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GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT

Case Name: Enterprise South Carlsbad
File Name: C:\Users\jzenker\Trinity Consultants, Inc\Enterprise Products - PROJECT\153201.0159 NSR Sig Rev\06 CALCULATIONS\GlyCalc\South Carlsbad GLYCalc VOC_v0.4.ddf
Date: September 04, 2020

DESCRIPTION:

Description: Updated gas analysis for dehy based on South Carlsbad Max Hourly Rate.pmx - Sweet gas stream received from Ms. Jing Li (EPCO)

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

CONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Hydrogen Sulfide	0.0345	0.828	0.1511
Methane	2.0630	49.511	9.0357
Ethane	4.0149	96.358	17.5854
Propane	8.3661	200.786	36.6434
Isobutane	2.2448	53.875	9.8322
n-Butane	7.0025	168.059	30.6708
Isopentane	1.8013	43.230	7.8895
n-Pentane	2.4410	58.585	10.6918
n-Hexane	0.7973	19.135	3.4922
Cyclohexane	1.5682	37.636	6.8685
Other Hexanes	1.3772	33.052	6.0320
Heptanes	0.8359	20.062	3.6613
Methylcyclohexane	1.1244	26.985	4.9248
Benzene	4.1552	99.724	18.1996
Toluene	2.5872	62.093	11.3319
Xylenes	0.2782	6.677	1.2185
C8+ Heavies	0.0125	0.300	0.0548
Total Emissions	40.7040	976.897	178.2836
Total Hydrocarbon Emissions	40.6695	976.069	178.1325
Total VOC Emissions	34.5916	830.199	151.5114
Total HAP Emissions	7.8179	187.628	34.2422
Total BTEX Emissions	7.0205	168.493	30.7500

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Hydrogen Sulfide	0.0371	0.890	0.1624
Methane	2.0663	49.592	9.0505
Ethane	4.0347	96.832	17.6719
Propane	8.5299	204.717	37.3609
Isobutane	2.3320	55.969	10.2143
n-Butane	7.3974	177.539	32.4008
Isopentane	2.0747	49.793	9.0871
n-Pentane	2.8323	67.976	12.4056
n-Hexane	1.1418	27.403	5.0011
Cyclohexane	2.5465	61.117	11.1538
Other Hexanes	1.8032	43.277	7.8981
Heptanes	1.8748	44.995	8.2115
Methylcyclohexane	2.5316	60.758	11.0883
Benzene	7.2972	175.133	31.9618
Toluene	8.1400	195.361	35.6534
Xylenes	2.5339	60.814	11.0986
C8+ Heavies	5.3119	127.485	23.2660
Total Emissions	62.4854	1499.650	273.6861
Total Hydrocarbon Emissions	62.4483	1498.760	273.5238
Total VOC Emissions	56.3473	1352.336	246.8013
Total HAP Emissions	19.1130	458.711	83.7148
Total BTEX Emissions	17.9712	431.308	78.7138

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Hydrogen Sulfide	0.0036	0.087	0.0158
Methane	19.7893	474.943	86.6771
Ethane	11.4918	275.803	50.3340
Propane	8.9269	214.245	39.0996
Isobutane	1.5885	38.123	6.9575
n-Butane	3.7218	89.323	16.3014
Isopentane	0.9009	21.622	3.9460
n-Pentane	0.9619	23.085	4.2130
n-Hexane	0.2122	5.094	0.9297
Cyclohexane	0.1358	3.260	0.5950
Other Hexanes	0.4529	10.870	1.9837
Heptanes	0.1711	4.107	0.7494
Methylcyclohexane	0.1017	2.442	0.4456
Benzene	0.0380	0.912	0.1664
Toluene	0.0270	0.647	0.1181
Xylenes	0.0030	0.073	0.0133

C8+ Heavies	0.0568	1.362	0.2486
Total Emissions	48.5832	1165.996	212.7943

Total Hydrocarbon Emissions	48.5795	1165.909	212.7784
Total VOC Emissions	17.2985	415.163	75.7673
Total HAP Emissions	0.2802	6.725	1.2274
Total BTEX Emissions	0.0680	1.631	0.2977

EQUIPMENT REPORTS:

CONDENSER

Condenser Outlet Temperature: 110.00 deg. F
Condenser Pressure: 13.10 psia
Condenser Duty: 7.69e-001 MM BTU/hr
Hydrocarbon Recovery: 1.70 bbls/day
Produced Water: 68.54 bbls/day
VOC Control Efficiency: 38.61 %
HAP Control Efficiency: 59.10 %
BTEX Control Efficiency: 60.93 %
Dissolved Hydrocarbons in Water: 643.60 mg/L

Component	Emitted	Condensed
Water	0.17%	99.83%
Carbon Dioxide	97.79%	2.21%
Hydrogen Sulfide	93.07%	6.93%
Nitrogen	99.89%	0.11%
Methane	99.84%	0.16%
Ethane	99.51%	0.49%
Propane	98.08%	1.92%
Isobutane	96.26%	3.74%
n-Butane	94.66%	5.34%
Isopentane	86.82%	13.18%
n-Pentane	86.19%	13.81%
n-Hexane	69.83%	30.17%
Cyclohexane	61.58%	38.42%
Other Hexanes	76.37%	23.63%
Heptanes	44.59%	55.41%
Methylcyclohexane	44.41%	55.59%
Benzene	56.94%	43.06%
Toluene	31.78%	68.22%
Xylenes	10.98%	89.02%
C8+ Heavies	0.24%	99.76%

ABSORBER

Calculated Absorber Stages: 2.05
Specified Dry Gas Dew Point: 7.00 lbs. H2O/MMSCF
Temperature: 120.0 deg. F
Pressure: 750.0 psig
Dry Gas Flow Rate: 200.0000 MMSCF/day
Glycol Losses with Dry Gas: 5.8623 lb/hr
Wet Gas Water Content: Saturated
Calculated Wet Gas Water Content: 126.81 lbs. H2O/MMSCF
Calculated Lean Glycol Recirc. Ratio: 1.20 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	5.51%	94.49%
Carbon Dioxide	99.90%	0.10%
Hydrogen Sulfide	99.46%	0.54%
Nitrogen	99.99%	0.01%
Methane	99.99%	0.01%
Ethane	99.98%	0.02%
Propane	99.96%	0.04%
Isobutane	99.95%	0.05%
n-Butane	99.94%	0.06%
Isopentane	99.94%	0.06%
n-Pentane	99.92%	0.08%
n-Hexane	99.88%	0.12%
Cyclohexane	99.50%	0.50%
Other Hexanes	99.91%	0.09%
Heptanes	99.80%	0.20%
Methylcyclohexane	99.47%	0.53%
Benzene	95.72%	4.28%
Toluene	94.23%	5.77%
Xylenes	89.11%	10.89%
C8+ Heavies	99.16%	0.84%

FLASH TANK

Flash Control: Vented to atmosphere
Flash Temperature: 100.0 deg. F
Flash Pressure: 73.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.99%	0.01%
Carbon Dioxide	61.37%	38.63%
Hydrogen Sulfide	91.11%	8.89%
Nitrogen	8.57%	91.43%
Methane	9.45%	90.55%

Ethane	25.99%	74.01%
Propane	48.86%	51.14%
Isobutane	59.48%	40.52%
n-Butane	66.53%	33.47%
Isopentane	69.87%	30.13%
n-Pentane	74.77%	25.23%
n-Hexane	84.40%	15.60%
Cyclohexane	95.10%	4.90%
Other Hexanes	80.13%	19.87%
Heptanes	91.68%	8.32%
Methylcyclohexane	96.29%	3.71%
Benzene	99.51%	0.49%
Toluene	99.70%	0.30%
Xylenes	99.90%	0.10%
C8+ Heavies	99.07%	0.93%

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	10.11%	89.89%
Carbon Dioxide	0.00%	100.00%
Hydrogen Sulfide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	0.72%	99.28%
n-Pentane	0.67%	99.33%
n-Hexane	0.59%	99.41%
Cyclohexane	3.37%	96.63%
Other Hexanes	1.25%	98.75%
Heptanes	0.55%	99.45%
Methylcyclohexane	4.16%	95.84%
Benzene	5.03%	94.97%
Toluene	7.93%	92.07%
Xylenes	12.99%	87.01%
C8+ Heavies	12.18%	87.82%

STREAM REPORTS:

WET GAS STREAM

Temperature: 120.00 deg. F
Pressure: 764.70 psia
Flow Rate: 8.36e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.67e-001	1.06e+003
Carbon Dioxide	3.18e-001	3.08e+003
Hydrogen Sulfide	9.97e-004	7.49e+000
Nitrogen	1.31e+000	8.08e+003
Methane	8.02e+001	2.83e+005
Ethane	1.04e+001	6.86e+004
Propane	4.63e+000	4.50e+004
Isobutane	6.07e-001	7.77e+003
n-Butane	1.34e+000	1.71e+004
Isopentane	2.98e-001	4.74e+003
n-Pentane	3.03e-001	4.82e+003
n-Hexane	5.98e-002	1.14e+003
Cyclohexane	2.89e-002	5.36e+002
Other Hexanes	1.28e-001	2.42e+003
Heptanes	4.59e-002	1.01e+003
Methylcyclohexane	2.29e-002	4.96e+002
Benzene	9.97e-003	1.72e+002
Toluene	6.98e-003	1.42e+002
Xylenes	9.97e-004	2.33e+001
C8+ Heavies	1.70e-002	6.36e+002
Total Components	100.00	4.50e+005

DRY GAS STREAM

Temperature: 120.00 deg. F
Pressure: 764.70 psia
Flow Rate: 8.33e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.47e-002	5.83e+001
Carbon Dioxide	3.19e-001	3.08e+003
Hydrogen Sulfide	9.95e-004	7.45e+000
Nitrogen	1.31e+000	8.08e+003
Methane	8.05e+001	2.83e+005
Ethane	1.04e+001	6.86e+004

Propane	4.64e+000	4.49e+004
Isobutane	6.09e-001	7.77e+003
n-Butane	1.34e+000	1.71e+004
Isopentane	2.99e-001	4.74e+003
n-Pentane	3.04e-001	4.81e+003
n-Hexane	5.99e-002	1.13e+003
Cyclohexane	2.89e-002	5.33e+002
Other Hexanes	1.28e-001	2.42e+003
Heptanes	4.59e-002	1.01e+003
Methylcyclohexane	2.29e-002	4.93e+002
Benzene	9.57e-003	1.64e+002
Toluene	6.60e-003	1.34e+002
Xylenes	8.91e-004	2.08e+001
C8+ Heavies	1.69e-002	6.31e+002
Total Components	100.00	4.49e+005

LEAN GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.00e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.90e+001	1.11e+004
Water	1.00e+000	1.13e+002
Carbon Dioxide	2.61e-012	2.94e-010
Hydrogen Sulfide	3.61e-014	4.07e-012
Nitrogen	5.97e-013	6.72e-011
Methane	6.52e-018	7.34e-016
Ethane	6.51e-008	7.33e-006
Propane	6.31e-009	7.11e-007
Isobutane	1.04e-009	1.18e-007
n-Butane	2.45e-009	2.76e-007
Isopentane	1.33e-004	1.50e-002
n-Pentane	1.69e-004	1.91e-002
n-Hexane	6.04e-005	6.81e-003
Cyclohexane	7.87e-004	8.87e-002
Other Hexanes	2.02e-004	2.28e-002
Heptanes	9.13e-005	1.03e-002
Methylcyclohexane	9.75e-004	1.10e-001
Benzene	3.43e-003	3.86e-001
Toluene	6.23e-003	7.01e-001
Xylenes	3.36e-003	3.78e-001
C8+ Heavies	6.54e-003	7.36e-001
Total Components	100.00	1.13e+004

RICH GLYCOL STREAM

Temperature: 120.00 deg. F
Pressure: 764.70 psia
Flow Rate: 2.22e+001 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.00e+001	1.11e+004
Water	9.02e+000	1.11e+003
Carbon Dioxide	2.38e-002	2.94e+000
Hydrogen Sulfide	3.29e-004	4.07e-002
Nitrogen	5.40e-003	6.67e-001
Methane	1.77e-001	2.19e+001
Ethane	1.26e-001	1.55e+001
Propane	1.41e-001	1.75e+001
Isobutane	3.17e-002	3.92e+000
n-Butane	9.00e-002	1.11e+001
Isopentane	2.42e-002	2.99e+000
n-Pentane	3.09e-002	3.81e+000
n-Hexane	1.10e-002	1.36e+000
Cyclohexane	2.24e-002	2.77e+000
Other Hexanes	1.84e-002	2.28e+000
Heptanes	1.66e-002	2.06e+000
Methylcyclohexane	2.22e-002	2.74e+000
Benzene	6.25e-002	7.72e+000
Toluene	7.18e-002	8.87e+000
Xylenes	2.36e-002	2.92e+000
C8+ Heavies	4.94e-002	6.11e+000
Total Components	100.00	1.24e+004

FLASH TANK OFF GAS STREAM

Temperature: 100.00 deg. F
Pressure: 87.70 psia
Flow Rate: 7.59e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	2.41e-001	8.69e-002
Carbon Dioxide	1.29e+000	1.13e+000
Hydrogen Sulfide	5.31e-003	3.62e-003
Nitrogen	1.09e+000	6.10e-001
Methane	6.16e+001	1.98e+001

Ethane	1.91e+001	1.15e+001
Propane	1.01e+001	8.93e+000
Isobutane	1.37e+000	1.59e+000
n-Butane	3.20e+000	3.72e+000
Isopentane	6.24e-001	9.01e-001
n-Pentane	6.66e-001	9.62e-001
n-Hexane	1.23e-001	2.12e-001
Cyclohexane	8.07e-002	1.36e-001
Other Hexanes	2.63e-001	4.53e-001
Heptanes	8.53e-002	1.71e-001
Methylcyclohexane	5.18e-002	1.02e-001
Benzene	2.43e-002	3.80e-002
Toluene	1.46e-002	2.70e-002
Xylenes	1.43e-003	3.03e-003
C8+ Heavies	1.66e-002	5.68e-002
Total Components	100.00	5.04e+001

FLASH TANK GLYCOL STREAM

Temperature: 100.00 deg. F
Flow Rate: 2.21e+001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.04e+001	1.11e+004
Water	9.05e+000	1.11e+003
Carbon Dioxide	1.46e-002	1.80e+000
Hydrogen Sulfide	3.01e-004	3.71e-002
Nitrogen	4.65e-004	5.72e-002
Methane	1.68e-002	2.07e+000
Ethane	3.28e-002	4.03e+000
Propane	6.93e-002	8.53e+000
Isobutane	1.90e-002	2.33e+000
n-Butane	6.01e-002	7.40e+000
Isopentane	1.70e-002	2.09e+000
n-Pentane	2.32e-002	2.85e+000
n-Hexane	9.33e-003	1.15e+000
Cyclohexane	2.14e-002	2.64e+000
Other Hexanes	1.48e-002	1.83e+000
Heptanes	1.53e-002	1.89e+000
Methylcyclohexane	2.15e-002	2.64e+000
Benzene	6.24e-002	7.68e+000
Toluene	7.19e-002	8.84e+000
Xylenes	2.37e-002	2.91e+000
C8+ Heavies	4.92e-002	6.05e+000
Total Components	100.00	1.23e+004

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 2.15e+004 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.81e+001	1.00e+003
Carbon Dioxide	7.22e-002	1.80e+000
Hydrogen Sulfide	1.92e-003	3.71e-002
Nitrogen	3.60e-003	5.72e-002
Methane	2.27e-001	2.07e+000
Ethane	2.37e-001	4.03e+000
Propane	3.41e-001	8.53e+000
Isobutane	7.08e-002	2.33e+000
n-Butane	2.25e-001	7.40e+000
Isopentane	5.07e-002	2.07e+000
n-Pentane	6.93e-002	2.83e+000
n-Hexane	2.34e-002	1.14e+000
Cyclohexane	5.34e-002	2.55e+000
Other Hexanes	3.69e-002	1.80e+000
Heptanes	3.30e-002	1.87e+000
Methylcyclohexane	4.55e-002	2.53e+000
Benzene	1.65e-001	7.30e+000
Toluene	1.56e-001	8.14e+000
Xylenes	4.21e-002	2.53e+000
C8+ Heavies	5.50e-002	5.31e+000
Total Components	100.00	1.07e+003

CONDENSER VENT GAS STREAM

Temperature: 110.00 deg. F
Pressure: 13.10 psia
Flow Rate: 3.62e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.80e+000	1.68e+000
Carbon Dioxide	4.20e+000	1.76e+000
Hydrogen Sulfide	1.06e-001	3.45e-002
Nitrogen	2.14e-001	5.72e-002
Methane	1.35e+001	2.06e+000
Ethane	1.40e+001	4.01e+000
Propane	1.99e+001	8.37e+000

Isobutane	4.05e+000	2.24e+000
n-Butane	1.26e+001	7.00e+000
Isopentane	2.62e+000	1.80e+000
n-Pentane	3.55e+000	2.44e+000
n-Hexane	9.70e-001	7.97e-001
Cyclohexane	1.95e+000	1.57e+000
Other Hexanes	1.68e+000	1.38e+000
Heptanes	8.74e-001	8.36e-001
Methylcyclohexane	1.20e+000	1.12e+000
Benzene	5.58e+000	4.16e+000
Toluene	2.94e+000	2.59e+000
Xylenes	2.75e-001	2.78e-001
C8+ Heavies	7.70e-003	1.25e-002
Total Components	100.00	4.42e+001

CONDENSER PRODUCED WATER STREAM

Temperature: 110.00 deg. F
Flow Rate: 2.00e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)	(ppm)
Water	9.99e+001	1.00e+003	999318.
Carbon Dioxide	3.65e-003	3.65e-002	37.
Hydrogen Sulfide	2.31e-004	2.31e-003	2.
Nitrogen	2.89e-006	2.89e-005	0.
Methane	2.06e-004	2.06e-003	2.
Ethane	4.67e-004	4.68e-003	5.
Propane	9.27e-004	9.27e-003	9.
Isobutane	1.37e-004	1.37e-003	1.
n-Butane	5.74e-004	5.74e-003	6.
Isopentane	1.06e-004	1.06e-003	1.
n-Pentane	1.55e-004	1.55e-003	2.
n-Hexane	4.27e-005	4.27e-004	0.
Cyclohexane	4.90e-004	4.91e-003	5.
Other Hexanes	5.90e-005	5.90e-004	1.
Heptanes	2.51e-005	2.51e-004	0.
Methylcyclohexane	1.69e-004	1.69e-003	2.
Benzene	3.86e-002	3.86e-001	386.
Toluene	2.01e-002	2.01e-001	201.
Xylenes	2.32e-003	2.32e-002	23.
C8+ Heavies	2.31e-007	2.31e-006	0.
Total Components	100.00	1.00e+003	1000000.

CONDENSER RECOVERED OIL STREAM

Temperature: 110.00 deg. F
Flow Rate: 4.97e-002 gpm

Component	Conc. (wt%)	Loading (lb/hr)
Water	3.79e-002	8.02e-003
Carbon Dioxide	1.52e-002	3.22e-003
Hydrogen Sulfide	1.20e-003	2.55e-004
Nitrogen	1.70e-004	3.59e-005
Methane	6.22e-003	1.32e-003
Ethane	7.13e-002	1.51e-002
Propane	7.31e-001	1.55e-001
Isobutane	4.06e-001	8.59e-002
n-Butane	1.84e+000	3.89e-001
Isopentane	1.29e+000	2.72e-001
n-Pentane	1.84e+000	3.90e-001
n-Hexane	1.63e+000	3.44e-001
Cyclohexane	4.60e+000	9.73e-001
Other Hexanes	2.01e+000	4.25e-001
Heptanes	4.91e+000	1.04e+000
Methylcyclohexane	6.65e+000	1.41e+000
Benzene	1.30e+001	2.76e+000
Toluene	2.53e+001	5.35e+000
Xylenes	1.06e+001	2.23e+000
C8+ Heavies	2.51e+001	5.30e+000
Total Components	100.00	2.11e+001

Section 7

Subsection 2 – Information Used to Determine Emissions from Previous 2020 Application Submission

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For clarity, this Subsection 2 contains supplemental information used to calculate emissions for the existing permit (i.e. Units other than 6, 7, 8, 9, 10, T-007, and LOAD_SLOP). For pertinent information used for the calculations associated with current project modifications, please refer to Section 7 Subsection 1.

GRI-HAPCalc ® 3.01
Truck Loading Report

Facility ID:	**SOUTH CARLSBAD**	**Notes:**
Operation Type:	**COMPRESSOR STATION**	
Facility Name:	**SOUTH CARLSBAD**	
User Name:		
Units of Measure:	**U.S. STANDARD**	

Note: Emissions less than 5.00E-09 tons (or tonnes) per year are considered insignificant and are treated as zero. These emissions are indicated on the report with a "0". Emissions between 5.00E-09 and 5.00E-05 tons (or tonnes) per year are represented on the report with "0.0000".

Truck Loading Unit

Unit Name: LOAD

Annual Throughput:	69,350.00 bbl/yr	**Control Efficiency:**	0.00 %
Ambient Temperature:	74.00 °F		
Loading Factor:	0		

Type of Loading: 0.6 - Submerged loading, dedicated service

Is Truck Required to Pass Annual Inspection?: NO

Are Vapors Routed to Control Device?: NO

User Concentration Inputs

Chemical Name	Feed Wt %
Ethane	0.0000
Propane	0.0000
Butane	3.7430
Pentane	32.4470
C6+	63.8100
n-Hexane	8.7170
Benzene	1.5710
Toluene	1.7570
Ethylbenzene	0.2380
Xylenes(m,p,o)	0.5100
2,2,4-Trimethylpentane	0.0000

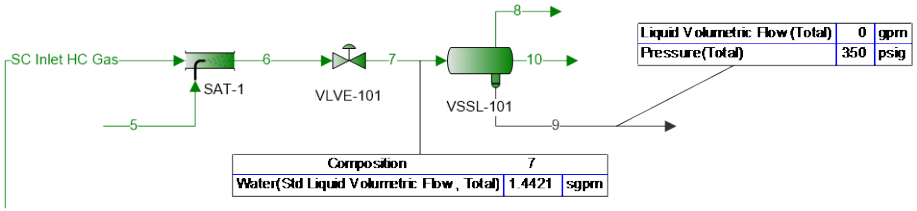
Calculated Emissions (ton/yr)

Chemical Name	Emissions
HAPs	
Benzene	0.0433
Toluene	0.0144
Ethylbenzene	0.0007
Xylenes(m,p,o)	0.0012
n-Hexane	0.3880
Total	0.4476
Criteria Pollutants	
NMHC	9.8020
NMEHC	9.8020

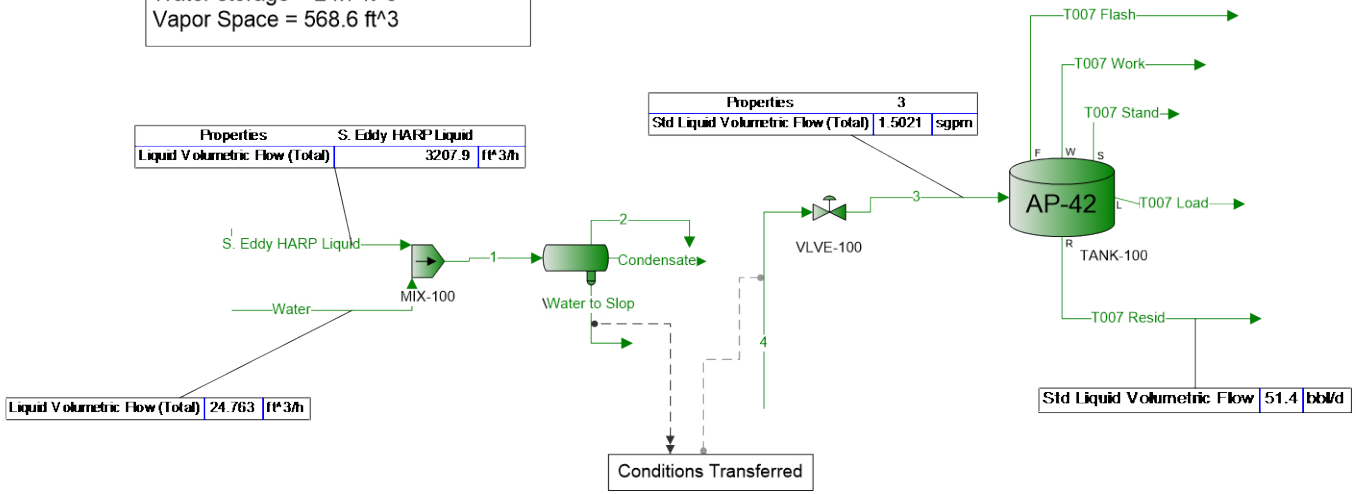
Other Pollutants

Butane	2.0418
Pentane	4.9199
C6+	2.8402

Flash Emissions for T007

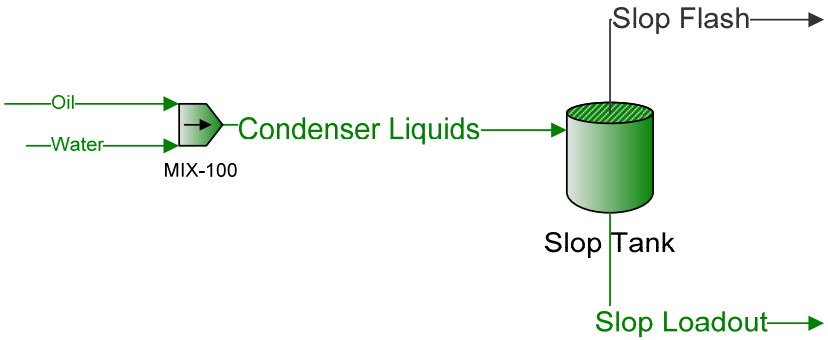


Per slug catcher vessel:
Liquid condensate hold up = 3200 ft^3
Water storage = 24.7 ft^3
Vapor Space = 568.6 ft^3



Process Streams		T007 Flash	T007 Load	T007 Resid	T007 Stand	T007 Work
Composition	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	**From Block:**	TANK-100	TANK-100	TANK-100	TANK-100	TANK-100
	To Block:	--	--	--	--	--
Mass Flow		lb/h	lb/h		lb/h	lb/h
CO2		0.133378	0.00189041		0.00119717	0.00373511
N2		0.00253144	5.20004E-07		3.29312E-07	1.02744E-06
Methane		0.234813	0.000134200		8.49873E-05	0.000265156
Ethane		0.140636	9.19687E-05		5.82427E-05	0.000181714
Propane		0.0718049	8.00178E-06		5.06744E-06	1.58101E-05
i-Butane		0.00714517	1.91629E-07		1.21357E-07	3.78626E-07
n-Butane		0.0203610	4.96324E-07		3.14316E-07	9.80649E-07
2,2-Dimethylpropane		3.41758E-05	2.76260E-10		1.74953E-10	5.45842E-10
i-Pentane		0.00295933	1.89223E-08		1.19833E-08	3.73871E-08
n-Pentane		0.00122503	2.37697E-09		1.50531E-09	4.69648E-09
2,2-Dimethylbutane		9.32821E-06	1.07660E-11		6.81797E-12	2.12717E-11
Cyclopentane		0	0		0	0
2,3-Dimethylbutane		0.000129139	2.78977E-10		1.76673E-10	5.51210E-10
2-Methylpentane		0.000230393	2.45186E-10		1.55274E-10	4.84445E-10
3-Methylpentane		0.000273982	6.25413E-10		3.96067E-10	1.23571E-09
n-Hexane		0.000174999	6.59635E-11		4.17739E-11	1.30332E-10
Methylcyclopentane		0.000218516	6.08282E-10		3.85218E-10	1.20186E-09
Benzene		0.0132306	2.13091E-06		1.34948E-06	4.21031E-06
Cyclohexane		0.000339756	1.53830E-09		9.74191E-10	3.03942E-09
2-Methylhexane		1.68889E-05	3.60261E-12		2.28149E-12	7.11813E-12
3-Methylhexane		0	0		0	0
2,2,4-Trimethylpentane		2.55548E-05	3.43200E-12		2.17345E-12	6.78104E-12
n-Heptane		3.56897E-05	2.86606E-12		1.81504E-12	5.66283E-12
Methylcyclohexane		8.79239E-05	7.94464E-11		5.03125E-11	1.56972E-10
Toluene		0.00376847	1.33734E-07		8.46922E-08	2.64235E-07
n-Octane		9.08574E-07	8.57030E-15		5.42748E-15	1.69334E-14
Ethylbenzene		0.000124212	1.26097E-09		7.98555E-10	2.49145E-09
m-Xylene		2.28563E-05	1.33288E-10		8.44099E-11	2.63354E-10
o-Xylene		0.000421244	4.38913E-09		2.77959E-09	8.67215E-09
n-Nonane		1.27632E-07	3.12644E-16		1.97994E-16	6.17729E-16
n-Decane		3.44277E-09	6.94417E-19		4.39766E-19	1.37205E-18
Undecane		8.55938E-11	6.20916E-21		3.93219E-21	1.22682E-20
Dodecane		2.66972E-11	1.98251E-21		1.25550E-21	3.91709E-21
Water		0.0179314	3.95852E-05		2.50689E-05	7.82135E-05

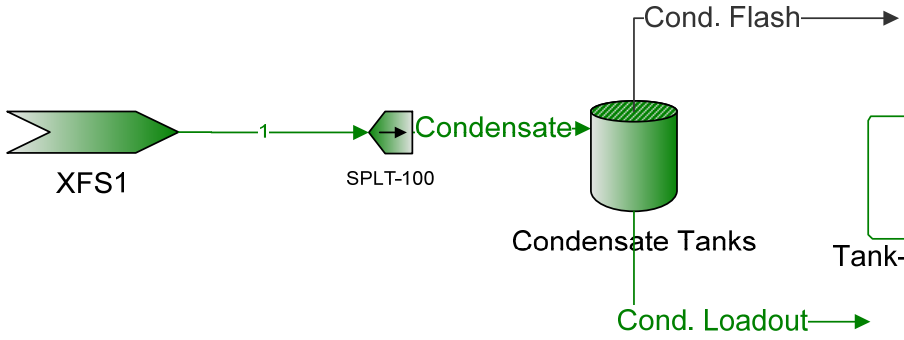
Process Streams		T007 Flash	T007 Load	T007 Resid	T007 Stand	T007 Work
Properties	**Status:**	Solved	Solved	Solved	Solved	Solved
Phase: Vapor	**From Block:**	TANK-100	TANK-100	TANK-100	TANK-100	TANK-100
	To Block:	--	--	--	--	--
Property	**Units**					
Temperature	°F	79.2053	79.2053		79.2053	79.2053
Pressure	psig	-1.81595	-1.81595		-1.81595	-1.81595
Mole Fraction Vapor	%	100	100		100	100
Mole Fraction Light Liquid	%	0	0		0	0
Mole Fraction Heavy Liquid	%	0	0		0	0
Phase Mole Fraction	%	100	13.4249		13.4249	13.4249
Molecular Weight	lb/lbmol	25.2452	38.1519		38.1519	38.1519
Mass Density	lb/ft^3	0.0564449	0.0853451		0.0853451	0.0853451
Molar Flow	lbmol/h	0.0258240	5.68167E-05		3.59814E-05	0.000112260
Mass Flow	lb/h	0.651930	0.00216766		0.00137276	0.00428293
Vapor Volumetric Flow	ft^3/h	11.5499	0.0253988		0.0160848	0.0501836
Liquid Volumetric Flow	gpm	1.43998	0.00316661		0.00200538	0.00625666
Std Vapor Volumetric Flow	MMSCFD	0.000235195	5.17465E-07		3.27704E-07	1.02242E-06
Std Liquid Volumetric Flow	sgpm	0.00315865	6.15482E-06		3.89778E-06	1.21609E-05
Compressibility		0.996134	0.995639		0.995639	0.995639
Specific Gravity		0.871650	1.31729		1.31729	1.31729
API Gravity						
Enthalpy	Btu/h	-1351.68	-7.88170		-4.99139	-15.5729
Mass Enthalpy	Btu/lb	-2073.34	-3636.03		-3636.03	-3636.03
Mass Cp	Btu/(lb*°F)	0.409161	0.237816		0.237816	0.237816
Ideal Gas CpCv Ratio		1.23906	1.28190		1.28190	1.28190
Dynamic Viscosity	cP	0.0111200	0.0143701		0.0143701	0.0143701
Kinematic Viscosity	cSt	12.2987	10.5114		10.5114	10.5114
Thermal Conductivity	Btu/(h*ft*°F)	0.0156055	0.0112447		0.0112447	0.0112447
Surface Tension	lbf/ft					
Net Ideal Gas Heating Value	Btu/ft^3	1052.52	230.930		230.930	230.930
Net Liquid Heating Value	Btu/lb	15713.4	2205.07		2205.07	2205.07
Gross Ideal Gas Heating Value	Btu/ft^3	1158.34	256.574		256.574	256.574
Gross Liquid Heating Value	Btu/lb	17304.5	2460.23		2460.23	2460.23



Annual tank loss calculations for "Condenser Liquids".
Total working and breathing losses are 0.04217 ton/yr.
* Only Non-Exempt VOCs are reported.

Slop W
Slop B

Tank-1



Annual tank loss calculations for "Condensate".
Total working and breathing losses are 18.85 ton/yr.
* Only Non-Exempt VOCs are reported.

Cond. W
Cond. B

Tank-2

Process Streams		Cond. B	Cond. W	Slop B	Slop W
Composition	**Status:**	Solved	Solved	Solved	Solved
Phase: **Vapor**	**From Block:**	--	--	--	--
	To Block:	--	--	--	--
Mass Flow		lb/h	lb/h	lb/h	lb/h
Hydrogen Sulfide		0	0	4.32823E-06	7.50437E-06
Nitrogen		0	0	1.45663E-06	2.52553E-06
Carbon Dioxide		1.00768E-11	1.05720E-11	0.000269307	##########
Methane		9.12786E-14	9.57649E-14	6.86483E-05	##########
Ethane		6.65034E-08	6.97720E-08	0.000540975	##########
Propane		0.000359202	0.000376857	0.00128489	0.00222776
i-Butane		0.0259811	0.0272581	0.000250330	##########
n-Butane		0.633070	0.664185	0.000768312	0.00133212
2,2-Dimethylpropane		0.0126623	0.0132846	0	0
i-Pentane		0.555451	0.582751	0.000203363	##########
n-Pentane		0.502932	0.527651	0.000214339	##########
2,2-Dimethylbutane		0.00490454	0.00514560	0	0
Cyclopentane		0	0	0	0
2,3-Dimethylbutane		0.0347401	0.0364476	0	0
2-Methylpentane		0.0803877	0.0843388	0	0
3-Methylpentane		0.0424292	0.0445146	0	0
n-Hexane		0.0745977	0.0782642	5.48424E-05	9.50869E-05
Methylcyclopentane		0.0344499	0.0361431	0	0
Benzene		0.00956336	0.0100334	0.000278791	##########
Cyclohexane		0.0236908	0.0248552	0.000108338	##########
2-Methylhexane		0.00616311	0.00646602	0	0
3-Methylhexane		0.00693466	0.00727549	0	0
2,2,4-Trimethylpentane		0	0	0	0
n-Heptane		0.0262616	0.0275524	4.86815E-05	8.44051E-05
Methylcyclohexane		0.0144051	0.0151132	6.72898E-05	##########
Toluene		0.00343216	0.00360085	0.000155995	##########
n-Octane		0.00693883	0.00727987	6.84443E-05	##########
Ethylbenzene		0.000160399	0.000168282	8.96892E-09	1.55505E-08
m-Xylene		0.000148515	0.000155815	1.85508E-05	3.21638E-05
p-Xylene		0.000154914	0.000162528	0	0
o-Xylene		0	0	0	0
n-Nonane		0.000646073	0.000677827	0	0
n-Decane		0	0	0	0
n-Undecane		0	0	0	0
C12		0	0	0	0
C13		0	0	0	0
C14		0	0	0	0
C15		0	0	0	0
C16		0	0	0	0
C17		0	0	0	0
C18		0	0	0	0
C19		0	0	0	0
C20		0	0	0	0
C21		0	0	0	0
C22		0	0	0	0
C23		0	0	0	0
C24		0	0	0	0
C25		0	0	0	0
C26		0	0	0	0
C27		0	0	0	0

C28	0	0	0	0
C29	0	0	0	0
C30	0	0	0	0
C36	0	0	0	0
Water	1.48038E-17	1.55314E-17	0.00389268	0.00674921
Triethylene Glycol	2.07380E-10	2.17572E-10	0	0
Diethanolamine	0	0	0	0
MDEA	0	0	0	0
Piperazine	0	0	0	0
2,2-Dimethylpentane	0	0	0	0
3-Ethylpentane	0	0	0	0
2-Methylheptane	0	0	0	0
4-Methylheptane	0	0	0	0
3-Methylheptane	0	0	0	0
Isobutylbenzene	0	0	0	0
2,4-Dimethylpentane	0	0	0	0
3,3-Dimethylpentane	0	0	0	0
2,3-Dimethylpentane	0	0	0	0
t-Butylbenzene	0	0	0	0

Process Streams		**Cond. B**	**Cond. W**	**Slop B**	**Slop W**
Properties	**Status:**	**Solved**	**Solved**	**Solved**	**Solved**
Phase: **Vapor**	**From Block:**	--	--	--	--
	To Block:	--	--	--	--
Property	**Units**				
Temperature	°F	82.6768	82.6768	82.6768	82.6768
Pressure	psia	9.86191	9.86191	0.784738	0.784738
Mole Fraction Vapor	%	100	100	100	100
Mole Fraction Light Liquid	%	0	0	0	0
Mole Fraction Heavy Liquid	%	0	0	0	0
Molecular Weight	lb/lbmol	69.0869	69.0869	27.1024	27.1024
Mass Density	lb/ft^3	0.120027	0.120027	0.00365654	0.00365654
Molar Flow	lbmol/h	0.0304032	0.0318976	0.000306230	##########
Mass Flow	lb/h	2.10046	2.20370	0.00829957	0.0143900
Vapor Volumetric Flow	ft^3/h	17.4999	18.3600	2.26979	3.93541
Liquid Volumetric Flow	gpm	2.18180	2.28904	0.282987	0.490649
Std Vapor Volumetric Flow	MMSCFD	0.000276901	0.000290511	2.78903E-06	4.83568E-06
Std Liquid Volumetric Flow	sgpm	0.00674299	0.00707441	2.38411E-05	4.13362E-05
Compressibility		0.975295	0.975295	0.999360	0.999360
Specific Gravity		2.38539	2.38539	0.935775	0.935775
API Gravity					
Enthalpy	Btu/h	-1853.82	-1944.94	-27.0068	-46.8250
Mass Enthalpy	Btu/lb	-882.579	-882.579	-3254.00	-3254.00
Mass Cp	Btu/(lb*°F)	0.400500	0.400500	0.410859	0.410859
Ideal Gas CpCv Ratio		1.07792	1.07792	1.21716	1.21716
Dynamic Viscosity	cP	0.00720860	0.00720860	0.0101239	0.0101239
Kinematic Viscosity	cSt	3.74930	3.74930	172.845	172.845
Thermal Conductivity	Btu/(h*ft*°F)	0.00875926	0.00875926	0.0107721	0.0107721
Surface Tension	lbf/ft				
Net Ideal Gas Heating Value	Btu/ft^3	3546.63	3546.63	695.842	695.842
Net Liquid Heating Value	Btu/lb	19331.5	19331.5	9165.06	9165.06
Gross Ideal Gas Heating Value	Btu/ft^3	3835.28	3835.28	788.181	788.181
Gross Liquid Heating Value	Btu/lb	20917.6	20917.6	10458.2	10458.2


SpiralX

1 | INTRODUCTION

SpiralX LLC offers 30” or 48” enclosed combustors as an efficient method of destroying BTEX. They are designed for the destruction of volatile organic compounds (VOCs) at rates greater than 95%, and compliant with regulations governing upstream oil and gas facilities (40 CFR 60, Subpart OOOOa) and gas dehydration facilities (40 CFR 63, Subparts HH and HHH). They can be built on-skid with the condenser as a single unit, or separately on an independent skid. All our combustion units use a Profire™ Burner Management System for the most reliable and efficient means of monitoring the pilot flame, and various accessories allow the combustor to thrive in almost any weather condition. Please look over the many types of units and accessories available within this catalog to see which combustor assembly is right for you. Please call us at 469-480-8802 for any questions you may have.

1.1 | Competitive Advantage

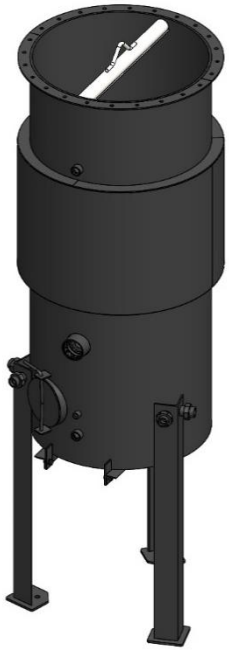
SpiralX has modified product design per customer feedback and includes:

- Stainless steel burner grids for increased product life (2-3 years). Shown to outlast standard carbon steel and ceramic burner grids.
- Lifting supports located at the top of the combustor for easier handling during transport and a top ring bracket for adding optional accessories such as rain/snow caps and body extensions.
- Dual burner grid option for burning exhaust from two different sources.
- Precision laser cutting for more precise and consistent designs.

2 | SIZING

SpiralX LLC combustors are made from A36 structural steel and come in 30” or 48” diameter bodies, depending on the amount of BTEX destruction required. These bodies are surrounded by a steel grate to protect objects from coming is direct contact with the combustion section during operation. The two sizes are listed below with their respective dimensions. Note that the on-site dimensions can change depending on the type of skid utilized for the combustor.

2.1 | 30” Combustor



HEIGHT: 106.00”

WEIGHT: 1300 LBS.

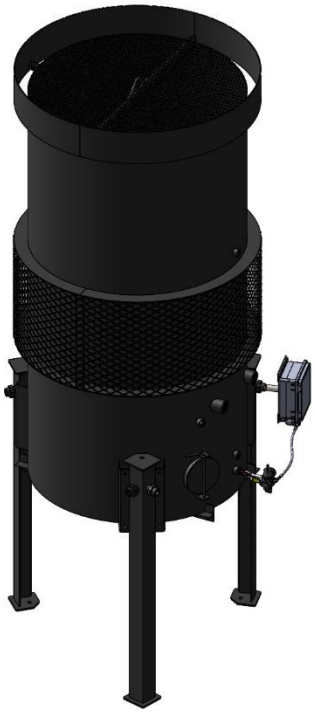
DIAMETER: 34.16” with grate. 37.86” max with legs.

2.2 | 48” Combustor

HEIGHT: 143.88”

WEIGHT: 1900 LBS.

DIAMETER: 54” with grate. 63.67” max with legs.



APPENDIX

Summary of Results
Quality Assurance/Quality Control Summary
Example Calculations
Calibration Certifications
Data Logger Files

Summary of Results

Company: Enterprise Products Operating
Location: South Carlsbad Compressor Station
Source: Solar Centaur 40 S/N: 30010096
Engine Rating: 4500hp @ 15000RPM
Technician: RAT

Test Run Number	**1**	**2**	**3**	
Unit	**2**	**2**	**2**	
Date	4/20/2010	4/20/2010	4/20/2010	
Start Time	16:12	16:36	17:02	
Stop Time	16:32	16:56	17:22	
Unit Operational Data				
Engine Speed (rpm)	15000	15000	15000	
Unit Horse Power (Hp)*	4320	4320	4320	
NPT Load (%)	90.0	90.0	90.0	
NGP Load (%)	96.0	96.0	96.0	
Compressor Suction Pressure (psig)	258	258	258	
Compressor Discharge Pressure (psig)	446	446	446	
Compressor Suction Temperature (°F)	69	69	69	
Compressor Discharge Pressure (°F)	408	408	408	
T1 Temperature (°F)	95	95	95	
T5 Temperature (°F)	1155	1155	1155	
Lube Oil Pressure (psig)	46.0	46.0	46.0	
Fuel ΔP (psid)	9.0	9.0	9.0	
PCD (psig)	95.0	95.0	95.0	
Fuel Data				
Calculated Fuel Consumption (SCFH)	34000	34000	34000	
O2 F-Factor (DSCF/MMBtu, HHV basis)	8710	8710	8710	
Fuel Heating Value (Btu/SCF, HHV basis)	1093	1093	1093	
BHp Specific Fuel Rate (Btu/Hp-hr, HHV basis)	8602	8602	8602	
BHp Specific Fuel Rate (Btu/Hp-hr, LHV basis)	7750	7750	7750	
Ambient Conditions				
Pressure Altitude (MSL)	3230	3230	3230	
Atmospheric Pressure ("Hg)	26.62	26.62	26.62	
Dry Bulb Temperature (°F)	63	65	68	
Wet Bulb Temperature (°F)	55	54	52	
Humidity (lb/lb air)	0.0084	0.0073	0.0055	
Measured Exhaust Emissions (Corrected)				**Average**
O_2 (% Vol)	16.86	16.88	16.95	**16.90**
NOx (ppmv)	73.59	74.50	75.46	**74.52**
CO (ppmv)	8.30	8.11	8.06	**8.2**
Exhaust Flow Rate (DSCFH)				
Dry SCFH (dry basis, calc. from Hp/BSFR/HHV)	1.67E+06	1.68E+06	1.71E+06	**1689983.01**
Calculated Mass Emission Rates (Based on btu Specific Fuel Rate BSFR)				
NOx (lbs/hr) {Permit Limit = 27}	14.7	14.9	15.4	**15.00**
CO (lbs/hr) {Permit Limit = 7.4}	1.0	0.9	1.0	**0.97**

*Based on gas producer speed.

Quality Assurance

Method 7E Non-Dilution Measurement System Performance Test Procedures
Method 7E Calculated Emission Gas Concentration

Project No.: 0023
Technician: RAT

Date: 04/20/10
Client: Enterprise Products Operating
Location: South Carlsbad Compressor Station

Calibration Gas Certified Values							Gas Selection, % of Span	
	Span	Low Gas	Mid Gas	High Gas	Analyzer	Analyzer Serial Number	Low (<20%)	Mid (40%-60%)
O_2 (% Vol)	20.96	0.00	11.97	20.96	AII GPR-29	001666832	0.0%	57.1%
NOx (ppmv)	98.18	0.00	50.51	98.18	TECO 42C	030400000000842	0.0%	51.4%
CO (ppmv)	100.60	0.00	50.05	100.60	TECO 48C	48C-67940-359	0.0%	49.8%

Initial Linearity Data

Calibration Error	Analyzer Calibration Response			Absolute Difference			Difference (% of Span)		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
O_2 (% Vol)	0.20	12.03	20.90	0.20	0.06	0.06	0.95%	0.29%	0.29%
NOx (ppmv)	0.00	49.50	98.60	0.00	1.01	0.42	0.00%	1.03%	0.43%
CO (ppmv)	0.00	50.50	100.81	0.00	0.45	0.21	0.00%	0.45%	0.21%

Run Number 1 Start: 16:12 End: 16:32

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.96	0.20	20.90	0.20	20.90	0.00%	0.00%	0.20	20.90	0.00%	0.00%	0.00%	0.00%	16.85	16.86 O_2 (% Vol)
NOx (ppmv)	50.51	0.00	49.50	0.00	50.73	0.00%	1.25%	0.00	50.65	0.00%	1.17%	0.00%	-0.08%	73.85	73.59 NOx (ppmv)
CO (ppmv)	50.05	0.00	50.50	0.00	49.98	0.00%	-0.52%	0.00	49.10	0.00%	-1.39%	0.00%	-0.87%	8.22	8.30 CO (ppmv)

Run Number 2 Start: 16:36 End: 16:56

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.96	0.20	20.90	0.20	20.90	0.00%	0.00%	0.20	20.90	0.00%	0.00%	0.00%	0.00%	16.87	16.88 O_2 (% Vol)
NOx (ppmv)	50.51	0.00	49.50	0.00	50.73	0.00%	1.25%	0.00	50.65	0.00%	1.17%	0.00%	-0.08%	74.77	74.50 NOx (ppmv)
CO (ppmv)	50.05	0.00	50.50	0.00	49.98	0.00%	-0.52%	0.00	49.10	0.00%	-1.39%	0.00%	-0.87%	8.03	8.11 CO (ppmv)

Run Number 3 Start: 17:02 End: 17:22

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.96	0.20	20.90	0.20	20.90	0.00%	0.00%	0.20	20.90	0.00%	0.00%	0.00%	0.00%	16.94	16.95 O_2 (% Vol)
NOx (ppmv)	50.51	0.00	49.50	0.00	50.73	0.00%	1.25%	0.00	50.65	0.00%	1.17%	0.00%	-0.08%	75.73	75.46 NOx (ppmv)
CO (ppmv)	50.05	0.00	50.50	0.00	49.98	0.00%	-0.52%	0.00	49.10	0.00%	-1.39%	0.00%	-0.87%	7.98	8.06 CO (ppmv)

Example Calculations

Drift Corrected Emission Concentrations

Formula

$$C_{GAS} = (Ç - Co) \times \frac{C_{MA}}{C_M - C_O} \quad \textit{(eq.7e-5)}$$

All Calculations Refer to Test Run 1 or an Average of Runs 1-3

$Ç_{NOx}$ =	Raw Concentration of NOx	= 73.85 ppmv	
C_O =	Avg. of Initial and Final Zero Checks	= 0.00 ppmv	
C_M =	Avg. of Initial and Final Span Checks	= 50.69 ppmv	
C_{MA} =	Certified Concentration of Span Gas	= 50.51 ppmv	
C_{NOx} =	**(73.85 - 0) x 50.51 / (50.7 - 0)**	**= 73.59 ppmv**	
$Ç_{CO}$ =	Raw Concentration of CO	= 8.22 ppmv	
C_O =	Avg. of Initial and Final Zero Checks	= 0.00 ppmv	
C_M =	Avg. of Initial and Final Span Checks	= 49.54 ppmv	
C_{MA} =	Certified Concentration of Span Gas	= 50.05 ppmv	
C_{CO} =	**(8.22 + 0) x 50.05 / (49.5 + 0)**	**= 8.30 ppmv**	
$Ç_{O2}$ =	Raw Concentration of O2	= 16.85%	
C_O =	Avg. of initial and final zero bias checks	= 0.20%	
C_M =	Avg. of initial and final span bias checks	= 20.90%	
C_{MA} =	Actual concentration of span gas	= 20.96%	
C_{O2} =	**(16.85 - 0.2) x 20.96 / (20.9 - 0.2)**	**= 16.86%**	

Example Calculations

Exhaust Calculations

Measured Data and Constants

C_{NOx} =	Corrected Concentration of NOx	=	73.59	ppmv
C_{CO} =	Corrected Concentration of CO	=	8.30	ppmv
Horsepower =	Observed Horsepower	=	4320	Hp
lb / mole =	EPA STP for Ideal Gas	=	385.15	SCF
lbs / hr to tpy =	Mass Conversion Factor	=	4.38	hrs-tons / lbs-yr
C_F =	PPMV Normalization	=	1 x e-6	1 / ppmv
MW_{NOx} =	Molecular Weight of NOx	=	46	lb / lb-mol
MW_{CO} =	Molecular Weight of CO	=	28	lb / lb-mol

S tack Gas Flow Rate via btu Specific Fuel Rate (BSFR)

Hp =	Engine Horsepower	=	4320	Hp
F_{BTU} =	btu Specific Fuel Rate	=	8602	Btu/Hp-Hr
F_{O2} =	O2 F-Factor	=	8710	DSCF/MMBtu
C_{O2} =	Measured Concentration of O2	=	16.86	%

$$Q_{S\ M19} = Hp \times F_{BTU} \times F_{O2} \times 10\text{^}6 \times \frac{20.9}{(20.9 - \%O2)}$$ DSCF/H

$$Q_{S\ M19} = 4320.00 \times 8602 \times 8710 \times \frac{20.9}{(20.9 - 16.86)} \times 1E\text{-}06$$

$Q_{S\ M19}$ = 1.67E+06 DSCF/H

Formulas

Pounds per Hour (lbs/hr) :

$$E_x\ (lb/hr) = C_x * C_F * Qs * \{ MW_x / (lb / mole) \}$$

Tons per Year (tpy) :

$$E_x\ (tpy) = E_x\ (lb/hr) * \{ 8760\ (hr / yr) / 2000\ (lb / ton) \}$$

Grams per Horsepower-hour (g/Hp-hr) :

$$E_x\ (g/hp\text{-}hr) = \{ E_x\ (lb/hr) / Hp \} / 454\ (g / lb) \}$$

Calculated Mass Emission Rates From Method 19 Exhaust Flow Rates

E_{NOx}

$$\textbf{lbs/hr} = 73.59 * 1 \text{ x e-6} * 1.67E+06 * \frac{46}{385.15} = \textbf{14.72}$$

$$\textbf{tpy} = 14.72\ lb/hr * 4.38 \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{64.46}$$

$$\textbf{g/Hp-hr} = \frac{14.72\ lb/hr}{4320\ Hp} * \frac{454\ g}{1\ lb} = \textbf{1.55}$$

E_{CO}

$$\textbf{lbs/hr} = 8.30 * 1 \text{ x e-6} * 1.67E+06 * \frac{28}{385.15} = \textbf{1.01}$$

$$\textbf{tpy} = 1.01\ lb/hr * 4.38 \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{4.43}$$

$$\textbf{g/Hp-hr} = \frac{1.01\ lb/hr}{4320\ Hp} * \frac{454\ g}{1\ lb} = \textbf{0.11}$$

Airgas

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900
FAX : 225.388.0959
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI74E15A338	Reference Number:	83-124220680-1
Cylinder Number:	CC59336	Cylinder Volume:	149 Cu.Ft.
Laboratory:	ASG - Port Allen - LA	Cylinder Pressure:	2015 PSIG
Analysis Date:	May 25, 2010	Valve Outlet:	590

Expiration Date: May 25, 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	4.900 %	5.110 %	G1	+/- 1% NIST Traceable
OXYGEN	21.00 %	20.96 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	06060806	cc206103	22.51% OXYGEN/NITROGEN	May 01, 2016
NTRM	10060118	CC281370	5.207% CARBON DIOXIDE/NITROGEN	Nov 01, 2015

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SCO2GM	NonDispersive Infrared	Apr 29, 2010
HO2GH	PMO2	Apr 29, 2010

Triad Data Available Upon Request

Notes:

Approved for Release

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E03NI76E15A0295	Reference Number:	83-124237642-1
Cylinder Number:	CC318799	Cylinder Volume:	153 Cu.Ft.
Laboratory:	ASG - Port Allen - LA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Oct 15, 2010	Valve Outlet:	590

Expiration Date: Oct 15, 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	12.00 %	11.98 %	G1	+/- 1% NIST Traceable
OXYGEN	12.00 %	11.97 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	00040210	CC108973	10.00% OXYGEN/NITROGEN	Oct 02, 2011
NTRM	09060612	CC262107	9.921% CARBON DIOXIDE/NITROGEN	Apr 10, 2013

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SCO2GM	NonDispersive Infrared	Sep 24, 2010
HO2GH	PMO2	Sep 16, 2010

Triad Data Available Upon Request

Notes:

Signature on file

QA Approval

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900
FAX: 225.388.0959
www.airgas.com

Part Number:	E04NI99E15A3530	Reference Number:	83-124198943-4
Cylinder Number:	CC265550	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Port Allen - LA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Dec 02, 2009	Valve Outlet:	660

Expiration Date: Dec 02, 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	90.00 PPM	90.89 PPM	G1	+/- 1% NIST Traceable
CARBON MONOXIDE	100.0 PPM	100.6 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	100.0 PPM	97.37 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			
Total oxides of nitrogen		98.18 PPM		For Reference Only

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	06060325	CC207559	490PPM NITRIC OXIDE/NITROGEN	Jan 01, 2010
NTRM	08060207	CC255258	51.26PPM CARBON MONOXIDE/NITROGEN	Jan 15, 2012
NTRM	000520	SG9105901BAL	50.5PPM PROPANE/NITROGEN	Apr 03, 2010
NTRM	06060241	CC207849	257.0PPM NITRIC OXIDE/NITROGEN	Jan 01, 2010

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR2MCO	FTIR	Nov 11, 2009
FTIR2MNO	FTIR	Nov 04, 2009
FTIR2PROPANE (50-500 ppm)	FTIR	Oct 29, 2009

Triad Data Available Upon Request

Notes:

QA Approval

Airgas

Airgas Specialty Gases
1075 Cinclare Drive
Port Allen, LA 70767
225.388.0900
FAX: 225.388.0959
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI99E15A3528	Reference Number:	83-124198943-3
Cylinder Number:	SG9135772BAL	Cylinder Volume:	144 Cu.Ft.
Laboratory:	ASG - Port Allen - LA	Cylinder Pressure:	2015 PSIG
Analysis Date:	Dec 02, 2009	Valve Outlet:	660

Expiration Date: Dec 02, 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	44.07 PPM	G1	+/- 1% NIST Traceable
CARBON MONOXIDE	50.00 PPM	50.05 PPM	G1	+/- 1% NIST Traceable
NITRIC OXIDE	50.00 PPM	50.50 PPM	G1	+/- 1% NIST Traceable
NITROGEN	Balance			
Total oxides of nitrogen		50.51 PPM		For Reference Only

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	060610	CC206050	49.38PPM NITRIC OXIDE/NITROGEN	Oct 02, 2012
NTRM	08060207	CC255258	51.26PPM CARBON MONOXIDE/NITROGEN	Jan 15, 2012
NTRM	99060203	CC263030	49.62PPM PROPANE/NITROGEN	Jul 08, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
FTIR2MCO	FTIR	Nov 11, 2009
FTIR2LNO	FTIR	Nov 10, 2009
FTIR2PROPANE (10-50 PPM)	FTIR	Oct 29, 2009

Triad Data Available Upon Request

Notes:

QA Approval

Nolan, Shiver

From: Heap, James
Sent: Monday, July 02, 2012 12:55 PM
To: Nolan, Shiver
Cc: Thompson, Roger
Subject: FW: Carlsbad Testing
Attachments: EPCO_SC_Unit_1_Report.pdf; EPCO_SC_Unit_2_Report.pdf

The annual testing for SoCarlsbad has been received. The reports are to be included with the next semi-annual report in October. These are for loading to the portal.

++++++++++++++++++++++++++++++++
Jim Heap Sr. Field Environmental Scientist
Enterprise Products, LLC
Midland, Texas USA
Office: 432-686-5404
Cell: 432-260-0239
jkheap@eprod.com

From: Ross Thompson [mailto:rthompson@relienteti.com]
Sent: Tuesday, June 26, 2012 4:37 PM
To: Heap, James
Subject: RE: Carlsbad Testing

Attached. I reduced the file size, in case your mail server is booting it due to size.

Thank you,

Ross A. Thompson
Principal Scientist
Relient Emissions Testing. Inc.
806-773-8851 Tel
806-771-2894 Fax

From: Heap, James [mailto:JKHEAP@eprod.com]
Sent: Tuesday, June 26, 2012 1:01 PM
To: 'Ross Thompson'
Subject: RE: Carlsbad Testing

This is the last email I have in my inbox from you.

Can you re-transmit?

Thanks

++++++++++++++++++++++++++++++++
Jim Heap Sr. Field Environmental Scientist
Enterprise Products, LLC
Midland, Texas USA
Office: 432-686-5404

Cell: 432-260-0239
jkheap@eprod.com

From: Ross Thompson [mailto:rthompson@relienteti.com]
Sent: Wednesday, May 23, 2012 12:04 PM
To: Heap, James
Subject: Re: Carlsbad Testing

I'll be there at 08:00 local time.

Ross Thompson
Principal Scientist
Relient Emissions Testing, Inc.
TEL: 806-773-8851
email: rthompson@relienteti.com

Connected by DROID on Verizon Wireless

From: "Heap, James" <JKHEAP@eprod.com>
Sent: Wed May 23 12:01:19 CDT 2012
To: 'Ross Thompson' <rthompson@relienteti.com>
Subject: Carlsbad Testing

Do you have an approximate arrival time for the Carlsbad testing tomorrow?

++++++++++++++++++++++++++++++++
Jim Heap Sr. Field Environmental Scientist
Enterprise Products, LLC
Midland, Texas USA
Office: 432-686-5404
Cell: 432-260-0239
jkheap@eprod.com

Annual Turbine Emissions Test Report

On
Exhaust Emissions
From

One Natural Gas Fired Turbine

at the
South Carlsbad Compressor Station
Loving, NM

Prepared For
Seminole Pipeline Company

May 2012

Relient Emissions Testing, Inc
Project Number: 0181

Relient Emissions Testing Inc.
Air Emissions Testing for Industry®

Mr. Jim Heap
Enterprise Products, LLC
Midland, TX
(432) 686-5404

05/21/2012

Re: Annual emissions testing at the South Carlsbad Compressor Station on unit 1

Mr. Heap,

Exhaust emissions from one compressor turbine was tested at the South Carlsbad compressor station near Loving, New Mexico on. Testing was conducted to demonstrate compliance with emission limits set forth by NMED permit. The engine is identified as follows:

Engine Information	
Unit Number:	Unit 1
Manufacturer:	Solar
Serial Number:	49240
Model:	CENTAUR 40
Mfr. Rated Hp:	4500hp
Mfr. Rated Speed:	15,000

This is a natural gas fired turbine used for compression of natural gas for transportation through the pipeline.

The test matrix consisted of three 60-minute test runs on the turbine in accordance with NMED requirements. For each test, the average emission concentrations of nitrogen oxides (NO_X), oxygen (O_2), and carbon monoxide (CO) were measured using analytical instrumentation. Operational data such as Gas Producer Speed, Turbine Speed, and suction and discharge pressures were recorded during each run from available operational data on the unit.

Results of the tests are presented in tabular format in this report. Included in this table are engine operational data, ambient conditions, emission concentrations, and mass emission rates.

Continuous emission monitors housed in an air-conditioned mobile laboratory were used to measure the exhaust concentrations of NO_X, CO and O_2. This testing utilized the following analytical methods:

EPA Reference Method 3a	O_2 concentration
EPA Reference Method 7e	NO_X concentration
EPA Reference Method 10	CO concentration
EPA Reference Method 19	Mass emission rates

A computerized data recorder was used to record output from the analyzers. The data logger record provides documentation of the emission measurements and the instrument calibrations. The data logger records are also useful for indicating trends in the data.

Mass emission rates were calculated using EPA Method 19 calculations (combustion stoichiometry). Emission rates in terms of lbs/hr and TPY were calculated using the pollutant concentration (ppmv), the oxygen F-factor (DSCFex/MMBtu) and the horsepower specific fuel consumption rate (Btu/Hp-hr). The O_2 F-Factor used in this test series was 8710 (DSCFex/MMBtu), the EPA default value for engines burning natural gas.

A summary of the quality assurance procedures associated with the EPA test methods is presented in tabular format in the appendix of this report. Examples of these procedures include daily multipoint calibrations, zero and span checks between each test run, NO_2 to NO converter efficiency check results, sample system bias check results, and analyzer interference test results.

The appendix of this report also includes supporting test documentation, example calculations, and data logger records.

If you have any questions, please feel free to contact me at (806) 773-8851.

Sincerely,

Ross Thompson
Principal Scientist
Relient Emissions Testing, Inc

APPENDIX

Summary of Results
Quality Assurance/Quality Control Summary
Example Calculations
Calibration Certifications
Data Logger Files

Company: Enterprise Products Operating
Location: South Carlsbad Compressor Station
Source: Solar Centaur 40 S/N: 49240
Engine Rating: 4500hp @ 15000RPM
Technician: RAT

Test Run Number	**1**	**2**	**3**	
Unit	**1**	**1**	**1**	
Date	5/24/2012	5/24/2012	5/24/2012	
Start Time	8:48	9:53	11:55	
Stop Time	9:48	10:53	12:55	
Unit Operational Data				
Engine Speed (rpm)	15000	15000	15000	
Unit Horse Power (Hp)*	4307	4307	4307	
NPT Load (%)	91.6	91.6	91.6	
NGP Load (%)	95.7	95.7	95.7	
Compressor Suction Pressure (psig)	385	385	385	
Compressor Discharge Pressure (psig)	634	634	634	
T5 Temperature (°F)	1173	1173	1173	
PCD (psig)	96	96	96	
Fuel Data				
Calculated Fuel Consumption (SCFH)	35440	35440	35440	
O2 F-Factor (DSCF/MMBtu, HHV basis)	8710	8710	8710	
Fuel Heating Value (Btu/SCF, HHV basis)	1093	1093	1093	
BHp Specific Fuel Rate (Btu/Hp-hr, HHV basis)	8995	8995	8995	
BHp Specific Fuel Rate (Btu/Hp-hr, LHV basis)	8103	8103	8103	
Ambient Conditions				
Pressure Altitude (MSL)	3250	3250	3250	
Atmospheric Pressure ("Hg)	26.60	26.60	26.60	
Dry Bulb Temperature (°F)	78	81	85	
Wet Bulb Temperature (°F)	61	63	65	
Humidity (lb/lb air)	0.0087	0.0094	0.0099	
Measured Exhaust Emissions (Corrected)				**Average**
O_2 (% Vol)	16.73	16.58	16.52	**16.61**
NOx (ppmv)	74.36	84.53	85.65	**81.51**
CO (ppmv)	10.12	9.21	9.02	**9.5**
Exhaust Flow Rate (DSCFH)				
Dry SCFH (dry basis, calc. from Hp/BSFR/HHV)	1.69E+06	1.63E+06	1.61E+06	**1644398.03**
Calculated Mass Emission Rates (Based on btu Specific Fuel Rate BSFR)				
NOx (lbs/hr) **{Permit Limit = 27 lb/hr}**	15.0	16.4	16.4	**15.93**
CO (lbs/hr) **{Permit Limit = 7.4 lb/hr}**	1.2	1.0	1.0	**1.07**

*** Based on gas producer speed**

Quality Assurance

Method 7E Non-Dilution Measurement System Performance Test Procedures
Method 7E Calculated Emission Gas Concentration

Project No.: 0023
Technician: RAT

Date: 05/24/12
Client: Enterprise Products Operating
Location: South Carlsbad Compressor Station

Calibration Gas Certified Values							Gas Selection, % of Span	
	Span	Low Gas	Mid Gas	High Gas	Analyzer	Analyzer Serial Number	Low (<20%)	Mid (40%-60%)
O_2 (% Vol)	20.90	0.00	11.70	20.90	AII GPR-29	001666832	0.0%	56.0%
NOx (ppmv)	251.40	0.00	90.00	251.40	TECO 42C	030400000000842	0.0%	35.8%
CO (ppmv)	257.00	0.00	99.00	257.00	TECO 48C	48C-67940-359	0.0%	38.5%

Initial Linearity Data

Calibration Error	Analyzer Calibration Response			Absolute Difference			Difference (% of Span)		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
O_2 (% Vol)	-0.01	11.70	20.87	0.01	0.00	0.03	0.05%	0.00%	0.14%
NOx (ppmv)	-0.05	91.00	251.55	0.05	1.00	0.15	0.02%	0.40%	0.06%
CO (ppmv)	0.00	101.20	255.95	0.00	2.20	1.05	0.00%	0.86%	0.41%

Run Number 1 Start: 8:48 End: 9:48

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	-0.01	20.77	0.00%	-0.48%	0.09	20.87	0.48%	0.00%	0.48%	0.48%	16.67	16.73 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	-0.55	87.45	-0.20%	-1.41%	0.00	86.45	0.02%	-1.81%	0.22%	-0.40%	71.79	74.36 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	-0.50	97.95	-0.19%	-1.26%	0.00	99.45	0.00%	-0.68%	0.19%	0.58%	9.86	10.12 CO (ppmv)

Run Number 2 Start: 9:53 End: 10:53

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	0.09	20.87	0.48%	0.00%	0.00	20.80	0.05%	-0.33%	-0.43%	-0.33%	16.54	16.58 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	0.00	86.45	0.02%	-1.81%	0.50	90.40	0.22%	-0.24%	0.20%	1.57%	83.07	84.53 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	0.00	99.45	0.00%	-0.68%	0.00	99.35	0.00%	-0.72%	0.00%	-0.04%	9.25	9.21 CO (ppmv)

Run Number 3 Start: 11:55 End: 12:55

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	0.00	20.80	0.05%	-0.33%	-0.01	20.90	0.00%	0.14%	-0.05%	0.48%	16.48	16.52 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	0.50	90.40	0.22%	-0.24%	0.00	90.21	0.02%	-0.31%	-0.20%	-0.08%	85.95	85.65 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	0.00	99.35	0.00%	-0.72%	0.00	99.45	0.00%	-0.68%	0.00%	0.04%	9.06	9.02 CO (ppmv)

Example Calculations

Drift Corrected Emission Concentrations

Formula

$$C_{GAS} = (Ç - Co) \times \frac{C_{MA}}{C_M - C_O} \quad \textit{(eq.7e-5)}$$

All Calculations Refer to Test Run 1 or an Average of Runs 1-3

$Ç_{NOx}$ =	Raw Concentration of NOx	= 71.79 ppmv
C_O =	Avg. of Initial and Final Zero Checks	= -0.28 ppmv
C_M =	Avg. of Initial and Final Span Checks	= 86.95 ppmv
C_{MA} =	Certified Concentration of Span Gas	= 90.00 ppmv
C_{NOx} =	**(71.79 - -0.28) x 90 / (87 -- 0.3)**	**= 74.36 ppmv**

$Ç_{CO}$ =	Raw Concentration of CO	= 9.86 ppmv
C_O =	Avg. of Initial and Final Zero Checks	= -0.25 ppmv
C_M =	Avg. of Initial and Final Span Checks	= 98.70 ppmv
C_{MA} =	Certified Concentration of Span Gas	= 99.00 ppmv
C_{CO} =	**(9.86 + 0.25) x 99 / (98.7 + 0.3)**	**= 10.12 ppmv**

$Ç_{O2}$ =	Raw Concentration of O2	= 16.67%
C_O =	Avg. of initial and final zero bias checks	= 0.04%
C_M =	Avg. of initial and final span bias checks	= 20.82%
C_{MA} =	Actual concentration of span gas	= 20.90%
C_{O2} =	**(16.67 - 0.04) x 20.9 / (20.8 - 0.04)**	**= 16.73%**

Example Calculations

Exhaust Calculations

Measured Data and Constants

C_{NOx} =	Corrected Concentration of NOx	=	74.36	ppmv
C_{CO} =	Corrected Concentration of CO	=	10.12	ppmv
Horsepower =	Observed Horsepower	=	4307	Hp
lb / mole =	EPA STP for Ideal Gas	=	385.15	SCF
lbs / hr to tpy =	Mass Conversion Factor	=	4.38	hrs-tons / lbs-yr
C_F =	PPMV Normalization	=	1 x e-6	1 / ppmv
MW_{NOx} =	Molecular Weight of NOx	=	46	lb / lb-mol
MW_{CO} =	Molecular Weight of CO	=	28	lb / lb-mol

S tack Gas Flow Rate via btu Specific Fuel Rate (BSFR)

Hp =	Engine Horsepower	=	4307	Hp
F_{BTU} =	btu Specific Fuel Rate	=	8995	Btu/Hp-Hr
F_{O2} =	O2 F-Factor	=	8710	DSCF/MMBtu
C_{O2} =	Measured Concentration of O2	=	16.73	%

$$Qs_{M19} = Hp \times F_{BTU} \times F_{O2} \times 10\text{^}6 \times \frac{20.9}{(20.9 - \%O2)}$$ DSCF/H

$$Qs_{M19} = 4306.50 \times 8995 \times 8710 \times 5.01 \times 1E\text{-}06$$

Qs_{M19} = 1.69E+06 DSCF/H

Formulas

Pounds per Hour (lbs/hr) :

$$Ex\ (lb/hr) = Cx * C_F * Qs * \{ MWx / (lb / mole) \}$$

Tons per Year (tpy) :

$$Ex\ (tpy) = Ex\ (lb/hr) * \{ 8760\ (hr / yr) / 2000\ (lb / ton) \}$$

Grams per Horsepower-hour (g/Hp-hr) :

$$Ex\ (g/hp\text{-}hr) = \{ Ex\ (lb/hr) / Hp \} / 454\ (g / lb) \}$$

Oxygen Correction (Cx @ 15%O_2)

$$(Cx\ @\ 15\%O_2) = (X^* (20.9\text{-}15)/(20.9\text{-}O_2\ measured)$$

Calculated Mass Emission Rates From Method 19 Exhaust Flow Rates

E_{NOx}

$$\textbf{lbs/hr} = 74.36 * 1 \text{ x e-6} * 1.69E+06 * \frac{46}{385.15} = \textbf{15.02}$$

$$\textbf{tpy} = 15.02\ lb/hr * 4.38 * \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{65.78}$$

$$\textbf{g/Hp-hr} = \frac{15.02\ lb/hr}{4307\ Hp} * \frac{454\ g}{1\ lb} = \textbf{1.58}$$

E_{CO}

$$\textbf{lbs/hr} = 10.12 * 1 \text{ x e-6} * 1.69E+06 * \frac{28}{385.15} = \textbf{1.24}$$

$$\textbf{tpy} = 1.24\ lb/hr * 4.38 * \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{5.45}$$

$$\textbf{g/Hp-hr} = \frac{1.24\ lb/hr}{4307\ Hp} * \frac{454\ g}{1\ lb} = \textbf{0.13}$$

SPECIALTY GASES OF AMERICA, INC.
AMERICAN INDUSTRIAL GASES, INC.
AMERICAN RARE GASES, INC

6055 BRENT DR. TOLEDO, OH 43611
419-729-7732 FAX 419-729-2411

THE AMERICAN GAS GROUP
www.americangasgroup.com

ANALYTICAL REPORT

Certificate ID: 110711019 **Date:** 11/7/2011

Customer Name: B&J Welding Supply, TX

Customer Address: 1512 East 50th Street

Lubbock TX 79404

Purchase Order: 17436 **Work Order:** 127416-01

Lot Number: 1024UB11 **Product Name:** 3-Component Mixture, EPA Protocol

Size: A31 **Pressure:** 2210 psig @ 84 Deg F

Content: Ven ID# C12011

Serial #: EB0002836

Analysis Date: 11/2/2011

Shelf Life: 36 months **Expiration Date:** 11/2/2014

Component	Nominal	Actual	Accuracy	Method
Oxygen	12.0%	11.7%	+/- 1% rel	Paramagnetic
Carbon Dioxide	12.0%	12.2%	+/- 1% rel	FTIR
Nitrogen	Balance	Balance		

REFERENCE STANDARD

Std Type	Std #	Cyl #	Concentration	Exp Date
GMIS	0606JG11	EB0001508	15.1500	6/7/2013
GMIS	0625HE10	EB0023062	19.8500	6/28/2012

INSTRUMENTATION

Instrument / ID	Component
Servomex 5200	O2
MKS 2031	CO2

Note: * ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS - SEPTEMBER 1997:G1
* DO NOT USE STANDARD WHEN PRESSURE IS BELOW 150 PSIG

Protocal
Specialty Gases of America, Inc

Issued by: Josh Jones

SPECIALTY GASES OF AMERICA, INC.
AMERICAN INDUSTRIAL GASES, INC.
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419-729-7732 FAX 419-729-2411

THE AMERICAN GAS GROUP

www.americangasgroup.com

ANALYTICAL REPORT

Certificate ID: 110711012 **Date:** 11/7/2011

Customer Name: B&J Welding Supply, TX

Customer Address: 1512 East 50th Street

Lubbock TX 79404

Purchase Order: 17436 **Work Order:** 127416-03

Lot Number: 1024UA11 **Product Name:** 3-Component Mixture, EPA Protocol

Size: A31 **Pressure:** 2220 psig @ 82 Deg F

Content: Ven ID# C12011

Serial #: EB0004610

Analysis Date: 11/2/2011

Shelf Life: 36 months **Expiration Date:** 11/2/2014

Component	Nominal	Actual	Accuracy	Method
Oxygen	20.9%	20.9%	+/- 1% rel	Paramagnetic
Carbon Dioxide	5.00%	5.10%	+/- 1% rel	FTIR
Nitrogen	Balance	Balance		

REFERENCE STANDARD

Std Type	Std #	Cyl #	Concentration	Exp Date
GMIS	0318XA11	EB0028214	20.9700	3/18/2013
GMIS	0625HE10	EB0023062	19.8500	6/28/2012

INSTRUMENTATION

Instrument / ID	Component
Servomex 5200	O2
MKS 2031	CO2

Note: * ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS - SEPTEMBER 1997:G1
* DO NOT USE STANDARD WHEN PRESSURE IS BELOW 150 PSIG

Protocal
Specialty Gases of America, Inc

Issued by: Josh Jones

Global Calibration Gases LLC
1500 15th Avenue Drive East,
#109
Palmetto, FL 34221
Blending Plant &
Analytical Laboratory
Accreditation No: 69191
PGVP Vendor ID: N12011

EPA PROTOCOL GAS MIXTURE

Customer:	B&J Specialty Gas	Reference#:	011612 - 2
CGA:	660	Certification Date:	1/16/12
Customer PO #:		Expiration Date:	1/16/14
Cylinder #:	EB0034805	Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (September 1997).

ANALYZED CYLINDER --

Components	Certified Concentration	Analytical Accuracy
NO	90.0 ppm	± 1 %
NOx	> 1 %	± 1 %
Propane	105.0 ppm	± 1 %
Methane	109.0 ppm	± 1 %
Carbon Monoxide	99.0 ppm	± 1 %
Nitrogen	BALANCE	-

REFERENCE STANDARD -

Type/SRM Sample	Cylinder#	Concentration
NO/ SRM 2735	Cal015838	784.4 ppm
NOx/ SRM 2735	Cal015838	787.5 ppm
Propane/ GMIS	EB0026425	310.9 ppm
Methane/ GMIS	EB0019166	94.6 ppm
CO/ GMIS	CC118813	95.5 ppm

INSTRUMENT -

Instrument/Model	Serial #	Last Date Calibrated	Analytical Method
California Analytical Instrument Model 600	Y09003	1/5/12	Chemiluminescence
Agilent	US02002031	1/10/12	Thermal conductivity

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights. We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 511635 and NIST Inst # 822/272103-06. This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Palmetto, Florida. *Do not use this standard when cylinder pressure is below 150 psig.

Principal Analyst: _____ Reviewer: _____

Date: 1/16/12 Date: 1-16-2012

B&J Welding Supply
Lamesa, Tx

Accreditation No 69191

PGVP Vendor ID N12012

EPA Protocol Gas Mixture

Customer:	B&J Welding Supply	Reference#:	011112-1
CGA:	660	Certification Date:	01/11/2012
Customer PO#	17784	Expiration Date:	01/11/2014
Cylinder #:	EB0032807	Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (September 1997)

Analyzed Cylinder-

Components	Certified Concentration	Analytical Accuracy
Nitric Oxide	251.4 ppm	+/-1%
NOx	<1%	+/-1%
Carbon Monoxide	257 ppm	+/-1%
Methane	248.6 ppm	+/-1%
Propane	251.6 ppm	+/-1%
Nitrogen	Balance	-

Reference Standard-

Type/SRM Sample	Cylinder #	Concentration
NO/SRM 2735	Cal015838	784.4 ppm
Nox/ SRM 2735	Cal015838	787.5 ppm
CO/ GMIS	EB0019151	1.96%
Propane/ GMIS	CC80936	2984 ppm
Methane/ GMIS	EB0026384	148.3 ppm

Instrument-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
California Analytical Instument Model 600	Y09003	01/06/2012	Chemiluminescence
Agilent Quad Series	US02002031	01/11/12	Thermal Conductivity
Rosemount 880A	F-04300088	01/04/2012	Non-Dispersive Infrared

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 511635 and NIST Inst # 822/272103-06.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Palmetto, Florida.

*Do not use this standard when cylinder pressure is below 150 psig.

Produced by:

Global Calibration Gases LLC.
1500 15th Avenue Drive, East Suite# 109
Palmetto, Florida 34221
Accreditation No.: 69191
PGVP Vendor ID.: N12012

Principal Analyst: _____ **Date:** 1-11-12

Principal Reviewer: _____ **Date:** 1-11-12

Annual Turbine Emissions Test Report

On
Exhaust Emissions
From

One Natural Gas Fired Turbine

at the
South Carlsbad Compressor Station
Loving, NM

Prepared For
Enterprise Products Operating

May 2012

Relient Emissions Testing, Inc
Project Number: 0181

Relient Emissions Testing Inc.
Air Emissions Testing for Industry®

Mr. Jim Heap
Enterprise Products, LLC
(432) 686-5404
Midland, TX

May 20, 2012

Re: Annual emissions testing at the South Carlsbad Compressor Station on Unit 2

Mr. Heap,

Exhaust emissions from one compressor turbine was tested at the South Carlsbad compressor station near Loving, New Mexico on. Testing was conducted to demonstrate compliance with emission limits set forth by NMED permit. The engine is identified as follows:

Engine Information	
Unit Number:	Unit 2
Manufacturer:	Solar
Serial Number:	3001096
Model:	CENTAUR 40
Mfr. Rated Hp:	4500hp
Mfr. Rated Speed:	15,000

This is a natural gas fired turbine used for compression of natural gas for transportation through the pipeline.

The test matrix consisted of three 60-minute test runs on the turbine in accordance with NMED requirements. For each test, the average emission concentrations of nitrogen oxides (NO_X), oxygen (O_2), and carbon monoxide (CO) were measured using analytical instrumentation. Operational data such as Gas Producer Speed, Turbine Speed, and suction and discharge pressures were recorded during each run from available operational data on the unit.

Results of the tests are presented in tabular format in this report. Included in this table are engine operational data, ambient conditions, emission concentrations, and mass emission rates.

Continuous emission monitors housed in an air-conditioned mobile laboratory were used to measure the exhaust concentrations of NO_X, CO and O_2. This testing utilized the following analytical methods:

EPA Reference Method 3a	O_2 concentration
EPA Reference Method 7e	NO_X concentration
EPA Reference Method 10	CO concentration
EPA Reference Method 19	Mass emission rates

A computerized data recorder was used to record output from the analyzers. The data logger record provides documentation of the emission measurements and the instrument calibrations. The data logger records are also useful for indicating trends in the data.

Mass emission rates were calculated using EPA Method 19 calculations (combustion stoichiometry). Emission rates in terms of lbs/hr and TPY were calculated using the pollutant concentration (ppmv), the oxygen F-factor (DSCFex/MMBtu) and the horsepower specific fuel consumption rate (Btu/Hp-hr). The O_2 F-Factor used in this test series was 8710 (DSCFex/MMBtu), the EPA default value for engines burning natural gas.

A summary of the quality assurance procedures associated with the EPA test methods is presented in tabular format in the appendix of this report. Examples of these procedures include daily multipoint calibrations, zero and span checks between each test run, NO_2 to NO converter efficiency check results, sample system bias check results, and analyzer interference test results.

The appendix of this report also includes supporting test documentation, example calculations, and data logger records.

If you have any questions, please feel free to contact me at (806) 773-8851.

Sincerely,

Ross Thompson
Principal Scientist
Relient Emissions Testing, Inc

APPENDIX

Summary of Results
Quality Assurance/Quality Control Summary
Example Calculations
Calibration Certifications
Data Logger Files

Summary of Results

Company: Enterprise Products Operating
Location: South Carlsbad Compressor Station
Source: Solar Centaur 40 S/N: 30010096
Engine Rating: 4500hp @ 15000RPM
Technician: RAT

Test Run Number	**1**	**2**	**3**	
Unit	**2**	**2**	**2**	
Date	4/20/2010	4/20/2010	4/20/2010	
Start Time	12:02	13:04	14:07	
Stop Time	12:22	13:24	14:27	
Unit Operational Data				
Engine Speed (rpm)	15000	15000	15000	
Unit Horse Power (Hp)*	4320	4320	4320	
NPT Load (%)	93.0	93.0	93.0	
NGP Load (%)	96.0	96.0	96.0	
Compressor Suction Pressure (psig)	225	225	225	
Compressor Discharge Pressure (psig)	382	382	382	
T5 Temperature (°F)	1190	1190	1190	
PCD (psig)	93.0	93.0	93.0	
Fuel Data				
Calculated Fuel Consumption (SCFH)	34000	34000	34000	
O2 F-Factor (DSCF/MMBtu, HHV basis)	8710	8710	8710	
Fuel Heating Value (Btu/SCF, HHV basis)	1093	1093	1093	
BHp Specific Fuel Rate (Btu/Hp-hr, HHV basis)	8602	8602	8602	
BHp Specific Fuel Rate (Btu/Hp-hr, LHV basis)	7750	7750	7750	
Ambient Conditions				
Pressure Altitude (MSL)	3250	3250	3250	
Atmospheric Pressure ("Hg)	26.60	26.60	26.60	
Dry Bulb Temperature (°F)	87	86	86	
Wet Bulb Temperature (°F)	65	64	64	
Humidity (lb/lb air)	0.0095	0.0090	0.0090	
Measured Exhaust Emissions (Corrected)				**Average**
O_2 (% Vol)	16.28	16.32	16.29	**16.30**
NOx (ppmv)	86.22	86.64	85.20	**86.02**
CO (ppmv)	9.60	9.51	9.67	**9.6**
Exhaust Flow Rate (DSCFH)				
Dry SCFH (dry basis, calc. from Hp/BSFR/HHV)	1.46E+06	1.48E+06	1.47E+06	**1469592.84**
Calculated Mass Emission Rates (Based on btu Specific Fuel Rate BSFR)				
NOx (lbs/hr) {Permit Limit = 27}	15.0	15.2	14.9	**15.03**
CO (lbs/hr) {Permit Limit = 7.4}	1.0	1.0	1.0	**1.00**

*Based on gas producer speed.

Quality Assurance

Method 7E Non-Dilution Measurement System Performance Test Procedures
Method 7E Calculated Emission Gas Concentration

Project No.: 0023
Technician: RAT

Date: 04/20/10
Client: Enterprise Products Operating
Location: South Carlsbad Compressor Station

Calibration Gas Certified Values							Gas Selection, % of Span	
	Span	Low Gas	Mid Gas	High Gas	Analyzer	Analyzer Serial Number	Low (<20%)	Mid (40%-60%)
O_2 (% Vol)	20.90	0.00	11.70	20.90	AII GPR-29	001666832	0.0%	56.0%
NOx (ppmv)	251.40	0.00	90.00	251.40	TECO 42C	030400000000842	0.0%	35.8%
CO (ppmv)	257.00	0.00	99.00	257.00	TECO 48C	48C-67940-359	0.0%	38.5%

Initial Linearity Data

Calibration Error	Analyzer Calibration Response			Absolute Difference			Difference (% of Span)		
	Low	Mid	High	Low	Mid	High	Low	Mid	High
O_2 (% Vol)	-0.01	11.70	20.87	0.01	0.00	0.03	0.05%	0.00%	0.14%
NOx (ppmv)	-0.05	91.00	251.55	0.05	1.00	0.15	0.02%	0.40%	0.06%
CO (ppmv)	0.00	101.20	255.95	0.00	2.20	1.05	0.00%	0.86%	0.41%

Run Number 1 Start: 12:02 End: 12:22

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	-0.01	20.90	0.00%	0.14%	-0.01	20.90	0.00%	0.14%	0.00%	0.00%	16.28	16.28 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	0.00	90.21	0.02%	-0.31%	0.00	90.40	0.02%	-0.24%	0.00%	0.08%	86.51	86.22 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	0.00	99.45	0.00%	-0.68%	0.00	99.50	0.00%	-0.66%	0.00%	0.02%	9.65	9.60 CO (ppmv)

Run Number 2 Start: 13:04 End: 13:24

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	-0.01	20.90	0.00%	0.14%	-0.01	20.85	0.00%	-0.10%	0.00%	-0.24%	16.30	16.32 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	0.00	90.40	0.02%	-0.24%	0.00	90.50	0.02%	-0.20%	0.00%	0.04%	87.07	86.64 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	0.00	99.50	0.00%	-0.66%	0.00	99.60	0.00%	-0.62%	0.00%	0.04%	9.56	9.51 CO (ppmv)

Run Number 3 Start: 14:07 End: 14:27

Bias and Drift	Upscale Gas	Cal. Response		Initial Values		Initial System Bias		Final Values		Final System Bias		Drift		Emission Calculation	
		Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Low	Upscale	Raw Avg	Run Avg
O_2 (% Vol)	20.90	-0.01	20.87	-0.01	20.85	0.00%	-0.10%	-0.01	20.90	0.00%	0.14%	0.00%	0.24%	16.27	16.29 O_2 (% Vol)
NOx (ppmv)	90.00	-0.05	91.00	0.00	90.50	0.02%	-0.20%	0.00	90.20	0.02%	-0.32%	0.00%	-0.12%	85.53	85.20 NOx (ppmv)
CO (ppmv)	99.00	0.00	101.20	0.00	99.60	0.00%	-0.62%	-0.50	99.30	-0.19%	-0.74%	-0.19%	-0.12%	9.49	9.67 CO (ppmv)

Example Calculations

Drift Corrected Emission Concentrations

Formula

$$C_{GAS} = (Ç - Co) \times \frac{C_{MA}}{C_M - C_O} \quad \textit{(eq.7e-5)}$$

All Calculations Refer to Test Run 1 or an Average of Runs 1-3

$Ç_{NOx}$ =	Raw Concentration of NOx	= 86.51 ppmv
C_O =	Avg. of Initial and Final Zero Checks	= 0.00 ppmv
C_M =	Avg. of Initial and Final Span Checks	= 90.31 ppmv
C_{MA} =	Certified Concentration of Span Gas	= 90.00 ppmv

C_{NOx} = (86.51 - 0) x 90 / (90.3 - 0) = 86.22 ppmv

$Ç_{CO}$ =	Raw Concentration of CO	= 9.65 ppmv
C_O =	Avg. of Initial and Final Zero Checks	= 0.00 ppmv
C_M =	Avg. of Initial and Final Span Checks	= 99.48 ppmv
C_{MA} =	Certified Concentration of Span Gas	= 99.00 ppmv

C_{CO} = (9.65 + 0) x 99 / (99.5 + 0) = 9.60 ppmv

$Ç_{O2}$ =	Raw Concentration of O2	= 16.28%
C_O =	Avg. of initial and final zero bias checks	= -0.01%
C_M =	Avg. of initial and final span bias checks	= 20.90%
C_{MA} =	Actual concentration of span gas	= 20.90%

C_{O2} = (16.28 - -0.01) x 20.9 / (20.9 - 0) = 16.28%

Example Calculations

Exhaust Calculations

Measured Data and Constants

C_{NOx} =	Corrected Concentration of NOx	=	86.22	ppmv
C_{CO} =	Corrected Concentration of CO	=	9.60	ppmv
Horsepower =	Observed Horsepower	=	4320	Hp
lb / mole =	EPA STP for Ideal Gas	=	385.15	SCF
lbs / hr to tpy =	Mass Conversion Factor	=	4.38	hrs-tons / lbs-yr
C_F =	PPMV Normalization	=	1 x e-6	1 / ppmv
MW_{NOx} =	Molecular Weight of NOx	=	46	lb / lb-mol
MW_{CO} =	Molecular Weight of CO	=	28	lb / lb-mol

S tack Gas Flow Rate via btu Specific Fuel Rate (BSFR)

Hp =	Engine Horsepower	=	4320	Hp
F_{BTU} =	btu Specific Fuel Rate	=	8602	Btu/Hp-Hr
F_{O2} =	O2 F-Factor	=	8710	DSCF/MMBtu
C_{O2} =	Measured Concentration of O2	=	16.28	%

$$Q_{S\ M19} = Hp \times F_{BTU} \times F_{O2} \times 10\text{^}6 \times \frac{20.9}{(20.9 - \%O2)}$$ DSCF/H

$$Q_{S\ M19} = 4320.00 \times 8602 \times 8710 \times \frac{20.9}{(20.9 - 16.28)} \times 1E\text{-}06$$

$Q_{S\ M19}$ = 1.46E+06 DSCF/H

Formulas

Pounds per Hour (lbs/hr) :

$$E_x\ (lb/hr) = C_x * C_F * Qs * \{ MW_x / (lb / mole) \}$$

Tons per Year (tpy) :

$$E_x\ (tpy) = E_x\ (lb/hr) * \{ 8760\ (hr / yr) / 2000\ (lb / ton) \}$$

Grams per Horsepower-hour (g/Hp-hr) :

$$E_x\ (g/hp\text{-}hr) = \{ E_x\ (lb/hr) / Hp \} / 454\ (g / lb) \}$$

Calculated Mass Emission Rates From Method 19 Exhaust Flow Rates

E_{NOx}

$$\textbf{lbs/hr} = 86.22 * 1 \text{ x e-6} * 1.46E+06 * \frac{46}{385.15} = \textbf{15.08}$$

$$\textbf{tpy} = 15.08\ lb/hr * 4.38 \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{66.04}$$

$$\textbf{g/Hp-hr} = \frac{15.08\ lb/hr}{4320\ Hp} * \frac{454\ g}{1\ lb} = \textbf{1.58}$$

E_{CO}

$$\textbf{lbs/hr} = 9.60 * 1 \text{ x e-6} * 1.46E+06 * \frac{28}{385.15} = \textbf{1.02}$$

$$\textbf{tpy} = 1.02\ lb/hr * 4.38 \frac{hrs\text{-}ton}{lbs\text{-}yr} = \textbf{4.48}$$

$$\textbf{g/Hp-hr} = \frac{1.02\ lb/hr}{4320\ Hp} * \frac{454\ g}{1\ lb} = \textbf{0.11}$$

SPECIALTY GASES OF AMERICA, INC.
AMERICAN INDUSTRIAL GASES, INC.
AMERICAN RARE GASES, INC

6055 BRENT DR. TOLEDO, OH 43611
419-729-7732 FAX 419-729-2411

THE AMERICAN GAS GROUP
www.americangasgroup.com

ANALYTICAL REPORT

Certificate ID: 110711019 **Date:** 11/7/2011

Customer Name: B&J Welding Supply, TX

Customer Address: 1512 East 50th Street

Lubbock TX 79404

Purchase Order: 17436 **Work Order:** 127416-01

Lot Number: 1024UB11 **Product Name:** 3-Component Mixture, EPA Protocol

Size: A31 **Pressure:** 2210 psig @ 84 Deg F

Content: Ven ID# C12011

Serial #: EB0002836

Analysis Date: 11/2/2011

Shelf Life: 36 months **Expiration Date:** 11/2/2014

Component	Nominal	Actual	Accuracy	Method
Oxygen	12.0%	11.7%	+/- 1% rel	Paramagnetic
Carbon Dioxide	12.0%	12.2%	+/- 1% rel	FTIR
Nitrogen	Balance	Balance		

REFERENCE STANDARD

Std Type	Std #	Cyl #	Concentration	Exp Date
GMIS	0606JG11	EB0001508	15.1500	6/7/2013
GMIS	0625HE10	EB0023062	19.8500	6/28/2012

INSTRUMENTATION

Instrument / ID	Component
Servomex 5200	O2
MKS 2031	CO2

Note: * ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS - SEPTEMBER 1997:G1
* DO NOT USE STANDARD WHEN PRESSURE IS BELOW 150 PSIG

Protocal
Specialty Gases of America, Inc

Issued by: Josh Jones

SPECIALTY GASES OF AMERICA, INC.
AMERICAN INDUSTRIAL GASES, INC.
AMERICAN RARE GASES, INC

6055 BRENT DR. TOLEDO, OH 43611
419-729-7732 FAX 419-729-2411

THE AMERICAN GAS GROUP

www.americangasgroup.com

ANALYTICAL REPORT

Certificate ID: 110711012 **Date:** 11/7/2011

Customer Name: B&J Welding Supply, TX

Customer Address: 1512 East 50th Street

Lubbock TX 79404

Purchase Order: 17436 **Work Order:** 127416-03

Lot Number: 1024UA11 **Product Name:** 3-Component Mixture, EPA Protocol

Size: A31 **Pressure:** 2220 psig @ 82 Deg F

Content: Ven ID# C12011

Serial #: EB0004610

Analysis Date: 11/2/2011

Shelf Life: 36 months **Expiration Date:** 11/2/2014

Component	Nominal	Actual	Accuracy	Method
Oxygen	20.9%	20.9%	+/- 1% rel	Paramagnetic
Carbon Dioxide	5.00%	5.10%	+/- 1% rel	FTIR
Nitrogen	Balance	Balance		

REFERENCE STANDARD

Std Type	Std #	Cyl #	Concentration	Exp Date
GMIS	0318XA11	EB0028214	20.9700	3/18/2013
GMIS	0625HE10	EB0023062	19.8500	6/28/2012

INSTRUMENTATION

Instrument / ID	Component
Servomex 5200	O2
MKS 2031	CO2

Note: * ANALYZED ACCORDING TO EPA TRACEABILITY PROTOCOL FOR ASSAY AND CERTIFICATION OF GASEOUS CALIBRATION STANDARDS - SEPTEMBER 1997:G1
* DO NOT USE STANDARD WHEN PRESSURE IS BELOW 150 PSIG

Protocal
Specialty Gases of America, Inc

Issued by: Josh Jones

Global Calibration Gases LLC
1500 15th Avenue Drive East,
#109
Palmetto, FL 34221
Blending Plant &
Analytical Laboratory
Accreditation No: 69191
PGVP Vendor ID: N12011

EPA PROTOCOL GAS MIXTURE

Customer:	B&J Specialty Gas	Reference#:	011612 - 2
CGA:	660	Certification Date:	1/16/12
Customer PO #:		Expiration Date:	1/16/14
Cylinder #:	EB0034805	Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (September 1997).

ANALYZED CYLINDER --

Components	Certified Concentration	Analytical Accuracy
NO	90.0 ppm	± 1 %
NOx	> 1 %	± 1 %
Propane	105.0 ppm	± 1 %
Methane	109.0 ppm	± 1 %
Carbon Monoxide	99.0 ppm	± 1 %
Nitrogen	BALANCE	-

REFERENCE STANDARD -

Type/SRM Sample	Cylinder#	Concentration
NO/ SRM 2735	Cal015838	784.4 ppm
NOx/ SRM 2735	Cal015838	787.5 ppm
Propane/ GMIS	EB0026425	310.9 ppm
Methane/ GMIS	EB0019166	94.6 ppm
CO/ GMIS	CC118813	95.5 ppm

INSTRUMENT -

Instrument/Model	Serial #	Last Date Calibrated	Analytical Method
California Analytical Instrument Model 600	Y09003	1/5/12	Chemiluminescence
Agilent	US02002031	1/10/12	Thermal conductivity

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights. We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 511635 and NIST Inst # 822/272103-06. This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Palmetto, Florida. *Do not use this standard when cylinder pressure is below 150 psig.

Principal Analyst: _____ Reviewer: _____

Date: 1/16/12 Date: 1-16-2012

B&J Welding Supply
Lamesa, Tx

Accreditation No 69191

PGVP Vendor ID N12012

EPA Protocol Gas Mixture

Customer:	B&J Welding Supply	Reference#:	011112-1
CGA:	660	Certification Date:	01/11/2012
Customer PO#	17784	Expiration Date:	01/11/2014
Cylinder #:	EB0032807	Pressure, psig:	2000

Method: This standard was analyzed according to EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards, Procedure G1 (September 1997)

Analyzed Cylinder-

Components	Certified Concentration	Analytical Accuracy
Nitric Oxide	251.4 ppm	+/-1%
NOx	<1%	+/-1%
Carbon Monoxide	257 ppm	+/-1%
Methane	248.6 ppm	+/-1%
Propane	251.6 ppm	+/-1%
Nitrogen	Balance	-

Reference Standard-

Type/SRM Sample	Cylinder #	Concentration
NO/SRM 2735	Cal015838	784.4 ppm
Nox/ SRM 2735	Cal015838	787.5 ppm
CO/ GMIS	EB0019151	1.96%
Propane/ GMIS	CC80936	2984 ppm
Methane/ GMIS	EB0026384	148.3 ppm

Instrument-

Instrument/ Model	Serial Number	Last Date Calibrated	Analytical Method
California Analytical Instument Model 600	Y09003	01/06/2012	Chemiluminescence
Agilent Quad Series	US02002031	01/11/12	Thermal Conductivity
Rosemount 880A	F-04300088	01/04/2012	Non-Dispersive Infrared

These mixtures were prepared gravimetrically using a high load high sensitivity electronic scale. Prior to filling the scale is verified for accuracy throughout the target mass range against applicable NIST traceable weights.

We certify that the weights are calibrated to ASTM E617-97 Class 1 tolerances. This calibration is referenced by serial # 7210-1, Certificate # 511635 and NIST Inst # 822/272103-06.

This report states accurately the results of the investigation made upon the material submitted to the analytical laboratory. Every effort has been made to determine objectively the information requested. However, in connection with this report, Global Calibration Gases LLC shall have no liability in excess of the established charge for this service. Assayed at Global Calibration Gases LLC, Palmetto, Florida.

*Do not use this standard when cylinder pressure is below 150 psig.

Produced by:

Global Calibration Gases LLC.
1500 15th Avenue Drive, East Suite# 109
Palmetto, Florida 34221
Accreditation No.: 69191
PGVP Vendor ID.: N12012

Principal Analyst: _____ **Date:** 1-11-12

Principal Reviewer: _____ **Date:** 1-11-12

Nolan, Shiver

From: Heap, James K
Sent: Monday, May 12, 2014 3:08 PM
To: 'stacktest.aqb@state.nm.us'; Nolan, Shiver
Cc: Thompson, Roger A; Babinski, Dina J.; Sage, Sondra, NMENV (Sondra.Sage@state.nm.us); Morris, Allan, NMENV
Subject: Annual Monitoring Report
Attachments: 14-0152-2_EPROD_SCarlsbad_T2_AnnualReport.pdf; 14-0152-1_EPROD_SCarlsbad_T1_AnnualReport.pdf; Test Report T1&T2 Annual monitoring MAY2014.pdf

Pursuant to Section A205 of Permit P130-R2, attached is the submittal form and Periodic Test-report for:
Enterprise Field Services LLC
South Carlsbad Compressor Station
AIRS: 350150044, Operating Permit (Title V): P130-R2

If you have any questions or require further information, please contact me using the info below.

Regards
++++++++++++++++++++++++++++++++
Jim Heap Sr. Field Environmental Scientist
Enterprise Products, LLC
Midland, Texas USA
Office: 432-686-5404
Cell: 432-260-0239
jkheap@eprod.com

New Mexico Environment Department
Air Quality Bureau
1301 Siler Road Building B
Santa Fe, NM 87507
Phone (505) 476-4300 Fax (505) 476-4375

Version 1/1/2010

NMED USE ONLY	
DTS	
TEMPO	

UNIVERSAL STACK TEST NOTIFICATION, PROTOCOL AND REPORT FORM

NMED USE ONLY	
Staff	
Admin	

Submit to: Stacktest.aqb@state.nm.us

I. DATABASE HEADER INFORMATION (drop down menus in bold)

a. AI#		
0218	Test Report	Periodic Test (EPA Method)

d. Company Name:	e. Facility Name:
Enterprise Field Services LLC	South Carlsbad Compressor Station

f. Emission Unit Numbers:	g. Emission Unit Description (boiler, Waukesha 7042, etc)
T1, T2	Turbines: GE Solar T4702

h. Reports - Tracking Number from notification response:	i. Proposed Test Date:	j. Actual test date:
CMT	30MAY2014	03JAN14,04JAN14

k. Reason for test (name permit requirement, NSPS, MACT, consent decree, etc. Indicate here is this notification is a revised test date only)
Annual Performance Test of existing engines pursuant to Title V Permit A205 A.

II. GENERAL COMPANY AND FACILITY INFORMATION

a.Company Address:			k.. Facility Address:		
PO Box 4324			Roberson Road, Eddy County		
b. City:	c. State:	d. Zip:	l. City:	m. State:	n. Zip:
Houston	TX	77210	Loving	NM	88526
e. Environmental Contact:	f. Title:		o. Facility Contact:	p. Title:	
Jim Heap	Sr. Env. Scientist		Dave Kresta	Area Mgr. - OPS	
g. Phone Number:	h. Cell Number:		q. Phone Number:	r. Cell Number:	
432-686-5404	432-260-0239		432-943-1801	325-277-5728	
i. Email Address:			s. Email Address:		
jkheap@eprod.com			dkresta@eprod.com		
j. Title V Permit Number:			t. NSR Permit Number:		
P-130-R2			0220-M7		

u. Detailed driving directions from nearest New Mexico town:
From Loving: US385N to Roberson Road West
Roberson Road west to station.

III. TESTING FIRM

a. Company:			g. Contact:	
Nordon Corporation			Shunil Jacob	
b. Address 1:			h. Title:	
PO Box 1415			Operations Manager	
c. Address 2:			i. Office Phone:	j. Cell Phone:
			512-355-3786	512-750-9226
d. City:	e. State:	f. Zip:	k. Email Address:	
Round Rock	TX	78680	shunil@nordoncorp.com	

IV. EMISSION UNIT

a. Emission Unit Number:	b. Make & Model Number
1 and 2	**GE Solar Centaur T-4702**
c. Serial Number:	d. Permitted Capacity:
1. OHD10C7915, 2. OHE12C7057	**3609 hp**

e Exceptions: Explain if test is late, rescheduled, related to an enforcement action:

NA

g. Emission Unit Description and brief process name or description:

Natural-gas fired turbines and compressors, processing field gas.

h. Installation Date:	i. Startup Date:	k. Date Reached Max. Capacity:

l. Control Equipment Description as listed in permit (model, ser. # etc. if applicable):

NA

STACK PARAMETERS

m. Velocity (ft/sec):

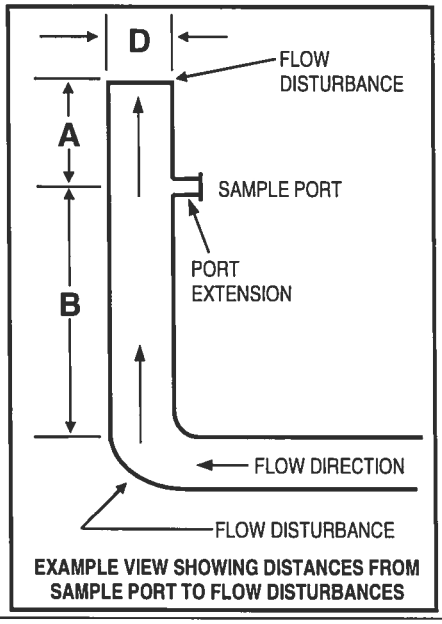
n. Temperature (°C):

o. Stack Diameter, D (in.):

p. Distance to Stack Bends or Obstructions:

Upstream, Distance A (in.):

Downstream, Distance B (in.):



EXAMPLE VIEW SHOWING DISTANCES FROM SAMPLE PORT TO FLOW DISTURBANCES

Attach an explanation or drawing to explain any difficult or unusual stack geometry or parameters.

V. POLLUTANTS AND PROPOSED TEST METHODS

Pollutant or Parameter:		Proposed Test Methods (Deviations from approved methods require supporting documentation and prior authorization)	Deviation to Test Method Requested
☐	**Portable Analyzer Methods for NOx, CO, SO_2**		☐
☒	NOx	**EPA Method 7E**	☐
☒	CO	**EPA Method 10**	☐
☐	SO2	**EPA Method 6**	☐
☐	VOCs	**(Specify)**	☐
☐	HAPs	**(Specify)**	☐
☐	PM (TSP)	**EPA Method 5**	☐
☐	PM10	**EPA Method 201**	☐
☐	PM2.5	**(Specify)**	☐
☐	Opacity	**EPA Method 9**	☐
☐	Visual E.	**EPA Method 22**	☐
☐	Stack Flow	**EPA Methods 1 - 3**	☐
☐	Moisture	**EPA Method 4**	☐
☒	Other	**(Specify) Method 3A (O2)**	☐
☒	Other	**(Specify) Method 19 (Stack Flow)**	☐

List Specific VOC's and HAP's:

VI. PROPOSED TEST RUN AND TEST LOAD INFORMATION

a. Number of Test Runs:	b. Run Duration	c. Required by (regulation or permit number):	d. Specific Condition or Section:
3	**00:30:00**	**Title V Permit P130-R2**	**A205 A.**

PLEASE NOTE – Default run duration is 60 minutes, unless otherwise specified by an applicable regulation.

e. Expected Load:	f. Percent of Permitted Capacity:	g. Is this an opacity test?	h. If yes, no. of observation pts.:
	90-110%	Yes ☐ No ☒	

i. If expected load during test is less than 90% of capacity, explain:

NOTE – Failure to test at 90-100% of permitted load will limit unit operation to 110% of tested load until a new initial compliance test is conducted.

PLANT OR UNIT OPERATING PARAMETERS TO BE MONITORED

j. List and explain the plant operating parameters that will be monitored and applicable permit conditions or regulatory standards.

Stack emissions of NOx and CO

VII. ADDITIONAL DETAILS (where applicable)

RATA and INSTRUMENTAL ANALYZER CALIBRATION PROCEDURES

a. Do any of the methods you are proposing utilize instrumental analyzers (i.e.; EPA Methods 3A, 6C, 7E, 10, 18, 25/25A, 320 etc.)? If yes, briefly describe analyzer calibration procedures and/or calibration standard procedures. Enter the highest pollutant concentration expected and the proposed concentrations of calibration gases. ☐ Yes ☒ No

SAMPLING TRAIN LEAK CHECK PROCEDURES

b. Do any of the methods you are proposing utilize the EPA Method 5 sampling train (i.e.; EPA Methods 1-4, 5, 17, 26/26A, 29, etc.)? If yes, briefly describe sampling train and pitot tube leak check procedures: ☐ Yes ☒ No

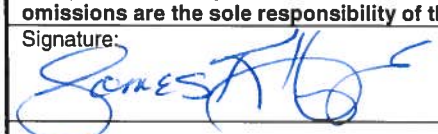
EPA METHOD 19 IN LIEU OF EPA METHODS 1-4

c. Are you proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4? If yes, explain why you believe this proposal is justified: ☒ Yes ☐ No

Method 19 is being used to avoid specific safety concerns regarding the uninsulated stack (burn hazard).

PLEASE NOTE – EPA Method 19 may be utilized in lieu of EPA Methods 1-4, subject to the approval of the Department. If you are proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4, you MUST include a recent fuel gas heating value analysis as well as a recent fuel flow meter calibration certificate, preferably conducted on the day of the test, but no earlier than three months prior to the test date. If the analyses have been conducted prior to the test date, you MUST append the certificates to the protocol. If conducted on the day of the test, you MUST append the certificates to the final test report.

VIII. ATTACHMENTS (as needed to support proposed test; check all that apply)		
NOTIFICATION/PROTOCOL ATTACHMENTS		
☐	Road Map Indicating Directions from Nearest New Mexico Town to Facility	
☐	Schematic of process being tested showing emission points, sampling sites and stack cross-section	
☐	Copy of proposed test methods (except for those promulgated test methods found in 40 CFR 51, 60, 61 and 63)	
☐	Fuel Heating Value Analysis	
☐	Fuel Flow Meter Calibration Certificate	
☐	Other:	
☐	Other:	
TEST REPORT ATTACHMENTS		
☒	**Section 2. Tables of Results**	
☐	**Supporting Documents (Specify)**	
Retain Report Section 3 - Test Procedures, Data, Calculations, Appendices – 2 years NSR permits, 5 years TV		

IX. CERTIFICATION		
This document has been prepared under my supervision and is accurate and complete to the best of my knowledge. I understand that acceptance of this protocol does not waive the requirements of any permit or regulation. I understand that any procedural errors or omissions are the sole responsibility of the permit holder.		
Signature: 	Print Name and Title: **James K. Heap, Senior Environmental Scientist**	Date: **12MAY2014**
Responsible Official for Title V? ☐ Yes	☒ No (R.O signature not required for routine periodic testing)	

Heap, James K

From: Sage, Sondra, NMENV <Sondra.Sage@state.nm.us>
Sent: Thursday, May 01, 2014 4:11 PM
To: Heap, James K
Cc: Morris, Allan, NMENV; Samaniego, Robert, NMENV
Subject: FW: Test Substitution Request

Mr. Heap,

Following a review of the additional information you provided regarding the previous periodic test, it appears that the test conducted for Initial GG compliance falls within the required timeframe for the Annual Monitoring test. If you wish to reformat the results and use them for the Annual Monitoring Test, please submit a test protocol showing the test as the Annual Monitoring Test , then submit the results in the appropriate format. This will essentially qualify as a case of enforcement discretion, since it will require waiving the 30 day notice for the test, as well as the requirement to report the test in a timely manner. This acceptance of the GG Initial Test results for the Annual Monitoring Test is applicable only to this instance. If, in future, you wish to use the results of a single testing event to comply with two requirements, it will be necessary to submit timely testing notifications and testing results indicating this is the case. It will not be acceptable to request this after the fact in future instances.

Sondra Sage
Compliance Specialist
NMED-Air Quality Bureau
525 Camino de los Marquez, Suite 1
Santa Fe, NM 87505
(505)476-4358
"Never cruel nor cowardly. Never give up, never give in." - the Doctor

---

From: Morris, Allan, NMENV
Sent: Wednesday, April 30, 2014 10:30 AM
To: Sage, Sondra, NMENV
Cc: Samaniego, Robert, NMENV
Subject: FW: Test Substitution Request

From: Heap, James K [mailto:JKHEAP@eprod.com]
Sent: Tuesday, April 29, 2014 6:11 PM
To: Morris, Allan, NMENV; Nolan, Shiver
Cc: Thompson, Roger A; Babinski, Dina J.; Shunil Jacob
Subject: Test Substitution Request

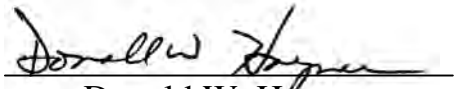
Pursuant to your request during our phone call today, I am providing you detail regarding Enterprise's desire to utilize our January Initial GG test for the permit required Annual Monitoring Test at the South Carlsbad Compressor Station (0218).

Annual Emission Test Report
for one
Solar Centaur T4702 Compressor Turbine
Unit Number T1
located at the
South Carlsbad Compressor Station

Prepared for
Enterprise Field Services, LLC
P. O. Box 4324
Houston, TX 77210

January 2014
Nordon Project No. 14-0152-1

This test report has been reviewed and approved for submittal to the New Mexico Environment Department (NMED) by the following representatives:



Donald W. Haynes
Nordon Corporation

Enterprise Field Services, LLC

NORDON *CORPORATION*

P. O. Box 1415 Round Rock, Texas 78680
Phone (512) 355-3786 Fax (512) 355-3785

SUMMARY OF RESULTS

Exhaust emission testing was performed on one Solar Centaur T4702 (Unit # T1) compressor turbine for Enterprise Field Services, LLC located at the South Carlsbad Compressor Station, near Loving, Eddy County, New Mexico. The turbine is used for natural gas compression. The testing was performed to demonstrate the continued compliance with the emission limits set forth in the NMED permit. Nordon Corporation of Round Rock, Texas, performed the exhaust emissions testing on January 3, 2014.

Continuous emission instruments housed in a mobile analysis unit were used to determine the concentrations of NO_X, CO, and O_2 in the exhaust stack of the compressor turbine. The following Code of Federal Regulations, Title 40, Part 60 (40CFR60), Appendix A reference methods were used to determine stack gas concentrations: Method 7E for nitrogen oxides (NO_X), Method 10 for carbon monoxide (CO), and Method 3A for oxygen (O_2). Mass emission rates were determined stoichiometrically according to Method 19 data reduction procedures using measured fuel flow rate.

Three thirty-minute test runs were performed on the exhaust of the turbine while firing on natural gas. The results of the testing are presented in a summary of results table. This table includes all the relevant information pertaining to the turbine/compressor operations, exhaust emissions, and ambient conditions. Exhaust concentrations are presented in part per million by volume (ppmv) or percent (%) by volume. The mass emission rates are presented in pound per hour (lb/hr) and ton per year (tpy). Turbine/compressor operational data was collected during each test run.

Summary of Results

NORDON CORPORATION

P.O. Box 1415 Round Rock, Texas 78680
PHONE (512) 355-3786 • FAX (512)355-3785

Plant: South Carlsbad Compressor Station
Facility Owner:Enterprise Field Services, LLC
Location: Loving, Eddy County, New Mexico
Unit Make/Model: Solar Centaur T4702
Unit Number: T1 , Ser. No.OHD10C7915
Test Personnel: DWH / KRJ

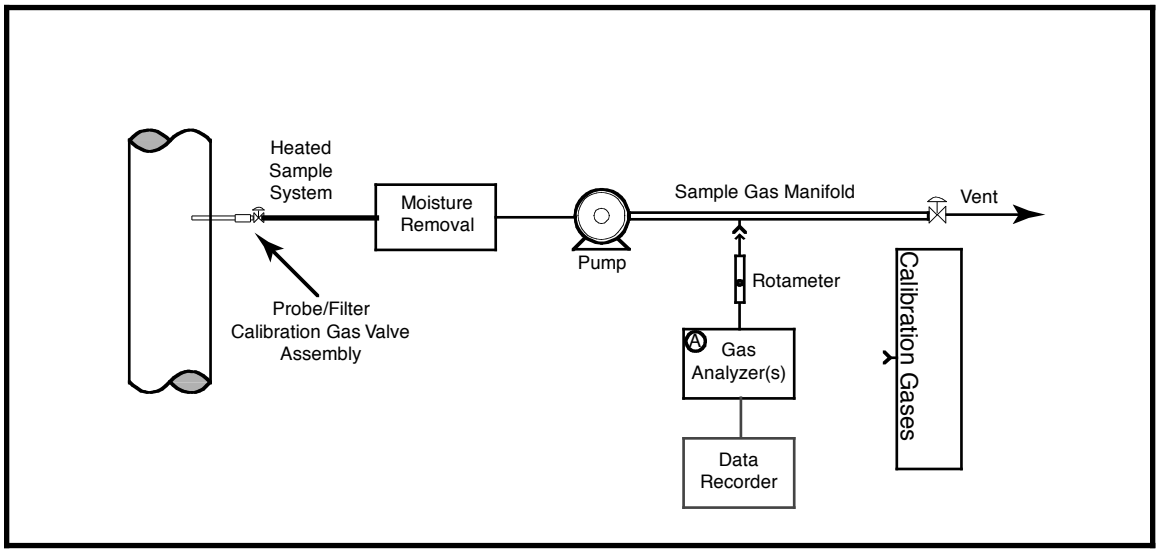
RUN NUMBER	DH-010314.01	DH-010314.02	DH-010314.03	
Date	1/3/14	1/3/14	1/3/14	
Start Time (hr)	9:23	10:12	10:49	
Stop Time (hr)	10:04	10:42	11:19	
TURBINE DATA				
Rated Horsepower (Hp)	3609	3609	3609	
Fuel Pressure (psig)	193	195	207	
Gas Producer Speed (%)	94.8	94.8	94.8	
Power Turbine Speed (%)	92.8	92.3	91.9	
Turbine Compressor Discharge Pressure (psig)	105	104	102	
Exhaust Temperature (°F)	1078	1082	1091	
Horsepower (Hp)	3508	3478	3418	
Heat Rate (MMBtu/hr)	43.0	43.0	42.4	
COMPRESSOR DATA				
Suction Pressure (psig)	293	294	295	
Suction Temperature (°F)	58	62	64	
Discharge Pressure (psig)	529	532	535	
Discharge Temperature (°F)	145	147	148	
Gas Production (MMscfd)	37	38	37	
FUEL & EXHAUST DATA				
O2 F-factor (dscf/MMBtu)	8698	8698	8698	
Fuel Heating Value (HHV Btu/scf)	1098	1098	1098	
Stoichiometric Exhaust Flow (dscfh)	1.94E+06	1.96E+06	1.96E+06	
AMBIENT CONDITIONS				
Temperature (°F): Dry bulb	39	44	47	
Temperature (°F): Wet bulb	32	37	39	
Atmospheric Pressure ("Hg)	26.90	26.88	26.84	
Humidity (lb water/lb air)	0.0026	0.0035	0.0037	
Humidity (% vol)	0.4	0.5	0.6	
MEASURED EXHAUST OUTLET CONCENTRATIONS				**AVERAGES**
NOx (ppmv)	74.0	74.1	75.0	**74.4**
CO (ppmv)	15.2	14.0	13.7	**14.3**
O2 (%)	16.9	16.9	17.0	**16.9**
EMISSION RATES				
NOx (lb/hr) LIMIT=27.0	17.14	17.36	17.57	**17.35**
CO (lb/hr) LIMIT=7.4	2.14	2.00	1.95	**2.03**
NOx (tpy, @8760 hr/yr) LIMIT=118.3	75.06	76.03	76.95	**76.01**
CO (tpy, @8760 hr/yr) LIMIT=32.5	9.39	8.77	8.55	**8.91**

PROCEDURES

Continuous emission instruments housed in the mobile analysis unit were used to determine the concentrations of pollutants found in the turbine exhaust stack. The following 40CFR60, Appendix A reference methods were used to determine stack gas concentrations: Method 7E for NO_X, Method 10 for CO, and Method 3A for O_2. Mass emission rates were determined according to data reduction procedures provided in Method 19.

As depicted in Figure 1, Sample System and Instrumentation, a stainless steel sample probe was located in the centroid of the stack. Sample gas enters the stainless steel probe into a stainless steel 3-way valve. The 3-way valve is used to perform leak checks and sample system bias checks. From the valve, the gas flows through a 3/8" Teflon® heat traced sample line to a stainless steel minimum contact condenser to dry the sample. From the condenser, a 3/8" Teflon sample line brings the exhaust gas to a manifold in the mobile analysis unit via a Teflon-lined diaphragm pump. The manifold partitions the gas through quick-connects so that each instrument can directly sample exhaust gas. Each instrument is equipped with a rotometer to maintain correct sample pressure and flow. The instruments are connected to a computer data acquisition system to document its response during quality assurance activities and testing.

Figure 1: Sample System and Instrumentation



(A) Gas Analyzers - NO_X, CO, O_2

Analyzer Make	Analyzer Model	Detection Principle
NO_X Analyzer: Thermo Environmental	42i-HL	Chemiluminescence
CO Analyzer : Thermo Environmental	48i-HL	Non-dispersive Infra-red
O_2 Analyzer: Thermo Environmental	48i-HL	Paramagnetic Cell

A continuous analyzer is used to determine NO_X concentrations according to EPA Reference Method 7E. This instrument employs a chemiluminescent detection principle. The NO_X concentration and mass emission rates are expressed as NO_2 per the reference method.

A continuous analyzer is used to determine CO concentrations according to EPA Reference Method 10. The instrument employs a nondispersive infrared detector coupled to a gas filter correlation wheel, which eliminates the interferences due to water and carbon dioxide.

A continuous analyzer is used to determine O_2 concentrations according to EPA Reference Method 3A. The instrument is equipped with either an electrochemical or paramagnetic cell.

Data obtained from the continuous emission analyzers were recorded by a National Instruments data acquisition (DAQ) system using Labview software. A copy of the DAQ records can be found in the appendix of this report.

Quality assurance activities meeting the requirements of the EPA reference methods were performed during the turbine testing. Tables documenting quality assurance procedures are located in the appendix of this report.

Exhaust flow rate was determined according to the data reduction procedures provided in EPA Method 19. The O_2 F-Factor used in the emission rate calculation was either calculated based on a recent fuel analysis or the standard 8710 value for natural gas provided by EPA Method 19.

Nordon personnel recorded turbine compressor operating parameters. Ambient conditions were collected using a wet/dry bulb sling psychrometer to measure temperature and a barometer to measure absolute atmospheric pressure.

APPENDIX

Field Data Sheets
Example Calculations
Gas Certifications
Quality Assurance Activities
DAQ Records

C_1	86.893
C_2	6.8402
C_3	2.5624
n-C_4	0.5497
i-C_4	0.2817
n-C_5	0.0813
i-C_5	0.0928
C_6	0.0534
C_{7+}	0.0813
N_2	1.1928
CO_2	1.4528

Plant: South Carlsbad Compressor Station	
Facility Owner: Enterprise	
Unit Owner: Enterprise	
Location: Loving, Eddy County, New Mexico	
Applicable Regulation: 40CFR60, Subpart GG	
Unit Make/Model: Solar Centaur T-4702	
Unit Number: T1	Ser. No. OHD10C7915
Test Personnel: DWH / KRJ	
Date: 1/3/14	

Run Number	01	02	03	04	05	06	07	08	09	10	11	12
Start Time	~~1023~~	~~1112~~	~~1149~~	~~1226~~	~~1303~~	~~1340~~	~~1417~~	~~1454~~	1431	1508	1545	1622
~~Stop Time~~	923	1012	1049	1126	1203	1240	1317	1354				
Turbine/Compressor Operation												
Load Condition	Max	Max	Max									
Fuel Flow (Mscfd)	941	941	926	847	871	865	652	890	884	636	741	677
Fuel Flow (scfh)												
Power Turbine Speed (%)	92.8	92.3	9.19	91.6	90.9	90.6	90.1	89.4	89.1	89.3	89.2	89.8
Gas Producer Speed (%)	94.8	94.8	94.8	94.7	94.8	94.8	94.8	94.8	94.8	94.8	94.8	94.8
Horsepower (hp)												
Rated Horsepower (hp)	3609	3609	3609	3609	3609	3609	3609	3609	3609	3609	3609	3609
% Load												
Turbine Compressor Discharge, PCD (psig)	105	104	102	102	100	99	98	98	97	98	98	100
Turbine Temperature T5 (°F)	1078	1082	1091	1092	1100	1102	1109	1111	1113	1106	1104	1103
Gas Compressor Suction Pressure (psig)	293	294	295	296	300	304	307	311	313	314	314	313
Gas Compressor Discharge Pressure (psig)	~~528~~529	532	535	530	523	521	523	524	526	527	529	531
Gas Compressor Suction Temperature (°F)	58	62	64	64	68	70	72	74	74	76	72	70
Gas Compressor Discharge Temperature (°F)	145	147	148	148	151	152	152	153	155	156	151	148
Fuel Gas Pressure (psig)	193	195	207	191	189	190	195	191	195	191	189	192
Gas Flow (MMscfd)	~~37~~ 37	38	37	38	37	37	37	37	37	38	39	40
Δt, ft.	2880	2900	2940	2960	3000	3020	3040	3060	3060	3080	3080	3100
Ambient Conditions												
Barometric Pressure (absolute In. Hg)	26.90	26.88	26.84	26.82	26.78	26.76	26.74	26.72	26.72			
Temperature Dry (°F)	39	44	47	49	55	60	62	67	68	65	63	55
Temperature Wet (°F)	32	37	39	40	43	46	47	49	49	48	47	44

C

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

Certificate of Analysis

Number: 1030-14010388-001A

Jan. 21, 2014

Thor Olsen
Nordon Corporation
PO Box 1415
Round Rock, TX 78680

Station Name:	South Calrsbad Compressor Stition	Sampled By:	
Station Location:	Loving, NM	Sample Of:	Gas Spot
Sample Point:	Turbine Fuel Gas	Sample Date:	01/04/2014 10:00
Cylinder No:	0298	Sample Conditions:	190 psig, @ 65 °F
Analyzed:	01/16/2014 05:34:22 by JD	Method:	GPA-2261M

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.65 psia		
Nitrogen	1.204	1.797		GPM TOTAL C2+	2.870
Carbon Dioxide	1.556	3.648		GPM TOTAL C3+	1.036
Methane	86.800	74.184		GPM TOTAL iC5+	0.077
Ethane	6.877	11.016	1.834		
Propane	2.516	5.911	0.691		
Iso-butane	0.292	0.904	0.095		
n-Butane	0.552	1.709	0.173		
Iso-pentane	0.086	0.331	0.031		
n-Pentane	0.072	0.277	0.026		
Hexanes Plus	0.045	0.223	0.020		
	100.000	100.000	2.870		

Physical Properties	Total	C6+
Relative Density Real Gas	0.6496	3.2176
Calculated Molecular Weight	18.77	93.19
Compressibility Factor	0.9973	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F		
Real Gas Dry BTU	1097	5113
Water Sat. Gas Base BTU	1078	5024

Comments: H2O Mol% : 1.750 ; Wt% : 1.681
Reran Sample Confirmed GC Analysis

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Fuel Gas Analysis

Gross Btu/scf	**1098**
O_2 F-Factor dscf/MMBtu	**8698**
O_2 F-Factor (wscf/MMBtu)	**10660**
H_2O F-Factor (scf/MMBtu)	**1962**
CO_2 F-Factor (scf CO_2/MMBtu)	**1058**
Btu/lb	**22164**
Sp. Gr.	**0.6516**
F_o	**1.719**
Moisture Factor	**18.407**
VOC Fraction	**0.063**

Compound	**Mol. Formula**	**Mol. %**
Methane	CH4	86.800
Ethane	C2H6	6.877
Propane	C3H8	2.516
Isobutane	C4H10	0.292
n-Butane	C4H10	0.552
Isopentane	C5H12	0.086
n-Pentane	C5H12	0.072
NeoPentane	C5H12	
n-Hexane	C6H14	0.045
n-Heptane	C7H16	
n-Octane	C8H18	
Carbon dioxide	CO2	1.556
Nitrogen	N2	1.204
Total		100.000

Chain of Custody Form

REPORT TO:

Company: Nordon Corporation
Contact: Don Haynes
Contact Phone: 512-355-3786
Contact Email: don@nordoncorp.com

PROJECT INFO:

Client Name: Enterprise Products
Facility Name: South Carlsbad Compressor Station
Facility Location: Loving, NM
Project #: 14-0001

LABORATORY INFO:

Company: SPL, Inc.
Address: 8820 Interchange Dr
Address: Houston, TX 77054
Contact: Chris Staley
Contact Info: cstaley@spl-inc.com
Lab Project#:

NORDON Corporation
P.O Box 1415 Round Rock, TX 78680
PH: 512.355.3786 FAX: 512.355.3785

Turn Around Time

☒ Standard
☐ Rush
specify RUSH date(s):

Lab ID	Sample Identification	Sample Description	Collection Date	Analysis Requested: Method 323 (HCHO)	CTM-027 (NH3)	EPA Method 5	EPA Method 201a	EPA Method 202	ASTM D6667	ASTM D1945	Sample Matrix	Container Type	Remarks (volumes,special notes, etc.)
	1030-00406	natural gas	1/4/14						x	x	natural gas	cylinder	
	1030-00298	natural gas	1/4/14						x	x	natural gas	cylinder	

Relinquished By: C. Lane **Date:** 1-13-14
Received By: **Date:** 1-13-14

Relinquished By: **Date:**
Received By: JAVIER GUZ **Date:** 1/14/14 15:01

NOTES:

Page 1 of 1

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010314.01 **Component: NOx**

Observed Measurements/Data:		**Scale, Certified Concentrations**	
	Direct Calibration Results		
0.17	NOx direct zero, Cdiro	94.7	NOx chart scale, CS
95.20	NOx direct span, Cdirm	94.7	NOx actual calibration gas concentration, Cma
	System Calibration Results	0	Actual low-level gas concentration, Coa
2.74	NOx, initial zero reading, Csoi		
92.63	NOx inital span reading, Csmi		
2.72	NOx final zero reading, Cof		
91.44	NOx final span reading, Csmf		
	Run Results		
72.48	NOx run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= 2.71 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -2.72 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= 2.69 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -3.97 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.03

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 1.26

Bias- Average Zero (Coavg)

$$= \left(\frac{Csoi + Csof}{2}\right)$$

= 2.730 (ppmv)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2}\right)$$

= 92.04 (ppmv)

NOx Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg}\right)$$

74.0 (ppmv)

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010314.01 **Component: CO**

Observed Measurements/Data:		**Scale, Certified Concentrations**	
	Direct Calibration Results		
-0.02	CO direct zero, Cdiro	193	CO chart scale, CS
193.21	CO direct span, Cdirm	193	CO actual calibration gas concentration, Cma
	System Calibration Results	0	Actual low-level gas concentration, Coa
-0.71	CO, initial zero reading, Csoi		
192.18	CO inital span reading, Csmi		
-1.00	CO final zero reading, Cof		
191.53	CO final span reading, Csmf		
	Run Results		
14.33	CO run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= -0.35 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -0.53 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= -0.50 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -0.87 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.15

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 0.34

Bias- Average Zero (Coavg)

$$= \left(\frac{Csoi + Csof}{2} \right)$$

= -0.851 (ppmv)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2} \right)$$

= 191.85 (ppmv)

CO Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg} \right)$$

15.2 (ppmv)

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010314.01 **Component: O2**

Observed Measurements/Data:		**Scale, Certified Concentrations**	
	Direct Calibration Results		
0.05	O2 direct zero, Cdiro	20.92	O2 chart scale, CS
11.02	O2 direct span, Cdirm	10.99	O2 actual calibration gas Concentration, Cma
	System Calibration Results	0	Actual low-level gas Concentration, Coa
0.05	O2, initial zero reading, Csoi		
10.98	O2 inital span reading, Csmi		
0.16	O2 final zero reading, Csof		
10.99	O2 final span reading, Csmf		
	Run Results		
16.81	O2 run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= 0.03 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -0.18 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= 0.55 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -0.16 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.51

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 0.02

Bias- Average Zero (O2avg)

$$= \left(\frac{Csoi + Csof}{2} \right)$$

= 0.107 (%)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2} \right)$$

= 10.99 (%)

O2 Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg} \right)$$

16.9 (%)

Example Calculations: Method 19 Exhaust Flow

Test Run #: DH-010314.01 **Component: Stack Flow**

Observed Measurements/Data:		**Standards/Constants/Conversion Factors**	
39208	Fuel Flow Rate (scfh)	1000000	Btu per MMBtu
8698	Fuel O2 F-Factor (dscf/MMBtu)	20.9	O2 % in air
1098	Fuel Heating Value (Btu/scf)		
16.9	O2 final concentration (%)		

Derivation of Exhaust Flow using Equation 19-1 from Method 19

$$E\left(\frac{lb}{MMBtu}\right) = C_d\left(\frac{lb}{scf}\right)F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{\left(20.9-\%O_2\right)} \qquad \text{Eq. 19-1}$$

divide each side of equation by Cd to obtain the following

$$\left(\frac{scf}{MMBtu}\right) = F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{\left(20.9-\%O_2\right)}$$

multiply each side of equation by heat input (MMBtu/hr)

$$\left(\frac{scf}{hr}\right) = HeatInput\left(\frac{MMBtu}{hr}\right)\times F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{\left(20.9-\%O_2\right)}$$

Fuel Gas Heat Rate/Heat Input (MMBtu/hr)

$$= \left(\text{Fuel Flow Rate } \frac{scf}{hr}\right)\times\left(\text{Fuel Heating Value } \frac{Btu}{scf}\right)\times\left(\frac{1MMBtu}{1000000\,Btu}\right)$$

= 43.04 (MMBtu/hr)

Stack Gas Volumetric Flow Rate, Q (dscfh)

$$= \left(\text{HeatInput } \frac{MMBtu}{hr}\right)\times\left(\text{Fuel } O_2 \text{ F-Factor } \frac{dscf}{MMBtu}\right)\times\left(\frac{20.9}{20.9-O_2}\right)$$

= 1.94E+06 (dscfh)

Example Calculations: Emissions Calculations

Test Run #: DH-010314.01 **Component: NOx**

Observed Measurements/Data:		**Standards/Constants/Conversion Factors**	
74.0	NOx final concentration, Cd (ppmv)	528	EPA Standard Temperature, Tstd (°R)
1940680	Average Stack Gas Flow Rate, Q (DSCFH)	29.92	EPA Standard Pressure, Pstd (in. Hg)
16.9	O2 final concentration (%)	385.3	Gas Constant @ EPA STP (SCF/lb-mol)
3508	Horsepower (Hp)	28.317	Liters per Cubic Foot
8698	Fuel O2 Factor (DSCF/MMBtu)	46	NOx molecular wt. (NO2), MW (lb/lb-mol)
		0.001912	Conversion constant (NOx ppm to g/m3)
		8760	hours per year
		2000	pounds per ton
		0.028317	cubic meters per cubic feet

NOx Emissions (ppmv @ 15%O2): *Applicable* yes

$$= \text{ppmv@15\%O}_2 = Cd \times \left(\frac{20.9\text{-}15}{20.9\text{-O}_2 \text{ concentration (\%)}} \right)$$

= 108 ppmv @15% O2

NOx Emission Rate (g/hp-hr): *Applicable* no

$$= \left(\frac{\text{g}}{\text{HP} - \text{hr}} \right) = \frac{Cd \times .001912 \times Q \times \left(\frac{0.028317 m^3}{ft^3} \right)}{HP}$$

= NOT APPLICABLE

NOx Emission Rate (lb/hr): *Applicable* yes

$$= \left(\frac{ppmv}{10^6} \right) \times \text{Average Stack Flow,Q} \times \left(\frac{MW}{385.3} \right)$$

= 17.14 (lb/hr)

NOx Emission Rate (tons/year): *Applicable* yes

$$= \left(\frac{\text{tons}}{\text{yr}} \right) = \frac{\text{lb}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}}$$

= 75.06 (tons/yr)

NOx Emissions (lb/MMBtu): *Applicable* no

$$= \left(\frac{lb}{MMBtu} \right) = \left(\frac{Cd}{10^6} \right) \times \left(\frac{MW}{385.3} \right) \times \left(\frac{DSCF}{MMBtu} \right) \times \left(\frac{20.9}{\left(20.9\text{-O}_2 \text{ concentration (\%)}\right)} \right)$$

= NOT APPLICABLE

Example Calculations: Emissions Calculations

Test Run #: DH-010314.01 **Component: CO**

Observed Measurements/Data:		**Standards/Constants/Conversion Factors**	
15.2	CO final concentration, Cd (ppmv)	528	EPA Standard Temperature, Tstd (°R)
1940680	Average Stack Gas Flow Rate, Q (DSCFH)	29.92	EPA Standard Pressure, Pstd (in. Hg)
16.9	O2 final concentration (%)	385.3	Gas Constant @ EPA STP (SCF/lb-mol)
3508	Horsepower (Hp)	28.317	Liters per Cubic Foot
8698	Fuel O2 Factor (DSCF/MMBtu)	28	CO molecular wt., MW (lb/lb-mol)
		0.001164	Conversion constant (CO ppm to g/m3)
		8760	hours per year
		2000	pounds per ton
		0.028317	cubic meters per cubic feet

CO Emissions (ppmv @ 15%O2): *Applicable* no

$$= \text{ppmv@15\%O}_2 = Cd \times \left(\frac{20.9\text{-}15}{20.9\text{-O}_2 \text{ concentration (\%)}} \right)$$

= NOT APPLICABLE

CO Emission Rate (g/hp-hr): *Applicable* no

$$= \left(\frac{\text{g}}{\text{HP} - \text{hr}} \right) = \frac{Cd \times .001164 \times Q \times \left(\frac{0.028317 m^3}{ft^3} \right)}{HP}$$

= NOT APPLICABLE

CO Emission Rate (lb/hr): *Applicable* yes

$$= \left(\frac{ppmv}{10^6} \right) \times \text{Average Stack Flow,Q} \times \left(\frac{MW}{385.3} \right)$$

= 2.14 (lb/hr)

CO Emission Rate (tons/year): *Applicable* yes

$$= \left(\frac{\text{tons}}{\text{yr}} \right) = \frac{\text{lb}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}}$$

= 9.39 (tons/yr)

CO Emissions (lb/MMBtu): *Applicable* no

$$= \left(\frac{lb}{MMBtu} \right) = \left(\frac{Cd}{10^6} \right) \times \left(\frac{MW}{385.3} \right) \times \left(\frac{DSCF}{MMBtu} \right) \times \left(\frac{20.9}{\left(20.9\text{-O}_2 \text{ concentration (\%)}\right)} \right)$$

= NOT APPLICABLE

THE LINDE GROUP

Linde

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#: I12013
CUSTOMER: UNION CITY
SALES#: 501210969
PROD#: 1254051
P.O.# : 4501210969
MATERIAL#: 24091202
CERTIFICATION DATE: 01-May-2013
EXPIRATION DATE: 02-May-2021
(Using the May 2012 Revision of the EPA Protocol)

GAS CODE: APPVD
CYLINDER # : CC-310704
CYLINDER PRES: 2000 PSIG
CYLINDER VALVE: CGA 660
CYLINDER SIZE: 2A
CYLINDER MATERIAL: Aluminum
GAS VOLUME: 4000 Liter
BLEND TOLERANCE: 5% Relative
PAGE: 1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Propane	01-May-2013	30.0 ppm	30.0 ppm	+/- 1%
Nitric Oxide	24-Apr-2013 01-May-2013	47.4 ppm 47.3 ppm	47.3 ppm	+/- 1%
NOx			47.3 ppm	Reference Value Only
Carbon Monoxide	01-May-2013	95.3 ppm	95.3 ppm	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Propane	GMIS-1	cc-113884	100.5 ppm
Nitric Oxide	GMIS-1	CC-278874	100.7 ppm
Carbon Monoxide	GMIS-1	cc-88590	96.8 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Propane	H. Packard 6890	US00001434	GC - FID	01-May-2013
Nitric Oxide	CAI 400-CLD	6L09004	Cheml	01-Apr-2013
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	19-Apr-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____
MATTHEW JACKSON

Linde Gas North America LLC

DATE: 01-May-2013

(908) 329-9700 Main (908) 329-9740 Fax
www.LindeGas.com

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

CERTIFICATE OF ANALYSIS
EPA PROTOCOL GAS

Cylinder Number:	EB0027577	**Certification Date:**	10/29/2012
Product ID Number:	124749	**Expiration Date:**	**10/22/2016**
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA Number:	GC1210170814-0	**Lot Number:**	GC1210170814
Customer PO. NO.:		**Tracking Number:**	048358699
Customer		**Previous Certification Dates:**	

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, using procedure G1 and/or G2. All values so noted are certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder Below 150 psig (1.0 Megapascal).

Certified Concentration(s)

Component	Concentration	Analytical Principle	Accuracy
Nitric Oxide	**94.5 PPM**	Non Dispersive Infrared Absorptiometry	**:ulate: High Unce**
Total Oxides of Nitrogen	**94.7 PPM**	Non Dispersive Infrared Absorptiometry	
Propane	**51 PPM**	FTIR	**+/- 1% NIST**
Carbon Monoxide	**193 PPM**	Gas Correlation Filter	**+/- 1% NIST**
Nitrogen	Balance		

Reference Standard(s)

Type	Component	Balance Gas	Concentration	Cylinder Number	Expiration	NIST Reference
GMIS	Nitric Oxide	Nitrogen	98.6 PPM	CC238350	2/14/2013	SRM 1686b
GMIS	Nitric Oxide	Nitrogen	98.6 PPM	CC238350	2/14/2013	SRM 1686b
GMIS	Carbon Monoxide	Nitrogen	398 PPM	EB0005726	1/5/2014	NTRM 021003
SRM	Propane	Nitrogen	49 PPM	CAL018150	8/17/2017	SRM 1667b

Analytical Information

Component	Nitric Oxide		
Analysis Date:	10/22/2012		
Z 0.152	S 16.337	C 15.549	Conc. 93.5 PPM
S 16.399	C 15.733	Z 0.109	Conc. 94.6 PPM
C 15.71	Z 0.088	S 16.451	Conc. 94.4 PPM

Analysis Date:	10/29/2012		
Z 0.295	S 16.912	C 16.321	Conc. 94.9 PPM
S 16.961	C 16.303	Z 0.281	Conc. 94.8 PPM
C 16.31	Z 0.325	S 16.9825	Conc. 94.8 PPM

Component	Carbon Monoxide		
Analysis Date:	10/22/2012		
Z 0.3390	S 41.027	C 19.9610	Conc. 192 PPM
S 41.0170	C 20.021	Z 0.294	Conc. 193 PPM
C 20.036	Z 0.3510	S 40.98	Conc. 193 PPM

Component	Propane		
Analysis Date:	10/26/2012		
Z 0.0110	S 49.01	C 50.7800	Conc. 51 PPM
S 49.0400	C 50.8	Z 0.004	Conc. 51 PPM
C 50.8	Z 0.0060	S 49.03	Conc. 51 PPM

Z= Zero Gas S= Span Gas C= Candidate Gas

Fred Holt, CHMM
Quality Control

Red Ball Technical Gas Service
PGVP Vendor ID # G12012
Information and Ordering
800-551-8150
Fax (318-425-6309)

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0046618	**Certification Date**:	07/29/2013
Product ID Number:	124752	**Expiration Date:**	07/27/2021
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA #	ML130726.170231.3-0	**Lot Number:**	ML130726.170231.3
Customer PO. NO.:		**Tracking Number:**	065271430
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Carbon Dioxide	**13.9 %**	±0.11 %	NDIR
Oxygen	**10.99 %**	±0.07 %	MPA
Nitrogen	Balance		

Analyitcal Measurement Data Available Online.

Reference Standard(s)

Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
GC1106080848	09/07/2013	GMIS	N2	CO2	12.57 %	0.384	3221755
GC0807251121	04/28/2019	GMIS	N2	O2	24.43 %	0.52	71001

Analytical Instrumentation

Component	Analytical Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Horiba	VA-3013	H0000P11	07/10/2013
O2	MPA	Horiba	VA-3013	H0000P11	07/11/2013

Z= Zero Gas S= Span Gas C= Candidate Gas

Red Ball Technical Gas Service
PGVP Vendor ID # G12013
Information and Ordering
800-551-8150
Fax (318-425-6309)

Fred Holt

Fred Holt, CHMM
Quality Control

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0039038	**Certification Date**:	08/02/2013
Product ID Number:	124753	**Expiration Date:**	07/31/2021
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA #	ML130726.170120.1-0	**Lot Number:**	ML130726.170120.1
Customer PO. NO.:		**Tracking Number:**	065155673
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Carbon Dioxide	**6.99 %**	±0.03 %	NDIR
Oxygen	**20.92 %**	±0.08 %	MPA
Nitrogen	Balance		

Analyitcal Measurement Data Available Online.

Reference Standard(s)

Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
GC1106080848	09/07/2013	GMIS	N2	CO2	12.57 %	0.384	3221755
GC0807251121	04/28/2019	GMIS	N2	O2	24.43 %	0.52	71001

Analytical Instrumentation

Component	Analytical Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Horiba	VA-3013	H0000P11	07/31/2013
O2	MPA	Horiba	VA-3013	H0000P11	07/11/2013

Z= Zero Gas S= Span Gas C= Candidate Gas

Red Ball Technical Gas Service
PGVP Vendor ID # G12013
Information and Ordering
800-551-8150
Fax (318-425-6309)

Fred Holt

Fred Holt, CHMM
Quality Control

MATHESON
ask. . .The Gas Professionals™

1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: NORDON

		Protocol:	Reference #:	Lot#:
Cylinder Number:	SX49930	G1	T176792-1	9302603567
Cylinder Pressure:	1900psig			
Last Analysis Date:	11/19/2012			
Expiration Date:	11/19/2014			

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 150 PSIG

		REPLICATE RESPONSES			
		Date:	11/2/2012	Date:	11/19/2012
Component:	Nitrogen Dioxide		45.60		45.20
			45.60		45.26
Certified Conc:	45.38ppm +/- 1% REL		45.40		45.25

BALANCE GAS: Air

REFERENCE STANDARDS:

Component:	Nitrogen Dioxide
Reference Standard:	SRM
Cylinder #:	CAL016152
Concentration:	98.0ppm
Exp Date:	12/31/2015
Lot #:	2660-C-57

CERTIFICATION INSTRUMENTS

Component:	Nitrogen Dioxide
Make/Model:	HORIBA CLA-510SS
Serial Number:	8H4SOCTJ
Measurement Principle:	CHEMI
Last Calibration:	11/2/2012

Notes:

This Certification was performed according to EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards September 1997, using procedure G1 and/or G2.

U.S. EPA Vendor ID No.: D52012: PGVP Participation Date: 1/1/2012: PGVP Renewal Date: 12/31/12

Analyst: Julie Higgins Date: 11/26/2012

Julie Higgins

NOx Converter Efficiency and Response Times

Date: January 3, 2014

METHOD 7E NOx CONVERTER EFFICIENCY TEST

Certified NO_2 Conc. (ppmv)	45.38
Measured NOx Conc. (ppmv)	41.83
Converter Efficiency (%)	**92**

Criteria: Converter Efficiency should be 90% or greater

METHOD 7E RESPONSE TIMES

	NOx (ppmv)	**CO (ppmv)**	**O_2 (%)**
Low-Level Gas Concentration	0	0	0
Upscale Gas Concentration	94.70	193.00	10.99
95% of Upscale Gas	90.0	183.4	10.4

	NOx	**CO**	**O_2**
Low-Level Gas RT (sec)	88	75	50
Upscale Gas RT (sec)	82	73	37
Longer Analyzer RT Interval (sec)	88	75	50
System Response Time (sec)	88		
*System Response Time (min)	1.5		
†System Purge Time (min)	**2.9**		

*Longer interval of time to reach 95% of stable stable response for low & upscale level gases.

Criteria: †System Purge Time shall be ≥ 2 times the System Response Time

Analyzer Gas Quality Assurance

Test Run:	DH-010314.01		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	n/a	n/a	n/a
Low Level Observed (ppm or %)	0.2	0.0	0.0
Mid Level Observed (ppm or %)	47.6	95.7	11.0
High Level Observed (ppm or %)	95.2	193.2	21.0
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.18	0.01	0.22
Difference from Mid Level (%)	0.32	0.22	0.15
Difference from High Level (%)	0.53	0.11	0.37
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	10.99
Initial Low/Zero Level Observed (ppm or %)	0.17	-0.02	0.05
Initial Upscale Level Observed (ppm or %)	95.20	193.21	11.02
Initial Bias Low/Zero Level Gas (ppm or %)	2.74	-0.71	0.05
Initial Bias Upscale Level Gas (ppm or %)	92.63	192.18	10.98
Final Bias Low/Zero Level Gas (ppm or %)	2.72	-1.00	0.16
Final Bias Upscale Level Gas (ppm or %)	91.44	191.53	10.99
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	2.71	-0.35	0.03
Initial Bias Upscale Level (%)	-2.72	-0.53	-0.18
Final Bias Low/Zero Level (%)	2.69	-0.50	0.55
Final Bias Upscale Level (%)	-3.97	-0.87	-0.16
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	0.03	0.15	0.51
Upscale Level Drift Calculation (%)	1.26	0.34	0.02
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	72.48	14.33	16.81
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	74.0	15.2	16.9
***Final Results (ppmv or %)**	**74.0**	**15.2**	**16.9**

**Final Results which are shown in Italics represent the MDL for that analyte*

Analyzer Gas Quality Assurance

Test Run:	DH-010314.02		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	0.0	0.0	0.0
Low Level Observed (ppm or %)	0.2	0.0	0.0
Mid Level Observed (ppm or %)	47.6	95.7	11.0
High Level Observed (ppm or %)	95.2	193.2	21.0
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.18	0.01	0.22
Difference from Mid Level (%)	0.32	0.22	0.15
Difference from High Level (%)	0.53	0.11	0.37
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	10.99
Initial Low/Zero Level Observed (ppm or %)	0.17	-0.02	0.05
Initial Upscale Level Observed (ppm or %)	95.20	193.21	11.02
Initial Bias Low/Zero Level Gas (ppm or %)	2.72	-1.00	0.16
Initial Bias Upscale Level Gas (ppm or %)	91.44	191.53	10.99
Final Bias Low/Zero Level Gas (ppm or %)	1.70	-0.96	0.18
Final Bias Upscale Level Gas (ppm or %)	90.59	191.32	10.99
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	2.69	-0.50	0.55
Initial Bias Upscale Level (%)	-3.97	-0.87	-0.16
Final Bias Low/Zero Level (%)	1.61	-0.48	0.64
Final Bias Upscale Level (%)	-4.86	-0.98	-0.13
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	1.07	0.02	0.09
Upscale Level Drift Calculation (%)	0.89	0.11	0.02
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	71.69	13.03	16.82
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	74.1	14.0	16.9
***Final Results (ppmv or %)**	**74.1**	**14.0**	**16.9**

**Final Results which are shown in Italics represent the MDL for that analyte*

Analyzer Gas Quality Assurance

Test Run:	DH-010314.03		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	0.0	0.0	0.0
Low Level Observed (ppm or %)	0.2	0.0	0.0
Mid Level Observed (ppm or %)	47.6	95.7	11.0
High Level Observed (ppm or %)	95.2	193.2	21.0
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.18	0.01	0.22
Difference from Mid Level (%)	0.32	0.22	0.15
Difference from High Level (%)	0.53	0.11	0.37
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	10.99
Initial Low/Zero Level Observed (ppm or %)	0.17	-0.02	0.05
Initial Upscale Level Observed (ppm or %)	95.20	193.21	11.02
Initial Bias Low/Zero Level Gas (ppm or %)	1.70	-0.96	0.18
Initial Bias Upscale Level Gas (ppm or %)	90.59	191.32	10.99
Final Bias Low/Zero Level Gas (ppm or %)	0.19	-4.17	0.01
Final Bias Upscale Level Gas (ppm or %)	91.34	189.89	10.91
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	1.61	-0.48	0.64
Initial Bias Upscale Level (%)	-4.86	-0.98	-0.13
Final Bias Low/Zero Level (%)	0.02	-2.15	-0.16
Final Bias Upscale Level (%)	-4.08	-1.72	-0.55
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	1.59	1.66	0.80
Upscale Level Drift Calculation (%)	0.78	0.74	0.42
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	72.28	11.15	16.86
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	75.0	13.7	17.0
***Final Results (ppmv or %)**	**75.0**	**13.7**	**17.0**

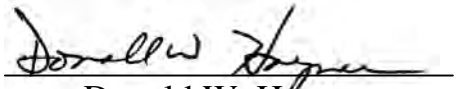
**Final Results which are shown in Italics represent the MDL for that analyte*

Annual Emission Test Report
for one
Solar Centaur T4702 Compressor Turbine
Unit Number T2
located at the
South Carlsbad Compressor Station

Prepared for
Enterprise Field Services, LLC
P. O. Box 4324
Houston, TX 77210

January 2014
Nordon Project No. 14-0152-2

This test report has been reviewed and approved for submittal to the New Mexico Environment Department (NMED) by the following representatives:



Donald W. Haynes
Nordon Corporation

Enterprise Field Services, LLC

NORDON *CORPORATION*

P. O. Box 1415 Round Rock, Texas 78680
Phone (512) 355-3786 Fax (512) 355-3785

SUMMARY OF RESULTS

Exhaust emission testing was performed on one Solar Centaur T4702 (Unit # T2) compressor turbine for Enterprise Field Services, LLC located at the South Carlsbad Compressor Station, near Loving, Eddy County, New Mexico. The turbine is used for natural gas compression. The testing was performed to demonstrate the continued compliance with the emission limits set forth in the NMED permit. Nordon Corporation of Round Rock, Texas, performed the exhaust emissions testing on January 4, 2014.

Continuous emission instruments housed in a mobile analysis unit were used to determine the concentrations of NO_X, CO, and O_2 in the exhaust stack of the compressor turbine. The following Code of Federal Regulations, Title 40, Part 60 (40CFR60), Appendix A reference methods were used to determine stack gas concentrations: Method 7E for nitrogen oxides (NO_X), Method 10 for carbon monoxide (CO), and Method 3A for oxygen (O_2). Mass emission rates were determined stoichiometrically according to Method 19 data reduction procedures using measured fuel flow rate.

Three thirty-minute test runs were performed on the exhaust of the turbine while firing on natural gas. The results of the testing are presented in a summary of results table. This table includes all the relevant information pertaining to the turbine/compressor operations, exhaust emissions, and ambient conditions. Exhaust concentrations are presented in part per million by volume (ppmv) or percent (%) by volume. The mass emission rates are presented in pound per hour (lb/hr) and ton per year (tpy). Turbine/compressor operational data was collected during each test run.

Summary of Results

NORDON CORPORATION

P.O. Box 1415 Round Rock, Texas 78680
PHONE (512) 355-3786 • FAX (512)355-3785

Plant: South Carlsbad Compressor Station
Facility Owner:Enterprise Field Services, LLC
Location: Loving, Eddy County, New Mexico
Unit Make/Model: Solar Centaur T4702
Unit Number: T2 , Ser. No.OHE12C7057
Test Personnel: DWH / KRJ

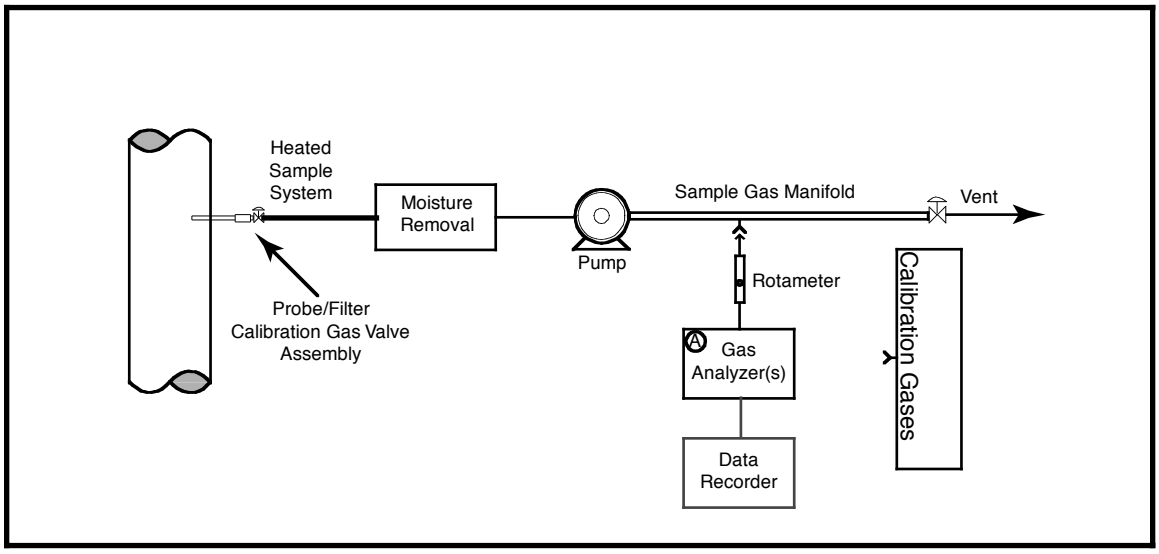
RUN NUMBER	DH-010414.01	DH-010414.02	DH-010414.03	
Date	1/4/14	1/4/14	1/4/14	
Start Time (hr)	8:20	9:10	9:47	
Stop Time (hr)	8:50	9:40	10:17	
TURBINE DATA				
Rated Horsepower (Hp)	3609	3609	3609	
Fuel Pressure (psig)	195	188	192	
Gas Producer Speed (%)	95	95	95	
Power Turbine Speed (%)	86	86	84	
Turbine Compressor Discharge Pressure (psig)	109	107	103	
Exhaust Temperature (°F)	1047	1060	1073	
Horsepower (Hp)	3630	3571	3452	
Heat Rate (MMBtu/hr)	42.9	38.4	39.9	
COMPRESSOR DATA				
Suction Pressure (psig)	330	330	338	
Suction Temperature (°F)	88	93	97	
Discharge Pressure (psig)	560	561	562	
Discharge Temperature (°F)	171	176	177	
Gas Production (MMscfd)	38	34	33	
FUEL & EXHAUST DATA				
O2 F-factor (dscf/MMBtu)	8698	8698	8698	
Fuel Heating Value (HHV Btu/scf)	1098	1098	1098	
Stoichiometric Exhaust Flow (dscfh)	1.97E+06	1.75E+06	1.82E+06	
AMBIENT CONDITIONS				
Temperature (°F): Dry bulb	42	49	64	
Temperature (°F): Wet bulb	36	41	47	
Atmospheric Pressure ("Hg)	26.64	26.64	26.64	
Humidity (lb water/lb air)	0.0036	0.0042	0.0037	
Humidity (% vol)	0.5	0.6	0.5	
MEASURED EXHAUST OUTLET CONCENTRATIONS				**AVERAGES**
NOx (ppmv)	78.7	80.4	84.1	**81.1**
CO (ppmv)	13.1	12.3	12.7	**12.7**
O2 (%)	16.9	16.9	16.9	**16.9**
EMISSION RATES				
NOx (lb/hr) LIMIT=27.0	18.54	16.85	18.27	**17.88**
CO (lb/hr) LIMIT=7.4	1.87	1.57	1.68	**1.71**
NOx (tpy, @8760 hr/yr) LIMIT=118.3	81.19	73.78	80.02	**78.33**
CO (tpy, @8760 hr/yr) LIMIT=32.5	8.20	6.89	7.35	**7.48**

PROCEDURES

Continuous emission instruments housed in the mobile analysis unit were used to determine the concentrations of pollutants found in the turbine exhaust stack. The following 40CFR60, Appendix A reference methods were used to determine stack gas concentrations: Method 7E for NO_X, Method 10 for CO, and Method 3A for O_2. Mass emission rates were determined according to data reduction procedures provided in Method 19.

As depicted in Figure 1, Sample System and Instrumentation, a stainless steel sample probe was located in the centroid of the stack. Sample gas enters the stainless steel probe into a stainless steel 3-way valve. The 3-way valve is used to perform leak checks and sample system bias checks. From the valve, the gas flows through a 3/8" Teflon® heat traced sample line to a stainless steel minimum contact condenser to dry the sample. From the condenser, a 3/8" Teflon sample line brings the exhaust gas to a manifold in the mobile analysis unit via a Teflon-lined diaphragm pump. The manifold partitions the gas through quick-connects so that each instrument can directly sample exhaust gas. Each instrument is equipped with a rotometer to maintain correct sample pressure and flow. The instruments are connected to a computer data acquisition system to document its response during quality assurance activities and testing.

Figure 1: Sample System and Instrumentation



(A) Gas Analyzers - NO_X, CO, O_2

Analyzer Make	Analyzer Model	Detection Principle
NO_X Analyzer: Thermo Environmental	42i-HL	Chemiluminescence
CO Analyzer : Thermo Environmental	48i-HL	Non-dispersive Infra-red
O_2 Analyzer: Thermo Environmental	48i-HL	Paramagnetic Cell

A continuous analyzer is used to determine NO_X concentrations according to EPA Reference Method 7E. This instrument employs a chemiluminescent detection principle. The NO_X concentration and mass emission rates are expressed as NO_2 per the reference method.

A continuous analyzer is used to determine CO concentrations according to EPA Reference Method 10. The instrument employs a nondispersive infrared detector coupled to a gas filter correlation wheel, which eliminates the interferences due to water and carbon dioxide.

A continuous analyzer is used to determine O_2 concentrations according to EPA Reference Method 3A. The instrument is equipped with either an electrochemical or paramagnetic cell.

Data obtained from the continuous emission analyzers were recorded by a National Instruments data acquisition (DAQ) system using Labview software. A copy of the DAQ records can be found in the appendix of this report.

Quality assurance activities meeting the requirements of the EPA reference methods were performed during the turbine testing. Tables documenting quality assurance procedures are located in the appendix of this report.

Exhaust flow rate was determined according to the data reduction procedures provided in EPA Method 19. The O_2 F-Factor used in the emission rate calculation was either calculated based on a recent fuel analysis or the standard 8710 value for natural gas provided by EPA Method 19.

Nordon personnel recorded turbine compressor operating parameters. Ambient conditions were collected using a wet/dry bulb sling psychrometer to measure temperature and a barometer to measure absolute atmospheric pressure.

APPENDIX

Field Data Sheets
Example Calculations
Gas Certifications
Quality Assurance Activities
Run Data Logs

Plant: South Carlsbad Compressor Station												
Facility Owner: Enterprise												
Unit Owner: Enterprise												
Location: Loving, Eddy County, New Mexico												
Applicable Regulation: 40CFR60, Subpart GG												
Unit Make/Model: Solar Centaur T-4702												
Unit Number: T2 Ser. No. OHE12C7057												
Test Personnel: DWH / KRJ												
Date: January 4, 2014												
Run Number	01	02	03	04	05	06	07	08	09	10	11	12
Start Time	820	1910	947	1024	1101	1138	1215	1252	1329	1406	1445	1522
Stop Time												
Turbine/Compressor Operation												
Load Condition												
Fuel Flow (Mscfd)	938	839	873	718	836	778	913	877	635	891	596	618
Fuel Flow (scfh)	-											
Power Turbine Speed (%)	86	86	84	84	83	82	80	81	80	80	80	80
Gas Producer Speed (%)	95	95	95	95	95	95	95	95	95	95	95	95
Horsepower (hp)												
Rated Horsepower (hp)												
% Load												
Turbine Compressor Discharge, PCD (psig)	109	107	103	103	103	103	102	102	102	102	102	102
Turbine Temperature T5 (°F)	1047	1060	1073	1075	1077	1075	1078	1078	1079	1081	1079	1078
Gas Compressor Suction Pressure (psig)	330	330	338	341	341	356	359	360	361	363	364	364
Gas Compressor Discharge Pressure (psig)	~~88~~ 560	561	562	566	567	571	574	576	577	577	577	578
Gas Compressor Suction Temperature (°F)	88	93	97	97	93	91	92	92	92	93	93	93
Gas Compressor Discharge Temperature (°F)	171	176	177	177	171	165	165	165	165	165	165	165
Fuel Gas Presssure (psig)	195	188	192	190	191	190	191	190	191	192	191	194
Gas Production Rate (MMscfd)	38	34	33	33	33	41	40	39	40	40	41	41
Alt. Ft.	3140	3140	3140	3160	3180	3200	3220	3220	3240	3260	3260	3260
Ambient Conditions												
Barometric Pressure (absolute In. Hg)	26.64	26.64	26.64									
Temperature Dry (°F)	42	49	64	66	68	69	72	72	71	71	70	69
Temperature Wet (°F)	36	41	47	47	48	48	50	49	48	48	48	47

Certificate of Analysis

Number: 1030-14010388-001A

Houston Laboratories
8820 Interchange Drive
Houston, TX 77054
Phone 713-660-0901

Thor Olsen
Nordon Corporation
PO Box 1415
Round Rock, TX 78680

Jan. 21, 2014

Station Name: South Calrsbad Compressor Stition
Station Location: Loving, NM
Sample Point: Turbine Fuel Gas
Cylinder No: 0298
Analyzed: 01/16/2014 05:34:22 by JD

Sampled By:
Sample Of: Gas Spot
Sample Date: 01/04/2014 10:00
Sample Conditions: 190 psig, @ 65 °F
Method: GPA-2261M

Analytical Data

Components	Mol. %	Wt. %	GPM at 14.65 psia		
Nitrogen	1.204	1.797		GPM TOTAL C2+	2.870
Carbon Dioxide	1.556	3.648		GPM TOTAL C3+	1.036
Methane	86.800	74.184		GPM TOTAL iC5+	0.077
Ethane	6.877	11.016	1.834		
Propane	2.516	5.911	0.691		
Iso-butane	0.292	0.904	0.095		
n-Butane	0.552	1.709	0.173		
Iso-pentane	0.086	0.331	0.031		
n-Pentane	0.072	0.277	0.026		
Hexanes Plus	0.045	0.223	0.020		
	100.000	100.000	2.870		

Physical Properties	Total	C6+
Relative Density Real Gas	0.6496	3.2176
Calculated Molecular Weight	18.77	93.19
Compressibility Factor	0.9973	
GPA 2172-09 Calculation:		
Calculated Gross BTU per ft³ @ 14.65 psia & 60°F		
Real Gas Dry BTU	1097	5113
Water Sat. Gas Base BTU	1078	5024

Comments: H2O Mol% : 1.750 ; Wt% : 1.681
Reran Sample Confirmed GC Analysis

Hydrocarbon Laboratory Manager

Quality Assurance: The above analyses are performed in accordance with ASTM, UOP, GPA guidelines for quality assurance, unless otherwise stated.

Fuel Gas Analysis

Gross Btu/scf	**1098**
O_2 F-Factor dscf/MMBtu	**8698**
O_2 F-Factor (wscf/MMBtu)	**10660**
H_2O F-Factor (scf/MMBtu)	**1962**
CO_2 F-Factor (scf CO_2/MMBtu)	**1058**
Btu/lb	**22164**
Sp. Gr.	**0.6516**
F_o	**1.719**
Moisture Factor	**18.407**
VOC Fraction	**0.063**

Compound	**Mol. Formula**	**Mol. %**
Methane	CH4	86.800
Ethane	C2H6	6.877
Propane	C3H8	2.516
Isobutane	C4H10	0.292
n-Butane	C4H10	0.552
Isopentane	C5H12	0.086
n-Pentane	C5H12	0.072
NeoPentane	C5H12	
n-Hexane	C6H14	0.045
n-Heptane	C7H16	
n-Octane	C8H18	
Carbon dioxide	CO2	1.556
Nitrogen	N2	1.204
Total		100.000

Chain of Custody Form

REPORT TO:

Company: Nordon Corporation
Contact: Don Haynes
Contact Phone: 512-355-3786
Contact Email: don@nordoncorp.com

PROJECT INFO:

Client Name: Enterprise Products
Facility Name: South Carlsbad Compressor Station
Facility Location: Loving, NM
Project #: 14-0001

LABORATORY INFO:

Company: SPL, Inc.
Address: 8820 Interchange Dr
Address: Houston, TX 77054
Contact: Chris Staley
Contact Info: cstaley@spl-inc.com
Lab Project#:

NORDON Corporation
P.O Box 1415 Round Rock, TX 78680
PH: 512.355.3786 FAX: 512.355.3785

Turn Around Time

☒ Standard
☐ Rush
specify RUSH date(s):

Lab ID	Sample Identification	Sample Description	Collection Date	Analysis Requested: Method 323 (HCHO)	CTM-027 (NH3)	EPA Method 5	EPA Method 201a	EPA Method 202	ASTM D6667	ASTM D1945	Sample Matrix	Container Type	Remarks (volumes,special notes, etc.)
	1030-00406	natural gas	1/4/14						x	x	natural gas	cylinder	
	1030-00298	natural gas	1/4/14						x	x	natural gas	cylinder	

Relinquished By: [signature] **Date:** 1-13-14
Received By: [signature] **Date:** 1-13-14

Relinquished By: **Date:**
Received By: JAVIER CRUZ **Date:** 1/14/14 15:07

NOTES:

Page 1 of 1

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010414.01 **Component: NOx**

Observed Measurements/Data:		Scale, Certified Concentrations	
	Direct Calibration Results		
0.42	NOx direct zero, Cdiro	94.7	NOx chart scale, CS
94.68	NOx direct span, Cdirm	94.7	NOx actual calibration gas concentration, Cma
	System Calibration Results	0	Actual low-level gas concentration, Coa
1.66	NOx, initial zero reading, Csoi		
92.45	NOx inital span reading, Csmi		
0.85	NOx final zero reading, Cof		
91.68	NOx final span reading, Csmf		
	Run Results		
76.69	NOx run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= 1.31 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -2.36 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= 0.45 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -3.17 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.86

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 0.81

Bias- Average Zero (Coavg)

$$= \left(\frac{Csoi + Csof}{2}\right)$$

= 1.256 (ppmv)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2}\right)$$

= 92.06 (ppmv)

NOx Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg}\right)$$

78.7 (ppmv)

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010414.01 **Component: CO**

Observed Measurements/Data:		**Scale, Certified Concentrations**	
	Direct Calibration Results		
0.63	CO direct zero, Cdiro	193	CO chart scale, CS
194.59	CO direct span, Cdirm	193	CO actual calibration gas concentration, Cma
	System Calibration Results	0	Actual low-level gas concentration, Coa
-0.63	CO, initial zero reading, Csoi		
192.76	CO inital span reading, Csmi		
0.00	CO final zero reading, Cof		
191.43	CO final span reading, Csmf		
	Run Results		
12.70	CO run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= -0.65 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -0.95 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= -0.32 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -1.63 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.33

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 0.69

Bias- Average Zero (Coavg)

$$= \left(\frac{Csoi + Csof}{2} \right)$$

= -0.315 (ppmv)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2} \right)$$

= 192.10 (ppmv)

CO Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg} \right)$$

13.1 (ppmv)

Example Calculations: Method 7E Concentration Correction

Test Run #: DH-010414.01 **Component: O2**

Observed Measurements/Data:		**Scale, Certified Concentrations**	
	Direct Calibration Results		
0.13	O2 direct zero, Cdiro	20.92	O2 chart scale, CS
21.26	O2 direct span, Cdirm	20.92	O2 actual calibration gas Concentration, Cma
	System Calibration Results	0	Actual low-level gas Concentration, Coa
0.25	O2, initial zero reading, Csoi		
21.19	O2 inital span reading, Csmi		
0.28	O2 final zero reading, Csof		
21.21	O2 final span reading, Csmf		
	Run Results		
17.22	O2 run average, Caverage		

Bias Check Initial Zero (SBoi)

$$SBoi = \frac{(Csoi - Cdiro)}{CS}$$

= 0.57 (%)

Bias Check Initial Span (SBmi)

$$SBmi = \frac{(Csmi - Cdirm)}{CS}$$

= -0.37 (%)

Bias Check Final Zero (SBof)

$$SBof = \frac{(Csof - Cdiro)}{CS}$$

= 0.75 (%)

Bias Check Final Span (SBmf)

$$SBmf = \frac{(Csmf - Cdirm)}{CS}$$

= -0.25 (%)

Drift Check Zero (Do)

$$|SBof - SBoi|$$

= 0.17

Drift Check Span (Ds)

$$|SBmf - SBmi|$$

= 0.12

Bias- Average Zero (O2avg)

$$= \left(\frac{Csoi + Csof}{2} \right)$$

= 0.263 (%)

Bias-Average Span (Cmavg)

$$= \left(\frac{CSmi + CSmf}{2} \right)$$

= 21.20 (%)

O2 Concentration Correction

$$= (Caverage - Coavg) \times \left(\frac{Cma}{Cmavg - Coavg} \right)$$

16.9 (%)

Example Calculations: Method 19 Exhaust Flow

Test Run #: DH-010414.01 **Component: Stack Flow**

Observed Measurements/Data:		**Standards/Constants/Conversion Factors**	
39083	Fuel Flow Rate (scfh)	1000000	Btu per MMBtu
8698	Fuel O2 F-Factor (dscf/MMBtu)	20.9	O2 % in air
1098	Fuel Heating Value (Btu/scf)		
16.9	O2 final concentration (%)		

Derivation of Exhaust Flow using Equation 19-1 from Method 19

$$E\left(\frac{lb}{MMBtu}\right) = C_d\left(\frac{lb}{scf}\right)F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{(20.9-\%O_2)} \qquad \text{Eq. 19-1}$$

divide each side of equation by Cd to obtain the following

$$\left(\frac{scf}{MMBtu}\right) = F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{(20.9-\%O_2)}$$

multiply each side of equation by heat input (MMBtu/hr)

$$\left(\frac{scf}{hr}\right) = HeatInput\left(\frac{MMBtu}{hr}\right)\times F_d\left(\frac{dscf}{MMBtu}\right)\times\frac{20.9}{(20.9-\%O_2)}$$

Fuel Gas Heat Rate/Heat Input (MMBtu/hr)

$$= \left(\text{Fuel Flow Rate } \frac{scf}{hr}\right)\times\left(\text{Fuel Heating Value } \frac{Btu}{scf}\right)\times\left(\frac{1MMBtu}{1000000\,Btu}\right)$$

= 42.90 (MMBtu/hr)

Stack Gas Volumetric Flow Rate, Q (dscfh)

$$= \left(\text{HeatInput } \frac{MMBtu}{hr}\right)\times\left(\text{Fuel } O_2 \text{ F-Factor } \frac{dscf}{MMBtu}\right)\times\left(\frac{20.9}{20.9-O_2}\right)$$

= 1.97E+06 (dscfh)

Example Calculations: Emissions Calculations

Test Run #: DH-010414.01 **Component: NOx**

Observed Measurements/Data:		Standards/Constants/Conversion Factors	
78.7	NOx final concentration, Cd (ppmv)	528	EPA Standard Temperature, Tstd (°R)
1973673	Average Stack Gas Flow Rate, Q (DSCFH)	29.92	EPA Standard Pressure, Pstd (in. Hg)
16.9	O2 final concentration (%)	385.3	Gas Constant @ EPA STP (SCF/lb-mol)
3630	Horsepower (Hp)	28.317	Liters per Cubic Foot
8698	Fuel O2 Factor (DSCF/MMBtu)	46	NOx molecular wt. (NO2), MW (lb/lb-mol)
		0.001912	Conversion constant (NOx ppm to g/m3)
		8760	hours per year
		2000	pounds per ton
		0.028317	cubic meters per cubic feet

NOx Emissions (ppmv @ 15%O2): *Applicable* yes

$$= \text{ppmv@15\%O}_2 = Cd \times \left(\frac{20.9\text{-}15}{20.9\text{-O}_2 \text{ concentration (\%)}} \right)$$

= 117 ppmv @15% O2

NOx Emission Rate (g/hp-hr): *Applicable* no

$$= \left(\frac{\text{g}}{\text{HP} - \text{hr}} \right) = \frac{Cd \times .001912 \times Q \times \left(\frac{0.028317 m^3}{ft^3} \right)}{HP}$$

= NOT APPLICABLE

NOx Emission Rate (lb/hr): *Applicable* yes

$$= \left(\frac{ppmv}{10^6} \right) \times \text{Average Stack Flow,Q} \times \left(\frac{MW}{385.3} \right)$$

= 18.54 (lb/hr)

NOx Emission Rate (tons/year): *Applicable* yes

$$= \left(\frac{\text{tons}}{\text{yr}} \right) = \frac{\text{lb}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}}$$

= 81.19 (tons/yr)

NOx Emissions (lb/MMBtu): *Applicable* no

$$= \left(\frac{lb}{MMBtu} \right) = \left(\frac{Cd}{10^6} \right) \times \left(\frac{MW}{385.3} \right) \times \left(\frac{DSCF}{MMBtu} \right) \times \left(\frac{20.9}{(20.9\text{-O}_2 \text{ concentration (\%)})} \right)$$

= NOT APPLICABLE

Example Calculations: Emissions Calculations

Test Run #: DH-010414.01 **Component: CO**

Observed Measurements/Data:		Standards/Constants/Conversion Factors	
13.1	CO final concentration, Cd (ppmv)	528	EPA Standard Temperature, Tstd (°R)
1973673	Average Stack Gas Flow Rate, Q (DSCFH)	29.92	EPA Standard Pressure, Pstd (in. Hg)
16.9	O2 final concentration (%)	385.3	Gas Constant @ EPA STP (SCF/lb-mol)
3630	Horsepower (Hp)	28.317	Liters per Cubic Foot
8698	Fuel O2 Factor (DSCF/MMBtu)	28	CO molecular wt., MW (lb/lb-mol)
		0.001164	Conversion constant (CO ppm to g/m3)
		8760	hours per year
		2000	pounds per ton
		0.028317	cubic meters per cubic feet

CO Emissions (ppmv @ 15%O2): *Applicable* no

$$= \text{ppmv@15\%O}_2 = Cd \times \left(\frac{20.9\text{-}15}{20.9\text{-O}_2 \text{ concentration (\%)}} \right)$$

= NOT APPLICABLE

CO Emission Rate (g/hp-hr): *Applicable* no

$$= \left(\frac{\text{g}}{\text{HP} - \text{hr}} \right) = \frac{Cd \times .001164 \times Q \times \left(\frac{0.028317 m^3}{ft^3} \right)}{HP}$$

= NOT APPLICABLE

CO Emission Rate (lb/hr): *Applicable* yes

$$= \left(\frac{ppmv}{10^6} \right) \times \text{Average Stack Flow,Q} \times \left(\frac{MW}{385.3} \right)$$

= 1.87 (lb/hr)

CO Emission Rate (tons/year): *Applicable* yes

$$= \left(\frac{\text{tons}}{\text{yr}} \right) = \frac{\text{lb}}{\text{hr}} \times \frac{8760 \text{ hr}}{\text{year}} \times \frac{\text{ton}}{2000 \text{ lb}}$$

= 8.20 (tons/yr)

CO Emissions (lb/MMBtu): *Applicable* no

$$= \left(\frac{lb}{MMBtu} \right) = \left(\frac{Cd}{10^6} \right) \times \left(\frac{MW}{385.3} \right) \times \left(\frac{DSCF}{MMBtu} \right) \times \left(\frac{20.9}{(20.9\text{-O}_2 \text{ concentration (\%)})} \right)$$

= NOT APPLICABLE

THE LINDE GROUP

Linde

CERTIFICATE OF ANALYSIS

EPA PROTOCOL MIXTURE

PROCEDURE # : G1

PGVP ID#: I12013
CUSTOMER: UNION CITY
SALES#: 501210969
PROD#: 1254051
P.O.# : 4501210969
MATERIAL#: 24091202
CERTIFICATION DATE: 01-May-2013
EXPIRATION DATE: 02-May-2021
(Using the May 2012 Revision of the EPA Protocol)

GAS CODE: APPVD
CYLINDER # : CC-310704
CYLINDER PRES: 2000 PSIG
CYLINDER VALVE: CGA 660
CYLINDER SIZE: 2A
CYLINDER MATERIAL: Aluminum
GAS VOLUME: 4000 Liter
BLEND TOLERANCE: 5% Relative
PAGE: 1 of 1

CERTIFICATION HISTORY

COMPONENT	DATE OF ASSAY	MEAN CONCENTRATION	CERTIFIED CONCENTRATION	ANALYTICAL ACCURACY
Propane	01-May-2013	30.0 ppm	30.0 ppm	+/- 1%
Nitric Oxide	24-Apr-2013 01-May-2013	47.4 ppm 47.3 ppm	47.3 ppm	+/- 1%
NOx			47.3 ppm	Reference Value Only
Carbon Monoxide	01-May-2013	95.3 ppm	95.3 ppm	+/- 1%

BALANCE Nitrogen

PREVIOUS CERTIFICATION DATES: None

REFERENCE STANDARDS

COMPONENT	SRM/NTRM#	CYLINDER#	CONCENTRATION
Propane	GMIS-1	cc-113884	100.5 ppm
Nitric Oxide	GMIS-1	CC-278874	100.7 ppm
Carbon Monoxide	GMIS-1	cc-88590	96.8 ppm

INSTRUMENTATION

COMPONENT	MAKE/MODEL	SERIAL #	DETECTOR	CALIBRATION DATE(S)
Propane	H. Packard 6890	US00001434	GC - FID	01-May-2013
Nitric Oxide	CAI 400-CLD	6L09004	Cheml	01-Apr-2013
Carbon Monoxide	Horiba VIA-510	570423011	NDIR	19-Apr-2013

THIS STANDARD IS NIST TRACEABLE. IT WAS CERTIFIED ACCORDING TO THE 1997 EPA PROTOCOL PROCEDURES. DO NOT USE THIS STANDARD IF THE CYLINDER PRESSURE IS LESS THAN 100 PSIG.

ANALYST: _____
MATTHEW JACKSON

Linde Gas North America LLC

DATE: 01-May-2013

(908) 329-9700 Main (908) 329-9740 Fax
www.LindeGas.com

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

CERTIFICATE OF ANALYSIS
EPA PROTOCOL GAS

Cylinder Number:	EB0027577	**Certification Date:**	10/29/2012
Product ID Number:	124749	**Expiration Date:**	**10/22/2016**
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA Number:	GC1210170814-0	**Lot Number:**	GC1210170814
Customer PO. NO.:		**Tracking Number:**	048358699
Customer		**Previous Certification Dates:**	

This calibration standard has been certified per the 1997 EPA Traceability Protocol, Document EPA-600/97/121, using procedure G1 and/or G2. All values so noted are certified to be +/-1% NIST Traceable.

Do Not Use This Cylinder Below 150 psig (1.0 Megapascal).

Certified Concentration(s)

Component	Concentration	Analytical Principle	Accuracy
Nitric Oxide	**94.5 PPM**	Non Dispersive Infrared Absorptiometry	**:ulate: High Unce**
Total Oxides of Nitrogen	**94.7 PPM**	Non Dispersive Infrared Absorptiometry	
Propane	**51 PPM**	FTIR	**+/- 1% NIST**
Carbon Monoxide	**193 PPM**	Gas Correlation Filter	**+/- 1% NIST**
Nitrogen	Balance		

Reference Standard(s)

Type	Component	Balance Gas	Concentration	Cylinder Number	Expiration	NIST Reference
GMIS	Nitric Oxide	Nitrogen	98.6 PPM	CC238350	2/14/2013	SRM 1686b
GMIS	Nitric Oxide	Nitrogen	98.6 PPM	CC238350	2/14/2013	SRM 1686b
GMIS	Carbon Monoxide	Nitrogen	398 PPM	EB0005726	1/5/2014	NTRM 021003
SRM	Propane	Nitrogen	49 PPM	CAL018150	8/17/2017	SRM 1667b

Analytical Information

Component	Nitric Oxide		
Analysis Date:	10/22/2012		
Z 0.152	S 16.337	C 15.549	Conc. 93.5 PPM
S 16.399	C 15.733	Z 0.109	Conc. 94.6 PPM
C 15.71	Z 0.088	S 16.451	Conc. 94.4 PPM

Analysis Date:	10/29/2012		
Z 0.295	S 16.912	C 16.321	Conc. 94.9 PPM
S 16.961	C 16.303	Z 0.281	Conc. 94.8 PPM
C 16.31	Z 0.325	S 16.9825	Conc. 94.8 PPM

Component	Carbon Monoxide		
Analysis Date:	10/22/2012		
Z 0.3390	S 41.027	C 19.9610	Conc. 192 PPM
S 41.0170	C 20.021	Z 0.294	Conc. 193 PPM
C 20.036	Z 0.3510	S 40.98	Conc. 193 PPM

Component	Propane		
Analysis Date:	10/26/2012		
Z 0.0110	S 49.01	C 50.7800	Conc. 51 PPM
S 49.0400	C 50.8	Z 0.004	Conc. 51 PPM
C 50.8	Z 0.0060	S 49.03	Conc. 51 PPM

Z= Zero Gas S= Span Gas C= Candidate Gas

Fred Holt, CHMM
Quality Control

Red Ball Technical Gas Service
PGVP Vendor ID # G12012
Information and Ordering
800-551-8150
Fax (318-425-6309)

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0046618	**Certification Date**:	07/29/2013
Product ID Number:	124752	**Expiration Date:**	07/27/2021
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA #	ML130726.170231.3-0	**Lot Number:**	ML130726.170231.3
Customer PO. NO.:		**Tracking Number:**	065271430
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Carbon Dioxide	**13.9 %**	±0.11 %	NDIR
Oxygen	**10.99 %**	±0.07 %	MPA
Nitrogen	Balance		

Analyitcal Measurement Data Available Online.

Reference Standard(s)

Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
GC1106080848	09/07/2013	GMIS	N2	CO2	12.57 %	0.384	3221755
GC0807251121	04/28/2019	GMIS	N2	O2	24.43 %	0.52	71001

Analytical Instrumentation

Component	Analytical Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Horiba	VA-3013	H0000P11	07/10/2013
O2	MPA	Horiba	VA-3013	H0000P11	07/11/2013

Z= Zero Gas S= Span Gas C= Candidate Gas

Red Ball Technical Gas Service
PGVP Vendor ID # G12013
Information and Ordering
800-551-8150
Fax (318-425-6309)

Fred Holt

Fred Holt, CHMM
Quality Control

Assay Laboratory: Red Ball TGS
555 Craig Kennedy Way
Shreveport, LA 71107
800-551-8150

EPA PROTOCOL GAS CERTIFICATE OF ANALYSIS

Cylinder Number:	EB0039038	**Certification Date**:	08/02/2013
Product ID Number:	124753	**Expiration Date:**	07/31/2021
Cylinder Pressure:	1900 PSIG	**MFG Facility:**	RBTGS-Shreveport-LA
COA #	ML130726.170120.1-0	**Lot Number:**	ML130726.170120.1
Customer PO. NO.:		**Tracking Number:**	065155673
Customer:		**Previous Certification Dates:**	

This calibration standard has been certified per the May 2012 EPA Traceability Protocol, Document EPA-600/R-12/531, using procedure G1.

Do Not Use This Cylinder Below 100 psig (0.7 Megapascal).

Certified Concentration(s)

Component	Concentration	Uncertainty	Analytical Principle
Carbon Dioxide	**6.99 %**	±0.03 %	NDIR
Oxygen	**20.92 %**	±0.08 %	MPA
Nitrogen	Balance		

Analyitcal Measurement Data Available Online.

Reference Standard(s)

Lot	Expiration	Type	Balance	Component	Concentration	Uncertainty(%)	NIST Reference
GC1106080848	09/07/2013	GMIS	N2	CO2	12.57 %	0.384	3221755
GC0807251121	04/28/2019	GMIS	N2	O2	24.43 %	0.52	71001

Analytical Instrumentation

Component	Analytical Principle	Make	Model	Serial	MPC Date
CO2	NDIR	Horiba	VA-3013	H0000P11	07/31/2013
O2	MPA	Horiba	VA-3013	H0000P11	07/11/2013

Z= Zero Gas S= Span Gas C= Candidate Gas

Red Ball Technical Gas Service
PGVP Vendor ID # G12013
Information and Ordering
800-551-8150
Fax (318-425-6309)

Fred Holt

Fred Holt, CHMM
Quality Control

MATHESON
ask. . .The Gas Professionals™

1700 Scepter Rd
Waverly, TN 37185
931-296-3357

Certificate of Analysis - EPA Protocol Mixtures

Customer: NORDON

		Protocol:	Reference #:	Lot#:
Cylinder Number:	SX49930	G1	T176792-1	9302603567
Cylinder Pressure:	1900psig			
Last Analysis Date:	11/19/2012			
Expiration Date:	11/19/2014			

DO NOT USE THIS CYLINDER WHEN THE PRESSURE FALLS BELOW 150 PSIG

		REPLICATE RESPONSES			
		Date:	11/2/2012	Date:	11/19/2012
Component:	Nitrogen Dioxide		45.60		45.20
			45.60		45.26
Certified Conc:	45.38ppm +/- 1% REL		45.40		45.25

BALANCE GAS: Air

REFERENCE STANDARDS:

Component:	Nitrogen Dioxide
Reference Standard:	SRM
Cylinder #:	CAL016152
Concentration:	98.0ppm
Exp Date:	12/31/2015
Lot #:	2660-C-57

CERTIFICATION INSTRUMENTS

Component:	Nitrogen Dioxide
Make/Model:	HORIBA CLA-510SS
Serial Number:	8H4SOCTJ
Measurement Principle:	CHEMI
Last Calibration:	11/2/2012

Notes:

This Certification was performed according to EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards September 1997, using procedure G1 and/or G2.

U.S. EPA Vendor ID No.: D52012: PGVP Participation Date: 1/1/2012: PGVP Renewal Date: 12/31/12

Analyst: Julie Higgins Date: 11/26/2012

Julie Higgins

NOx Converter Efficiency and Response Times

Date: January 4, 2014

METHOD 7E NOx CONVERTER EFFICIENCY TEST

Certified NO_2 Conc. (ppmv)	45.38
Measured NOx Conc. (ppmv)	41.03
Converter Efficiency (%)	**90**

Criteria: Converter Efficiency should be 90% or greater

METHOD 7E RESPONSE TIMES

	NOx (ppmv)	**CO (ppmv)**	**O_2 (%)**
Low-Level Gas Concentration	0	0	0
Upscale Gas Concentration	94.7	193	20.92
95% of Upscale Gas	90.0	183.4	19.9

	NOx	**CO**	**O_2**
Low-Level Gas RT (sec)	70	66	30
Upscale Gas RT (sec)	63	63	33
Longer Analyzer RT Interval (sec)	70	66	33
System Response Time (sec)	70		
*System Response Time (min)	1.2		
†System Purge Time (min)	**2.3**		

*Longer interval of time to reach 95% of stable stable response for low & upscale level gases.

Criteria: †System Purge Time shall be ≥ 2 times the System Response Time

Analyzer Gas Quality Assurance

Test Run:	DH-010414.01		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	n/a	n/a	n/a
Low Level Observed (ppm or %)	0.4	0.6	0.1
Mid Level Observed (ppm or %)	46.9	96.7	11.2
High Level Observed (ppm or %)	94.7	194.6	21.3
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.44	0.33	0.60
Difference from Mid Level (%)	0.39	0.71	0.87
Difference from High Level (%)	0.02	0.82	1.64
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	20.92
Initial Low/Zero Level Observed (ppm or %)	0.42	0.63	0.13
Initial Upscale Level Observed (ppm or %)	94.68	194.59	21.26
Initial Bias Low/Zero Level Gas (ppm or %)	1.66	-0.63	0.25
Initial Bias Upscale Level Gas (ppm or %)	92.45	192.76	21.19
Final Bias Low/Zero Level Gas (ppm or %)	0.85	0.00	0.28
Final Bias Upscale Level Gas (ppm or %)	91.68	191.43	21.21
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	1.31	-0.65	0.57
Initial Bias Upscale Level (%)	-2.36	-0.95	-0.37
Final Bias Low/Zero Level (%)	0.45	-0.32	0.75
Final Bias Upscale Level (%)	-3.17	-1.63	-0.25
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	0.86	0.33	0.17
Upscale Level Drift Calculation (%)	0.81	0.69	0.12
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	76.69	12.70	17.22
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	78.7	13.1	16.9
***Final Results (ppmv or %)**	**78.7**	**13.1**	**16.9**

**Final Results which are shown in Italics represent the MDL for that analyte*

Analyzer Gas Quality Assurance

Test Run:	DH-010414.02		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	0.0	0.0	0.0
Low Level Observed (ppm or %)	0.4	0.6	0.1
Mid Level Observed (ppm or %)	46.9	96.7	11.2
High Level Observed (ppm or %)	94.7	194.6	21.3
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.44	0.33	0.60
Difference from Mid Level (%)	0.39	0.71	0.87
Difference from High Level (%)	0.02	0.82	1.64
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	20.92
Initial Low/Zero Level Observed (ppm or %)	0.42	0.63	0.13
Initial Upscale Level Observed (ppm or %)	94.68	194.59	21.26
Initial Bias Low/Zero Level Gas (ppm or %)	0.85	0.00	0.28
Initial Bias Upscale Level Gas (ppm or %)	91.68	191.43	21.21
Final Bias Low/Zero Level Gas (ppm or %)	2.50	-1.50	0.34
Final Bias Upscale Level Gas (ppm or %)	91.54	190.52	21.25
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	0.45	-0.32	0.75
Initial Bias Upscale Level (%)	-3.17	-1.63	-0.25
Final Bias Low/Zero Level (%)	2.20	-1.11	1.00
Final Bias Upscale Level (%)	-3.32	-2.11	-0.05
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	1.75	0.78	0.26
Upscale Level Drift Calculation (%)	0.15	0.47	0.20
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	78.07	11.51	17.23
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	80.4	12.3	16.9
***Final Results (ppmv or %)**	**80.4**	**12.3**	**16.9**

**Final Results which are shown in Italics represent the MDL for that analyte*

Analyzer Gas Quality Assurance

Test Run:	DH-010414.03		
Parameter	**NOx**	**CO**	**O2**
CALIBRATION ERROR DATA			
Range/Span Data			
Analyzer Range	100	200	25
Method 7E Span	94.7	193.0	20.9
Certified Calibration Gas Data			
Zero Level Certified Value (ppm or %)	0	0	0
Low Level Certified Value (ppm or %)	0.0	0.0	0.0
Mid Level Certified Value (ppm or %)	47.3	95.3	10.99
High Level Certified Value (ppm or %)	94.7	193.0	20.92
Calibration Error Observations (Direct)			
Zero Level Observed (ppm or %)	0.0	0.0	0.0
Low Level Observed (ppm or %)	0.4	0.6	0.1
Mid Level Observed (ppm or %)	46.9	96.7	11.2
High Level Observed (ppm or %)	94.7	194.6	21.3
Calibration Error Results			
Difference from Zero Level (%)	n/a	n/a	n/a
Difference from Low Level (%)	0.44	0.33	0.60
Difference from Mid Level (%)	0.39	0.71	0.87
Difference from High Level (%)	0.02	0.82	1.64
Allowable Difference (%)	(±2%)	(±2%)	(±2%)
TEST RUN DATA			
Bias Observations			
Low/Zero Level Cal. Gas Certified Value (ppm or %)	0.00	0.00	0.00
Upscale Cal. Gas Certified Value (ppm or %)	94.70	193.00	20.92
Initial Low/Zero Level Observed (ppm or %)	0.42	0.63	0.13
Initial Upscale Level Observed (ppm or %)	94.68	194.59	21.26
Initial Bias Low/Zero Level Gas (ppm or %)	2.50	-1.50	0.34
Initial Bias Upscale Level Gas (ppm or %)	91.54	190.52	21.25
Final Bias Low/Zero Level Gas (ppm or %)	2.11	-2.63	0.36
Final Bias Upscale Level Gas (ppm or %)	91.12	189.62	21.30
Bias and Drift Results			
Initial Bias Low/Zero Level (%)	2.20	-1.11	1.00
Initial Bias Upscale Level (%)	-3.32	-2.11	-0.05
Final Bias Low/Zero Level (%)	1.79	-1.69	1.13
Final Bias Upscale Level (%)	-3.76	-2.58	0.18
Allowable Bias (%)	(±5%)	(±5%)	(±5%)
Low/Zero Level Drift Calculation (%)	0.41	0.58	0.12
Upscale Level Drift Calculation (%)	0.45	0.47	0.23
Allowable Drift (%)	(±3%)	(±3%)	(±3%)
Raw Results (ppmv or %)	81.34	10.56	17.27
Minimum Detection Limit (MDL)	0.5	1.0	0.1
Corrected Results (ppmv or %)	84.1	12.7	16.9
***Final Results (ppmv or %)**	**84.1**	**12.7**	**16.9**

**Final Results which are shown in Italics represent the MDL for that analyte*

New Mexico Environment Department
525 Camino de los Marquez, Suite 1
Santa Fe, NM 87505
Phone (505) 476-4300 Fax (505) 476-4375

Version 1/1/2010

NMED USE ONLY	
DTS	
TEMPO	

UNIVERSAL STACK TEST NOTIFICATION, PROTOCOL AND REPORT FORM

NMED USE ONLY	
Staff	
Admin	

Submit to: Stacktest.aqb@state.nm.us

I. DATABASE HEADER INFORMATION (drop down menus in bold)

a. AI#		
218	**Test Report**	**Periodic Test (Portable Analyzer)**

d. Company Name:	e. Facility Name:
Enterprise Field Services LLC	**South Carlsbad Compressor Station**
f. Emission Unit Numbers:	g. Emission Unit Description (boiler, Waukesha 7042, etc)
1, 2	**Turbines, Solar Centaur T-4702**

h. Reports - Tracking Number from notification response:	i. Proposed Test Date:	j. Actual test date:
CMT	**Week of 1/19/15**	**1/20/2015**

k. Reason for test (name permit requirement, NSPS, MACT, consent decree, etc. Indicate here is this notification is a revised test date only)

Annual performance test of existing turbines pursuant to NSR condition A205C.

II. GENERAL COMPANY AND FACILITY INFORMATION

a.Company Address:			k.. Facility Address:		
PO Box 4324			**Roberson Road, Eddy County**		
b. City:	c. State:	d. Zip:	l. City:	m. State:	n. Zip:
Houston	**TX**	**77210⊥**	**Loving**	**NM**	**88526**
e. Environmental Contact:	f. Title:		o. Facility Contact:	p. Title:	
Dina Babinski	**ENV Supervisor**		**Thomas Green**	**Area Supervisor**	
g. Phone Number:	h. Cell Number:		q. Phone Number:	r. Cell Number:	
210-528-3824	**210-232-4880**		**575-885-7235**	**575-708-0015**	
i. Email Address:			s. Email Address:		
djbabinski@eprod.com			**tdgreen@eprod.com**		
j. Title V Permit Number:			t. NSR Permit Number:		
P-130-R2			**NSR 220M8-R1**		

u. Detailed driving directions from nearest New Mexico town:

From Loving, UN285 north to Roberson Road west, Roberson Road west to station.

III. TESTING FIRM

a. Company:	g. Contact:	
Compliance Services and Testing	**Chris Spencer**	
b. Address 1:	h. Title:	
7108 Washington NE Ste. A	**Director**	
c. Address 2:	i. Office Phone:	j. Cell Phone:
PO Box 94191-87199		**505-681-4909**

d. City:	e. State:	f. Zip:	k. Email Address:
Albuquerque	**NM**	**87109**	**cspencer@comptesting.com**

IV. EMISSION UNIT

a. Emission Unit Number:	b. Make & Model Number
1 and 2	**Solar Centaur T-4702**
c. Serial Number:	d. Permitted Capacity:
See section g.	**3609 hp**

e Exceptions: Explain if test is late, rescheduled, related to an enforcement action:

g. Emission Unit Description and brief process name or description:

Turbine 1 SN: OHD10C7915

Turbine 2 SN: OHE12C7057

Natural gas-fired turbines for natural gas compression.

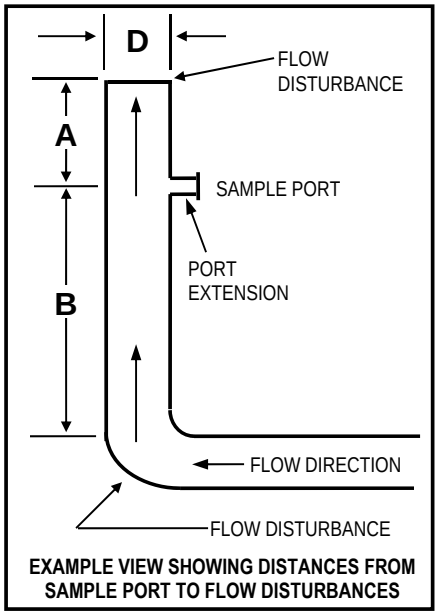
h. Installation Date:	i. Startup Date:	k. Date Reached Max. Capacity:

l. Control Equipment Description as listed in permit (model, ser. # etc. if applicable):

NA

STACK PARAMETERS

m. Velocity (ft/sec):	**177**
n. Temperature (ºC):	**486**
o. Stack Diameter, D (in.):	**NA**
p. Distance to Stack Bends or Obstructions:	
Upstream, Distance A (in.):	**NA**
Downstream, Distance B (in.):	**NA**



EXAMPLE VIEW SHOWING DISTANCES FROM SAMPLE PORT TO FLOW DISTURBANCES

Attach an explanation or drawing to explain any difficult or unusual stack geometry or parameters.

V. POLLUTANTS AND PROPOSED TEST METHODS

Pollutant or Parameter:		Proposed Test Methods (Deviations from approved methods require supporting documentation and prior authorization)	Deviation to Test Method Requested
☒	**Portable Analyzer Methods for NOx, CO, SO_2**		☐
☐	**NOx**	**EPA Method 7E**	☐
☐	**CO**	**EPA Method 10**	☐
☐	**SO2**	**EPA Method 6**	☐
☐	**VOCs**	**(Specify)**	☐
☐	**HAPs**	**(Specify)**	☐
☐	**PM (TSP)**	**EPA Method 5**	☐
☐	**PM10**	**EPA Method 201**	☐
☐	**PM2.5**	**(Specify)**	☐
☐	**Opacity**	**EPA Method 9**	☐
☐	**Visual E.**	**EPA Method 22**	☐
☐	**Stack Flow**	**EPA Methods 1 - 3**	☐
☐	**Moisture**	**EPA Method 4**	☐
☐	**Other**	**(Specify)**	☐
☐	**Other**	**(Specify)**	☐

List Specific VOC's and HAP's:

VI. PROPOSED TEST RUN AND TEST LOAD INFORMATION

a. Number of Test Runs:	b. Run Duration	c. Required by (regulation or permit number):	d. Specific Condition or Section:
3	**20 min**	**NSR 220 A205C**	**A205C**

PLEASE NOTE – Default run duration is 60 minutes, unless otherwise specified by an applicable regulation.

e. Expected Load:	f. Percent of Permitted Capacity:	g. Is this an opacity test?	h. If yes, no. of observation pts.:
>90%	**>90%**	**Yes** ☐ **No** ☒	

i. If expected load during test is less than 90% of capacity, explain**:**

NOTE – Failure to test at 90-100% of permitted load will limit unit operation to 110% of tested load until a new initial compliance test is conducted.

PLANT OR UNIT OPERATING PARAMETERS TO BE MONITORED

j. List and explain the plant operating parameters that will be monitored and applicable permit conditions or regulatory standards.

Fuel usage, compressor operating parameters, turbine operating parameters.

VII. ADDITIONAL DETAILS (where applicable)

RATA and INSTRUMENTAL ANALYZER CALIBRATION PROCEDURES

a. Do any of the methods you are proposing utilize instrumental analyzers (i.e.; EPA Methods 3A, 6C, 7E, 10, 18, 25/25A, 320 etc.)? If yes, briefly describe analyzer calibration procedures and/or calibration standard procedures. Enter the highest pollutant concentration expected and the proposed concentrations of calibration gases.	☒ Yes	☐ No

As described in the methods.

SAMPLING TRAIN LEAK CHECK PROCEDURES

b. Do any of the methods you are proposing utilize the EPA Method 5 sampling train (i.e.; EPA Methods 1-4, 5, 17, 26/26A, 29, etc.)? If yes, briefly describe sampling train and pitot tube leak check procedures:	☐ Yes	☒ No

EPA METHOD 19 IN LIEU OF EPA METHODS 1-4

c. Are you proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4? If yes, explain why you believe this proposal is justified:	☒ Yes	☐ No

Method 19 with use of a calibrated fuel meter and current fuel gas analysis.

PLEASE NOTE – EPA Method 19 may be utilized in lieu of EPA Methods 1-4, subject to the approval of the Department. If you are proposing to utilize EPA Method 19 in lieu of EPA Methods 1-4, you MUST include a recent fuel gas heating value analysis as well as a recent fuel flow meter calibration certificate, preferably conducted on the day of the test, but no earlier than three months prior to the test date. If the analyses have been conducted prior to the test date, you MUST append the certificates to the protocol. If conducted on the day of the test, you MUST append the certificates to the final test report.