

APPENDIX 4
CALIBRATION DATA

Dry Gas Meter Calibration Form

Date: 30-Jun-05
 Tech. I.D.: Tony L
 Console I.D.: 31D-621C

Parameter Summary	Run No. 1	Run No. 2	Run No. 3
Wet Test Meter Factor (WTF)	1.0197		
Ta = Ambient (Wet Test Meter) temp.	71.0	71.0	71.0
ΔP = Press. diff. @ Wet Test Meter	-1.50	-2.10	-2.40
Pb = Atmospheric Pressure	29.90	29.90	29.90
Pv = Vapour Pressure at Temp. Ta	0.7648	0.7648	0.7648
ΔH = Press. diff. @ Orifice	1.0	2.0	3.0
Ti = Dry Test inlet Temp.	82.5	84.0	87.3
To = Dry Test outlet Temp.	78.0	79.8	81.0
Ri = Initial Dry Test vol.	418.071	429.463	441.679
Rf = Final Dry Test vol.	426.764	441.679	456.631
Vi = Initial Wet Test vol.	3188.668	3199.933	3212.093
Vf = Final Wet Test vol.	3197.335	3212.093	3226.945
Pw = Pb + (ΔP / 13.6)	29.7897	29.7456	29.7235
Pd = Pb + (ΔH / 13.6)	29.9735	30.0471	30.1206
Tw = Ta + 460	531.0	531.0	531.0
Td = [(Ti + To) / 2] + 460	540.3	541.9	544.2
Bw = Pv / Pb	0.02558	0.02558	0.02558
<u>CALCULATED VALUE (Y)</u>	1.0017	0.9992	0.9981

Parameter Summary	Run No. 1	Run No. 2	Run No. 3
Md = Mol. Wet Dry Air	28.96	28.96	28.96
Y = Dry Gas Meter Calibration	0.9997	0.9997	0.9997
ΔT = Measured Interval (minutes)	15.0	15.0	15.0
Qm = Y * (Rf - Ri) / ΔT	0.57935	0.81414	0.99648
Tm = To + 460	538.0	539.8	541.0
Pm = Pb + (ΔH/13.6)	29.974	30.047	30.121
<u>CALCULATED VALUE (Ko)</u>	0.7359	0.7309	0.7305

AVERAGE (Y) = 0.9997
AVERAGE (Ko) = 0.7324

Calibration Equation: $Y = [(V_f - V_i) * WTF] / (R_f - R_i) * [(P_w / P_d) * (T_d / T_w)] * (1 - B_w)$
 Calibration Equation: $K_o = Q_m / (T_m / P_m * \Delta H / M_d)^{0.5}$

AUTHORIZATION

AL

 Calibration Section

S - TYPE PITOT CALIBRATION FORM

Date: July 20, 2005
 Technician: J. Lang
 Pitot I.D.: A.L. 3C
 Nozzle I.D.: 0.250

Approx. Wind Vel. Ft/sec.	Pitot Vel. Pressure		S-Type Pitot Vel. Press.		Pitot Coefficient Cp
	$\Delta P_{ref.}$	Cref. SQRT($\Delta P_{ref.}$)	ΔP_s	SQRT(ΔP_s)	
19.75	0.090	0.29700	0.130	0.36056	0.82370
30.16	0.210	0.45367	0.300	0.54772	0.82830
42.66	0.420	0.64159	0.620	0.78740	0.81480
48.81	0.550	0.73420	0.800	0.89443	0.82100

AVERAGE Cp = 0.8220

Calibration Equation: $C_p = C_{ref.} * SQRT(\Delta P_{ref.}/\Delta P_s)$

Cref. = 0.99

Where:

$\Delta P_{ref.}$ = velocity pressure measured by reference pitot

Cref. = coefficient of reference pitot

ΔP_s = velocity pressure measured by S - type pitot

Cp = coefficient of S - type pitot

AUTHORIZATION



 Calibration Section

A. LANFRANCO and ASSOCIATES INC.
ENVIRONMENTAL CONSULTANTS

TEMPERATURE CALIBRATION FORM

Technician: M. Lanfranco
 Date: Feb.1, 2005

Calibration Section: _____

TEMPERATURE DEVICE CALIBRATIONS

Reference Device Model CL23A Calibrator	Temperature Settings (degrees F)					
	0	100	200	300	500/750	1000
Device	Device Readout (degrees F)					
UEI DT150 # 1	-2	98	198	298	498	997
UEI DT150 # 2	0	100	200	301	500	1000
UEI DT150 # 3	-1	99	198	298	498	997
UEI DT 200	-1	98	198	298	498	997
TPI 341 #2	-1	99	198	299	499	1000
TPI 341 #3	1	100	198	499	748	998
TPI 341 #4	-1	99	199	501	747	1001
KM-450 (in deg C) converted to F	0	99	201	502	754	1009
KM-330 #2	-1	98	200	497	749	996
D836C	1	100	202	500	752	1008
D895C	3	100	202	499	752	1001
D979C	-1	98	199	498	751	998
Fording Coal	1	99	201	500	750	1004
PM 100	1	98	199	499	750	1001
31D 621C	1	99	200	498	747	998
D947C	1	99	201	499	748	1004
BEI-210404	0	98	199	497	748	1011
Napp 40 D818C	-1	99	199	497	749	998
Harmac D423	1	98	202	503	752	1010

Reference device is a NIST certified digital thermocouple calibrator



CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER **A LAN FRANCO**

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE GMIS	vsSRM#1684b	CC 136077	99.1 ppm
SULFUR DIOXIDE	vs SRM#1661	CC 131647	249.7 ppm
CARBON MONOXIDE GMIS	vs SRM#2536	SA 7901	249.8 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT NITRIC OXIDE GMIS		ANALYZER MAKE-MODEL-S/N		HORIBA, VIA-510, 57042305			
ANALYTICAL PRINCIPLE NDIR				LAST CALIBRATION DATE 11/02/04			
FIRST ANALYSIS DATE 11/08/04				SECOND ANALYSIS DATE 11/15/04			
Z 0.0	R 99.1	C 80.8	CONC. 80.8	Z 0.0	R 99.6	C 80.2	CONC. 79.8
R 99.1	Z 0.0	C 80.3	CONC. 80.3	R 99.6	Z 0.0	C 80.2	CONC. 79.8
Z 0.0	C 80.6	R 99.0	CONC. 80.7	Z 0.0	C 80.2	R 99.6	CONC. 79.8
U/M ppm		MEAN TEST ASSAY	80.6	U/M ppm		MEAN TEST ASSAY	79.8
2. COMPONENT SULFUR DIOXIDE		ANALYZER MAKE-MODEL-S/N		Siemens Ultramat 5E S/N C1-009			
ANALYTICAL PRINCIPLE NDIR				LAST CALIBRATION DATE 11/02/04			
FIRST ANALYSIS DATE 11/08/04				SECOND ANALYSIS DATE 11/15/04			
Z 0.0	R 250.0	C 160.5	CONC. 160	Z 0	R 250	C 159	CONC. 159
R 249.5	Z 0.0	C 160.5	CONC. 161	R 250	Z 0	C 159	CONC. 159
Z 0.0	C 160.0	R 249.0	CONC. 160	Z 0	C 159	R 250	CONC. 159
U/M ppm		MEAN TEST ASSAY	160	U/M ppm		MEAN TEST ASSAY	159
3. COMPONENT CARBON MONOXIDE GMIS		ANALYZER MAKE-MODEL-S/N		HORIBA, VIA-510, S/N 576876015			
ANALYTICAL PRINCIPLE NDIR				LAST CALIBRATION DATE 11/02/04			
FIRST ANALYSIS DATE 11/08/04				SECOND ANALYSIS DATE 11/15/04			
Z 0.0	R 249.8	C 159.5	CONC. 160	Z 0	R 250	C 162	CONC. 162
R 249.8	Z 0.0	C 159.5	CONC. 160	R 250	Z 0	C 161	CONC. 161
Z 0.0	C 159.5	R 249.5	CONC. 159	Z 0	C 161	R 250	CONC. 161
U/M ppm		MEAN TEST ASSAY	160	U/M ppm		MEAN TEST ASSAY	161

THIS CYLINDER NO.	CC 151106	CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION	EPA-600/R97/121	NITRIC OXIDE	80.2 ppm
OF TRACEABILITY PROTOCOL NO.	Rev. 9/97	SULFUR DIOXIDE	160 ppm
PROCEDURE	G1	CARBON MONOXIDE	160 ppm
CERTIFIED ACCURACY	± 1 % NIST TRACEABLE	NITROGEN	BALANCE
CYLINDER PRESSURE	2000 PSIG		
CERTIFICATION DATE	11/15/04	NOx-81.1ppm values for reference only	
EXPIRATION DATE	11/15/06	All values not valid below 150 psig	
TERM	24 MONTHS		

ANALYZED BY

Phil Kim
PHIL KIM

CERTIFIED BY

Joseph Charles
JOSEPH CHARLES

IMPORTANT

Information contained herein has been prepared at your request by qualified experts within Praxair Distribution, Inc. While we believe that the information is accurate within the limits of the analytical methods employed and is complete to the extent of the specific analyses performed, we make no warranty or representation as to the suitability of the use of the information for any particular purpose. The information is offered with the understanding that any use of the information is at the sole discretion and risk of the user. In no event shall the liability of Praxair Distribution, Inc., arising out of the use of the information contained herein exceed the fee established for providing such information.



3gas

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER A LANFRANCO

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NITRIC OXIDE	vs SRM1685	CC 115273	258.8 ppm
CARBON MONOXIDE	vs SRM#1680	CC 106625	498 ppm
SULFUR DIOXIDE	vs SRM#1661	CC 186108	505 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT	ANALYTICAL PRINCIPLE	ANALYZER MAKE-MODEL-S/N	HORIBA, VIA-510, 57042305	LAST CALIBRATION DATE	07/02/05		
NITRIC OXIDE	NDIR			SECOND ANALYSIS DATE	07/29/05		
FIRST ANALYSIS DATE	07/22/05						
Z 0.0	R 258.8	C 219.3	CONC. 219	Z 0.0	R 258.8	C 219.9	CONC. 220
R 258.8	Z 0.0	C 219.5	CONC. 220	R 259.0	Z 0.0	C 220.0	CONC. 220
Z 0.0	C 220.0	R 259.0	CONC. 220	Z 0.0	C 219.4	R 258.8	CONC. 219
U/M	ppm	MEAN TEST ASSAY	220	U/M	ppm	MEAN TEST ASSAY	220
2. COMPONENT	CARBON MONOXIDE	ANALYZER MAKE-MODEL-S/N	HORIBA, VIA-510, S/N 576876015	LAST CALIBRATION DATE	07/02/05		
ANALYTICAL PRINCIPLE	NDIR			SECOND ANALYSIS DATE	07/29/05		
FIRST ANALYSIS DATE	07/22/05						
Z 0	R 498	C 435	CONC. 435	Z 0	R 498	C 434	CONC. 434
R 498	Z 0	C 436	CONC. 436	R 498	Z 0	C 435	CONC. 435
Z 0	C 435	R 498	CONC. 435	Z 0	C 435	R 498	CONC. 435
U/M	ppm	MEAN TEST ASSAY	435	U/M	ppm	MEAN TEST ASSAY	435
3. COMPONENT	SULFUR DIOXIDE	ANALYZER MAKE-MODEL-S/N	Siemens Ultramat 5E S/N C1-009	LAST CALIBRATION DATE	07/02/05		
ANALYTICAL PRINCIPLE	NDIR			SECOND ANALYSIS DATE	07/29/05		
FIRST ANALYSIS DATE	07/22/05						
Z 0	R 505	C 450	CONC. 450	Z 0	R 505	C 450	CONC. 450
R 505	Z 0	C 450	CONC. 450	R 505	Z 0	C 451	CONC. 451
Z 0	C 450	R 505	CONC. 450	Z 0	C 450	R 505	CONC. 450
U/M	ppm	MEAN TEST ASSAY	450	U/M	ppm	MEAN TEST ASSAY	450

THIS CYLINDER NO. SA 17347

HAS BEEN CERTIFIED ACCORDING TO SECTION

OF TRACEABILITY PROTOCOL NO. REV. 9/97

PROCEDURE G1

CERTIFIED ACCURACY ± 1 % NIST TRACEABLE

CYLINDER PRESSURE 2000 PSIG

CERTIFICATION DATE 07/29/05

EXPIRATION DATE 07/29/07 TERM 24 MONTHS

CERTIFIED CONCENTRATION

NITRIC OXIDE 220 ppm

CARBON MONOXIDE 435 ppm

SULFUR DIOXIDE 450 ppm

NITROGEN BALANCE

NO conc. adjusted for CO2 interference.

NOx=222 ppm (for reference only).

ANALYZED BY

HENRY KOUNG

CERTIFIED BY

JACK FU

IMPORTANT

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER A LANFRANCO

P O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
NIIRIC OXIDE GMIS	vsSRM#1687b	SA 15262	992 ppm
SULFUR DIOXIDE GMIS	vs SRM#1661	SGAL 2615	1009 ppm
CARBON MONOXIDE GMIS	vs SRM#1681	CC 160132	997 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT		NIIRIC OXIDE	GMIS	ANALYZER MAKE-MODEL-S/N		HORIBA, VIA-510. 57042305	
ANALYTICAL PRINCIPLE		NDIR		LAST CALIBRATION DATE		05/02/05	
FIRST ANALYSIS DATE		05/25/05		SECOND ANALYSIS DATE		06/01/05	
Z 0	R 1002	C 467	CONC. 462	Z 0	R 998	C 465	CONC. 462
R 1006	Z 0	C 468	CONC. 461	R 996	Z 0	C 465	CONC. 463
Z 0	C 467	R 1010	CONC. 459	Z	C 464	R 998	CONC. 461
U/M ppm	MEAN TEST ASSAY		461	U/M ppm	MEAN TEST ASSAY		462
2. COMPONENT		SULFUR DIOXIDE	GMIS	ANALYZER MAKE-MODEL-S/N		Siemens Ultramat SE S/N C1-009	
ANALYTICAL PRINCIPLE		NDIR		LAST CALIBRATION DATE		05/02/05	
FIRST ANALYSIS DATE		05/25/05		SECOND ANALYSIS DATE		06/01/05	
Z 0	R 1010	C 890	CONC. 889	Z 0	R 1010	C 890	CONC. 889
R 1010	Z 0	C 890	CONC. 889	R 1010	Z 0	C 890	CONC. 889
Z 0	C 890	R 1010	CONC. 890	Z 0	C 890	R 1010	CONC. 889
U/M ppm	MEAN TEST ASSAY		889	U/M ppm	MEAN TEST ASSAY		889
3. COMPONENT		CARBON MONOXIDE	GMIS	ANALYZER MAKE-MODEL-S/N		HORIBA, VIA-510, S/N 576876015	
ANALYTICAL PRINCIPLE		NDIR		LAST CALIBRATION DATE		05/02/05	
FIRST ANALYSIS DATE		05/25/05		SECOND ANALYSIS DATE		06/01/05	
Z 0	R 992	C 908	CONC. 913	Z 0	R 997	C 905	CONC. 905
R 1010	Z 0	C 914	CONC. 902	R 998	Z 0	C 908	CONC. 907
Z 0	C 896	R 988	CONC. 904	Z 0	C 908	R 998	CONC. 907
U/M ppm	MEAN TEST ASSAY		906	U/M ppm	MEAN TEST ASSAY		906

THIS CYLINDER NO.	CC 95909	CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION	EPA-600/R97/121	NIIRIC OXIDE	462 ppm
OF TRACEABILITY PROTOCOL NO.	Rev 9/97	SULFUR DIOXIDE	889 ppm
PROCEDURE	G1	CARBON MONOXIDE	906 ppm
CERTIFIED ACCURACY	± 1 % NIST TRACEABLE	NIITROGEN	BALANCE
CYLINDER PRESSURE	2000 PSIG	NOx=465ppm values for reference only.	
CERTIFICATION DATE	06/01/05	All values not valid below 150 psig	
EXPIRATION DATE	06/01/07	TERM	24 MONTHS

ANALYZED BY

HENRY KOENIG

CERTIFIED BY

JOSEPH CHARLES

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New D₂/CO₂

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER PRAXAIR CANADA

P.O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
CARBON DIOXIDE GMIS	vs. SRM#2745	SA 15085	15.05 %
OXYGEN GMIS	vs. SRM#2659	SA 4344	15.03 %

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT		CARBON DIOXIDE GMIS	ANALYZER MAKE-MODEL-S/N		Siemens Ultramat SE S/N A12-730	
ANALYTICAL PRINCIPLE		NDIR			LAST CALIBRATION DATE 03/19/05	
FIRST ANALYSIS DATE		03/30/05			SECOND ANALYSIS DATE	
Z 0.00	R 15.04	C 15.00	CONC. 15.01	Z	R	C CONC.
R 15.04	Z 0.00	C 15.00	CONC. 15.01	R	Z	C CONC.
Z 0.00	C 15.00	R 15.04	CONC. 15.01	Z	C	R CONC.
U/M %	MEAN TEST ASSAY 15.01		U/M %	MEAN TEST ASSAY		
2. COMPONENT		OXYGEN GMIS	ANALYZER MAKE MODEL-S/N		Siemens Oxymat SE S/N A12-839	
ANALYTICAL PRINCIPLE		Paramagnetic			LAST CALIBRATION DATE 03/19/05	
FIRST ANALYSIS DATE		03/30/05			SECOND ANALYSIS DATE	
Z 0.00	R 15.02	C 11.06	CONC. 11.07	Z	R	C CONC.
R 15.02	Z 0.00	C 11.06	CONC. 11.07	R	Z	C CONC.
Z 0.00	C 11.05	R 15.02	CONC. 11.07	Z	C	R CONC.
U/M %	MEAN TEST ASSAY 11.07		U/M %	MEAN TEST ASSAY		

Values not valid below 150 psig

THIS CYLINDER NO.	CC 174207	CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION	EPA-800/R97/121	CARBON DIOXIDE	15.01 %
OF TRACEABILITY PROTOCOL NO	Rev. 9/97	OXYGEN	11.07 %
PROCEDURE	G1	NITROGEN	BALANCE
CERTIFIED ACCURACY	± 1 % NIST TRACEABLE		
CYLINDER PRESSURE	2000 PSIG		
CERTIFICATION DATE	03/30/05		
EXPIRATION DATE	03/30/08 IERM 36 MONTHS		

ANALYZED BY

Helena Tran
HELENA TRAN

CERTIFIED BY

Henry Kung
HENRY KOUNG

IMPORTANT

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER A LAN FRANCO

P O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	GMIS vs SRM#1667	SA 5183	49.8 ppm

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

I. COMPONENT	PROPANE	GMIS	ANALYZER MAKE-MODEL/S/N	HORIBA FIA-510	851135122
ANALYTICAL PRINCIPLE		Flame Ionization Detector		LAST CALIBRATION DATE	06/05/03
FIRST ANALYSIS DATE		06/19/03		SECOND ANALYSIS DATE	
Z 0	R 134.1	C 84.2	CONC. 31.3	Z	R C CONC.
R 134.4	Z 0	C 84.3	CONC. 31.2	R	Z C CONC.
Z 0	C 84.4	R 134.6	CONC. 31.2	Z	C R CONC.
U/M ppm		MEAN TEST ASSAY	31.2	U/M ppm	MEAN TEST ASSAY

Values not valid below 150 psig

THIS CYLINDER NO	CC 102068	CERTIFIED CONCENTRATION	
HAS BEEN CERTIFIED ACCORDING TO SECTION	EPA-600/R97/121	PROPANE	31.2 ppm
OF TRACEABILITY PROTOCOL NO.	Rev. 9/97	AIR	BALANCE
PROCEDURE	G1		
CERTIFIED ACCURACY	± 1 % NIST TRACEABLE		
CYLINDER PRESSURE	2000 PSIG		
CERTIFICATION DATE	06/19/03		
EXPIRATION DATE	06/19/06	TERM	36 MONTHS

ANALYZED BY

PHU TIEN NGUYEN

CERTIFIED BY



IMPORTANT

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CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

CUSTOMER A LAN FRANCO

P O NUMBER

REFERENCE STANDARD

COMPONENT	NIST SRM NO.	CYLINDER NO.	CONCENTRATION
PROPANE	GMIS	SA 3224	79.9 ppm
	vs. SRM#1668		

ANALYZER READINGS

R=REFERENCE STANDARD

Z=ZERO GAS

C=GAS CANDIDATE

1. COMPONENT	PROPANE	GMIS	ANALYZER MAKE-MODEL-S/N	HORIBA, FIA-510, 851135122
ANALYTICAL PRINCIPLE		Flame Ionization Detector	LAST CALIBRATION DATE	04/03/04
FIRST ANALYSIS DATE		04/07/04	SECOND ANALYSIS DATE	
Z 0	R 242	C 250	CONC. 82.5	Z R C CONC.
R 242	Z 0	C 250	CONC. 82.5	R Z C CONC.
Z 0	C 250	R 242	CONC. 82.5	Z C R CONC.
U/M ppm		MEAN TEST ASSAY	82.5	U/M ppm MEAN TEST ASSAY

Values not valid below 150 psig

THIS CYLINDER NO. CC 95976	CERTIFIED CONCENTRATION
HAS BEEN CERTIFIED ACCORDING TO SECTION EPA-600/R97/121	PROPANE 82.5 ppm
OF TRACEABILITY PROTOCOL NO. Rev. 9/97	AIR BALANCE
PROCEDURE G1	
CERTIFIED ACCURACY ± 1 % NIST TRACEABLE	
CYLINDER PRESSURE 2000 PSIG	
CERTIFICATION DATE 04/07/04	
EXPIRATION DATE 04/07/07 TERM 36 MONTHS	

ANALYZED BY

Phil Kim
PHIL KIM

CERTIFIED BY

Victor Dotan
VICTOR DOTAN

IMPORTANT

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