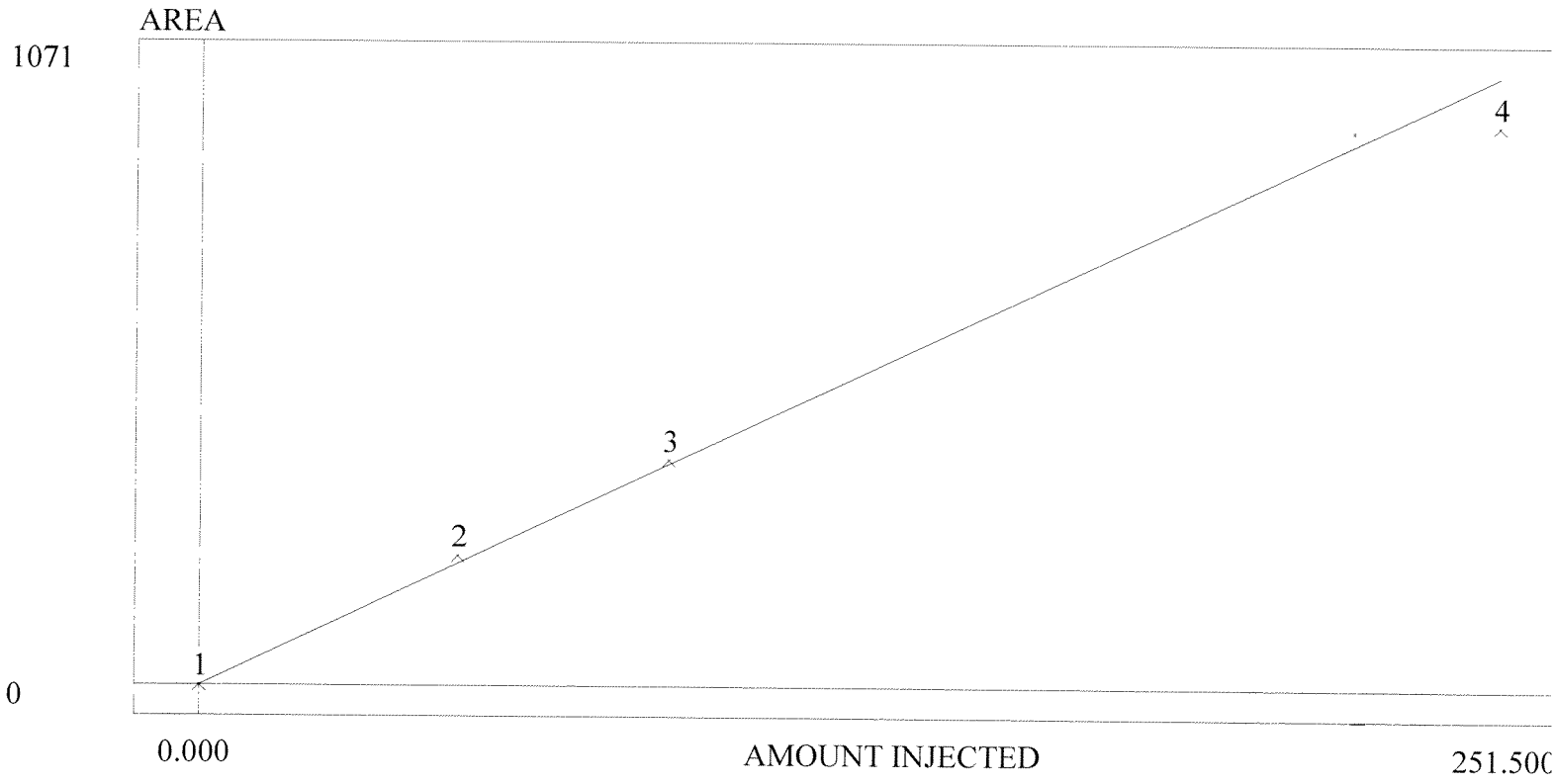
VALERO
UNIT NO. 80
SUMMARY OF METHANE ANALYSIS RESULTS
9-Feb-11

File Name	Date	Time	Sample	Area	Concentration	Recovery	Recovery Corrected Concentration
021011 Unit 80 Cal 50_23.CHR	2/10/2011	10:08:01	50.2	226.9540			
021011 Unit 80 Cal 50_24.CHR	2/10/2011	10:09:04	50.2	227.2235			
021011 Unit 80 Cal 50_25.CHR	2/10/2011	10:10:07	50.2	226.3225			
021011 Unit 80 Cal 90_28.CHR	2/10/2011	10:16:38	90.9	394.6220			
021011 Unit 80 Cal 90_29.CHR	2/10/2011	10:17:41	90.9	392.9310			
021011 Unit 80 Cal 90_30.CHR	2/10/2011	10:18:44	90.9	395.0875			
021011 Unit 80 Cal 250_35.CHR	2/10/2011	10:24:42	251.5	984.3470			
021011 Unit 80 Cal 250_36.CHR	2/10/2011	10:25:45	251.5	985.6100			
021011 Unit 80 Cal 250_37.CHR	2/10/2011	10:27:01	251.5	983.4550			
Run 1							
021011 Unit 80 Run 1_04.CHR	2/10/2011	10:36:07	Run 1	459.8910	108.0 ppm	0.99	109.1 ppm
021011 Unit 80 Run 1_05.CHR	2/10/2011	10:37:10	Run 1	459.8140	108.0 ppm	0.99	109.1 ppm
021011 Unit 80 Run 1_06.CHR	2/10/2011	10:38:13	Run 1	459.7995	108.0 ppm	0.99	109.1 ppm
				Average	**108.0 ppm**		**109.1 ppm**
Run 2							
021011 Unit 80 Run 2_09.CHR	2/10/2011	10:42:13	Run 2	450.0510	105.7 ppm	0.99	106.8 ppm
021011 Unit 80 Run 2_10.CHR	2/10/2011	10:43:16	Run 2	450.1170	105.7 ppm	0.99	106.8 ppm
021011 Unit 80 Run 2_11.CHR	2/10/2011	10:44:20	Run 2	450.1560	105.8 ppm	0.99	106.8 ppm
				Average	**105.7 ppm**		**106.8 ppm**
Run 3							
021011 Unit 80 Run 3_14.CHR	2/10/2011	10:48:07	Run 3	341.0310	80.1 ppm	0.99	80.9 ppm
021011 Unit 80 Run 3_15.CHR	2/10/2011	10:49:10	Run 3	341.7310	80.3 ppm	0.99	81.1 ppm
021011 Unit 80 Run 3_16.CHR	2/10/2011	10:50:13	Run 3	341.2500	80.2 ppm	0.99	81.0 ppm
				Average	**80.2 ppm**		**81.0 ppm**
Spike Recovery							
021111 Spike Run 1 Unit 80_39.CHR	2/11/2011	7:17:57	Spike Recovery	680.0910	159.8 ppm		
021111 Spike Run 1 Unit 80_40.CHR	2/11/2011	7:18:57	Spike Recovery	681.1800	160.0 ppm		
021111 Spike Run 1 Unit 80_41.CHR	2/11/2011	7:20:01	Spike Recovery	678.8930	159.5 ppm		
				Average	**159.8 ppm**		
Post Cal							
021111 Post 90_43.CHR	2/11/2011	7:22:24	90.9	376.3430			
021111 Post 90_44.CHR	2/11/2011	7:23:27	90.9	375.9840			
021111 Post 90_45.CHR	2/11/2011	7:24:30	90.9	376.3060			

VALERO
UNIT NO. 81
SUMMARY OF METHANE ANALYSIS RESULTS
8-Feb-11

File Name	Date	Time	Sample	Area	Concentration	Recovery	Recovery Corrected Concentration
021011 Unit 80 Cal 50_23.CHR	2/10/2011	10:08:01	50.2	226.9540			
021011 Unit 80 Cal 50_24.CHR	2/10/2011	10:09:04	50.2	227.2235			
021011 Unit 80 Cal 50_25.CHR	2/10/2011	10:10:07	50.2	226.3225			
021011 Unit 80 Cal 90_28.CHR	2/10/2011	10:16:38	90.9	394.6220			
021011 Unit 80 Cal 90_29.CHR	2/10/2011	10:17:41	90.9	392.9310			
021011 Unit 80 Cal 90_30.CHR	2/10/2011	10:18:44	90.9	395.0875			
021011 Unit 80 Cal 250_35.CHR	2/10/2011	10:24:42	251.5	984.3470			
021011 Unit 80 Cal 250_36.CHR	2/10/2011	10:25:45	251.5	985.6100			
021011 Unit 80 Cal 250_37.CHR	2/10/2011	10:27:01	251.5	983.4550			
Run 1							
021011 Unit 81 Run 1_18.CHR	2/10/2011	10:52:53	Run 1	287.8430	67.6 ppm	0.99	68.3 ppm
021011 Unit 81 Run 1_19.CHR	2/10/2011	10:53:56	Run 1	289.3850	68.0 ppm	0.99	68.7 ppm
021011 Unit 81 Run 1_20.CHR	2/10/2011	10:54:59	Run 1	288.9390	67.9 ppm	0.99	68.6 ppm
				Average	**67.8 ppm**		**68.5 ppm**
Run 2							
021011 Unit 81 Run 2_22.CHR	2/10/2011	10:57:55	Run 2	304.9740	71.6 ppm	0.99	72.4 ppm
021011 Unit 81 Run 2_23.CHR	2/10/2011	10:58:58	Run 2	305.2070	71.7 ppm	0.99	72.4 ppm
021011 Unit 81 Run 2_23.CHR	2/10/2011	11:00:01	Run 2	306.3880	72.0 ppm	0.99	72.7 ppm
				Average	**71.8 ppm**		**72.5 ppm**
Run 3							
021011 Unit 81 Run 3_25.CHR	2/10/2011	11:02:29	Run 3	293.3580	68.9 ppm	0.99	69.6 ppm
021011 Unit 81 Run 3_26.CHR	2/10/2011	11:03:32	Run 3	294.9870	69.3 ppm	0.99	70.0 ppm
021011 Unit 81 Run 3_27.CHR	2/10/2011	11:04:35	Run 3	293.9800	69.1 ppm	0.99	69.8 ppm
				Average	**69.1 ppm**		**69.8 ppm**
Spike Recovery							
021111 Spike Run 1 Unit 80_39.CHR	2/11/2011	7:17:57	Spike Recovery	680.0910	159.8 ppm		
021111 Spike Run 1 Unit 80_40.CHR	2/11/2011	7:18:57	Spike Recovery	681.1800	160.0 ppm		
021111 Spike Run 1 Unit 80_41.CHR	2/11/2011	7:20:01	Spike Recovery	678.8930	159.5 ppm		
				Average	**159.8 ppm**		
Post Cal							
021111 Post 90_43.CHR	2/11/2011	7:22:24	90.9	376.3430			
021111 Post 90_44.CHR	2/11/2011	7:23:27	90.9	375.9840			
021111 Post 90_45.CHR	2/11/2011	7:24:30	90.9	376.3060			

Calibration file: 021011.cal



Avg slope of curve: 4.26
Y-axis intercept: 0.00
Linearity: 1.00
Number of levels: 4
SD/rel SD of CF's: 2.1/67.1
Y=4.2566X
r2: 0.9978
Last calibrated: Thu Feb 10 10:33:05 2011

Lvl.	Area/ht.	Amount	CF	Current	Previous #1	Previous #2
1	0.000	0.000	0.000	0.000	0.000	0.000
2	226.833	50.190	4.519	226.954	227.224	226.322
3	394.213	90.920	4.336	394.622	392.931	395.087
4	984.471	251.500	3.914	984.347	985.610	983.455

METHANE SPIKE RECOVERY STUDY RESULTS

Theoretical Concentration of Spike

conc3={|(conc1 x volume1)+(conc2 x volume2)| / |volume1 + volume2|}

Where:
conc1 = average sample concentration (ppm)
conc2 = spike gas cylinder concentration (ppm)
conc3 = spiked bag concentration (ppm)
volume1 = initial volume of sample gas in spike bag (before spike).
volume2 = volume of spike gas injected

Run 1-Unit 80 Bag Spike		40% of sample ppmvd	60% of sample ppmvd
C1=	108.0	151.24	172.85
V1=	3.0		
C2=	509.5		
V2=	0.45		
C3=	**160.4**		

FRACTION OF SPIKED COMPOUND RECOVERED

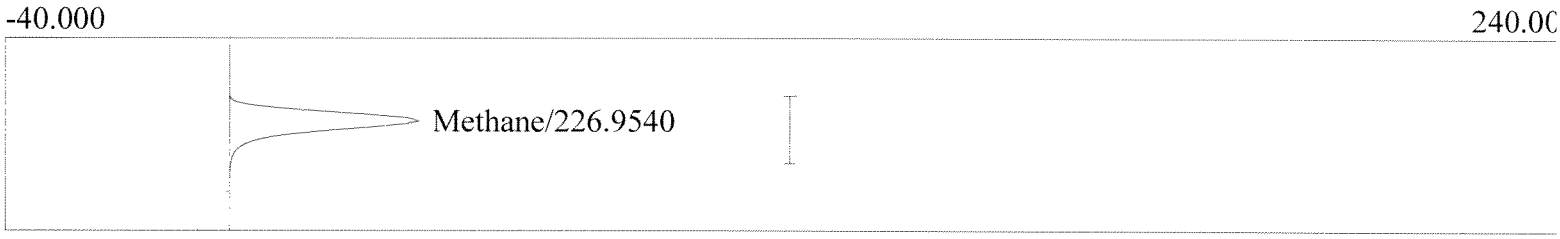
$$R = \frac{t-u}{s}$$

Where:
R=Average Fraction Recovered
t=Avg Spiked Bag ppm = 159.8
u=Avg Bag = 108.0
s=Theoretical ppm of spike = 52.4

$$R = \frac{159.8 - 108.0}{52.4}$$

$$R = 0.99$$

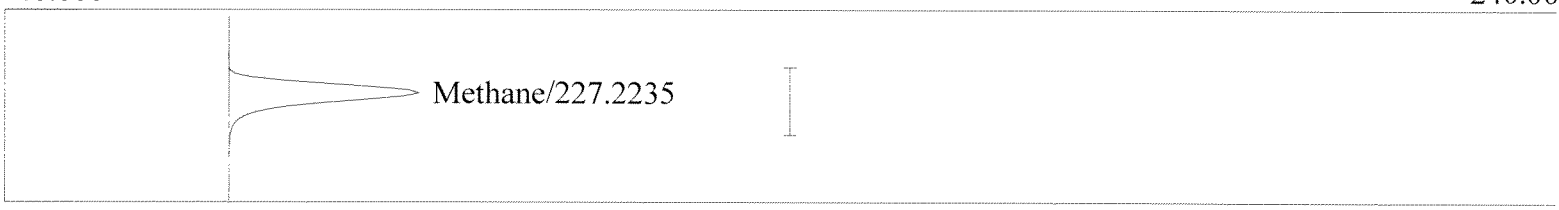
Client: VALERO
Analysis date: 02/10/2011 10:08:01
Data file: 021011 Unit 80 Cal 50_23.CHR ()
Sample: CAL 50
Operator: CW



Component	Retention	Area	Height
Methane	0.433	226.9540	33.965
		226.9540	

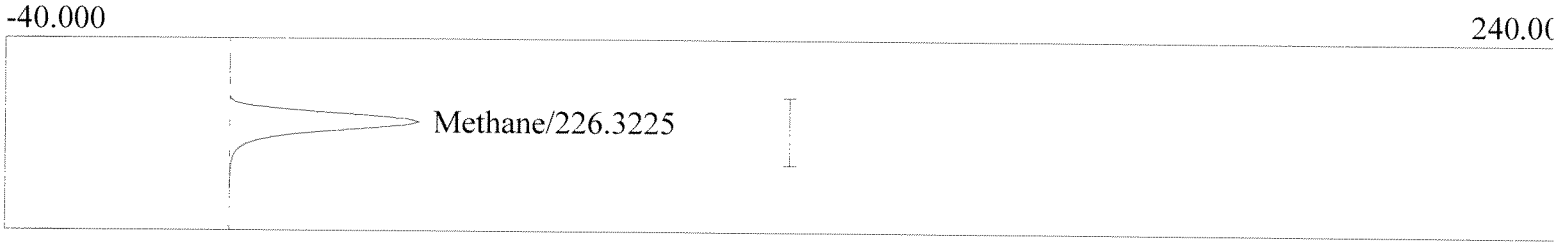
Client: VALERO
Analysis date: 02/10/2011 10:09:04
Data file: 021011 Unit 80 Cal 50_24.CHR ()
Sample: CAL 50
Operator: CW

-40.000 240.00



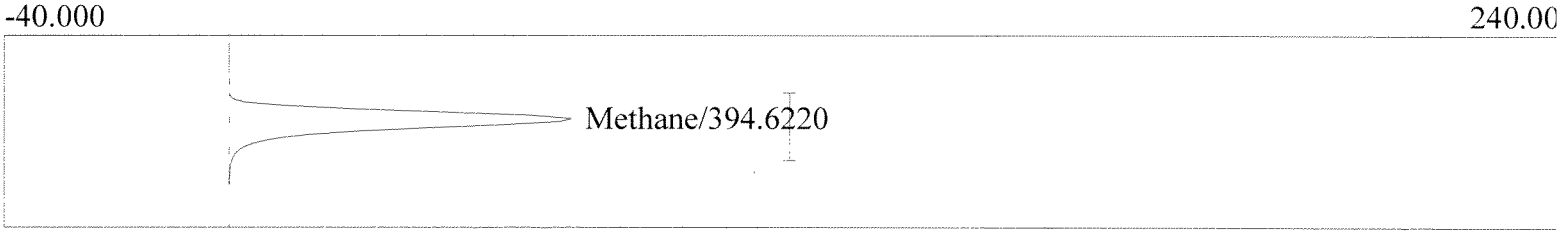
Component	Retention	Area	Height
Methane	0.433	227.2235	34.032
		227.2235	

Client: VALERO
Analysis date: 02/10/2011 10:10:07
Data file: 021011 Unit 80 Cal 50_25.CHR ()
Sample: CAL 50
Operator: CW



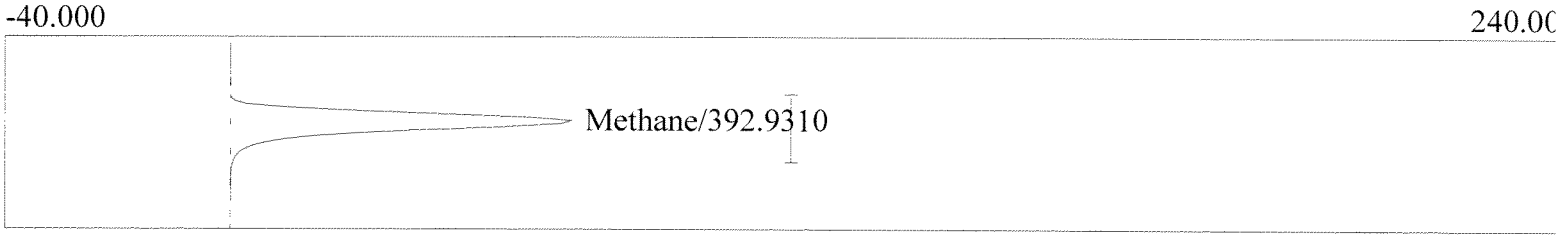
Component	Retention	Area	Height
Methane	0.433	226.3225	33.962
		226.3225	

Client: VALERO
Analysis date: 02/10/2011 10:16:38
Data file: 021011 Unit 80 Cal 90_28.CHR ()
Sample: CAL 91
Operator: CW



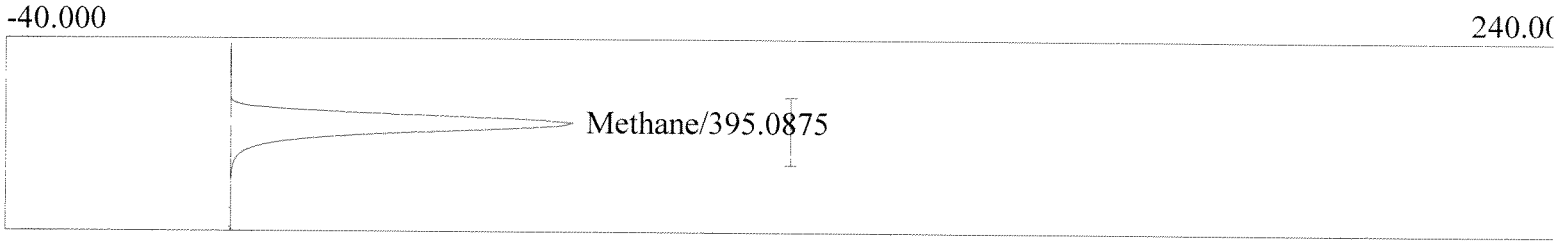
Component	Retention	Area	Height
Methane	0.433	394.6220	61.316
		394.6220	

Client: VALERO
Analysis date: 02/10/2011 10:17:41
Data file: 021011 Unit 80 Cal 90_29.CHR ()
Sample: CAL 91
Operator: CW



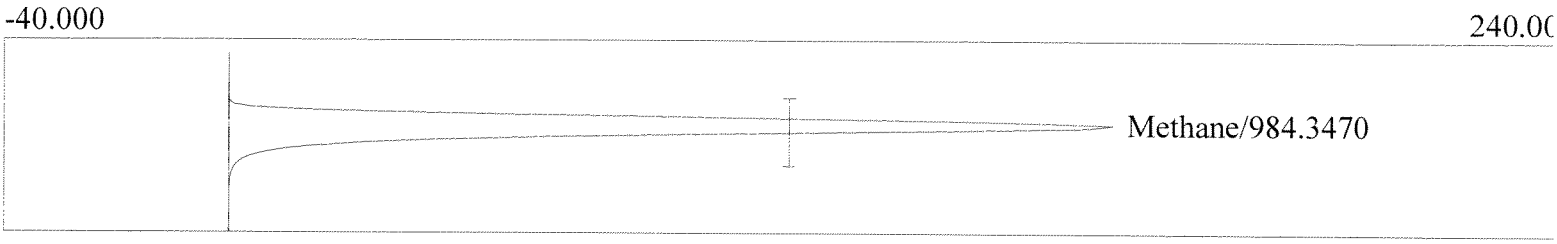
Component	Retention	Area	Height
Methane	0.433	392.9310	61.059
		392.9310	

Client: VALERO
Analysis date: 02/10/2011 10:18:44
Data file: 021011 Unit 80 Cal 90_30.CHR ()
Sample: CAL 91
Operator: CW



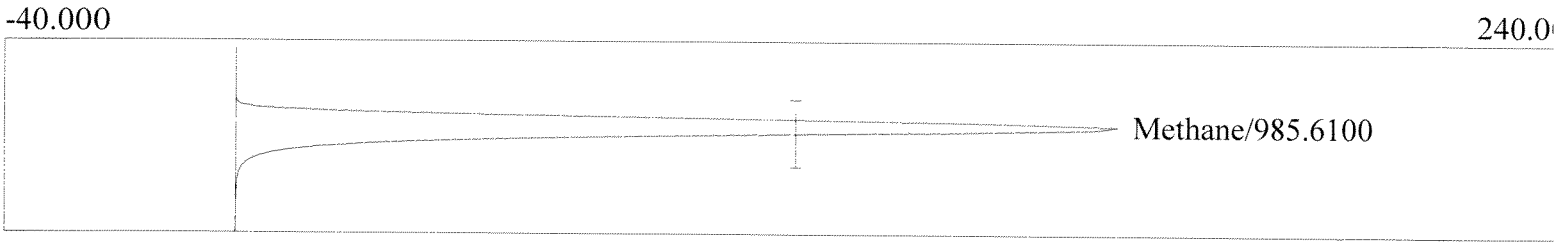
Component	Retention	Area	Height
Methane	0.433	395.0875	61.272
		395.0875	

Client: VALERO
Analysis date: 02/10/2011 10:24:42
Data file: 021011 Unit 80 Cal 250_35.CHR ()
Sample: CAL 252
Operator: CW



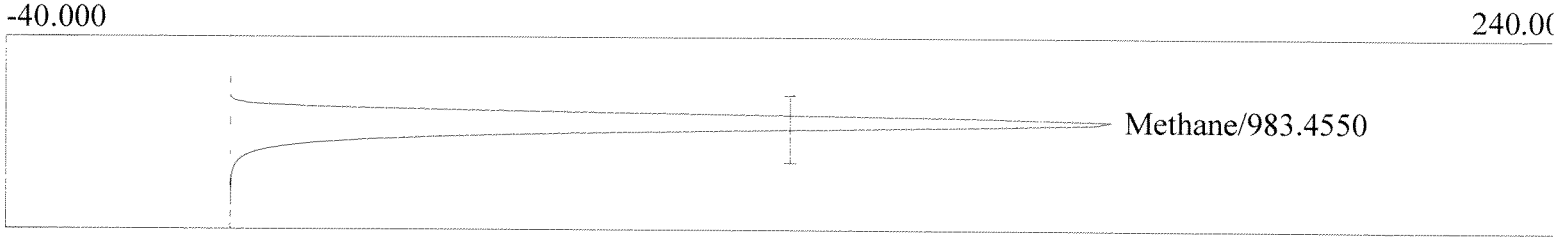
Component	Retention	Area	Height
Methane	0.433	984.3470	157.833
		984.3470	

Client: VALERO
Analysis date: 02/10/2011 10:25:45
Data file: 021011 Unit 80 Cal 250_36.CHR ()
Sample: CAL 252
Operator: CW



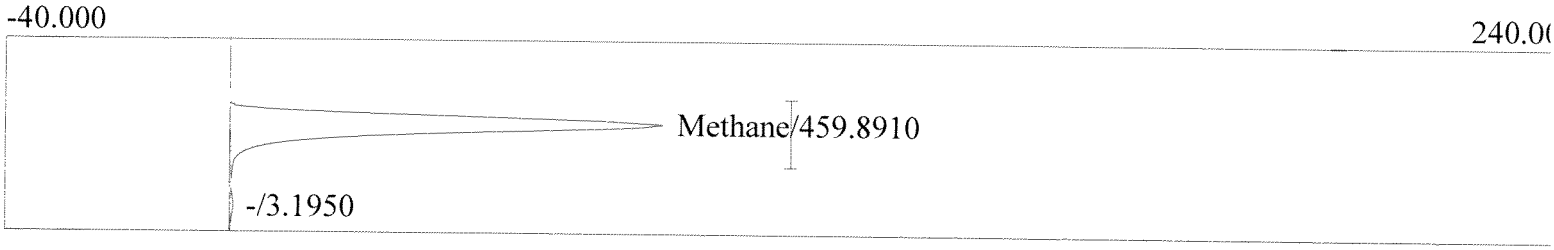
Component	Retention	Area	Height
Methane	0.433	985.6100	157.827
		985.6100	

Client: VALERO
Analysis date: 02/10/2011 10:27:01
Data file: 021011 Unit 80 Cal 250_37.CHR ()
Sample: CAL 252
Operator: CW



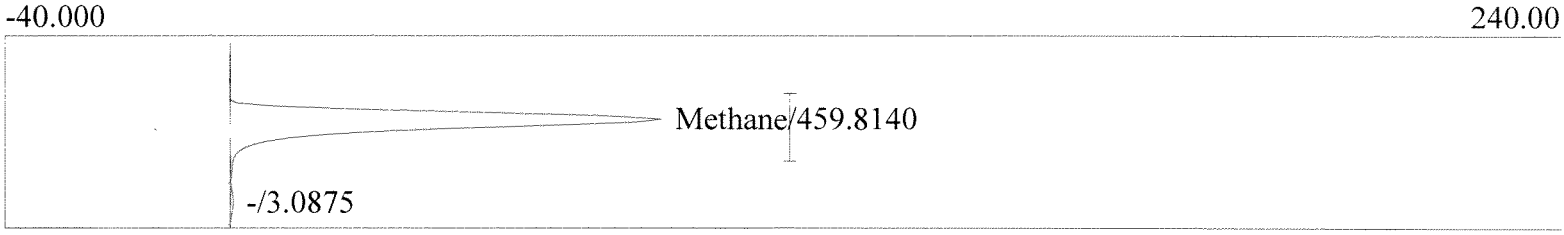
Component	Retention	Area	Height
Methane	0.433	983.4550	157.188
		983.4550	

Client: VALERO
Analysis date: 02/10/2011 10:36:07
Data file: 021011 Unit 80 Run 1_04.CHR ()
Sample: RUN 1 UNIT 80
Operator: CW



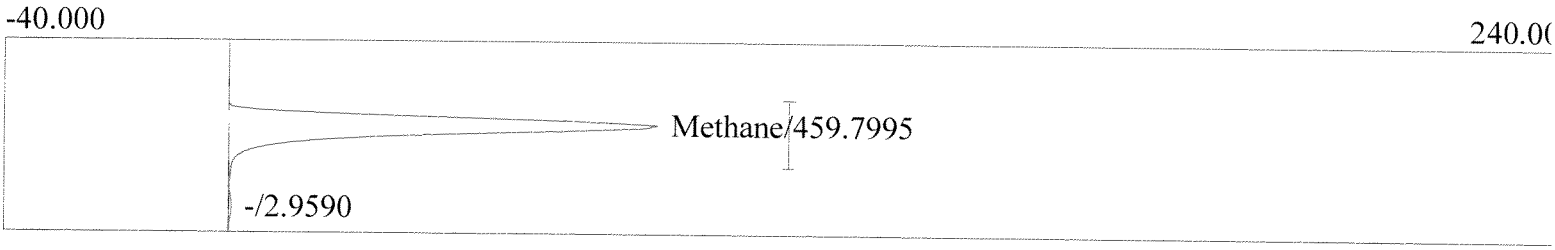
Component	Retention	Area	Height	External	Units
Methane	0.433	459.8910	77.266	108.0426	ppm
		459.8910		108.0426	

Client: VALERO
Analysis date: 02/10/2011 10:37:10
Data file: 021011 Unit 80 Run 1_05.CHR ()
Sample: RUN 1 UNIT 80
Operator: CW



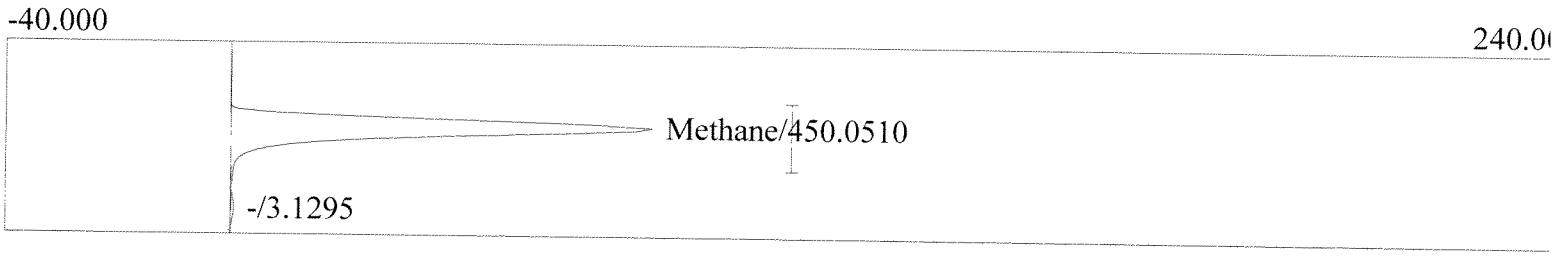
Component	Retention	Area	Height	External	Units
Methane	0.433	459.8140	77.189	108.0245	ppm
		459.8140		108.0245	

Analysis date: 02/10/2011 10:38:13
Data file: 021011 Unit 80 Run 1_06.CHR ()
Sample: RUN 1 UNIT 80
Operator: CW



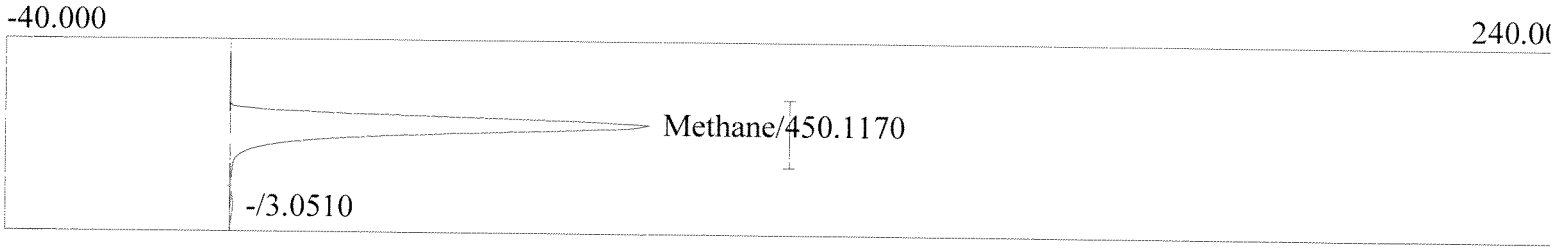
Component	Retention	Area	Height	External	Units
Methane	0.433	459.7995	76.670	108.0211	ppm
		459.7995		108.0211	

Client: VALERO
Analysis date: 02/10/2011 10:42:13
Data file: 021011 Unit 80 Run 2_09.CHR ()
Sample: RUN 2 UNIT 80
Operator: CW



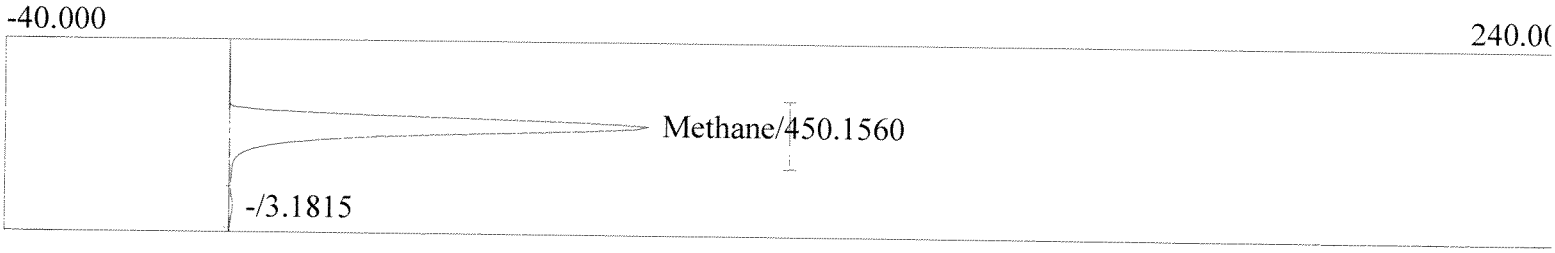
Component	Retention	Area	Height	External	Units
Methane	0.433	450.0510	75.160	105.7308	ppm
		450.0510		105.7308	

Client: VALERO
Analysis date: 02/10/2011 10:43:16
Data file: 021011 Unit 80 Run 2_10.CHR ()
Sample: RUN 2 UNIT 80
Operator: CW



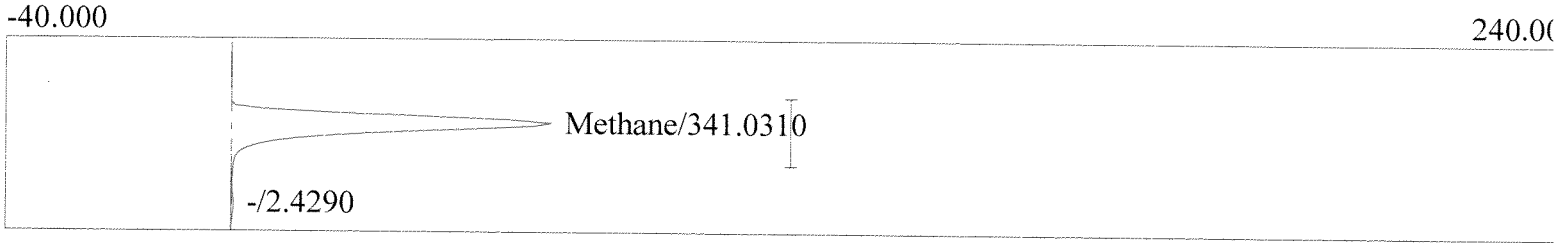
Component	Retention	Area	Height	External	Units
Methane	0.433	450.1170	75.052	105.7464	ppm
		450.1170		105.7464	

Client: VALERO
Analysis date: 02/10/2011 10:44:20
Data file: 021011 Unit 80 Run 2_11.CHR ()
Sample: RUN 2 UNIT 80
Operator: CW



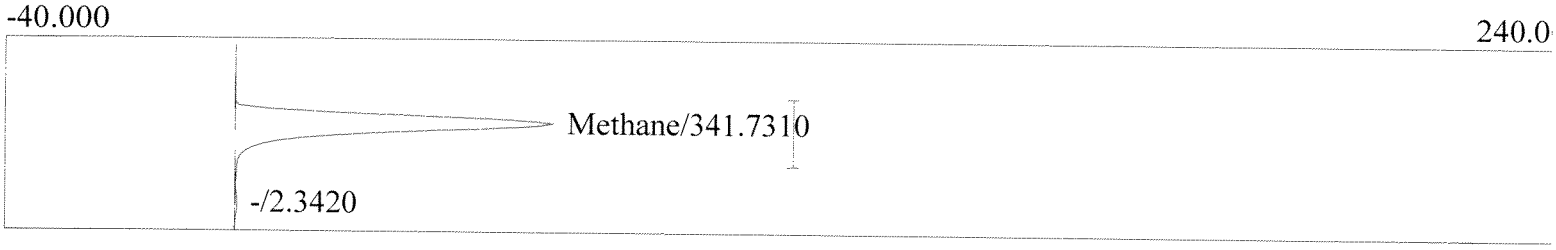
Component	Retention	Area	Height	External	Units
Methane	0.433	450.1560	74.935	105.7555	ppm
		450.1560		105.7555	

Client: VALERO
Analysis date: 02/10/2011 10:48:07
Data file: 021011 Unit 80 Run 3_14.CHR ()
Sample: RUN 3 UNIT 80
Operator: CW



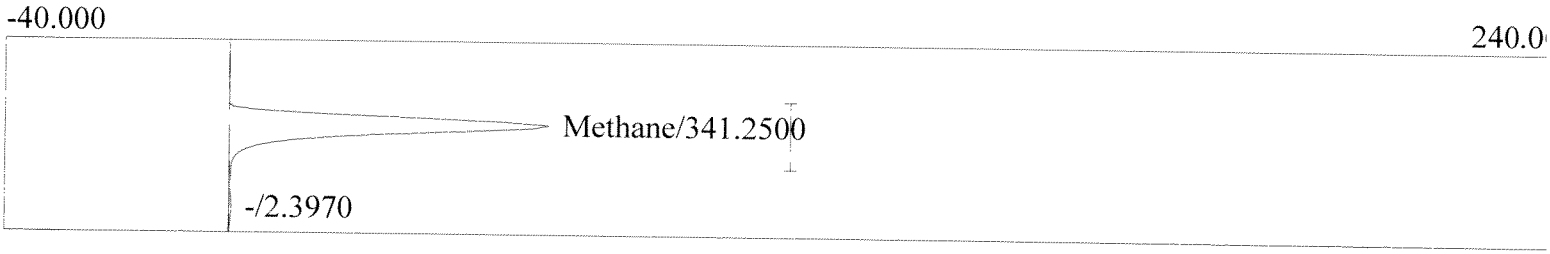
Component	Retention	Area	Height	External	Units
Methane	0.433	341.0310	57.247	80.1187	ppm
		341.0310		80.1187	

Client: VALERO
Analysis date: 02/10/2011 10:49:10
Data file: 021011 Unit 80 Run 3_15.CHR ()
Sample: RUN 3 UNIT 80
Operator: CW



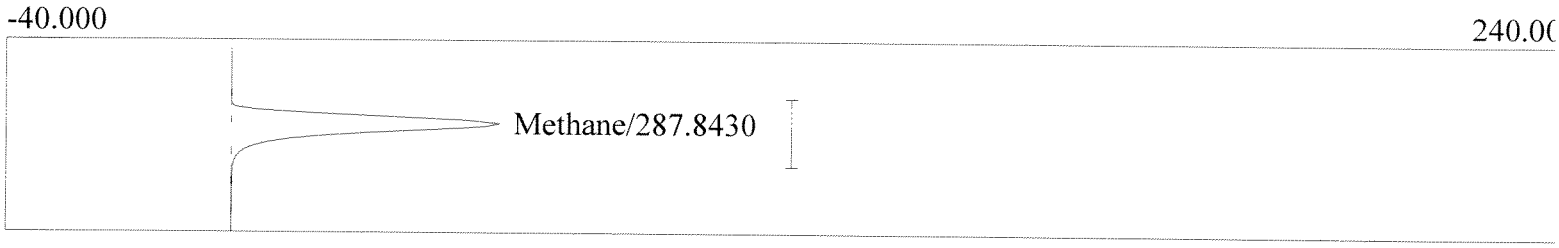
Component	Retention	Area	Height	External	Units
Methane	0.433	341.7310	57.218	80.2831	ppm
		341.7310		80.2831	

Client: VALERO
Analysis date: 02/10/2011 10:50:13
Data file: 021011 Unit 80 Run 3_16.CHR ()
Sample: RUN 3 UNIT 80
Operator: CW



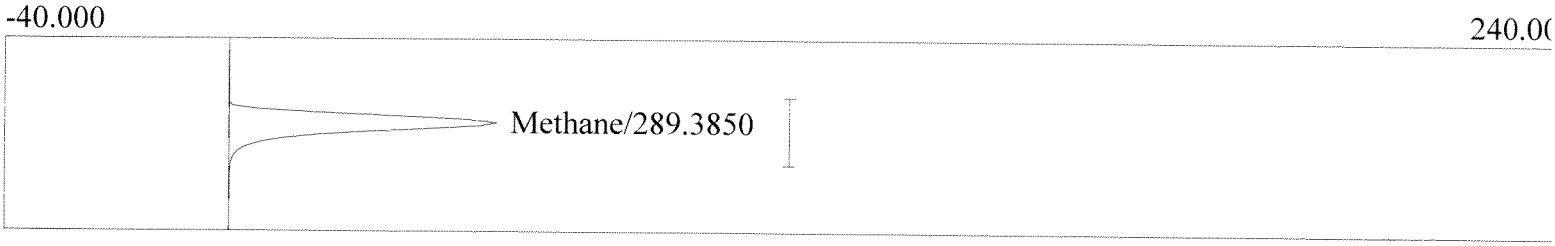
Component	Retention	Area	Height	External	Units
Methane	0.433	341.2500	57.081	80.1701	ppm
		341.2500		80.1701	

Client: VALERO
Analysis date: 02/10/2011 10:52:53
Data file: 021011 Unit 81 Run 1_18.CHR ()
Sample: RUN 1 UNIT 81
Operator: CW



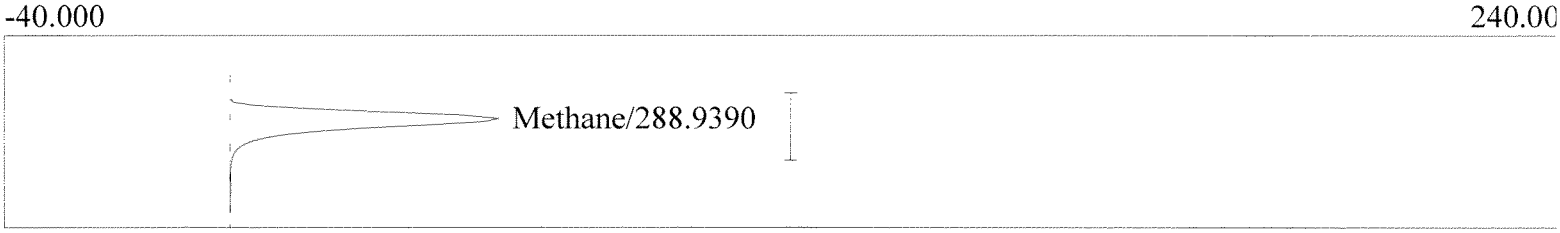
Component	Retention	Area	Height	External	Units
Methane	0.433	287.8430	48.095	67.6232	ppm
		287.8430		67.6232	

Client: VALERO
Analysis date: 02/10/2011 10:53:56
Data file: 021011 Unit 81 Run 1_19.CHR ()
Sample: RUN 1 UNIT 81
Operator: CW



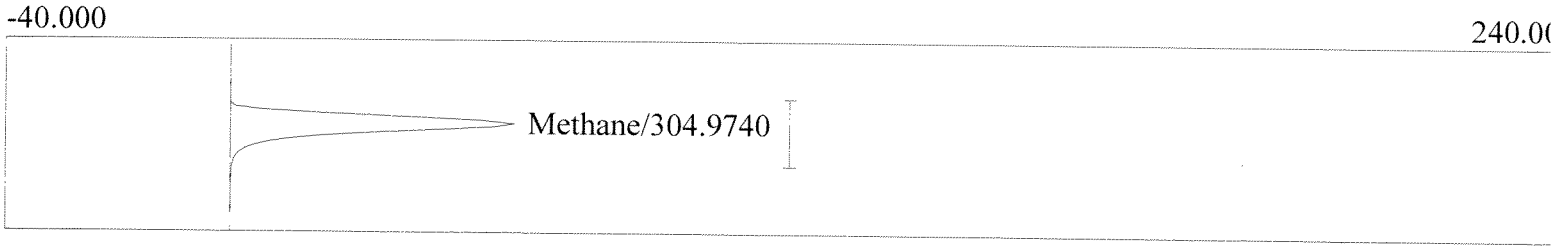
Component	Retention	Area	Height	External	Units
Methane	0.433	289.3850	48.117	67.9855	ppm
		289.3850		67.9855	

Client: VALERO
Analysis date: 02/10/2011 10:54:59
Data file: 021011 Unit 81 Run 1_20.CHR ()
Sample: RUN 1 UNIT 81
Operator: CW



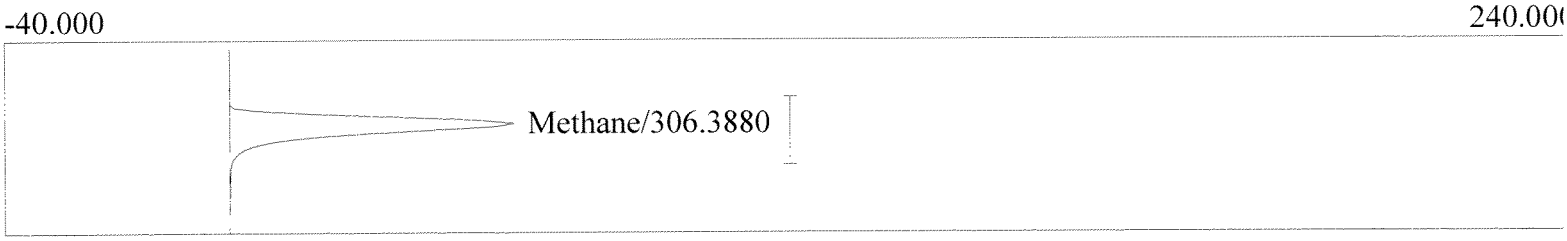
Component	Retention	Area	Height	External	Units
Methane	0.433	288.9390	48.091	67.8807	ppm
		288.9390		67.8807	

Client: VALERO
Analysis date: 02/10/2011 10:57:55
Data file: 021011 Unit 81 Run 2_22.CHR ()
Sample: RUN 2 UNIT 81
Operator: CW



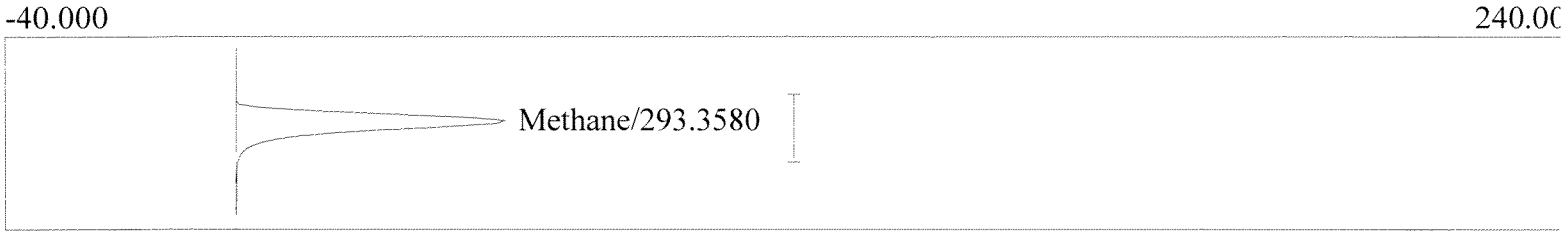
Component	Retention	Area	Height	External	Units
Methane	0.433	304.9740	50.944	71.6478	ppm
		304.9740		71.6478	

Client: VALERO
Analysis date: 02/10/2011 11:00:01
Data file: 021011 Unit 81 Run 2_23.CHR ()
Sample: RUN 2 UNIT 81
Operator: CW



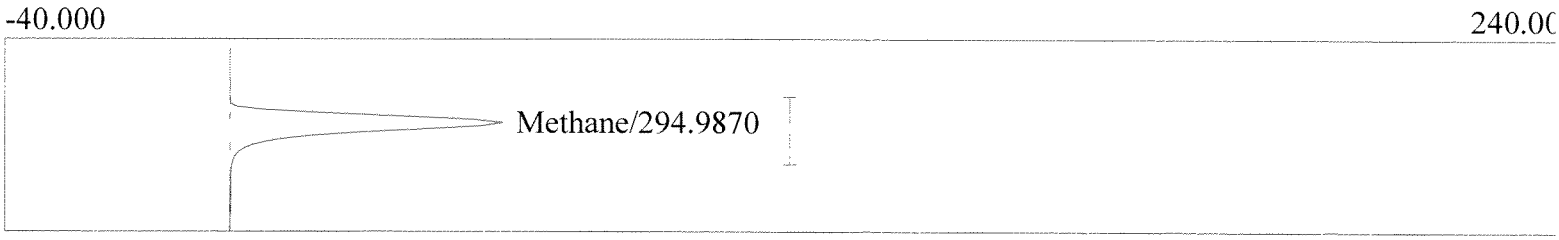
Component	Retention	Area	Height	External	Units
Methane	0.433	306.3880	50.958	71.9800	ppm
		306.3880		71.9800	

Client: VALERO
Analysis date: 02/10/2011 11:02:29
Data file: 021011 Unit 81 Run 3_25.CHR ()
Sample: RUN 3 UNIT 81
Operator: CW



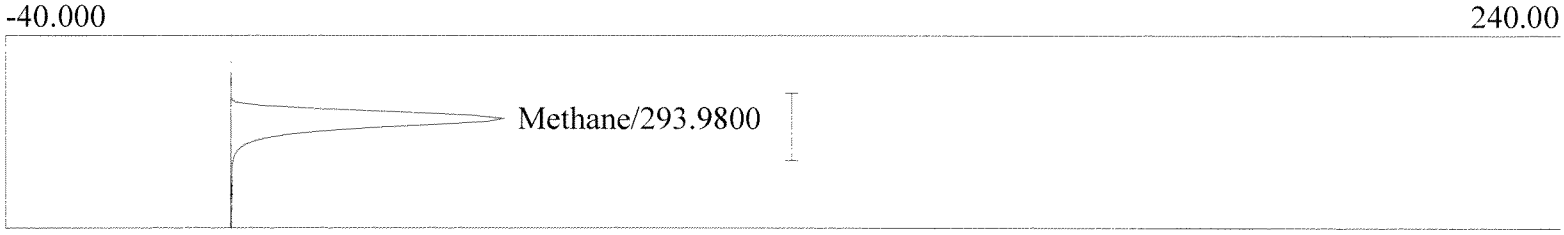
Component	Retention	Area	Height	External	Units
Methane	0.433	293.3580	48.409	68.9188	ppm
		293.3580		68.9188	

Client: VALERO
Analysis date: 02/10/2011 11:03:32
Data file: 021011 Unit 81 Run 3_26.CHR ()
Sample: RUN 3 UNIT 81
Operator: CW



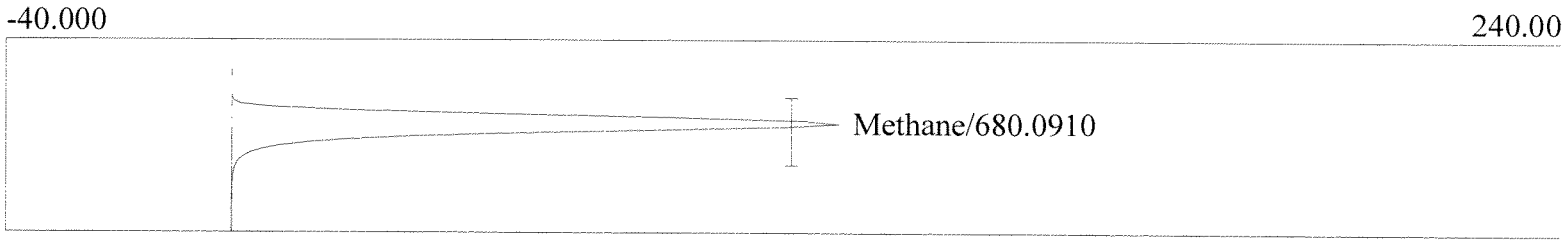
Component	Retention	Area	Height	External	Units
Methane	0.433	294.9870	48.945	69.3015	ppm
		294.9870		69.3015	

Client: VALERO
Analysis date: 02/10/2011 11:04:35
Data file: 021011 Unit 81 Run 3_27.CHR ()
Sample: RUN 3 UNIT 81
Operator: CW



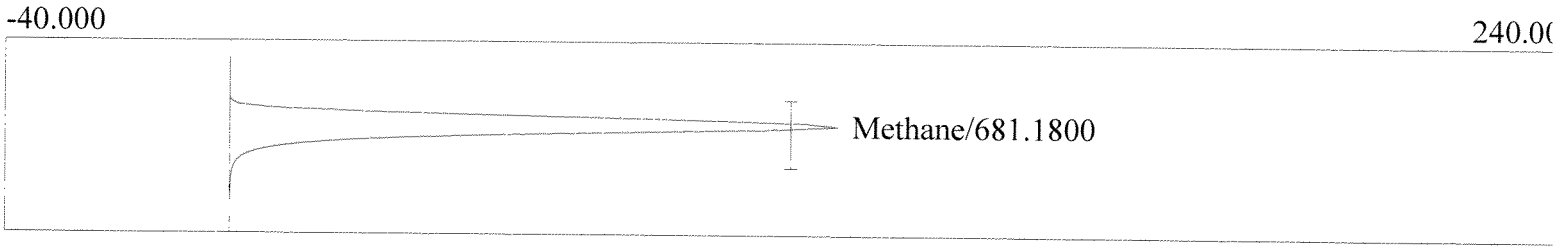
Component	Retention	Area	Height	External	Units
Methane	0.433	293.9800	48.877	69.0650	ppm
		293.9800		69.0650	

Client: VALERO
Analysis date: 02/11/2011 07:17:57
Data file: 021111 Spike Run 1 Unit 80_39.CHR ()
Sample: SPIKE RUN 1 UNIT 80
Operator: CW



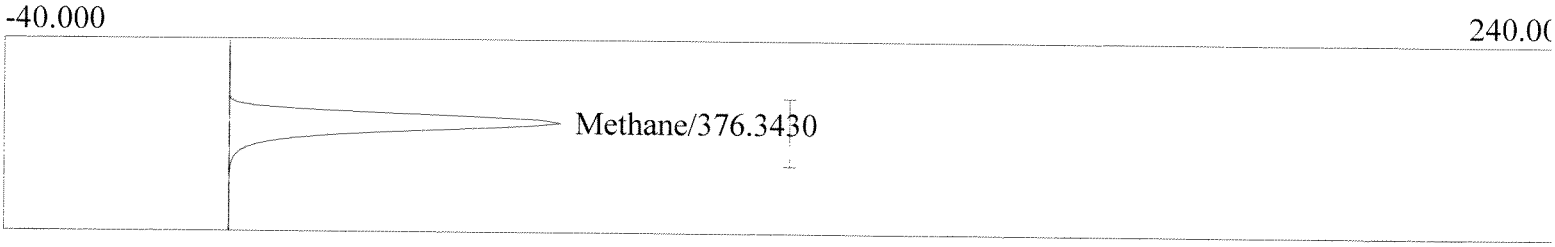
Component	Retention	Area	Height	External	Units
Methane	0.433	680.0910	108.678	159.7743	ppm
		680.0910		159.7743	

Client: VALERO
Analysis date: 02/11/2011 07:18:57
Data file: 021111 Spike Run 1 Unit 80_40.CHR ()
Sample: SPIKE RUN 1 UNIT 80
Operator: CW



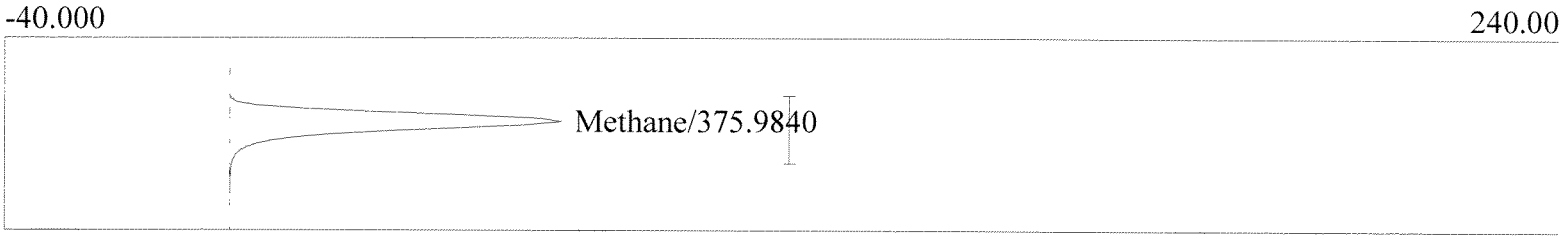
Component	Retention	Area	Height	External	Units
Methane	0.433	681.1800	108.607	160.0302	ppm
		681.1800		160.0302	

Client: VALERO
Analysis date: 02/11/2011 07:22:24
Data file: 021111 Post 90_43.CHR ()
Sample: POST 91
Operator: CW



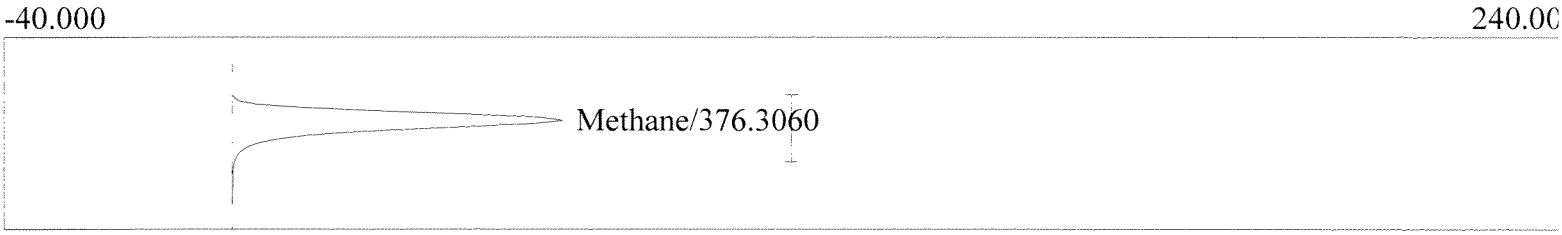
Component	Retention	Area	Height
Methane	0.433	376.3430	59.448
		376.3430	

Client: VALERO
Analysis date: 02/11/2011 07:23:27
Data file: 021111 Post 90_44.CHR ()
Sample: POST 91
Operator: CW



Component	Retention	Area	Height
Methane	0.433	375.9840	59.399
		375.9840	

Client: VALERO
Analysis date: 02/11/2011 07:24:30
Data file: 021111 Post 90_45.CHR ()
Sample: POST 91
Operator: CW



Component	Retention	Area	Height
Methane	0.433	376.3060	59.375
		376.3060	

APPENDIX C
EXAMPLE CALCULATIONS

EXAMPLE CALCULATIONS FOR VOLUMETRIC FLOW AND MOISTURE

1. Volume of dry gas sampled at standard conditions (68 deg F, 29.92 in. Hg), dscf.

$$Vm(std) = \frac{17.64 \times Y \times Vm \times \left(Pb + \frac{\text{delta H}}{13.6} \right)}{(Tm + 460)}$$

Where:

Vm(std) =	Volume of gas sample measured by the dry gas meter, corrected to standard conditions, dscf.
Vm =	Volume of gas sample measured by the dry gas meter at meter conditions, dcf.
Pb =	Barometric Pressure, in Hg.
delt H =	Average pressure drop across the orifice meter, in H_2O
Tm =	Average dry gas meter temperature , deg F.
Y =	Dry gas meter calibration factor.
17.64 =	Factor that includes ratio of standard temperature (528 deg R) to standard pressure (29.92 in. Hg), deg R/in. Hg.
13.6 =	Specific gravity of mercury.

2. Volume of water vapor in the gas sample corrected to standard conditions, scf.

$$Vw(std) = (0.04707 \times Vwc) + (0.04715 \times Wwsg)$$

Where:

Vw(std) =	Volume of water vapor in the gas sample corrected to standard conditions, scf.
Vwc =	Volume of liquid condensed in impingers, ml.
Wwsg =	Weight of water vapor collected in silica gel, g.
0.04707 =	Factor which includes the density of water (0.002201 lb/ml), the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), ft^3/ml.
0.04715 =	Factor which includes the molecular weight of water (18.0 lb/lb-mole), the ideal gas constant 21.85 (in. Hg) (ft^3)/lb-mole)(deg R); absolute temperature at standard conditions (528 deg R), absolute pressure at standard conditions (29.92 in. Hg), and 453.6 g/lb, ft^3/g.

3. Moisture content

$$bws = \frac{Vw(std)}{Vw(std) + Vm(std)}$$

Where:

bws =	Proportion of water vapor, by volume, in the gas stream, dimensionless.

4. Mole fraction of dry gas.

$$Md = 1 - bws$$

Where:

Md =	Mole fraction of dry gas, dimensionless.

5. Dry molecular weight of gas stream, lb/lb-mole.

$$MWd = (0.440 \times \%\ CO_2) + (0.320 \times \%\ O_2) + (0.280 \times (\%\ N_2 + \%\ CO))$$

Where:

MWd =	Dry molecular weight , lb/lb-mole.
% CO2 =	Percent carbon dioxide by volume, dry basis.
$\%\ O_2$ =	Percent oxygen by volume, dry basis.
$\%\ N_2$ =	Percent nitrogen by volume, dry basis.
% CO =	Percent carbon monoxide by volume, dry basis.
0.440 =	Molecular weight of carbon dioxide, divided by 100.
0.320 =	Molecular weight of oxygen, divided by 100.
0.280 =	Molecular weight of nitrogen or carbon monoxide, divided by 100.

6. Actual molecular weight of gas stream (wet basis), lb/lb-mole.

$$MWs = (MWd \times Md) + (18 \times (1 - Md))$$

Where:

MWs =	Molecular weight of wet gas, lb/lb-mole.
18 =	Molecular weight of water, lb/lb-mole.

7. Average velocity of gas stream at actual conditions, ft/sec.

$$Vs = 85.49 \times Cp \times ((\text{delt } p)^{1/2})avg \times \left(\frac{Ts\ (avg)}{Ps \times MWs} \right)^{1/2}$$

Where:

Vs = Average gas stream velocity, ft/sec.

85.49 = Pitot tube constant, $\frac{(lb/lb\text{-}mole)(in.\ Hg)^{1/2}}{(deg\ R)(in\ H_2O)}$

Cp = Pitot tube coefficient, dimensionless.

Ts = Absolute gas stream temperature, deg R = Ts, deg F + 460.

Ps = Absolute gas stack pressure, in. Hg. = $Pb + \frac{P(static)}{13.6}$

delt p = Velocity head of stack, in. H_2O

8. Average gas stream volumetric flow rate at actual conditions, wacf/min.

$$Qs(act) = 60 \times Vs \times As$$

Where:

Qs(act) = Volumetric flow rate of wet stack gas at actual conditions, wacf/min.

As = Cross-sectional area of stack, ft^2.

60 = Conversion factor from seconds to minutes.

9. Average gas stream dry volumetric flow rate at standard conditions, dscf/min.

$$Qs(std) = 17.64 \times Md \times \frac{Ps}{Ts} \times Qs(act)$$

Where:

Qs(std) = Volumetric flow rate of dry stack gas at standard conditions, dscf/min.

EXAMPLE CALCULATIONS FOR
BIAS CORRECTION AND MASS EMISSION RATES OF
SULFUR DIOXIDE

1. Bias corrected value of Sulfur Dioxide dry basis, ppm.

$$SO2(corr) = \frac{(AVG - Zbias)}{(Sbias - Zbias)} \times SPAN\ GAS$$

Where:

AVG = Average SO2 concentration for the test run.

Zbias = The average of pre and post test zero bias checks.

Sbias = The average of pre and post test span bias check.

SPAN GAS = The calibration gas closest to the gas stream concentration, which was used for the BIAS check.

SO2(corr) = Bias corrected value.

Note: Same bias correction applies to oxygen and carbon dioxide.

2. Sulfur dioxide mass emission rate dry basis, lb/hr.

$$MR1(SO2) = \frac{SO2(corr) \times Qs(std) \times 64.06 \times 60\ min/hr}{385.35 \times 10^{\wedge}6}$$

Where:

MR1(SO2) = SO2 mass emission rate, lb/hr.

Qs(std) = Average volumetric gas stream flow rate at standard conditions, dscf/min.

64.06 = Molecular weight of SO2.

385.35x106 = Conversion factor from ppm to lbs.

Note: Mass rates for the other parameters were calculated using the above equation except the specific molecular weights and measured concentrations of each parameter were used.

EXAMPLE CALCULATIONS FOR
MOISTURE CORRECTION and METHANE CORRECTION
FOR NMVOC

1. Moisture corrected value of VOC, dry basis (ppm/v).

$$C(VOC\text{-}m) = \frac{C(VOC\text{-}w)}{(100 - \%\ MOISTURE) / 100}$$

Where:

C(VOC-w) = The concentration of total VOCs, wet basis, (ppmvw)

C(VOC-m) = The concentration of total VOCs, corrected for moisture, (ppmvd)

% MOISTURE = The precentage of water vapor in the gas stream.

2. Non-methane VOC concentration in sample dry basis (ppmvd).

NMVOC = C(VOC-m)-C(Methane)

Where:

NMVOC = Non-methane VOC concentration of sample dry basis, (ppmvd).

C(Methane) = Stack methane content, dry basis (ppmvd) determined by gas chromatograph analysis.

APPENDIX D
EQUIPMENT CALIBRATION RECORDS

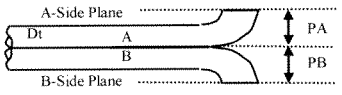
Standard Pitot Tube Inspection Data Form

Pitot Tube Identification Number: **INC-1**

If all Criteria PASS Cp is equal to 0.84

Inspection Date 2/25/10 Individual Conducting Inspection DV

PASS/FAIL



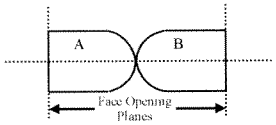
Distance to A Plane (PA) - inches 0.395 PASS

Distance to B Plane (PB) - inches 0.395 PASS

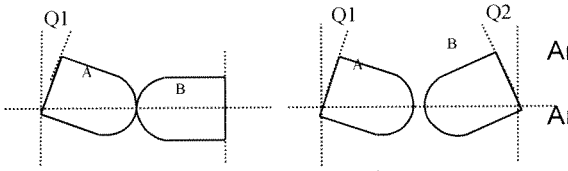
Pitot OD (D_t) - inches 0.375

$1.05\ D_t < P < 1.5\ D_t$

PA must Equal PB



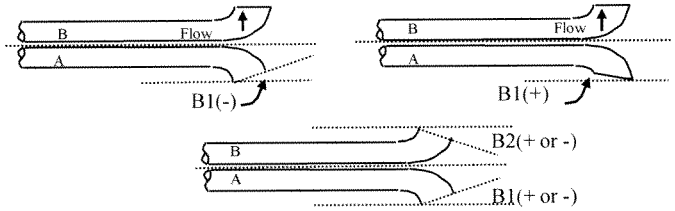
Are Open Faces Aligned Perpendicular to the Tube Axis ◉ YES ○ NO PASS



Angle of Q1 from vertical A Tube- degrees (absolute) 3 PASS

Angle of Q2 from vertical B Tube- degrees (absolute) 4 PASS

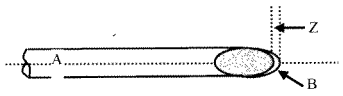
Q1 and Q2 must be $\leq 10^o$



Angle of B1 from vertical A Tube- degrees (absolute) -4 PASS

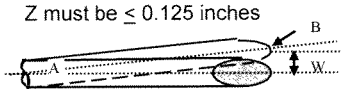
Angle of B1 from vertical B Tube- degrees (absolute) -5 PASS

B1 or B2 must be $\leq 5^o$



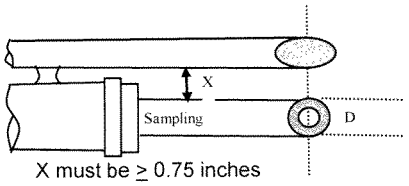
Horizontal offset between A and B Tubes (Z) - inches 0.071 PASS

Z must be ≤ 0.125 inches



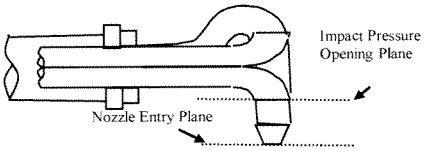
Vertical offset between A and B Tubes (W) - inches 0.029 PASS

W must be ≤ 0.03125 inches

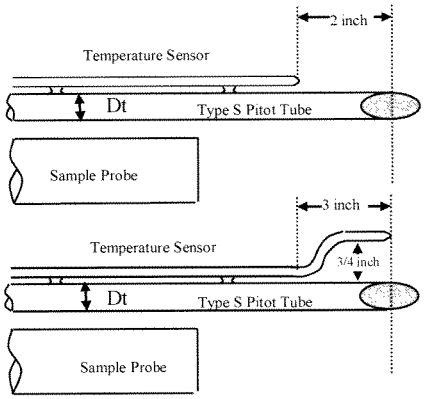


Distance between Sample Nozzle and Pitot (X) - inches NA

X must be ≥ 0.75 inches



Impact Pressure Opening Plane is above the Nozzle Entry Plane ○ YES ○ NO ◉ NA



Thermocouple meets the Distance Criteria in the adjacent figure ◉ YES ○ NO ○ NA

Thermocouple meets the Distance Criteria in the adjacent figure ○ YES ○ NO ◉ NA PASS

Long Cal and Temperature Cal Datasheet for Standard Dry Gas Meter Console

Calibrator: PM | Meter Box Number: 21 | Ambient Temp: 72

Date: 22-Jun-10 | Wet Test Meter Number: P-2952 | Temp Reference Source: Thermocouple Simulator (Accuracy +/- 1°F)

Dry Gas Meter Number: 6848063

Baro Press, in Hg (Pb)	29.86

Setting	Gas Volume		Temperatures					Calibration Results	
Orifice Manometer	Wet Test Meter	Dry gas Meter	Wet Test Meter	Dry Gas Meter					
in H_20 (ΔH)	ft^3 (Vw)	ft^3 (Vd)	°F (Tw)	Outlet, °F (Td_o)	Inlet, °F (Td_i)	Average, °F (Td)	Time, min (O)	Y	ΔH
0.5	5.0	117.715	74.0	74.00	75.00	74.5	13.2	0.9863	1.9588
		122.783		74.00	75.00				
		5.068		74.00	75.00				
1.0	5.1	122.783	74.0	76.00	77.00	76.5	9.6	0.9871	1.9993
		127.961		76.00	77.00				
		5.178		76.00	77.00				
1.5	10.0	127.961	74.0	77.00	78.00	77.5	16.0	0.9835	2.1492
		138.158		77.00	78.00				
		10.197		77.00	78.00				
2.0	11.0	138.158	74.0	79.00	79.00	79.0	15.3	0.9817	2.1732
		149.412		79.00	79.00				
		11.254		79.00	79.00				
3.0	10.0	149.412	74.0	80.00	81.00	80.5	11.2	0.9857	2.1077
		159.605		80.00	81.00				
		10.193		80.00	81.00				
							Average	0.9849	2.0776

Vw - Gas Volume passing through the wet test meter
Vd - Gas Volume passing through the dry gas meter
Tw - Temp of gas in the wet test meter
Tdi - Temp of the inlet gas of the dry gas meter
Tdo - Temp of the outlet gas of the dry gas meter
Td - Average temp of the gas in the dry gas meter

0 - Time of calibration run
Pb - Barometric Pressure
ΔH - Pressure differential across orifice
Y - Ratio of accuracy of wet test meter to dry gas meter

$$Y = \frac{Vw * Pb * (td + 460)}{Vd * \left[Pb + \frac{(\Delta H)}{13.6}\right] * (tw + 460)}$$

$$\Delta H = \left[\frac{0.0317 * \Delta H}{Pb * (td + 460)}\right] * \left[\frac{(tw + 460) * O}{Vw}\right]^2$$

Reference Temperature	Temperature Reading from Individual Thermocouple Input [1]						Average Temperature Reading	Temp Difference [2] (%)
Select Temperature ○ °C ◉ °F	Channel Number							
	1	2	3	4	5	6		
32	31	31	31	31	31		31.0	0.2%
212	212	212	212	212	212		212.0	0.0%
932	932	932	932	932	932		932.0	0.0%
1832	1831	1831	1831	1831	1831		1831.0	0.0%

1 - Channel Temps must agree with +/- 5°F or 3°C

2 - Acceptable Temperature Difference less than 1.5 %

$$\text{Temp Diff} = \left[\frac{(\text{Reference Temp}(°F) + 460) - (\text{Test Temp}(°F) + 460)}{\text{Reference Temp}(°F) + 460}\right]$$

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E03NI79E15A00E4	Reference Number:	82-124223450-1
Cylinder Number:	CC307713	Cylinder Volume:	151 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 21, 2010	Valve Outlet:	590

Expiration Date: Jun 21, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON DIOXIDE	9.000 %	9.000 %	G1	+/- 1% NIST Traceable
OXYGEN	12.00 %	12.06 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRMplus	06060817	CC207898	22.51% OXYGEN/NITROGEN	May 01, 2016
NTRMplus	08061301	CC254761	20.09% CARBON DIOXIDE/NITROGEN	Jul 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens Ultramat 6E N1-N0-0820	NDIR	May 24, 2010
Siemens 5E BN805	Paramagnetic	Jun 03, 2010

Triad Data Available Upon Request

Notes:

Approved for Release

#5000

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E03NI62E15A0224	Reference Number:	82-124179392-1
Cylinder Number:	CC158897	Cylinder Volume:	157 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 02, 2009	Valve Outlet:	590

Expiration Date: Jun 02, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON DIOXIDE	17.00 %	16.77 %	G1	+/- 1% NIST Traceable
OXYGEN	21.00 %	21.01 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	08061313	CC254791	20.09% CARBON DIOXIDE/NITROGEN	Jul 15, 2012
NTRM	03060218	XC024401B	22.60% OXYGEN/NITROGEN	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens Ultramat 6E N1-N0-0820	NDIR	May 21, 2009
Siemens 5E BN805	Paramagnetic	May 06, 2009

Triad Data Available Upon Request

Notes:O2 CONCENTRATION CORRECTED FOR CO2 INTERFERENCE.

C. Carballo

QA Approval

#5000

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E02NI99E15A0257	Reference Number:	82-124242553-1
Cylinder Number:	CC274191	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Nov 29, 2010	Valve Outlet:	660

Expiration Date: May 29, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
SULFUR DIOXIDE	25.00 PPM	25.52 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	10061022	CC283926	14.82PPM SULFUR DIOXIDE/NITROGEN	May 10, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 SO2	FTIR	Nov 08, 2010

Triad Data Available Upon Request

Notes:

Approved for Release

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0350	Reference Number:	82-124188759-1
Cylinder Number:	CC314591	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Sep 01, 2009	Valve Outlet:	660

Expiration Date: Sep 01, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
SULFUR DIOXIDE	50.00 PPM	49.91 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	06061319	CC207636	45.91PPM SULFUR DIOXIDE/NITROGEN	Sep 01, 2010

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801933 SO2	FTIR	Aug 19, 2009

Triad Data Available Upon Request

Notes:

Signature on file

QA Approval

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0041	Reference Number:	82-124128405-1
Cylinder Number:	CC51951	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Mar 19, 2008	Valve Outlet:	350

Expiration Date: Mar 19, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	125.0 PPM	123.5 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	98060826	CC94612	98.0PPM CARBON MONOXIDE/NITROGEN	Apr 01, 2008

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens Ultramat 6 N9-782	NDIR	Feb 25, 2008

Triad Data Available Upon Request

Notes:

Signature on file

_____

QA Approval

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E02NI99E15A0080	Reference Number:	82-124218846-1
Cylinder Number:	CC79023	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	May 18, 2010	Valve Outlet:	350

Expiration Date: May 18, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	250.0 PPM	251.0 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	08060324	CC255333	250.0PPM CARBON MONOXIDE/NITROGEN	Apr 15, 2012
NTRM	08060302	CC254448	250.0PPM CARBON MONOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Siemens 6E Ultramat L9-0191	NDIR	May 05, 2010

Triad Data Available Upon Request

Notes:

C. Mudge Cawski

Approved for Release

#5000

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E02AI99E15A0557	Reference Number:	82-124243919-1
Cylinder Number:	XC027851B	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Dec 06, 2010	Valve Outlet:	590

Expiration Date: Dec 06, 2013

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
PROPANE	25.00 PPM	25.21 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	08061015	CC262393	49.62PPM PROPANE/AIR	Jul 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 C3H8	FTIR	Dec 02, 2010

Triad Data Available Upon Request

Notes:

Approved for Release

#5000

Airgas

Airgas Specialty Gases
600 Union Landing Road
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(856) 829-7878
Fax (856) 829-0571
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0277	Reference Number:	82-124141440-1
Cylinder Number:	XC002134B	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 17, 2008	Valve Outlet:	590

Expiration Date: Jun 17, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
PROPANE	45.00 PPM	45.55 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	00060602	XC003549B	30.0PPM PROPANE/NITROGEN	Sep 02, 2010

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Varian 3900 10-100ppm C3H8	FID	Jun 02, 2008

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0461	Reference Number:	82-124141441-1
Cylinder Number:	SG9183284	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 17, 2008	Valve Outlet:	590

Expiration Date: Jun 17, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
PROPANE	85.00 PPM	84.37 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	99060201	XC003449B	93.9PPM PROPANE/AIR	Oct 02, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Varian 3900 10-100ppm C3H8	FID	Jun 02, 2008

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

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www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0570	Reference Number:	82-124184139-1
Cylinder Number:	SG9148206	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jul 16, 2009	Valve Outlet:	590

Expiration Date: Jul 16, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	25.00 PPM	24.79 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07060602	CC207784	49.97PPM METHANE/AIR	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 CH4	FTIR	Jul 15, 2009

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

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(856) 829-7878
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CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0569	Reference Number:	82-124182148-1
Cylinder Number:	CC153960	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 29, 2009	Valve Outlet:	590

Expiration Date: Jun 29, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	45.00 PPM	45.11 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07060602	CC207784	49.97PPM METHANE/AIR	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 CH4	FTIR	Jun 20, 2009

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

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(856) 829-7878
Fax (856) 829-0571
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0571	Reference Number:	82-124184625-1
Cylinder Number:	CC122469	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jul 22, 2009	Valve Outlet:	590

Expiration Date: Jul 22, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	90.00 PPM	89.17 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	02050402	SG9112129BAL	246.0PPM METHANE/NITROGEN	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 CH4	FTIR	Jul 09, 2009

Triad Data Available Upon Request

Notes:

C. Cavaliere

QA Approval

#5000

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Part Number:	E02AI99E15A0447	Reference Number:	82-124146638-1
Cylinder Number:	CC39486	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Aug 07, 2008	Valve Outlet:	590

Expiration Date: Aug 07, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sep.. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	50.00 PPM	50.19PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
SRM	211-B-16	CAL014072	49.3PPM METHANE/AIR	May 21, 2009

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HP 5890 3022A9265 - 0-100ppm CH4	FID	Jul 28, 2008

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

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(856) 829-7878
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www.airgas.com

Part Number:	E02AI99E15A0571	Reference Number:	82-124180265-1
Cylinder Number:	SG9149509	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Jun 08, 2009	Valve Outlet:	590

Expiration Date: Jun 08, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	90.00 PPM	90.92 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07060602	CC207784	49.97PPM METHANE/AIR	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 CH4	FTIR	Jun 05, 2009

Triad Data Available Upon Request

Notes:

QA Approval

#5000

Airgas

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600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A0573	Reference Number:	82-124170518-1
Cylinder Number:	CC102718	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	Mar 19, 2009	Valve Outlet:	590

Expiration Date: Mar 19, 2012

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
METHANE	250.0 PPM	251.5 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	81659x01	SG9112129	246.0PPM METHANE/NITROGEN	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 470 AEP0000416 CH4	FTIR	Mar 19, 2009

Triad Data Available Upon Request

Notes:

C. Arnaldo

QA Approval

#5000

Airgas

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Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E02AI99E15A3015	Reference Number:	82-124138219-7
Cylinder Number:	XC022539B	Cylinder Volume:	146 Cu.Ft.
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
Analysis Date:	May 20, 2008	Valve Outlet:	590

Expiration Date: May 20, 2011

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainity
METHANE	500.0 PPM	509.5 PPM	G1	+/- 1% NIST Traceable
Air	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	02050508	SG9169464BAL	495.1PPM METHANE/NITROGEN	Jul 01, 2011

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
HP 5890 3022A9265-400-1005PPM	FID	May 12, 2008

Triad Data Available Upon Request

Notes:

QA Approval

#5000

CERTIFICATE

The permeation rate of the DYNACAL® PERMEATION DEVICE listed below is certified traceable to N.I.S.T. standards.

Serial Number: T-35381

Certification Date: Jan 29, 2010	Certificate Expires: Jan 29, 2011
Chemical: Hydrogen Sulfide	Part Number: 147-543-0110-C50S
Device Type: Dynacal Wafer	Geometry: 40T3
Permeation Rate: 633.63 ng/min	Temperature: 50 C
True Accuracy: +/- 0.83 %	Max Allowed Accuracy: +/- 2.00 %
Certification Method: Gravimetric	Order No: 102466

Customer: WESTON SOLUTIONS, INC.

Approved By: _____

VICI

VICI Metronics, Inc.
26295 Twelve Trees Lane NW
Poulsbo, WA 98370
(360) 697-9199 Fax: (360) 697-6682

CERTIFICATE

The permeation rate of the DYNACAL® PERMEATION DEVICE listed below is certified traceable to N.I.S.T. standards.

Serial Number: F-35177

Certification Date: Feb 17, 2010
Certificate Expires: Feb 17, 2011
Chemical: Carbonyl Sulfide
Part Number: 147-693-7600-C50S
Device Type: Dynacal Wafer
Geometry: 90F3
Permeation Rate: 475.99 ng/min
Temperature: 50 C
True Accuracy: +/- 1.17 %
Max Allowed Accuracy: +/- 2.00 %
Certification Method: Gravimetric
Order No: 102022
Customer: WESTON SOLUTIONS, INC.

Approved By: _____

VICI

VICI Metronics, Inc.
26295 Twelve Trees Lane NW
Poulsbo, WA 98370
(360) 697-9199 Fax: (360) 697-6682

CERTIFICATE

The permeation rate of the DYNACAL® PERMEATION DEVICE listed below is certified traceable to N.I.S.T. standards.

Serial Number: 33-35287

Certification Date: Feb 4, 2010
Certificate Expires: Jul 11, 2010
Chemical: Carbon Disulfide
Part Number: 117-025-6300-C50S
Device Type: Dynacal Tube
Length: 2.50
Permeation Rate: 619.67 ng/min
Temperature: 50 C
True Accuracy: +/- 0.69 %
Max Allowed Accuracy: +/- 2.00 %
Certification Method: Gravimetric
Order No: 102022
Customer: WESTON SOLUTIONS, INC.

Approved By: _____

VICI

VICI Metronics, Inc.
26295 Twelve Trees Lane NW
Poulsbo, WA 98370
(360) 697-9199 Fax: (360) 697-6682

INTERFERENCE RESPONSE CHECK
SERVOMEX MODEL 4900 O_2 ANALYZER
29-Nov-01

SPAN (%)	TEST GAS	ANALYZER RESPONSE (%)[1]	% of SPAN
25	O_2 12.43%/CO_2 9.86% CC105016	0.03	0.12
25	SO_2 257.55 ppm CC20694	0.02	0.08
25	CO 474.94 ppm CC104212	0.0	0.00
25	**SUM**	0.05	0.20 METHOD SPECIFICATION 2%

[1] WESTON's O_2/CO_2 calibration gases are a mixed blend. Analyzer response shown to this gas is the absolute difference between the known O_2 value and the analyzer response.

INTERFERENCE RESPONSE CHECK
SERVOMEX MODEL 4900 CO_2 ANALYZER
29-Nov-01

SPAN (%)	TEST GAS	ANALYZER RESPONSE (%)[1]	% of SPAN
25	O_2 21.0%/CO_2 16.7% CC37502	0.16	0.64
25	SO_2 257.55 ppm CC20694	0.03	0.12
25	CO 474.94 ppm CC104212	0.04	0.16
25	**SUM**	0.23	0.92 METHOD SPECIFICATION 2%

[1] WESTON's O_2/CO_2 calibration gases are a mixed blend. Analyzer response shown to this gas is the absolute difference between the known CO_2 value and the analyzer response.

APPENDIX E
LIST OF WESTON PROJECT PARTICIPANTS

LIST OF WESTON PROJECT PARTICIPANTS

The following WESTON employees participated in this project:

Steve Brady Client Service Manager	Integrated Air Services
Brian Benson Certified Industrial Hygienist	Integrated Air Services
Matt Savin Associate Project Scientist	Integrated Air Services
David Van Dyne Associate Project Scientist	Integrated Air Services