



TRANSFORMER LIQUID COOLANT TEST



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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

		<u>ASTM</u>
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

<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: _____

EQPT. INVENTORY NO. _____ TESTED BY: _____



TRANSFORMER LIQUID COOLANT ANALYSIS



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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			

DISSOLVED GAS ANALYSIS

ASTM D-3612C

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

TESTED BY: WEIDMANN - ACTI



TRANSFORMER LIQUID COOLANT TRENDING



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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

FLUID QUALITY										
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										
* HYDROGEN (H2)										
* METHANE (CH4)										
* ETHANE (C2H6)										
* ETHYLENE (C2H4)										
* ACETYLENE (C2H2)										
* CARBON MONOXIDE (CO)										
CARBON DIOXIDE (CO2)										
NITROGEN (N2)										
OXYGEN (O2)										
TOTAL GAS										
TOTAL COMBUSTIBLE GAS										

* COMBUSTIBLE GAS

COMMENTS:

DEFICIENCIES:

SAMPLED BY: _____

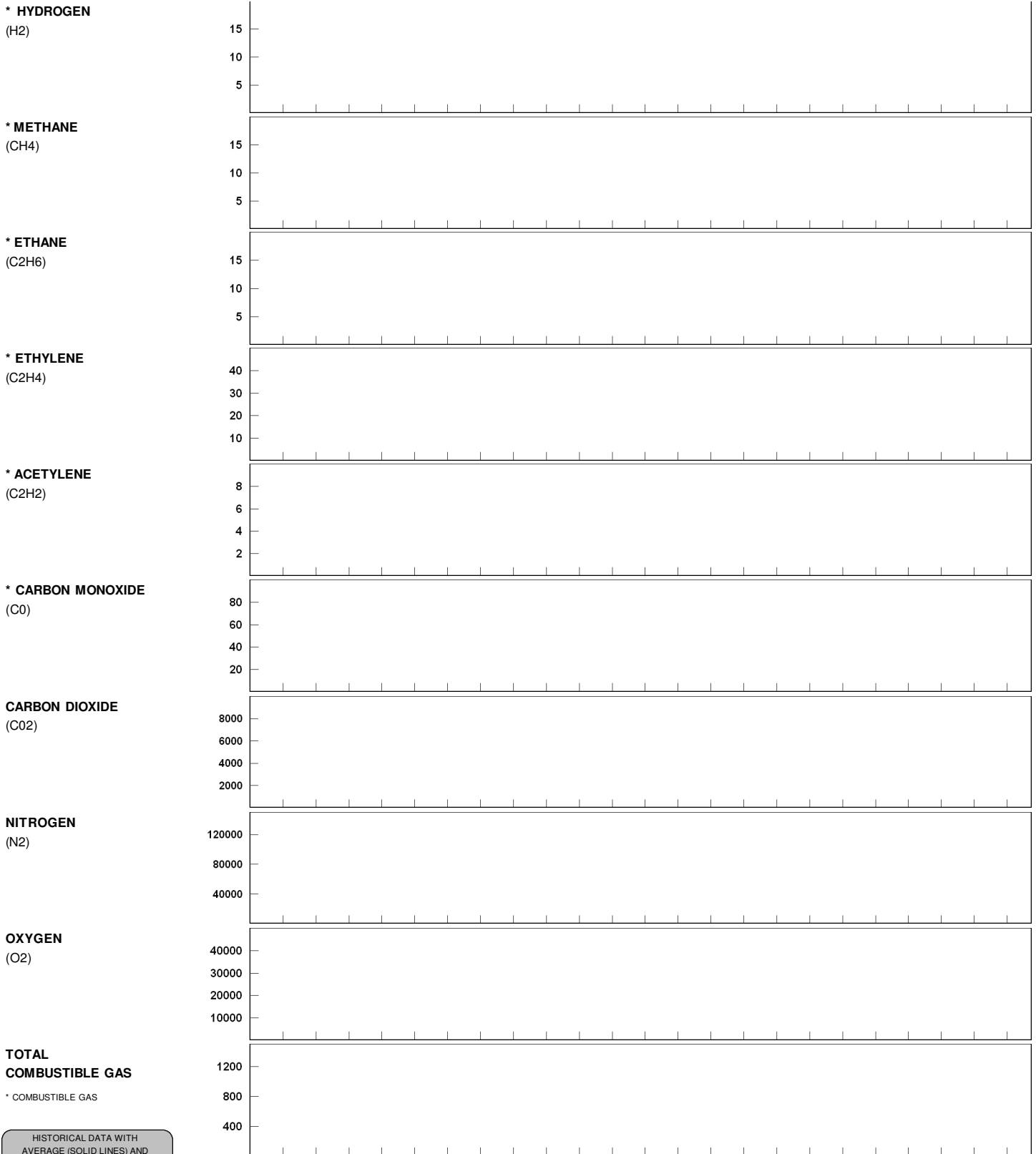
TESTED BY: WEIDMANN - ACTI



TRANSFORMER LIQUID COOLANT TRENDING DISSOLVED GAS ANALYSIS



USER SAMPLE FORMS COMPANY PAGE _____
 SUBSTATION INSULATION FLUID POSITION GENERAL JOB # FORMS-ALL
 SERIAL NO. _____



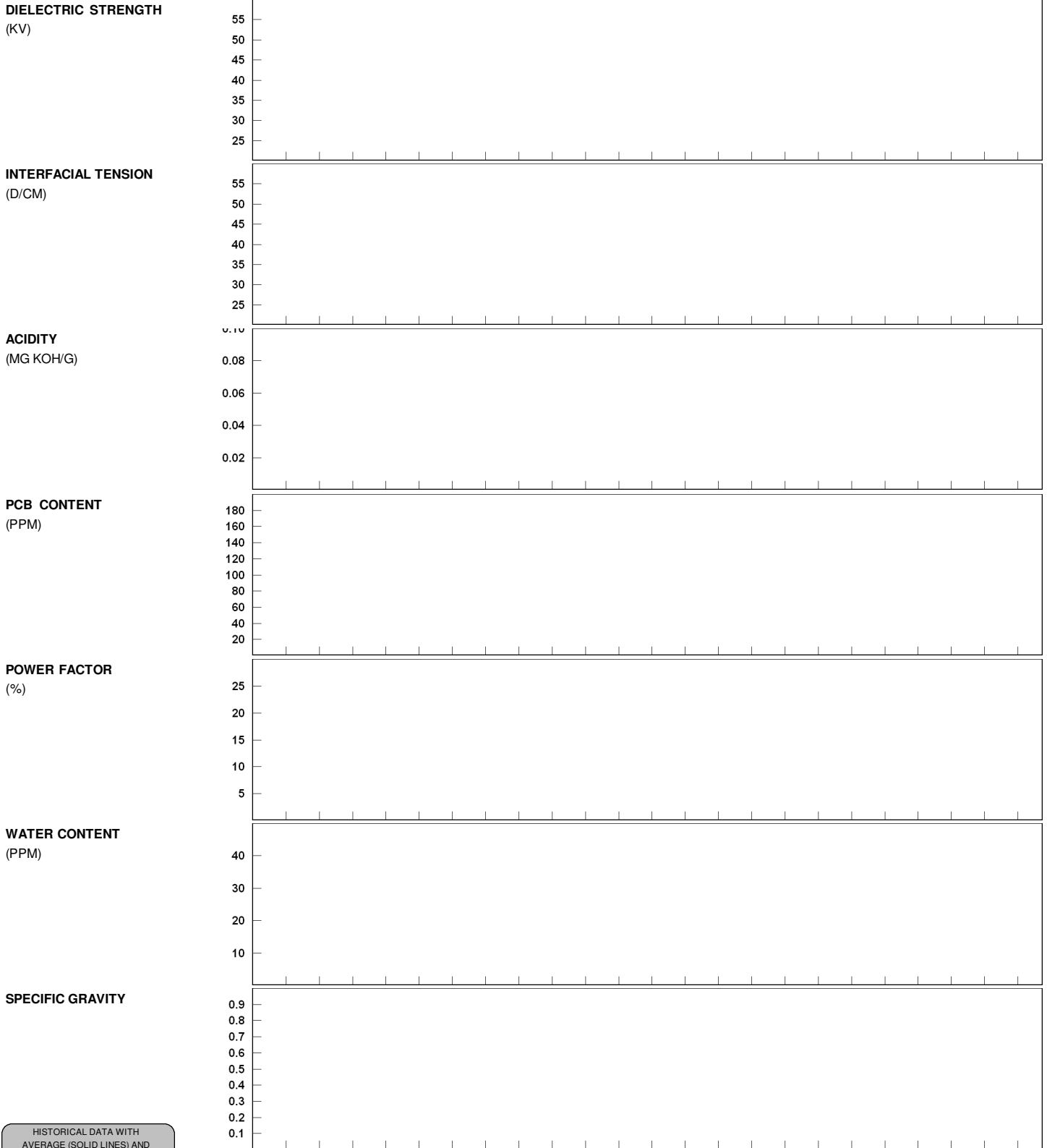
HISTORICAL DATA WITH
 AVERAGE (SOLID LINES) AND
 2-SIGMA (DOTTED LINES)



TRANSFORMER LIQUID COOLANT TRENDING FLUID QUALITY



USER SAMPLE FORMS COMPANY PAGE _____
 SUBSTATION INSULATION FLUID POSITION GENERAL JOB # FORMS-ALL
 SERIAL NO. _____



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



OIL CIRCUIT BREAKER FLUID TEST



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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: _____

EQPT. INVENTORY NO. _____ TESTED BY: _____



DISSOLVED GAS ANALYSIS ELECTRICAL INSULATING FLUID



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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:

EQPT. INVENTORY NO. _____

TESTED BY: _____



ELECTRICAL EQUIPMENT INSULATING FLUID TEST



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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: _____

EQPT. INVENTORY NO. _____ TESTED BY: _____



TRANSFORMER FURFURAN ANALYSIS



CUSTOMER SAMPLE FORMS COMPANY PAGE _____
 ADDRESS _____ JOB # FORMS-ALL
 USER SAMPLE FORMS COMPANY
 OWNER REPRESENTATIVE _____ TELEPHONE _____
 DATE 5/7/2008 TEMPERATURE _____ °F HUMIDITY _____ % EQPT. LOCATION _____
 SUBSTATION INSULATION FLUID POSITION GENERAL

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

Component	Unit	1	2	3	4	5	6
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: _____

EQPT. INVENTORY NO. _____ TESTED BY: _____



INSULATING FLUID ANALYSIS



SAMPLE FORMS COMPANY

Equipment ID _____	Manufacturer _____	Owner _____
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 _____ GENERAL _____
PAGE _____

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

DISSOLVED GAS ANALYSIS

Report Date:
Report Number:

Job Number: FORMS-ALL
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: GENERAL

Sample Date:				
Laboratory No.:				
Container No.:				
Temperature:	0			

Hydrogen (ppm):	0			
Methane (ppm):	0			
Ethane (ppm):	0			
Ethylene (ppm):	0			
Acetylene (ppm):	0			
Carbon Monoxide (ppm):	0			
Carbon Dioxide (ppm):	0			
Nitrogen (ppm):	0			
Oxygen (ppm):	0			

Total (ppm):	0			
--------------	---	--	--	--

TDCG (ppm):	0			
TDCG Rate (ppm/day):	0			
TDCG (gallons):	0			
TDHHG (ppm):	0			
ETCG (% in blanket):	0			

CH4 / H2:	0			
C2H2 / C2H4:	0			
C2H2 / CH4:	0			
C2H6 / C2H2:	0			
C2H4 / C2H6:	0			
CO2 / CO:	0			

Dissolved Gas Diagnostics

Key Gas Method:	
Doernenburg Ratios:	
Rodgers Ratios (3):	
Rodgers Ratios (4):	
CO2 / CO:	
Heat Index:	

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

◆ 3123 Fite Circle
Sacramento, CA 95827
(916) 361-7177

◆ 1000 Riverbend Blvd: Suite O
St. Rose, LA 70087
(604) 468-8837

◆ 3098 Happy Valley Road
Sun Prairie, WI 53590
(608) 825-2022

◆ 204 Gale Lane
Kennett Square, PA 19348
(610) 925-0688

DISSOLVED GAS ANALYSIS

<p>* HYDROGEN (H₂)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>* METHANE (CH₄)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>* ETHANE (C₂H₆)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>* ETHYLENE (C₂H₄)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>* ACETYLENE (C₂H₂)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>* CARBON MONOXIDE (CO)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>CARBON DIOXIDE (CO₂)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>NITROGEN (N₂)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>OXYGEN (O₂)</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>
<p>TOTAL COMBUSTIBLE GAS * COMBUSTIBLE GAS</p>	<p>1.0e-3 0.8e-3 0.6e-3 0.4e-3 0.2e-3</p>

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

Report Date:
Report Number:

Job Number: FORMS-ALL
PO Number:

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

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:							

DISSOLVED GAS ANALYSIS

WEIDMANN-ACTI INC.
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SAMPLE FORMS COMPANY SERIAL # _____ MFR. _____ ACCOUNT _____
 BANK/PH _____ KV _____ REPORT # _____
 TANK _____ KVA _____ CONTROL # _____
 BREATHING _____ % IMP. (% Z) _____ RECEIVED _____
 ATTN _____ FLUID _____ CONTAINER _____ REPORTED _____
 P. O. # _____ GALLONS _____ PROJECT ID _____ CUSTOMER ID _____
 LOCATION _____ SUBSTATION INSULATION FLUID _____ POSITION GENERAL _____

DISSOLVED GAS ANALYSIS	ASTM D-3612	LAB CONTROL NUMBER				
	REPORT UNITS: PPM	DATE SAMPLED				
		ACTI REPORT 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 GAS				
	TOTAL COMBUSTIBLE GAS					
	EQUIVALENT TCG PERCENT					
OIL SCREEN	D-1533B	MOISTURE IN OIL (ppm)				
		% SATURATION AT TOP OIL TEMP				
	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 (kV mm-C)				
	D-924	POWER FACTOR-25 (%)				
	D-924	POWER FACTOR-100C (%)				
D-1298	SPECIFIC GRAVITY (RELATIVE)					
DIAGNOSTICS	DGA KEY GAS / INTERPRETIVE METHOD (Most Recent Sample)					
	DGA ROGERS RATIO METHOD					
	DGA CELLULOSE (PAPER) INSULATION					
	DGA IEEE/ANSI (C57.104-1991) (Two most recent samples)					
	MOISTURE IN OIL					
INTERFACIAL TENSION						
ACID NUMBER						
COLOR NUMBER, VISUAL, AND SEDIMENT						
DIELECTRIC BREAKDOWN						
POWER FACTOR						

The analyses, opinions or interpretations contained in this report are based upon material and information supplied by the client. Weidmann-ACTI Inc. does not imply that the contents of the sample received by this laboratory are the same as all such material in the environment from which the sample was taken. Our test results relate only to the sample or samples tested. Any interpretations or opinions expressed represent the best judgement of Weidmann-ACTI. Weidmann-ACTI assumes no responsibility and makes no warranty or representation, expressed or implied as to the condition, productivity, or proper operation of any equipment or other property for which this report may be used or relied upon for any reason whatsoever.



DISSOLVED GAS ANALYSIS



USER SAMPLE FORMS COMPANY PAGE _____
 SUBSTATION INSULATION FLUID POSITION GENERAL JOB # FORMS-ALL
 SERIAL NO. _____

* HYDROGEN
(H₂)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

* METHANE
(CH₄)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

* ETHANE
(C₂H₆)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

* ETHYLENE
(C₂H₄)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

* ACETYLENE
(C₂H₂)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

* CARBON MONOXIDE
(CO)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

CARBON DIOXIDE
(CO₂)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

NITROGEN
(N₂)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

OXYGEN
(O₂)

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

TOTAL
COMBUSTIBLE GAS

* COMBUSTIBLE GAS

1.0e-3
0.8e-3
0.6e-3
0.4e-3
0.2e-3

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