVICE SERVICE
------	-------	-------------	----------	-----	-------	-------	------	-----------------------

Additional Information

Reason Not Tested

LIQUID SCREEN TEST DATA

DATE	SERVICE	ACID	IFT	DIEL 877	DIEL 1816	GAP	COLOR	SP. GRAV.	VISUAL	SEDIMENT
------	---------	------	-----	----------	-----------	-----	-------	-----------	--------	----------

INHIBITOR CONTENT

DATE	PCT. BY WEIGHT
------	----------------

This test was not run on this transformer.

LIQUID POWER FACTOR

DATE	25 C	100 C
------	------	-------

This test was not run on this transformer.

KEY TO ABBREVIATIONS: AC -- ACCEPTABLE QU -- QUESTIONABLE UN -- UNACCEPTABLE RS -- RESAMPLE
NOTE: * AFTER A TEST RESULT INDICATES THAT THIS TEST WAS PERFORMED OTHER THAN SD MYERS INC.

DISCLAIMER: All testing was provided by SD Myers, Inc. analytical lab with all data being provided to PowerDB for the convenience of S. D. Myers, Inc. customers using PowerDB. SD Myers, Inc. shall not be liable for any errors in data or format of data after provided to PowerDB. For comprehensive test data, SD Myers, Inc. Rainbow Report, or to verify any information provided through this report, please visit <http://transformerdashboard.com> or call SD Myers, Inc. at 330.630.7000.

ELECTRICAL EQUIPMENT FLUID TESTING RESULTS

(testing provided by SD Myers, Inc.)

TC#

Owner Example Owner S/N _____ Page 2
Substation _____ Mfg. _____ Gal Liq. _____ High V. _____
Location _____ Unit No. _____ KVA _____ Low V. _____

K.F. TEST MOISTURE CONTENT EXPRESSED IN PPM

DATE	AVG TEMP	PPM	PCT. SATURATION	MOIST./DRY WGT. PCT.
------	-------------	-----	--------------------	-------------------------

This test was not run on this transformer.

FURAN ANALYSIS EXPRESSED IN PPB

DATE	5H2F	2FOL	2FAL	2ACF	5M2F	TOTAL
------	------	------	------	------	------	-------

This test was not run on this transformer.

GAS-IN-OIL ANALYSIS GAS CHROMATOGRAPHY EXPRESSED IN PPM

DATE	HYDROGEN	OXYGEN	NITROGEN	METHANE	CARBON MONOXIDE	CARBON DIOXIDE	ETHANE	ETHYLENE	ACETYLENE	TOTAL COMBUST.	TOTAL GAS
------	----------	--------	----------	---------	--------------------	-------------------	--------	----------	-----------	-------------------	--------------

This test was not run on this transformer.

ICP METALS-IN-OIL EXPRESSED IN PPM

DATE	ALUMINUM	IRON	COPPER
------	----------	------	--------

This test was not run on this transformer.

PCB CONTENT EXPRESSED IN PPM

DATE	1242	1254	1260	OTHER	TOTAL
------	------	------	------	-------	-------

This test was not run on this transformer.

KEY TO ABBREVIATIONS: AC -- ACCEPTABLE QU -- QUESTIONABLE UN -- UNACCEPTABLE
NOTE: * AFTER A TEST RESULT INDICATES THAT THIS TEST WAS PERFORMED BY AN OUTSIDE LAB.

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ELECTRICAL EQUIPMENT FLUID TESTING RESULTS

(testing provided by SD Myers, Inc.)

TC#

Owner	Example Owner	S/N		Page	3
Substation		Mfg.		High V.	
Location		Unit No.		Low V.	

RECAP RECOMMENDATIONS

COMMENTS:

DEFICIENCIES:

KEY TO ABBREVIATIONS: AC -- ACCEPTABLE QU -- QUESTIONABLE UN -- UNACCEPTABLE

NOTE: * AFTER A TEST RESULT INDICATES THAT THIS TEST WAS PERFORMED BY AN OUTSIDE LAB.

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DISSOLVED GAS ANALYSIS

Report Date: _____ Job Number: INSULATION FLUID
Report Number: _____ PO Number: _____

Location: _____ Year of Mfg.: _____
Bank & Phase: _____ kV Rating: _____
Serial Number: _____ Breathing: _____
Manufacturer: _____ Cooling: _____
Equipment Type: _____ Fluid Type: _____
Model: _____ Fluid Volume: _____

Substation: INSULATION FLUID Position: AUTOMATED

Sample Date:				
Laboratory No.:				
Container No.:				
Temperature:				

Hydrogen (ppm):				
Methane (ppm):				
Ethane (ppm):				
Ethylene (ppm):				
Acetylene (ppm):				
Carbon Monoxide (ppm):				
Carbon Dioxide (ppm):				
Nitrogen (ppm):				
Oxygen (ppm):				

Total (ppm): _____

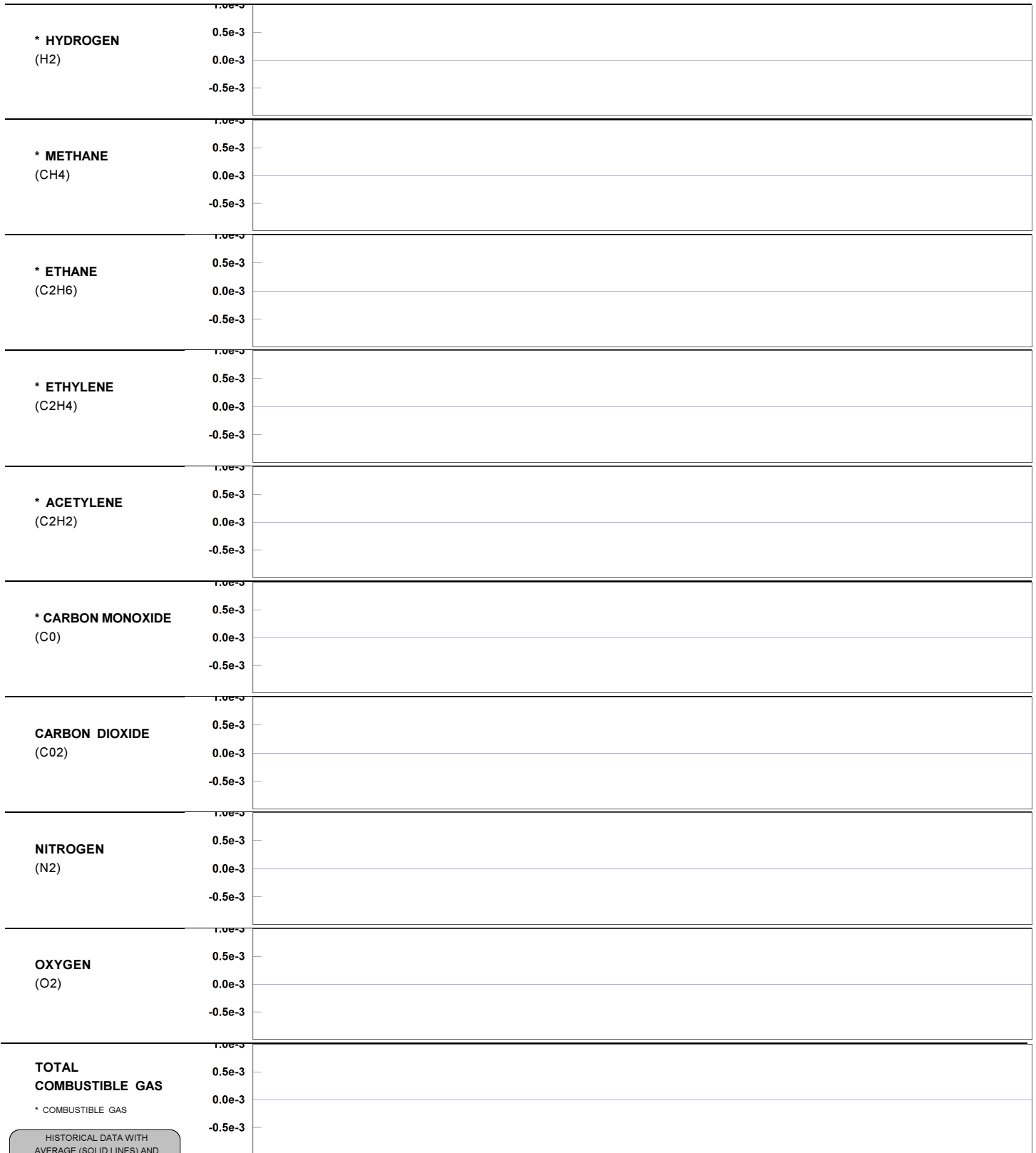
TDCG (ppm):				
TDCG Rate (ppm/day):				
TDCG (gallons):				
TDHHG (ppm):				
ETCG (% in blanket):				

CH ₄ / H ₂ :	0			
C ₂ H ₂ / C ₂ H ₄ :	0			
C ₂ H ₂ / CH ₄ :	0			
C ₂ H ₆ / C ₂ H ₂ :	0			
C ₂ H ₄ / C ₂ H ₆ :	0			
CO ₂ / CO:	0			

Dissolved Gas Diagnostics

Key Gas Method:	
Doernenburg Ratios:	
Rodgers Ratios (3):	
Rodgers Ratios (4):	
CO ₂ / CO:	
Heat Index:	

IEEE Std. C57.104 - 1991 Condition: _____ TDCG Level (ppm): _____ TDCG Rate (ppm/day): _____
 Sampling Interval: _____
 Operating Procedure: _____
 Comments: _____





OIL TEST - COMPACT



OWNER Example Owner
 PLANT Example Plant
 SUBSTATION INSULATION FLUID
 POSITION AUTOMATED

PAGE 6
 AMBIENT TEMP. _____ °F
 DATE 10/13/2014
 HUMIDITY _____ %
 JOB # INSULATION FLUID
 ASSET ID _____

OTS60PB EDITION _____ OTS SER. NO. _____ PASS/FAIL LIMIT _____ OIL TYPE _____

No.	SAMPLE	TEST STANDARD	GAP mm	PASS LIMIT	TEMP F	NO. TESTS	FREQ Hz	BREAKDOWN VOLTAGE (kV)						STD DEV		RESULT	
								1	2	3	4	5	6	AVG	s		s/x
1						6											

SAMPLE NOTES
 1

COMMENTS:
 DEFICIENCIES:

TEST EQUIPMENT USED: _____

TESTED BY: Default Administrator

DISSOLVED GAS ANALYSIS

WEIDMANN DIAGNOSTIC SOLUTIONS
5305 Commerce Square Drive • Indianapolis, IN • 46237 USA
Phone 317 888 7288 • Fax 317 888 2577
WWW.WEIDMANN-DIAGNOSTICS.COM



ATTN _____	SERIAL # <u>NA3118001</u>	JOB # <u>INSULATION FLUID</u>	PAGE <u>7</u>
P. O. # _____	BANK/PH _____	MFR. _____	ACCOUNT _____
LOCATION _____	TANK _____	KV _____	ORDER # _____
	BREATHING _____	KVA _____	CONTROL # _____
	FLUID _____	% IMP. (% Z) _____	RECEIVED _____
	GALLONS _____	CONTAINER _____	REPORTED _____
	SUBSTATION <u>INSULATION FLUID</u>	PROJECT ID _____	CUSTOMER ID _____
		POSITION <u>AUTOMATED</u>	

DISSOLVED GAS ANALYSIS	ASTM D-3612 LAB CONTROL NUMBER				
	REPORT UNITS: PPM DATE SAMPLED				
	ORDER NUMBER				
	OIL TEMP (C)				
	HYDROGEN (H2)				
	METHANE (CH4)				
	ETHANE (C2H6)				
	ETHYLENE (C2H4)				
	ACETYLENE (C2H2)				
	CARBON MONOXIDE (CO)				
	CARBON DIOXIDE (CO2)				
	NITROGEN (N2)				
	OXYGEN (O2)				
	TOTAL DISSOLVED GAS				
TOTAL DISSOLVED COMBUSTIBLE GAS					
EQUIVALENT TCG PERCENT					
OIL SCREEN	D-1533B MOISTURE IN OIL (ppm)				
	D-971 INTERFACIAL TENSION (dynes/cm)				
	D-974 ACID NUMBER (mg KOH/g)				
	D-1500 COLOR NUMBER (RELATIVE)				
	D-1524 VISUAL EXAM (RELATIVE)				
	D-1524 SEDIMENT EXAM (RELATIVE)				
	D-877 DIELECTRIC BREAKDOWN (kV)				
	D-1816 DIELECTRIC BREAKDOWN 1 mm (kV mm-C)				
	D-1816 DIELECTRIC BREAKDOWN 2 mm (kV mm-C)				
	D-924 POWER FACTOR-25 (%)				
	D-924 POWER FACTOR-100C (%)				
	D-1298 SPECIFIC GRAVITY (RELATIVE)				
	WDS PASSIVATOR (ppm)				
	D-1298 OXIDATION INHIBITOR (wt. %):				
DIAGNOSTICS	DGA KEY GAS / INTERPRETIVE METHOD IEEE (C57.104) (Most Recent Sample)				
	DGA TDCG RATE INTERPERATIVE METHOD DGA IEEE/ANSI (C57.104-2008) (Two most recent samples)				
	DGA CELLULOSE (PAPER) INSULATION WDS DGA CONDITION CODE				
	WDS RECOMMENDED ACTION MOISTURE IN OIL INTERFACIAL TENSION ACID NUMBER COLOR NUMBER AND VISUAL DIELECTRIC BREAKDOWN D-877 DIELECTRIC BREAKDOWN D-1816 POWER FACTOR @ 25C POWER FACTOR @ 100C OXIDATION INHIBITOR				



DISSOLVED GAS ANALYSIS



USER _____ PAGE 8
 SUBSTATION INSULATION FLUID POSITION AUTOMATED JOB # NSULATION FLUID
 SERIAL NO. NA3118001

* HYDROGEN
(H2)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

* METHANE
(CH4)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

* ETHANE
(C2H6)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

* ETHYLENE
(C2H4)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

* ACETYLENE
(C2H2)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

* CARBON MONOXIDE
(CO)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

CARBON DIOXIDE
(CO2)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

NITROGEN
(N2)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

OXYGEN
(O2)

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

TOTAL
COMBUSTIBLE GAS

* COMBUSTIBLE GAS

1.0e-3
0.5e-3
0.0e-3
-0.5e-3

HISTORICAL DATA WITH
AVERAGE (SOLID LINES) AND
2-SIGMA (DOTTED LINES)



DISSOLVED GAS ANALYSIS



USER _____ PAGE 9
SUBSTATION INSULATION FLUID POSITION AUTOMATED JOB # NSULATION FLUIE
SERIAL NO. NA3118001

COMMENTS: _____
DEFICIENCIES: _____



OTS OIL TEST



OWNER Example Owner
 PLANT Example Plant
 SUBSTATION INSULATION FLUID
 POSITION AUTOMATED

PAGE 10
 AMBIENT TEMP. _____ °F
 HUMIDITY _____ %
 DATE 10/13/2014
 JOB # INSULATION FLUID
 ASSET ID _____

INSTRUMENT TYPE: _____ 1

RESULT ID: _____ TEST ID: _____ TEST NAME: _____ DATE: _____
 MACHINE SERIAL NO: _____ SOFTWARE: _____ STD LIB: _____ TIME: _____
 ELECTRODE TYPE: _____ OIL TEMPERATURE: _____ MEAN BREAKDOWN: _____ kV
 MAX VOLTAGE: _____ kV OIL TYPE: _____ STD DEVIATION: _____ kV
 VOLTAGE RISE: _____ V/s STIRRER TYPE: _____ DISPERSION: _____
 TEST FREQUENCY: 61.8 Hz RANGE: _____ kV
 ELECTRODE GAP: _____ mm VALIDATION %: _____ % VALIDATION VALUE: _____ kV
 TRIP SETTING: _____ RESULT: _____

TEST NO.	1	2	3	4	5
BREAKDOWN VOLTAGE (kV)					

NO. OF RESULTS: 5

NOTES: _____

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____

TESTED BY: Default Administrator



INSULATING FLUID ANALYSIS



Equipment ID _____	Manufacturer _____	Owner _____	Example Customer Comp
Apparatus Type _____	Serial No _____	Location _____	
Fluid Type _____	Year Mfg _____	Designation _____	
Fluid Cap. _____	Model/Type _____	Description _____	
Analysis Rules _____	kV Rating _____	Preservation _____	
	MVA Rating _____	Cooling _____	

Report Date _____ SUBSTATION _____ INSULATION FLUID _____ POSITION _____ AUTOMATED _____

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Gas Analysis	ppm/day	Limits
Sample No		
Fluid Temp (C)		
Hydrogen (H2)	0.00	< 100
Methane (CH4)	0.00	< 120
Ethane (C2H6)	0.00	< 65
Ethylene (C2H4)	0.00	< 50
Acetylene (C2H2)	0.00	< 35
Carbon Monoxide (CO)	0.00	< 350
Carbon Dioxide (CO2)	0.06	< 2500
Oxygen (O2)		
Nitrogen (N2)		
TDCG (ppm)	0.00	< 720
Equivalent TCG (%)		
Total Gas (%)		
CO2/CO		
O2/N2		
Water		< 35
Water Saturation		
Equipment Condition		

Result	Port or Tank	Test Lab
Interval (days)	Sampled by	Test Date
Gas Std	Reason	Lab Ref No

Gas Analysis Remarks

Fluid Quality	Limits
Sample No	
Fluid Temp (C)	
Acid Number	mg KOH/g < .15
Interfacial Tension	mN/m > 30
Diel Str (D1816)	kV > 47
Diel Str (D877)	kV
PF at 25 C	% < .5
Water	ppm < 20
Water Saturation	% < 15
Color	< 3
Specific Gravity	
Fluid / PCB Cond	

Result	Port or Tank	Test Lab
Interval (days)	Sampled by	Test Date
Fluid Std	Reason	Lab Ref No

Fluid Quality Analysis Remarks

INSULATING FLUID EVALUATION

Report Date:
Report Number:

Job Number: INSULATION FLUID
PO Number:

Location:
Bank & Phase:
Serial Number:
Manufacturer:
Equipment Type:
Model:

Year of Mfg.:
kV Rating:
Breathing:
Cooling:
Fluid Type:
Fluid Volume:

Substation: INSULATION FLUID

Position: AUTOMATED

Sample Date:				
Laboratory No.:				
Container No.:				
Temperature:				

D1533	Moisture	(ppm):				
D971	Interfacial Tension	(dynes/cm)				
D974	Acid Number	(mg/KOH/g):				
D1500	Color Number	:				
D1524	Visual Examination	:				
D877	Dielectric BV	(kV):				
D1816	Dielectric BV	(kV):				
D924	Power Factor	(% at 25 C):				
D924	Power Factor	(% at 100 C):				
D2668	Oxidation Inhibitor	(%):				
D129	Specific Gravity	:				
D88	Viscosity	(SUS):				
D97	Pour Point	(C):				
D92	Flash Point	(C):				
D92	Fire Point	(C):				
D1807	Refractive Index	:				
D1275	Corrosive Sulfur	:				

Insulating Fluid Daignostics

	ASTM D3487	IEEE Group I	<69	>69<288	>345	IEEE Group II	IEEE Group III
Moisture:	35 max		35 max	25 max	20 max		
Interfacial Tension:	40 min		24 min	26 min	30 min	24 min	16 min
Acid Number:	0.03 max		0.2 max	0.2 max	0.1 max	0.2 max	0.5 max
Color Number:	0.5 max						
Visual Examination:	clear & bright						
Dielectric BV D877:	30 min		26 min	26 min	26 min		
Dielectric BV D1816:	28 min		23 min	26 min	26 min		
Power Factor @ 25 C:	0.05 max						
Power Factor @ 100 C:	0.30 max						
Oxidation Inhibitor:	0.3 max						
Specific Gravity:	0.91 max						
Viscosity @ 40 C:	66 max						
Pour Point:	-40 max						
Flash Point:	145 min						
Fire Point:							
Refractive Index:							
Corrosive Sulfur:	noncorrosive						
Comments:							



OIL TEST



OWNER Example Owner PAGE 13
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION AUTOMATED ASSET ID _____

OTS60PB EDITION _____ OTS SER. NO. _____ PASS/FAIL LIMIT _____

SAMPLE DESCRIPTION _____
 TEST STANDARD _____ PASS LIMIT _____ kV TEST FREQUENCY _____ Hz TEMPERATURE _____ F GAP _____ mm
 AVG BREAKDOWN VOLTAGE _____ kV STANDARD DEVIATION s = _____ s / x = _____ NO. OF TESTS 5 OIL TYPE _____
 RESULT _____

TEST NO.	1	2	3	4	5
BREAKDOWN VOLTAGE (KV)					

NOTES _____

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____ TESTED BY: Default Administrator



TRANSFORMER LIQUID COOLANT ANALYSIS



OWNER Example Owner PAGE 14
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 SPECIFICATION NO. _____ KVA _____ / _____ / _____ TYPE _____ CLASS _____
 PHASE 3 TEMPERATURE RISE _____ °C IMPEDANCE _____ % B.I.L. RATING _____ KV PRI. _____ KV SEC. _____
 COOLANT _____ CAPACITY _____ GALLONS TOTAL WEIGHT _____
 WINDING POLARITY SUBTRACTIVE WINDING MATERIAL _____ K FACTOR _____ NA _____
 PRIMARY VOLTAGE _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 SECONDARY VOLTAGE _____ / _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 TAP VOLTAGES _____
 TAP CONNECTIONS _____
 TAP SETTING _____ VOLTS # FANS _____ TAP CHANGER: INTERNAL EXTERNAL DRY TYPE

TEST RESULTS

		ASTM
PARTICLES	_____	D-1524
DIELECTRIC STRENGTH	_____ kV	D-877
INTERFACIAL TENSION	_____ D/CM	D-971
ACIDITY	_____ MG KOH/G	D-974
ASTM COLOR NO.	_____	D-1500
PCB CONTENT	_____ PPM	D-4059
E.P.A. CLASSIFICATION	_____	
POWER FACTOR	_____ %	D-924
WATER CONTENT	_____ PPM	D-1533B
SPECIFIC GRAVITY	_____	D-287

TRANSFORMER INSPECTION

TEMPERATURE GAUGE PRESENT READING _____ °C
 TEMPERATURE GAUGE HIGH READING _____ °C
 PRESSURE/VACUUM GAUGE READING _____ #
 PAINT CONDITION _____
 GASKETS _____
 BUSHINGS _____
 LIQUID LEVEL _____

PLUMBING TABLE

	P	S	OTHER
TOP			
BOTTOM			
VENT			
ACCESS PORT			
SAMPLE VALVE			

DISSOLVED GAS ANALYSIS

		ASTM D-3612C
* HYDROGEN (H2)	_____	PPM
* METHANE (CH4)	_____	PPM
* ETHANE (C2H6)	_____	PPM
* ETHYLENE (C2H4)	_____	PPM
* ACETYLENE (C2H2)	_____	PPM
* CARBON MONOXIDE (CO)	_____	PPM
CARBON DIOXIDE (CO2)	_____	PPM
NITROGEN (N2)	_____	PPM
OXYGEN (O2)	_____	PPM
TOTAL GAS	<u>0</u>	PPM
TOTAL COMBUSTIBLE GAS	<u>0</u>	PPM
EQUIVALENT TCG READING	_____	%
* COMBUSTIBLE GAS		

ANALYSIS OF TEST RESULTS

CONDITION	SERVICE
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS:
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS: _____
 DEFICIENCIES: _____

SAMPLED BY: Default Administrator TESTED BY: WEIDMANN - ACTI



ELECTRICAL EQUIPMENT INSULATING FLUID TEST



OWNER Example Owner PAGE 15
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

SAMPLE DATA

CUSTOMER SAMPLE I.D. _____ TESTING COMPANY SAMPLE I.D. _____
 DATE SAMPLES RECEIVED _____
 DEVICE IDENTIFICATION _____ DEVICE LOCATION _____
 DEVICE MANUFACTURER _____ FLUID TYPE _____ EQUIP. CAP. _____ GAL.

TEST RESULTS

PARTICLES _____
 DIELECTRIC STRENGTH _____ kV
 INTERFACIAL TENSION _____ d/cm
 ACIDITY _____ mg KOH/g
 ASTM COLOR NO. _____
 PARTS PER MILLION OF PCB _____
 E.P.A. CLASSIFICATION _____
 POWER FACTOR _____ %
 MOISTURE _____ PPM
 SPECIFIC GRAVITY _____
 VISCOSITY _____ SUS
 POUR POINT _____ °C
 FLASH POINT _____ °C

ANALYSIS OF TEST RESULTS

<u>CONDITION</u>	<u>SERVICE</u>
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS:
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____ TESTED BY: Default Administrator



OIL CIRCUIT BREAKER FLUID TEST



OWNER Example Owner PAGE 16
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 TYPE _____ MODEL NO. _____ DATE MANUFACTURED _____
 TEMPERATURE RISE _____ °C IMPEDANCE _____ B.I.L. RATING _____ kV PRI. _____ kV SEC.
 PRIMARY VOLTAGES _____ K FACTOR _____
 SECONDARY VOLTAGES _____ TOTAL WEIGHT _____ LIQUID CAPACITY _____

TEST RESULTS

PARTICLES _____
 DIELECTRIC STRENGTH _____ kV
 INTERFACIAL TENSION _____ D/CM
 ACIDITY _____ MG KOH/G
 ASTM COLOR NO. _____
 PARTS PER MILLION OF PCB _____
 E.P.A. CLASSIFICATION _____
 POWER FACTOR _____ %
 PARTS PER MILLION OF WATER _____

TRANSFORMER INSPECTION

TEMPERATURE GAUGE PRESENT READING _____ °C
 TEMPERATURE GAUGE HIGH READING _____ °C
 PRESSURE/VACUUM GAUGE READING _____ #
 PAINT CONDITION _____
 GASKETS _____
 BUSHINGS _____
 LIQUID LEVEL _____

PLUMBING TABLE

	P	S	OTHER
TOP			
BOTTOM			
VENT			
ACCESS PORT			

DISSOLVED GAS ANALYSIS

* HYDROGEN (H2) _____ PPM
 OXYGEN (O2) _____ PPM
 NITROGEN (N2) _____ PPM
 * METHANE (CH4) _____ PPM
 * CARBON MONOXIDE (CO) _____ PPM
 CARBON DIOXIDE (CO2) _____ PPM
 * ETHYLENE (C2H4) _____ PPM
 * ETHANE (C2H6) _____ PPM
 * ACETYLENE (C2H2) _____ PPM
 TOTAL GAS CONTENT _____ %
 COMBUSTIBLE GAS CONTENT _____ PPM
 * COMBUSTIBLE GAS ** NONE DETECTED

ANALYSIS OF TEST RESULTS

CONDITION	SERVICE
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS:
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS:

DEFICIENCIES:

--

TEST EQUIPMENT USED: _____

TESTED BY: Default Administrator



TRANSFORMER LIQUID COOLANT TEST



OWNER Example Owner PAGE 17
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 SPECIFICATION NO. _____ KVA _____ / _____ / _____ TYPE _____ CLASS _____
 PHASE 3 TEMPERATURE RISE _____ °C IMPEDANCE _____ % B.I.L. RATING _____ KV PRI. _____ KV SEC.
 COOLANT _____ CAPACITY _____ GALLONS TOTAL WEIGHT _____
 WINDING POLARITY SUBTRACTIVE WINDING MATERIAL _____ K FACTOR _____ NA
 PRIMARY VOLTAGE _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 SECONDARY VOLTAGE _____ / _____ 0 DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 TAP VOLTAGES _____
 TAP CONNECTIONS _____
 TAP SETTING _____ VOLTS # FANS _____ TAP CHANGER: INTERNAL EXTERNAL DRY TYPE

TEST RESULTS

		ASTM
PARTICLES	_____	D-1524
DIELECTRIC STRENGTH	_____ kV	D-877
INTERFACIAL TENSION	_____ D/CM	D-971
ACIDITY	_____ MG KOH/G	D-974
ASTM COLOR NO.	_____	D-1500
PCB CONTENT	_____ PPM	D-4059
E.P.A. CLASSIFICATION	_____	
POWER FACTOR	_____ %	D-924
WATER CONTENT	_____ PPM	D-1533B
SPECIFIC GRAVITY	_____	D-287

TRANSFORMER INSPECTION

TEMPERATURE GAUGE PRESENT READING _____ °C
 TEMPERATURE GAUGE HIGH READING _____ °C
 PRESSURE/VACUUM GAUGE READING _____ #
 PAINT CONDITION _____
 GASKETS _____
 BUSHINGS _____
 LIQUID LEVEL _____

PLUMBING TABLE

	P	S	OTHER
TOP			
BOTTOM			
VENT			
ACCESS PORT			
SAMPLE VALVE	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

ANALYSIS OF TEST RESULTS

CONDITION	SERVICE
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS:
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____ TESTED BY: Default Administrator



TRANSFORMER FURFURAN ANALYSIS



OWNER Example Owner PAGE 18
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 SPECIFICATION NO. _____ KVA _____ / _____ / _____ TYPE _____ CLASS _____
 PHASE 3 TEMPERATURE RISE _____ °C IMPEDANCE _____ % B.I.L. RATING _____ KV PRI. _____ KV SEC. _____
 COOLANT _____ CAPACITY _____ GALLONS TOTAL WEIGHT _____
 WINDING POLARITY SUBTRACTIVE WINDING MATERIAL _____ K FACTOR _____ NA _____
 PRIMARY VOLTAGE _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 SECONDARY VOLTAGE _____ / _____ 0 DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 TAP VOLTAGES _____
 TAP CONNECTIONS _____
 TAP SETTING _____ VOLTS # FANS _____ TAP CHANGER: INTERNAL EXTERNAL DRY TYPE

FURFURYL ANALYSIS

Item	Unit	Value	Value	Value	Value	Value	Value
1 - FUROIC ACID	PPM	_____	_____	_____	_____	_____	_____
2 - FURYL ALCOHOL	PPM	_____	_____	_____	_____	_____	_____
5 - HYDRO-METHYL FURALDEHYDE	PPM	_____	_____	_____	_____	_____	_____
2 - FURALDEHYDE	PPM	_____	_____	_____	_____	_____	_____
2 - ACETYLFURAN	PPM	_____	_____	_____	_____	_____	_____
5 - METHYL - 2 - FURALDEHYDE	PPM	_____	_____	_____	_____	_____	_____

* NONE DETECTED

TESTED BY _____
 SAMPLED BY _____

ANALYSIS OF CURRENT TEST RESULTS

DEGREE OF POLYMERIZATION _____
 EQUIVALENT OPERATING AGE _____

DEGREE OF POLYMERIZATION = (LOG [FUR] - 1.51) / -0.0035
 EQUIVALENT OPERATING AGE = (LOG [FUR] + 1.83) / 0.058
 (2 - FURALDEHYDE USED IN CALCULATIONS)

CONDITION	SERVICE
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____ TESTED BY: Default Administrator



DISSOLVED GAS ANALYSIS ELECTRICAL INSULATING FLUID



OWNER Example Owner PAGE 19
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 SPECIFICATION NO. _____ KVA _____ / _____ / _____ TYPE _____ CLASS _____
 PHASE 3 TEMPERATURE RISE _____ °C IMPEDANCE _____ % B.I.L. RATING _____ KV PRI. _____ KV SEC. _____
 COOLANT _____ CAPACITY _____ GALLONS TOTAL WEIGHT _____
 WINDING POLARITY SUBTRACTIVE WINDING MATERIAL _____ K FACTOR _____ NA _____
 PRIMARY VOLTAGE _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 SECONDARY VOLTAGE _____ / _____ 0 DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 TAP VOLTAGES _____
 TAP CONNECTIONS _____
 TAP SETTING _____ VOLTS # FANS _____ TAP CHANGER: INTERNAL EXTERNAL DRY TYPE

DISSOLVED GAS ANALYSIS

ASTM D-3612

HISTORICAL DATA - PPM

		GAS		HISTORICAL DATA - PPM				
* HYDROGEN	(H2)	_____	PPM	_____	_____	_____	_____	_____
* METHANE	(CH4)	_____	PPM	_____	_____	_____	_____	_____
* ETHANE	(C2H6)	_____	PPM	_____	_____	_____	_____	_____
* ETHYLENE	(C2H4)	_____	PPM	_____	_____	_____	_____	_____
* ACETYLENE	(C2H2)	_____	PPM	_____	_____	_____	_____	_____
* CARBON MONOXIDE	(CO)	_____	PPM	_____	_____	_____	_____	_____
CARBON DIOXIDE	(CO2)	_____	PPM	_____	_____	_____	_____	_____
NITROGEN	(N2)	_____	PPM	_____	_____	_____	_____	_____
OXYGEN	(O2)	_____	PPM	_____	_____	_____	_____	_____
TOTAL GAS		<u>0</u>	PPM	_____	_____	_____	_____	_____
TOTAL COMBUSTIBLE GAS		<u>0</u>	PPM	_____	_____	_____	_____	_____
EQUIVALENT TCG READING		<u>0</u>	%	_____	_____	_____	_____	_____

* COMBUSTIBLE GAS

ANALYSIS OF CURRENT TEST RESULTS

- LOW VOLUME OF COMBUSTIBLE GAS PRESENT
- OVERHEATING OF: OIL CELLULOSE
- CORONA IN: OIL CELLULOSE
- ARCING IN: OIL CELLULOSE
- UNUSUAL CONDITION (SEE COMMENTS)

CONDITION	SERVICE
<input type="radio"/> EXCELLENT	<input type="checkbox"/> NO SERVICE REQUIRED
<input type="radio"/> GOOD	<input type="checkbox"/> RETEST IN _____ MONTHS:
<input type="radio"/> INVESTIGATE	<input type="checkbox"/> SERVICE REQUIRED
<input type="radio"/> POOR	<input type="checkbox"/> SERVICE IMMEDIATELY
<input type="radio"/> FAILED UNIT	<input type="checkbox"/> REFER TO COMMENTS

COMMENTS: _____
 DEFICIENCIES: _____

TEST EQUIPMENT USED: _____ TESTED BY: Default Administrator



TRANSFORMER LIQUID COOLANT TRENDING



OWNER Example Owner PAGE 20
 PLANT Example Plant AMBIENT TEMP. _____ °F DATE 10/13/2014
 SUBSTATION INSULATION FLUID HUMIDITY _____ % JOB # INSULATION FLUID
 POSITION GENERAL ASSET ID _____

NAMEPLATE DATA

MANUFACTURER _____ SERIAL NO. _____
 SPECIFICATION NO. _____ KVA _____ / _____ / _____ TYPE _____ CLASS _____
 PHASE 3 TEMPERATURE RISE _____ °C IMPEDANCE _____ % B.I.L. RATING _____ KV PRI. _____ KV SEC. _____
 COOLANT _____ CAPACITY _____ GALLONS TOTAL WEIGHT _____
 WINDING POLARITY SUBTRACTIVE WINDING MATERIAL _____ K FACTOR _____ NA _____
 PRIMARY VOLTAGE _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 SECONDARY VOLTAGE _____ / _____ DELTA WYE RATED CURRENT _____ / _____ / _____ AMPERES
 TAP VOLTAGES _____
 TAP CONNECTIONS _____
 TAP SETTING _____ VOLTS # FANS _____ TAP CHANGER: INTERNAL EXTERNAL DRY TYPE

FLUID QUALITY	10/13/2014									
PARTICLES										
DIELECTRIC STRENGTH (KV)										
INTERFACIAL TENSION (D/CM)										
ACIDITY (MG KOH/G)										
ASTM COLOR NO.										
PCB CONTENT (PPM)										
E.P.A. CLASSIFICATION										
POWER FACTOR (%)										
WATER CONTENT (PPM)										
SPECIFIC GRAVITY										

DISSOLVED GAS ANALYSIS	10/13/2014									
* HYDROGEN (H2)										
* METHANE (CH4)										
* ETHANE (C2H6)										
* ETHYLENE (C2H4)										
* ACETYLENE (C2H2)										
* CARBON MONOXIDE (CO)										
CARBON DIOXIDE (CO2)										
NITROGEN (N2)										
OXYGEN (O2)										
TOTAL GAS	0									
TOTAL COMBUSTIBLE GAS	0									

* COMBUSTIBLE GAS

SAMPLED BY: Default Administrator TESTED BY: WEIDMANN - ACTI

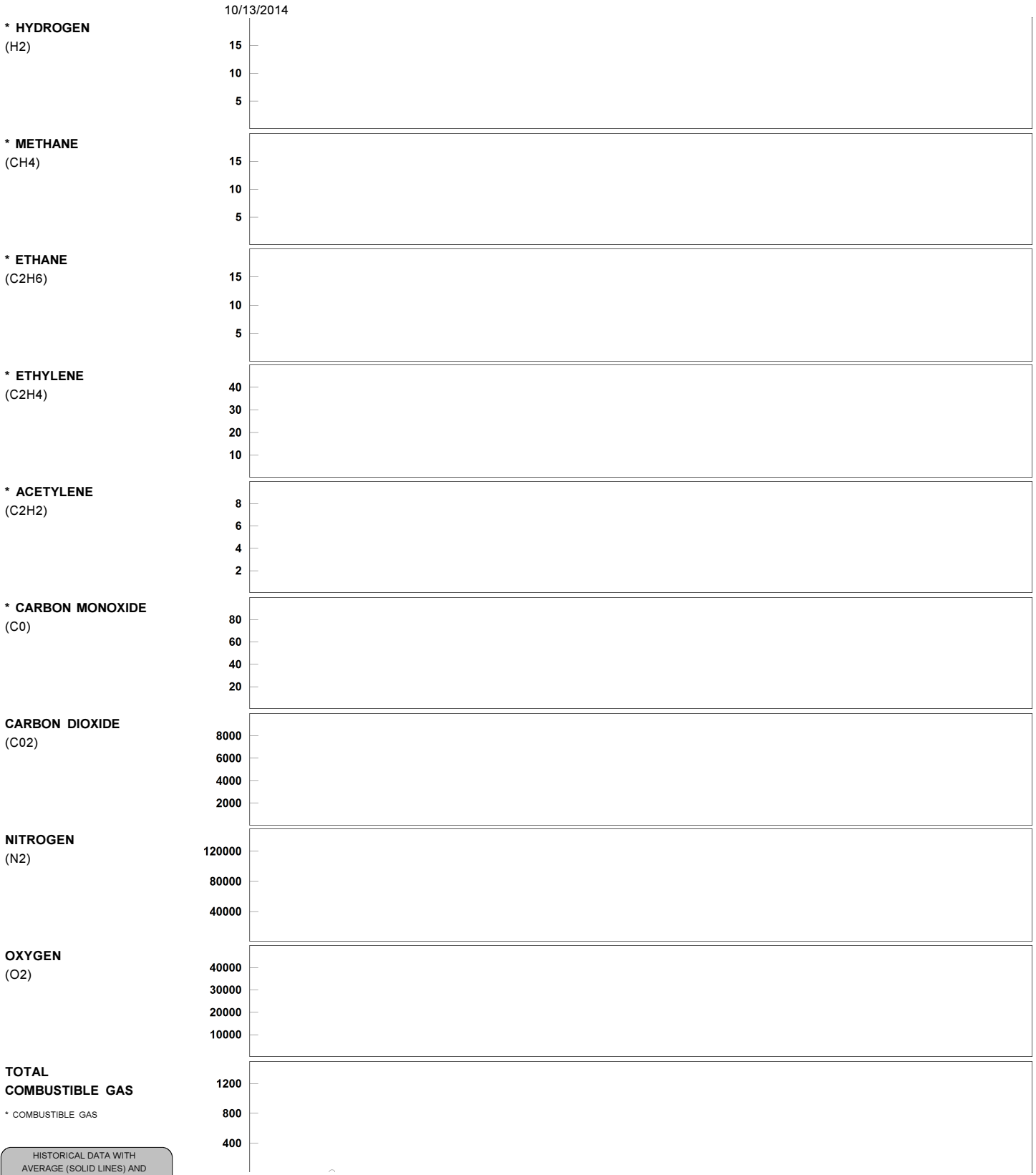


TRANSFORMER LIQUID COOLANT TRENDING DISSOLVED GAS ANALYSIS



USER _____
 SUBSTATION INSULATION FLUID POSITION GENERAL
 SERIAL NO. _____

PAGE 21
 JOB # NSULATION FLUIE



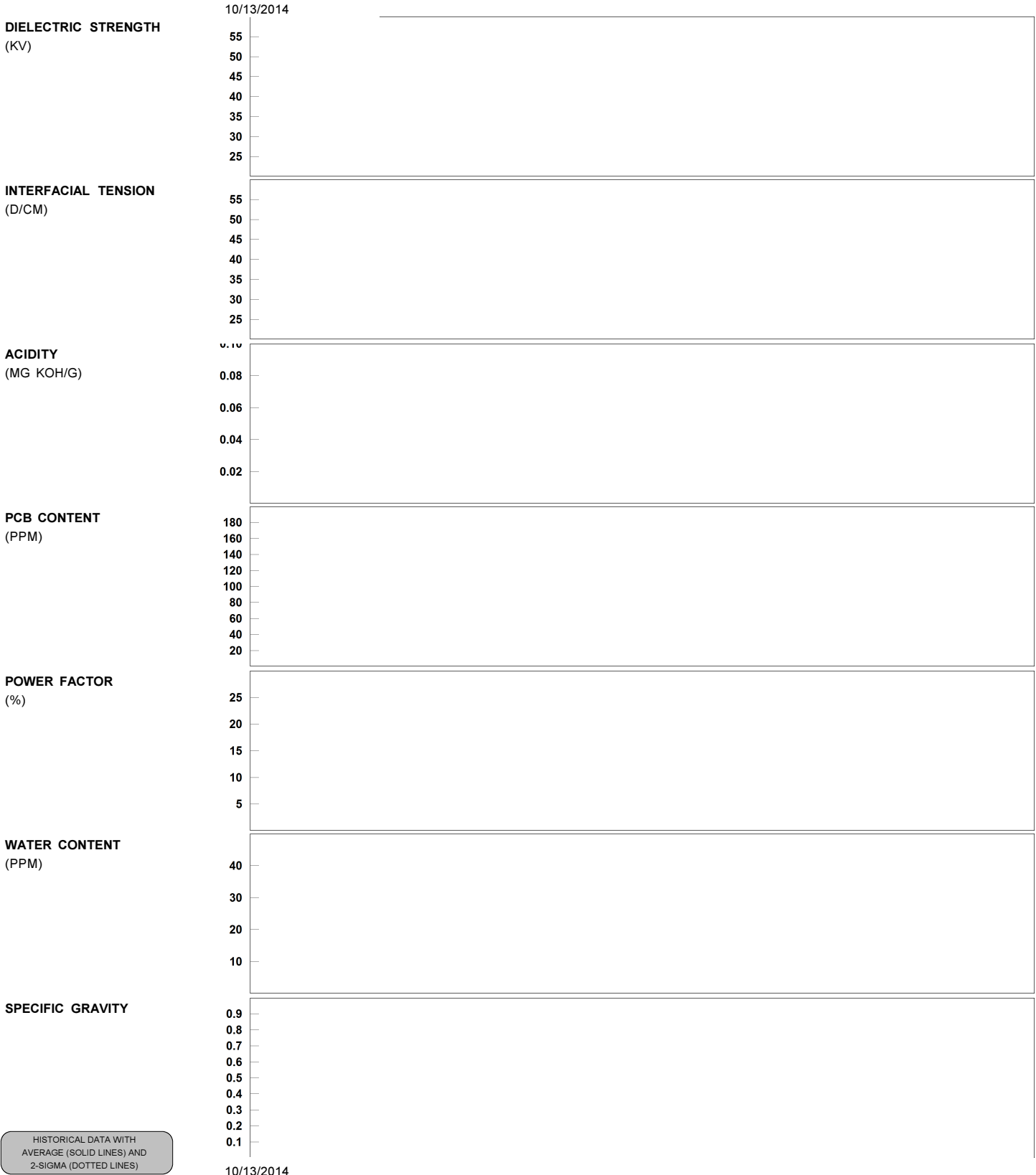


TRANSFORMER LIQUID COOLANT TRENDING FLUID QUALITY



USER _____
 SUBSTATION INSULATION FLUID POSITION GENERAL
 SERIAL NO. _____

PAGE 22
 JOB # NSULATION FLUID



HISTORICAL DATA WITH
 AVERAGE (SOLID LINES) AND
 2-SIGMA (DOTTED LINES)



TRANSFORMER LIQUID COOLANT TRENDING FLUID QUALITY



USER _____
 SUBSTATION INSULATION FLUID POSITION GENERAL
 SERIAL NO. _____

PAGE 23
 JOB # NSULATION FLUIE

COMMENTS: _____
 DEFICIENCIES: _____