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Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 18, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 11, 2013
Date Analyzed: December 11, 2013
AtmAA Lab No.: 13453-9 P2E1

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents "as is" ideal gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	62.07	38.13	Carbon	44.65
Carbon dioxide	34.79	58.76	Hydrogen	9.54
Nitrogen	2.24	2.41	Oxygen	43.37
Oxygen	0.51	0.63	Nitrogen	2.41
Argon	0.023	0.035	Argon	0.03
$(CH_2)_n$	0.066	0.035	Sulfur	0.00

Specific Volume	14.361			
BTU/ft^3	627	HHV	565	LHV
BTU/ lb.	9010	HHV	8113	LHV
F (factor)	9259	HHV	10283	LHV

"as is" ideal gas at 60° F, 1 atm, where CH4-1010H, 909.4L TGNMO-804H, 756L BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	10.428	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for SCAQMD RECLAIM HHV and F (factor)

Report Date: December 18, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 11, 2013
Date Analyzed: December 11, 2013
AtmAA Lab No.: 13453-9 P2E1

HHV, and F factor are calculated using labortatory analysis results for methane,carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds inserted into SCAQMD RECLAIM D3588 spreadsheet.
Results represent a dry "real" gas at 60oF and 1 atm.

Component	Mole %	Wt %	C,H,O,N,S, Wt.%	
Methane	62.29	38.13	Carbon	44.66
Carbon dioxide	34.91	58.77	Hydrogen	9.54
Nitrogen	2.25	2.41	Oxygen	43.40
Oxygen	0.54	0.66	Nitrogen	2.41
$(CH_2)_n$	0.066	0.035	Sulfur	0.00

HHV (btu/scf)	620
Average MW	26.14
Gas Density (Ideal Gas)	0.06779
Compressibility Factor	0.99702
Gas Density (Real Gas)	0.06800
HHV (btu/lb)	9116
F Factor (dry)	9149
F Factor - dry (60 F)	9011
F Factor (wet)	11169
F Factor - wet (60 F)	10999
Fwet / Fdry	1.221
Fc (dry)	1572

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LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Tedlar Bag Sample

Report Date: December 17, 2013
Client: SCEC
Project Location: OCSD Plant 2 / Fuel Sample
Project No.: 2061.1053
Date Received: December 6, 2013
Date Analyzed: December 6, 2013

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

	AtmAA Lab No.:	13403-5
	Sample I.D.:	P2E2
		(Concentration in ppmv)
Components		
Hydrogen sulfide		22.4
Carbonyl sulfide		<0.2
Methyl mercaptan		<0.2
Ethyl mercaptan		<0.2
Dimethyl sulfide		<0.2
Carbon disulfide		<0.2
isopropyl mercaptan		<0.2
n-propyl mercaptan		0.30
Dimethyl disulfide		<0.2
TRS		22.7

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: OCSD Plant 2 / Fuel Sample
Date Received: December 6, 2013
Date Analyzed: December 6, 2013

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	P2E2	22.0	22.9	22.4	2.0
Carbonyl sulfide	P2E2	<0.2	<0.2	---	---
Methyl mercaptan	P2E2	<0.2	<0.2	---	---
Ethyl mercaptan	P2E2	<0.2	<0.2	---	---
Dimethyl sulfide	P2E2	<0.2	<0.2	---	---
Carbon disulfide	P2E2	<0.2	<0.2	---	---
iso-propyl mercaptan	P2E2	<0.2	<0.2	---	---
n-propyl mercaptan	P2E2	0.30	0.31	0.30	1.6
Dimethyl disulfide	P2E2	<0.2	<0.2	---	---

One Tedlar bag sample, laboratory number 13403-5, was analyzed for total reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 2 repeat measurements from one Tedlar bag sample is 1.8%.

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LABORATORY ANALYSIS REPORT

Speciated Hydrocarbons Analysis in Tedlar Bag Samples

Report Date: December 18, 2013
Client: SCEC
Site: OCSD
Project: Plant 2 / Fuel Samples
Project No.: 2061.1053

Date Received: December 6, 2013
Date Analyzed: December 6, 2013

ANALYSIS DESCRIPTION

Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18.

AtmAA Lab No.:	13403-5	(repeat)
Sample ID:	P2E2	P2E2
	(Concentration in ppmv, component)	
Methane	632000	636000
non-methane hydrocarbons analysis by carbon number grouping		
C2	2.71	2.93
C3	2.23	2.24
C4	0.56	0.56
C5	0.94	0.85
C6	0.76	0.74
C7	0.78	0.74
C8	1.94	1.35
C9	4.74	5.81
C10	22.82	23.58
C11	29.82	28.02
C12	3.40	3.62
C13	1.61	1.70
TNMHC	705	701

TNMHC - total non-methane hydrocarbons as ppmvC.

Michael L. Porter
Laboratory Director

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 18, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 6, 2013
Date Analyzed: December 6, 2013
AtmAA Lab No.: 13403-5 P2E2

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents "as is" ideal gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.39	39.26	Carbon	45.60
Carbon dioxide	34.70	59.10	Hydrogen	9.82
Nitrogen	1.08	1.17	Oxygen	43.39
Oxygen	0.33	0.41	Nitrogen	1.17
Argon	0.015	0.023	Argon	0.02
$(CH_2)_n$	0.070	0.038	Sulfur	0.00

Specific Volume	14.460			
BTU/ft^3	641	HHV	577	LHV
BTU/ lb.	9266	HHV	8343	LHV
F (factor)	9251	HHV	10274	LHV

"as is" ideal gas at 60° F, 1 atm, where CH4-1010H, 909.4L TGNMO-804H, 756L BTU/cu.ft.

Component	Specific volume reference values *
Methane	23.35 (ft^3/lb)
Carbon dioxide	8.59
Nitrogen	13.54
Oxygen	11.87
Argon	9.52
(CH2)n	10.428

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for SCAQMD RECLAIM HHV and F (factor)

Report Date: December 18, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 6, 2013
Date Analyzed: December 6, 2013
AtmAA Lab No.: 13403-5 P2E2

HHV, and F factor are calculated using labortatory analysis results for methane,carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds inserted into SCAQMD RECLAIM D3588 spreadsheet.
Results represent a dry "real" gas at 60oF and 1 atm.

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.70	39.26	Carbon	45.60
Carbon dioxide	34.87	59.11	Hydrogen	9.82
Nitrogen	1.08	1.17	Oxygen	43.41
Oxygen	0.35	0.43	Nitrogen	1.17
$(CH_2)_n$	0.070	0.038	Sulfur	0.00

HHV (btu/scf)	634
Average MW	25.95
Gas Density (Ideal Gas)	0.06732
Compressibility Factor	0.99698
Gas Density (Real Gas)	0.06752
HHV (btu/lb)	9387
F Factor (dry)	9130
F Factor - dry (60 F)	8991
F Factor (wet)	11149
F Factor - wet (60 F)	10980
Fwet / Fdry	1.221
Fc (dry)	1559

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LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Tedlar Bag Sample

Report Date: December 23, 2013
Client: SCEC
Project Location: OCSD Plant 2 / Fuel Sample
Project No.: 2061.1053
Date Received: December 12, 2013
Date Analyzed: December 12, 2013

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

	AtmAA Lab No.:	13463-40
	Sample I.D.:	P2E3
		(Concentration in ppmv)
Components		
Hydrogen sulfide		<0.5
Carbonyl sulfide		<0.2
Methyl mercaptan		<0.2
Ethyl mercaptan		<0.2
Dimethyl sulfide		<0.2
Carbon disulfide		<0.2
isopropyl mercaptan		<0.2
n-propyl mercaptan		<0.2
Dimethyl disulfide		<0.2
TRS		<0.5

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: OCSD Plant 2 / Fuel Sample
Date Received: December 12, 2013
Date Analyzed: December 12, 2013

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	P2E3	<0.5	<0.5	---	---
Carbonyl sulfide	P2E3	<0.2	<0.2	---	---
Methyl mercaptan	P2E3	<0.2	<0.2	---	---
Ethyl mercaptan	P2E3	<0.2	<0.2	---	---
Dimethyl sulfide	P2E3	<0.2	<0.2	---	---
Carbon disulfide	P2E3	<0.2	<0.2	---	---
iso-propyl mercaptan	P2E3	<0.2	<0.2	---	---
n-propyl mercaptan	P2E3	<0.2	<0.2	---	---
Dimethyl disulfide	P2E3	<0.2	<0.2	---	---

One Tedlar bag sample, laboratory number 13403-40, was analyzed for total reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". No % difference from mean can be calculated from the one Tedlar bag sample.

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LABORATORY ANALYSIS REPORT

Speciated Hydrocarbons Analysis in Tedlar Bag Samples

Report Date: December 23, 2013
Client: SCEC
Site: OCSD
Project: Plant 2 / Fuel Samples
Project No.: 2061.1053

Date Received: December 12, 2013
Date Analyzed: December 12, 2013

ANALYSIS DESCRIPTION

Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18.

AtmAA Lab No.:	13463-40	(repeat)
Sample ID:	P2E3	P2E3
	(Concentration in ppmv, component)	
Methane	628000	626000
non-methane hydrocarbons analysis by carbon number grouping		
C2	2.77	1.79
C3	2.45	2.44
C4	0.64	0.81
C5	0.97	1.02
C6	0.64	0.59
C7	0.86	0.87
C8	0.56	0.80
C9	4.13	5.45
C10	6.04	6.42
C11	3.80	3.59
C12	0.16	0.18
C13	1.90	0.17
TNMHC	201	192

TNMHC - total non-methane hydrocarbons as ppmvC.

Michael L. Porter
Laboratory Director

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 23, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 12, 2013
Date Analyzed: December 12, 2013
AtmAA Lab No.: 13463-40 P2E3

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents "as is" ideal gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S, Wt.%	
Methane	62.70	38.63	Carbon	45.44
Carbon dioxide	35.62	60.35	Hydrogen	9.66
Nitrogen	0.72	0.78	Oxygen	44.11
Oxygen	0.18	0.22	Nitrogen	0.78
Argon	0.008	0.012	Argon	0.01
$(CH_2)_n$	0.020	0.011	Sulfur	0.00

Specific Volume	14.340			
BTU/ft^3	633	HHV	570	LHV
BTU/ lb.	9083	HHV	8178	LHV
F (factor)	9303	HHV	10332	LHV

"as is" ideal gas at 60° F, 1 atm, where CH4-1010H, 909.4L TGNMO-804H, 756L BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	10.428	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for SCAQMD RECLAIM HHV and F (factor)

Report Date: December 23, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 12, 2013
Date Analyzed: December 12, 2013
AtmAA Lab No.: 13463-40 P2E3

HHV, and F factor are calculated using labortatory analysis results for methane,carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds inserted into SCAQMD RECLAIM D3588 spreadsheet.
Results represent a dry "real" gas at 60oF and 1 atm.

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.19	38.63	Carbon	45.44
Carbon dioxide	35.90	60.36	Hydrogen	9.66
Nitrogen	0.73	0.78	Oxygen	44.12
Oxygen	0.19	0.23	Nitrogen	0.78
$(CH_2)_n$	0.020	0.011	Sulfur	0.00

HHV (btu/scf)	629
Average MW	26.17
Gas Density (Ideal Gas)	0.06788
Compressibility Factor	0.99693
Gas Density (Real Gas)	0.06809
HHV (btu/lb)	9231
F Factor (dry)	9153
F Factor - dry (60 F)	9015
F Factor (wet)	11173
F Factor - wet (60 F)	11004
Fwet / Fdry	1.221
Fc (dry)	1580

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LABORATORY ANALYSIS REPORT

Hydrogen Sulfide and Reduced Sulfur Compounds
Analysis in Tedlar Bag Samples

Report Date: December 19, 2013
Client: SCEC
Project Location: OCSD Plant 2 / Fuel Samples
Project No.: 2061.1053
Date Received: December 10, 2013
Date Analyzed: December 10, 2013

ANALYSIS DESCRIPTION

Hydrogen sulfide was analyzed by gas chromatography with a Hall electrolytic conductivity detector operated in the oxidative sulfur mode. All other components were measured by GC/ Mass Spec.

AtmAA Lab No.:	13443-1	13443-2
Sample I.D.:	P2E4	P2E5
Components	*(Concentration in ppmv)*	
Hydrogen sulfide	18.0	16.9
Carbonyl sulfide	<0.2	<0.2
Methyl mercaptan	<0.2	<0.2
Ethyl mercaptan	<0.2	<0.2
Dimethyl sulfide	<0.2	<0.2
Carbon disulfide	<0.2	<0.2
isopropyl mercaptan	<0.2	<0.2
n-propyl mercaptan	0.26	0.28
Dimethyl disulfide	<0.2	<0.2
TRS	18.3	17.2

TRS - total reduced sulfur

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)

Project Location: OCSD Plant 2 / Fuel Samples
Date Received: December 10, 2013
Date Analyzed: December 10, 2013

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppmv)			
Hydrogen sulfide	P2E4	17.0	18.9	18.0	5.3
	P2E5	17.2	16.6	16.9	1.8
Carbonyl sulfide	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
Methyl mercaptan	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
Ethyl mercaptan	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
Dimethyl sulfide	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
Carbon disulfide	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
iso-propyl mercaptan	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---
n-propyl mercaptan	P2E4	0.25	0.27	0.26	3.8
	P2E5	0.28	0.28	0.28	0.0
Dimethyl disulfide	P2E4	<0.2	<0.2	---	---
	P2E5	<0.2	<0.2	---	---

Two Tedlar bag samples, laboratory numbers 13443-(1 & 2), were analyzed for total reduced sulfur compounds. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 4 repeat measurements from two Tedlar bag samples is 2.8%.

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LABORATORY ANALYSIS REPORT

Speciated Hydrocarbons Analysis in Tedlar Bag Samples

Report Date: December 20, 2013
Client: SCEC
Site: OCSD
Project: Plant 2 / Fuel Samples
Project No.: 2061.1053

Date Received: December 10, 2013
Date Analyzed: December 10, 2013

ANALYSIS DESCRIPTION

Hydrocarbon Speciation analysis was performed by flame ionization detection/gas chromatography (FID/GC), modified EPA-18.

AtmAA Lab No.:	13443-1	(repeat)	13443-2
Sample ID:	P2E4	P2E4	P2E5
	(Concentration in ppmv, component)		
Methane	632000	634000	634000
non-methane hydrocarbons analysis by carbon number grouping			
C2	3.46	3.76	2.77
C3	2.21	2.25	2.16
C4	0.43	0.37	0.73
C5	1.07	0.98	1.12
C6	0.91	0.72	0.94
C7	1.09	0.92	1.02
C8	1.39	1.41	1.80
C9	5.75	6.34	5.50
C10	27.03	26.54	29.89
C11	27.69	26.95	30.40
C12	3.26	3.21	4.27
C13	1.45	1.44	1.63
TNMHC	729	719	803

TNMHC - total non-methane hydrocarbons as ppmvC.

Michael L. Porter
Laboratory Director

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 20, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 10, 2013
Date Analyzed: December 10, 2013
AtmAA Lab No.: 13443-1 P2E4

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents "as is" ideal gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S, Wt.%	
Methane	63.26	38.90	Carbon	45.58
Carbon dioxide	35.50	60.03	Hydrogen	9.73
Nitrogen	0.74	0.79	Oxygen	43.88
Oxygen	0.18	0.22	Nitrogen	0.79
Argon	0.008	0.012	Argon	0.01
$(CH_2)_n$	0.072	0.039	Sulfur	0.00

Specific Volume	14.382			
BTU/ft^3	640	HHV	576	LHV
BTU/ lb.	9197	HHV	8282	LHV
F (factor)	9251	HHV	10274	LHV

"as is" ideal gas at 60° F, 1 atm, where CH4-1010H, 909.4L TGNMO-804H, 756L BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	10.428	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for SCAQMD RECLAIM HHV and F (factor)

Report Date: December 20, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 10, 2013
Date Analyzed: December 10, 2013
AtmAA Lab No.: 13443-1 P2E4

HHV, and F factor are calculated using labortatory analysis results for methane,carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds inserted into SCAQMD RECLAIM D3588 spreadsheet.
Results represent a dry "real" gas at 60oF and 1 atm.

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.46	38.90	Carbon	45.58
Carbon dioxide	35.61	60.03	Hydrogen	9.73
Nitrogen	0.74	0.79	Oxygen	43.90
Oxygen	0.19	0.23	Nitrogen	0.79
$(CH_2)_n$	0.072	0.039	Sulfur	0.00

HHV (btu/scf)	632
Average MW	26.10
Gas Density (Ideal Gas)	0.06769
Compressibility Factor	0.99694
Gas Density (Real Gas)	0.06789
HHV (btu/lb)	9301
F Factor (dry)	9147
F Factor - dry (60 F)	9008
F Factor (wet)	11166
F Factor - wet (60 F)	10997
Fwet / Fdry	1.221
Fc (dry)	1573

Calculated values for Specific Volume, BTU and F (factor)

Report Date: December 20, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 10, 2013
Date Analyzed: December 10, 2013
AtmAA Lab No.: 13443-2 P2E5

Specific volume, BTU, and F factor are calculated using labortatory analysis results for methane, carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds in equations that include assumed values for the specific volume of gases (CH4, CO2, N2, O2, Ar, and (CH2)n). The specific volume of gases were taken from the Scott Speciality Gases catalogue, 2001, and represents "as is" ideal gas at 60° F and 1 atm. The F factor is calculated according to the equation in ASTM D-3588.B89

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.45	38.97	Carbon	45.64
Carbon dioxide	35.55	60.03	Hydrogen	9.75
Nitrogen	0.72	0.77	Oxygen	43.83
Oxygen	0.14	0.17	Nitrogen	0.77
Argon	0.006	0.009	Argon	0.01
$(CH_2)_n$	0.080	0.043	Sulfur	0.00

Specific Volume	14.389			
BTU/ft^3	641	HHV	578	LHV
BTU/ lb.	9231	HHV	8312	LHV
F (factor)	9236	HHV	10257	LHV

"as is" ideal gas at 60° F, 1 atm, where CH4-1010H, 909.4L TGNMO-804H, 756L BTU/cu.ft.

Component	Specific volume reference values *	
Methane	23.35	(ft^3/lb)
Carbon dioxide	8.59	
Nitrogen	13.54	
Oxygen	11.87	
Argon	9.52	
(CH2)n	10.428	

* reference, Scott Specialty Gases Catalogue, 2001 adjusted to 60°F

Calculated values for SCAQMD RECLAIM HHV and F (factor)

Report Date: December 20, 2013
Client: SCEC
Project Location: OCSD
Date Received: December 10, 2013
Date Analyzed: December 10, 2013
AtmAA Lab No.: 13443-2 P2E5

HHV, and F factor are calculated using labortatory analysis results for methane,carbon dioxide, nitrogen, oxygen, TGNMO, and sulfur compounds inserted into SCAQMD RECLAIM D3588 spreadsheet.
Results represent a dry "real" gas at 60oF and 1 atm.

Component	Mole %	Wt %	C,H,O,N,S,	Wt.%
Methane	63.53	38.97	Carbon	45.64
Carbon dioxide	35.59	60.04	Hydrogen	9.75
Nitrogen	0.72	0.77	Oxygen	43.84
Oxygen	0.15	0.18	Nitrogen	0.77
$(CH_2)_n$	0.080	0.043	Sulfur	0.00

HHV (btu/scf)	632
Average MW	26.08
Gas Density (Ideal Gas)	0.06765
Compressibility Factor	0.99694
Gas Density (Real Gas)	0.06786
HHV (btu/lb)	9318
F Factor (dry)	9148
F Factor - dry (60 F)	9010
F Factor (wet)	11167
F Factor - wet (60 F)	10998
Fwet / Fdry	1.221
Fc (dry)	1572

AtmAA Inc.
23917 Craftsman Rd., Calabasas, CA 91302 • (818) 223-3277 • FAX (818) 223-8250

LABORATORY ANALYSIS REPORT

environmental consultants
laboratory services

TO-15 Component Analysis in SUMMA Canister Samples, by GC/MS

Report Date: January 8, 2014
Client: SCEC
Project Location: OCSD / Plant 1 and 2
Client Project No.: 2061.1053
Date Received: December 12, 2013
Date Analyzed: December 17 & 18, 2013

				P2E3	P2E3	P2E3 (2N)
AtmAA Lab No.:	13463-47	13463-48	13463-49	13463-50	13463-51	13463-52
Sample ID:	P2E1 Run 1	P2E1 Run 2	P2E1 Run 3	P2E2 Run 1	P2E2 Run 2	P2E2 Run 3
Components	(Concentations in ppbv)					
Freon 12	<1	<1	<1	<1	<1	<1
Chloromethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Freon 114	<1	<1	<1	<1	<1	<1
Vinyl Chloride	<1	<1	<1	<1	<1	<1
1,3-Butadiene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Bromomethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Chloroethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Bromoethene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Acetone	118	99.6	85.1	63.3	93.5	106
Freon 11	<1	<1	<1	<1	<1	<1
Isopropyl Alcohol	<2	<2	<2	<2	<2	<2
1,1-Dichloroethene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Methylene Chloride	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
3-Chloro-1-Propene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Carbon Disulfide	<1.4	<1.4	1.41	<1.4	1.59	3.26
Freon 113	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
trans-1,2-Dichloroethene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,1-Dichloroethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
MTBE	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Vinyl Acetate	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
2-Butanone	18.7	15.3	15.0	11.3	12.4	12.2
cis-1,2-Dichloroethene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
n-Hexane	5.28	5.05	4.53	2.89	2.53	2.55
Chloroform	<1	<1	<1	<1	<1	<1
Ethyl Acetate	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Tetrahydrofuran	2.19	1.62	1.46	<1.4	<1.4	<1.4
1,2-Dichloroethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,1,1-Trichloroethane	<1	<1	<1	<1	<1	<1
Benzene	23.6	23.2	21.8	5.48	5.31	5.08
Carbon Tetrachloride	<1	<1	<1	<1	<1	<1
Cyclohexane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,2-Dichloropropane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Bromodichloromethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Trichloroethene	<1	<1	<1	<1	<1	<1
1,4-Dioxane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
2,2,4-Trimethylpentane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
n-Heptane	2.74	2.60	2.43	<1.4	<1.4	<1.4
cis-1,3-Dichloropropene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
4-Methyl-2-pentanone	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
trans-1,3-Dichloropropene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,1-2-Trichloroethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Toluene	12.6	12.3	12.0	2.55	2.39	2.23
2-Hexanone	2.56	1.98	1.96	<1.4	1.52	<1.4
Dibromochloromethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,2-Dibromomethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Tetrachloroethene	<1	<1	<1	<1	<1	<1
Chlorobenzene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Ethylbenzene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
m,p-Xylene	3.16	3.80	2.90	<1.4	<1.4	<1.4
Bromoform	<1	<1	<1	<1	<1	<1
Styrene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,1,2,2-Tetrachloroethane	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
o-Xylene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Benzyl Chloride	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
4-Ethyltoluene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,3,5-Trimethylbenzene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,2,4-Trimethylbenzene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
1,3-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,4-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,2-Dichlorobenzene	<1	<1	<1	<1	<1	<1
1,2,4-Trichlorobenzene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4
Hexachlorobutadiene	<1.4	<1.4	<1.4	<1.4	<1.4	<1.4

Michael L. Porter
Laboratory Director

QUALITY ASSURANCE SUMMARY

(Repeat Analyses)

Project Location: OCSD / Plant 1 and 2
Date Received: December 12, 2013
Date Analyzed: December 17 & 18, 2013

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Freon 12	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Chloromethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Freon 114	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Vinyl Chloride	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
1,3-Butadiene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Bromomethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Chloroethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Bromoethene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Acetone	P1E2 Run 1	118	127	122	3.7
	P2E1 Run 1	117	119	118	0.85
Freon 11	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Isopropyl Alcohol	P1E2 Run 1	<2	<2	---	---
	P2E1 Run 1	<2	<2	---	---
1,1-Dichloroethene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Methylene Chloride	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
3-Chloro-1-Propene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Carbon Disulfide	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Freon 113	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
trans-1,2-Dichloroethene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,1-Dichloroethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
MTBE	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Vinyl Acetate	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
2-Butanone	P1E2 Run 1	108	108	108	0.0
	P2E1 Run 1	19.3	18.1	18.7	3.2
cis-1,2-Dichloroethene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
n-Hexane	P1E2 Run 1	3.86	4.19	4.02	4.1
	P2E1 Run 1	5.46	5.11	5.28	3.3
Chloroform	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Ethyl Acetate	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Tetrahydrofuran	P1E2 Run 1	5.08	4.77	4.92	3.1
	P2E1 Run 1	2.01	2.37	2.19	8.2
1,2-Dichloroethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,1,1-Trichloroethane	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Benzene	P1E2 Run 1	59.6	62.9	61.2	2.7
	P2E1 Run 1	23.6	23.5	23.6	0.21
Carbon Tetrachloride	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Cyclohexane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,2-Dichloropropane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Bromodichloromethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Trichloroethene	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
1,4-Dioxane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
2,2,4-Trimethylpentane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
n-Heptane	P1E2 Run 1	3.08	3.55	3.32	7.1
	P2E1 Run 1	2.89	2.58	2.74	5.7
cis-1,3-Dichloropropene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
4-Methyl-2-pentanone	P1E2 Run 1	3.14	3.23	3.18	1.4
	P2E1 Run 1	<1.4	<1.4	---	---
trans-1,3-Dichloropropene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,1-2-Trichloroethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Toluene	P1E2 Run 1	18.2	19.4	18.8	3.2
	P2E1 Run 1	12.9	12.4	12.6	2.0
2-Hexanone	P1E2 Run 1	17.9	18.5	18.2	1.6
	P2E1 Run 1	2.71	2.42	2.56	5.6
Dibromochloromethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,2-Dibromomethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Tetrachloroethene	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
Chlorobenzene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Ethylbenzene	P1E2 Run 1	2.01	2.12	2.06	2.7
	P2E1 Run 1	<1.4	<1.4	---	---
m,p-Xylene	P1E2 Run 1	3.06	3.31	3.18	3.9
	P2E1 Run 1	3.21	3.11	3.16	1.6
Bromoform	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---

QUALITY ASSURANCE SUMMARY
(Repeat Analyses)
(continued)

Components	Sample ID	Repeat Analysis Run #1	Repeat Analysis Run #2	Mean Conc.	% Diff. From Mean
		(Concentration in ppbv)			
Styrene	P1E2 Run 1	2.30	2.76	2.53	9.1
	P2E1 Run 1	<1.4	<1.4	---	---
1,1,2,2-Tetrachloroethane	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
o-Xylene	P1E2 Run 1	<1.4	1.44	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Benzyl Chloride	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
4-Ethyltoluene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,3,5-Trimethylbenzene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,2,4-Trimethylbenzene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
1,3-Dichlorobenzene	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
1,4-Dichlorobenzene	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
1,2-Dichlorobenzene	P1E2 Run 1	<1	<1	---	---
	P2E1 Run 1	<1	<1	---	---
1,2,4-Trichlorobenzene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---
Hexachlorobutadiene	P1E2 Run 1	<1.4	<1.4	---	---
	P2E1 Run 1	<1.4	<1.4	---	---

Twelve SUMMA canister samples, laboratory numbers 13463-(41-52), were analyzed for TO-15 components by GC/MS. Agreement between repeat analyses is a measure of precision and is shown above in the column "% Difference from Mean". The average % difference from mean for 21 repeat measurements from 12 SUMMA canister samples is 3.5%.

GRAVIMETRIC ANALYSIS

CLIENT: OCSD
ANALYST: AC
REPORT#: 2061-1053
METHOD: SCAQMD 5-1
TEST DATE: 12/11/13

LOCATION/UNIT: P2E1			RUN #: 1		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
Condensable (Inorg)	470 ml	E-24 Tare: 99.6975	99.7077 Date/Time: 12/30 9:15	99.7075 Date/Time: 12/31 9:41	Date/Time:
Condensable (Org)	125 ml	E-82 Tare: 101.4818	101.4840 Date/Time: 12/30 10:05	101.4839 Date/Time: 12/31 9:50	Date/Time:
Filter 55-839 Tare: .13966	-----	-----	.14107 Date/Time: 12/27 8:31	.14105 Date/Time: 12/30/13 8:26	Date/Time:

LOCATION/UNIT: P2E			RUN #: 2		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
Condensable (Inorg)	548 ml	E-113 Tare: 115.2026	115.2135 Date/Time: 12/30 8:43	115.2133 Date/Time: 12/31 8:17	Date/Time:
Condensable (Org)	125 ml	E-92 Tare: 113.1201	113.1234 Date/Time: 12/30 9:48	113.1232 Date/Time: 12/31 9:06	Date/Time:
Filter 55-837 Tare: .13802	-----	-----	.14075 Date/Time: 12/27 8:34	.14077 Date/Time: 12/30/13 8:28	Date/Time:

LOCATION/UNIT: P2E			RUN #: 3		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
Condensable (Inorg)	506 ml	E-8 Tare: 118.8226	118.8262 Date/Time: 12/30 8:50	118.8250 Date/Time: 12/31 8:45	118.8254 Date/Time: 01/02 8:25
Condensable (Org)	125 ml	E-34 Tare: 97.0818	97.0850 Date/Time: 12/30 10:15	97.0842 Date/Time: 12/31 9:24	97.0839 Date/Time: 01/02 8:39
Filter 55-834 Tare: .15722	-----	-----	.15742 Date/Time: 12/27 8:37	.15743 Date/Time: 12/30/13 8:30	Date/Time:

GRAVIMETRIC ANALYSIS

CLIENT: OCSD ANALYST: AE

REPORT#: 2061-1053 METHOD: SCAQMD 5-1

TEST DATE: _____

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LOCATION/UNIT: P2E4			RUN #: 4 1		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
Condensable (Inorg)	538 ml	E120 Tare: 114.3112	114.3150 Date/Time: 12/30 9:10	114.3146 Date/Time: 12/31 8:54	Date/Time:
Condensable (Org)	125 ml	E96 Tare: 113.7054	113.7072 Date/Time: 12/30 10:02	113.7071 Date/Time: 12/31 9:53	Date/Time:
Filter 55-822 Tare: .15372	-----	-----	.15479 Date/Time: 12/27 8:40	.15479 Date/Time: 12/30/13 8:32	Date/Time:

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LOCATION/UNIT: P2E5			RUN #: 5 1		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
Condensable (Inorg)	484 ml	E70 Tare: 118.5642	118.5687 Date/Time: 12/30 8:53	118.5681 Date/Time: 12/31 8:50	118.5683 Date/Time: 01/02 8:29
Condensable (Org)	125 ml	E18 Tare: 101.2149	101.2180 Date/Time: 12/30 9:56	101.2178 Date/Time: 12/31 9:14	Date/Time:
Filter 55-835 Tare: .15832	-----	-----	.15955 Date/Time: 12/27 8:48	.15955 Date/Time: 12/30/13 8:34	Date/Time:

LOCATION/UNIT: Blanks			RUN #:		
			SAMPLE WEIGHTS		
FRACTION	VOLUME	EVAP DISH	Weight (g)	Weight (g)	Weight (g)
Probe/Nozzle		Tare:	Date/Time:	Date/Time:	Date/Time:
DI water ~~Condensable (Inorg)~~	250 ml	E109 Tare: 110.2146	110.2147 Date/Time: 12/30 9:28	110.2146 Date/Time: 12/31 8:31	Date/Time:
Methylene Chloride ~~Condensable (Org)~~	200 ml	E80 Tare: 118.1548	118.1548 Date/Time: 12/30 9:59	118.1548 Date/Time: 12/31 9:20	Date/Time:
Filter Tare:	-----	-----	Date/Time:	Date/Time:	Date/Time:

SCEC

Appendix G

Calibration Data and Calibration Gas Certificates

CB-11

CERTIFICATE OF CALIBRATION

CUSTOMER:	**SOUTH COAST ENVIRONMENTAL** ORANGE CA	**CALIBRATION DATE:**	03/11/13
PO NUMBER:	4531	**CALIBRATION DUE:**	03/11/14
INST. MANUFACTURER:	APEX INSTRUMENTS	**PROCEDURE:**	NAVAIR 17-20MG-02
INST. DESCRIPTION:	AIR SAMPLER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70 F
MODEL NUMBER:	XC-60A	**STANDARD(S) USED:**	A797, A24 DUE 07-2013
SERIAL NUMBER:	0608010	**NIST TRACE #' S:**	1361269184, 1360578741, 1360586185
RATED UNCERTAINTY:	+/-1% RD.	**AMBIENT CONDITIONS:**	765 mm HGA 46 % RH 69 F
UNCERTAINTY GIVEN:	FLOW measurement uncertainty: +/- .199% RD. K=2	**CERTIFICATE FILE #:**	432503.13

NOTES: AS RECEIVED/ AS LEFT WITHIN SPECS. REFERENCE CONDITIONS ARE: 760 mm HGA 70 F

TEST POINT NUMBER	UUT INDICATED M3/HR PD.METER	DM.STD. ACTUAL M3/HR PD.METER	CORRRECTION FACTOR	UUT INDICATED FLOWMETER SCCM	DM.STD. ACTUAL FLOWMETER SCCM	
1	0.050	0.050	1.000	100	101.2	
2	0.100	0.100	1.000	400	404.1	
3	0.249	0.250	1.004	600	605.6	
4	0.498	0.500	1.004	800	808.0	
5	0.997	1.000	1.003	1000	1008.9	
6	1.494	1.500	1.004	GAUGE	GAUGE	
7	1.991	2.000	1.005	"HG VAC.	"HG VAC.	
8	2.488	2.500	1.005	0-30	0-30	
		AVERAGE	1.00305	TEMPERATURE	TEMPERATURE	
				F DEG.	F DEG.	
				72	71.91	

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 10572 Calle Lee #138 • Los Alamitos, CA 90720
Phone (714) 827-1215 • Fax (714) 827-0823

Date: 3/11/2013

Approved By:

Calibration Technician: Jaime Acosta

CB-12

CERTIFICATE OF CALIBRATION

CUSTOMER:	**SOUTH COAST ENVIRONMENTAL** ORANGE CA	**CALIBRATION DATE:**	03/11/13
PO NUMBER:	4531	**CALIBRATION DUE:**	03/11/14
INST. MANUFACTURER:	APEX INSTRUMENTS	**PROCEDURE:**	NAVAIR 17-20MG-02
INST. DESCRIPTION:	AIR SAMPLER	**CALIBRATION FLUID:**	AIR @ 14.7 PSIA 70 F
MODEL NUMBER:	XC-60A	**STANDARD(S) USED:**	A797, A24 DUE 07-2013
SERIAL NUMBER:	0602002	**NIST TRACE #' S:**	1361269184, 1360578741, 1360586185
RATED UNCERTAINTY:	+/-1% RD.	**AMBIENT CONDITIONS:**	765 mm HGA 46 % RH 69 F
UNCERTAINTY GIVEN:	FLOW measurement uncertainty: +/- .199% RD. K=2	**CERTIFICATE FILE #:**	432502.13

NOTES: AS RECEIVED/ AS LEFT WITHIN SPECS. REFERENCE CONDITIONS ARE: 760 mm HGA 70 F

TEST POINT NUMBER	UUT INDICATED M3/HR PD.METER	DM.STD. ACTUAL M3/HR PD.METER	CORRECTION FACTOR	UUT INDICATED FLOWMETER SCCM	DM.STD. ACTUAL FLOWMETER SCCM	
1	0.050	0.050	1.000	100	100.8	
2	0.100	0.100	1.000	400	403.6	
3	0.251	0.250	0.996	600	604.9	
4	0.502	0.500	0.996	800	807.5	
5	1.002	1.000	0.998	1000	1008.2	
6	1.504	1.500	0.997	GAUGE	GAUGE	
7	2.007	2.000	0.997	"HG VAC.	"HG VAC.	
8	2.510	2.500	0.996	0-30	0-30	
		AVERAGE	0.99749	TEMPERATURE	TEMPERATURE	
				F DEG.	F DEG.	
				71	70.93	

All instruments used in the performance of the shown calibration have traceability to the National Institute of Standards and Technology (NIST). The uncertainty ratio between the calibration standards (DM.STD.) used and the unit under test (UUT) is a minimum of 4:1, unless otherwise noted. Calibration has been performed per the shown procedure number, in accordance with ISO 10012:2003, ISO 17025:2005, ANSI/NCSL-Z-540.3, and/or MIL-STD-45662A. Test methods: API2530-92 & ASME MFC-3M-1989.

Dick Munns Company • 10572 Calle Lee #138 • Los Alamitos, CA 90720
Phone (714) 827-1215 • Fax (714) 827-0823

Date: 3/11/2013

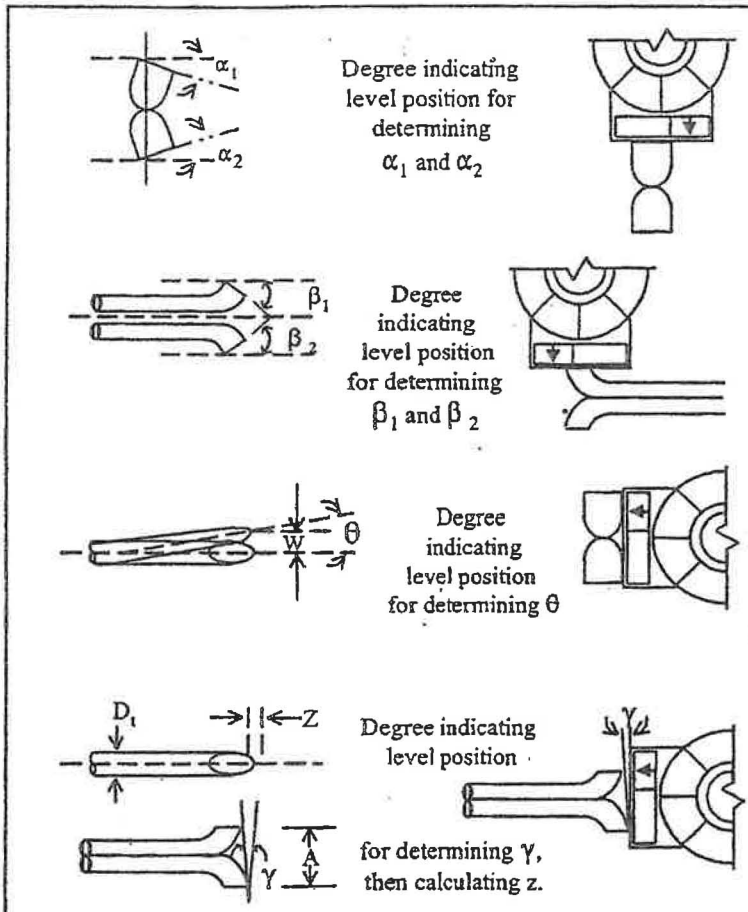
Approved By:

Calibration Technician: Jaime Acosta

Table 2G-1. Type S Probe Inspection Sheet

Note: Method 2 provides the criteria for an acceptably constructed Type S pitot tube. However, the procedure for making the necessary measurements is not specified. One approach is given below.

1. Use a vise with parallel and perpendicular faces. Use an angle-measuring device (analog or digital) for this check.
2. Place the pitot tube in the vise, and level the pitot tube horizontally using the angle-measuring device.
3. Place the angle-measuring device as shown below.
4. Measure distance A, which is P_A plus P_B. Method 2 specifies that $P_A = P_B$, but provides no tolerance for this measurement. Because this measurement is very difficult, it is suggested that $P_A = P_B = A/2$.
5. Measure the external tube diameter (D_t) with a micrometer, machinist's rule, or internal caliper.
6. Record all data as shown on the form below.
7. Calculate dimensions w and z as shown below.



Level and perpendicular?		Y
Obstruction?		N
Damaged?		N
α_1	$(-2° \le \alpha_1 \le +2°)$	0
α_2	$(-2° \le \alpha_2 \le +2°)$	0
β_1	$(-2° \le \beta_1 \le +2°)$	1
β_2	$(-2° \le \beta_2 \le +2°)$	0
γ		0
θ		0
$z = A (\tan\gamma)$	[≤ 0.5 mm (0.02 in.)]	0
$w = A (\tan\theta)$	[≤ 0.5 mm (0.02 in.)]	0
D_t	[≥ 9.5 mm (3/8 in.)]	3/8
A		0.904
$A/2D_t$	$(1.05 \le P_A/D_t \le 1.5)$ *	1.2
* Recommended dimensions		

QA/QC Check

Completeness ✓ Legibility ✓ Accuracy ✓

Specifications ✓ Reasonableness ✓

Certification

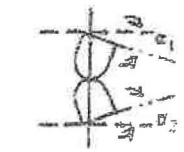
I certify that the Type S probe ID 7 meets or exceeds all specifications, criteria, and applicable design features.

Certified by: [signature] Date: 11/5/13

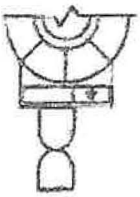
Table 2G-1. Type S Probe Inspection Sheet

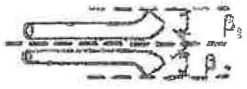
Note: Method 2 provides the criteria for an acceptably constructed Type S pitot tube. However, the procedure for making the necessary measurements is not specified. One approach is given below.

1. Use a vise with parallel and perpendicular faces. Use an angle-measuring device (analog or digital) for this check.
2. Place the pitot tube in the vise, and level the pitot tube horizontally using the angle-measuring device.
3. Place the angle-measuring device as shown below.
4. Measure distance A, which is P_A plus P_B. Method 2 specifies that: $P_A = P_B$, but provides no tolerance for this measurement. Because this measurement is very difficult, it is suggested that $P_A = P_B = A/2$.
5. Measure the external tube diameter (D_t) with a micrometer, machinist's rule, or internal caliper.
6. Record all data as shown on the form below.
7. Calculate dimensions w and z as shown below.

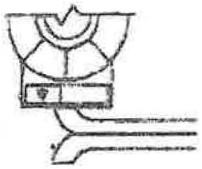


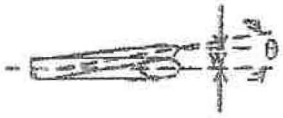
Degree indicating level position for determining α_1 and α_2



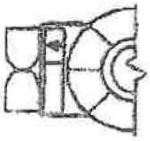


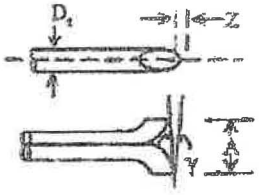
Degree indicating level position for determining β_1 and β_2



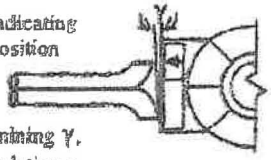


Degree indicating level position for determining θ





Degree indicating level position for determining γ, then calculating z.



Level and perpendicular?		Y
Obstruction?		N
Damaged?		N
α_1	$(-2° \le \alpha_1 \le +2°)$	1
α_2	$(-2° \le \alpha_2 \le +2°)$	0
β_1	$(-2° \le \beta_1 \le +2°)$	1
β_2	$(-2° \le \beta_2 \le +2°)$	1
γ		0
θ		0
z = A (tanγ)	[≤ 0.5 mm (0.02 in.)]	0
w = A (tanθ)	[≤ 0.5 mm (0.02 in.)]	0
D_t	[≥ 9.5 mm (3/8 in.)]	5/16
A		.864
$A/2D_t$	$(1.05 \le P_A/D_t \le 1.5)$ *	1.38

* Recommended dimensions

QA/QC Check

Completeness ✓ Legibility ✓ Accuracy ✓

Specifications ✓ Reasonableness ✓

Certification

I certify that the Type S probe ID 59 meets or exceeds all specifications, criteria, and applicable design features.

Certified by: [signature] Date: 7-3-13

SCEC
1582-1 North Batavia
Orange CA 92867
(714) 282 - 8240

BAROMETER CALIBRATION

BAROMETER ID #:	SNA-BAR-4
DATE:	10/31/2013
ANNUAL OR MONTHLY CALIBRATION:	ANNUAL
REFERENCE BAROMETER #:	LAB
CALIBRATION PERFORMED BY	MAA
ELEVATION DURING CALIBRATION:	250

BAROMETER		
ACTUAL	REFERENCE	DIFFERENCE
30.02	30.02	0

TOLERANCE MAXIMUM DIFFERENCE IS 0.1 IN. Hg
ELEVATION CORRECTION: (2.5MM OR 0.1 IN.) PER (30 METERS OR 100Ft.)

SCEC
1582-1 NORTH BATAVIA STREET
ORANGE, CALIFORNIA 92867
(714) 282-8240

TEMPERATURE SENSOR CALIBRATION

TEMPERATURE SENSOR I.D. #:	**Stack KO 5**
THERMOCOUPLE SOURCE:	**PIE Model 520-K**
SOURCE SERIAL NUMBER:	**S/N 106970**
CALIBRATION DATE:	**January 12, 2012**
CALIBRATED BY:	**GM**

ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

ICE BATH		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
32	33	0.20
32	33	0.20
32	33	0.20

BOILING WATER		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
212	215	0.45
212	215	0.45
212	215	0.45

BOILING OIL		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
365	369	0.48
365	369	0.48
365	369	0.48

MAXIMUM TOLERANCE BETWEEN ANY TWO MEASUREMENTS IS 1.5%
NOTE: TAKE READINGS EVERY 1 MINUTE

SCEC
1582-1 NORTH BATAVIA STREET
ORANGE, CALIFORNIA 92867
(714) 282-8240

TEMPERATURE SENSOR CALIBRATION

TEMPERATURE SENSOR I.D. #:	**Heated Line 6**
THERMOCOUPLE SOURCE:	**PIE Model 520-K**
SOURCE SERIAL NUMBER:	**S/N 106970**
CALIBRATION DATE:	**February 6, 2013**
CALIBRATED BY:	**GM**

ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

ICE BATH		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
32	35	0.61
32	35	0.61
32	35	0.61

BOILING WATER		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
212	216	0.60
212	216	0.60
212	216	0.60

BOILING OIL		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
365	368	0.36
365	368	0.36
365	368	0.36

MAXIMUM TOLERANCE BETWEEN ANY TWO MEASUREMENTS IS 1.5%
NOTE: TAKE READINGS EVERY 1 MINUTE

SCEC
1582-1 NORTH BATAVIA STREET
ORANGE, CALIFORNIA 92867
(714) 282-8240

TEMPERATURE SENSOR CALIBRATION

TEMPERATURE SENSOR I.D. #:	**PT55 TC 55**
THERMOCOUPLE SOURCE:	**PIE Model 520-K**
SOURCE SERIAL NUMBER:	**S/N 106970**
CALIBRATION DATE:	**July 3, 2013**
CALIBRATED BY:	**GM**

ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

ICE BATH		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
32	31	0.20
32	31	0.20
32	31	0.20

BOILING WATER		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
212	210	0.30
212	210	0.30
212	210	0.30

BOILING OIL		
SIMULATED THERMOMETER TEMPERATURE	**FIELD SENSOR TEMPERATURE**	**ABSOLUTE % DIFFERENCE**
365	363	0.24
365	361	0.48
365	363	0.24

MAXIMUM TOLERANCE BETWEEN ANY TWO MEASUREMENTS IS 1.5%
NOTE: TAKE READINGS EVERY 1 MINUTE

SCEC
1582-1 NORTH BATAVIA STREET
ORANGE, CALIFORNIA 92867
(714) 282-8240

TEMPERATURE SENSOR CALIBRATION

TEMPERATURE SENSOR I.D. #:	PT7 TC53 (stack)
THERMOCOUPLE SOURCE:	PIE Model 520-K
SOURCE SERIAL NUMBER:	S/N 106970
CALIBRATION DATE:	February 19, 2013
CALIBRATED BY:	GM

ALL TEMPERATURES ARE IN DEGREES FAHRENHEIT

ICE BATH		
SIMULATED THERMOMETER TEMPERATURE	FIELD SENSOR TEMPERATURE	ABSOLUTE % DIFFERENCE
32	33	0.20
32	32	0.00
32	33	0.20

BOILING WATER		
SIMULATED THERMOMETER TEMPERATURE	FIELD SENSOR TEMPERATURE	ABSOLUTE % DIFFERENCE
212	213	0.15
212	213	0.15
212	213	0.15

BOILING OIL		
SIMULATED THERMOMETER TEMPERATURE	FIELD SENSOR TEMPERATURE	ABSOLUTE % DIFFERENCE
365	366	0.12
365	366	0.12
365	366	0.12

MAXIMUM TOLERANCE BETWEEN ANY TWO MEASUREMENTS IS 1.5%
NOTE: TAKE READINGS EVERY 1 MINUTE

SEMI-ANNUAL METER BOX CALIBRATION DATA AT STANDARD TEMPERATURE OF 60 DEG F

Orifice Method - Triplicate Runs/Four Calibration Points
English Meter Box Units, English K' Factor
Filename:
File Modified From: APEX 522 Series Meter box Calibration
Revised: 4/7/2004

Model # CAE
ID # CB15
Date: July 9, 2013
Bar. Pressure: 29.90 (in. Hg)
Performed By: MAA

Theoretical Critical Vacuum = 14.11

DRY GAS METER READINGS									CRITICAL ORIFICE READINGS					
					Initial Temps		Final Temps					Ambient Temperature		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.30	18.00	252.53	258.15	5.62	78.00	79.00	80.00	79.00	40	0.231	24.00	77.00	77.00	77.00
0.30	18.00	258.15	263.77	5.62	80.00	79.00	80.00	80.00	40	0.231	24.00	77.00	78.00	77.50
0.30	18.00	263.77	269.40	5.62	80.00	80.00	81.00	81.00	40	0.231	24.00	78.00	79.00	78.50
0.62	13.00	269.40	275.42	6.03	81.00	81.00	81.00	81.00	48	0.343	22.00	79.00	80.00	79.50
0.62	13.00	275.42	281.46	6.04	81.00	81.00	82.00	81.00	48	0.343	22.00	80.00	80.00	80.00
0.62	13.00	281.46	287.51	6.04	82.00	81.00	82.00	82.00	48	0.343	22.00	80.00	81.00	80.50
1.60	8.00	293.69	299.78	6.09	82.00	81.00	84.00	82.00	63	0.562	19.00	81.00	81.00	81.00
1.60	8.00	299.78	305.87	6.09	84.00	82.00	84.00	83.00	63	0.562	19.00	81.00	82.00	81.50
1.60	8.00	305.87	311.96	6.09	84.00	83.00	84.00	83.00	63	0.562	19.00	82.00	82.00	82.00
3.30	6.00	311.96	318.30	6.34	83.00	83.00	84.00	83.00	73	0.779	15.00	82.00	82.00	82.00
3.30	6.00	318.30	324.65	6.35	84.00	83.00	85.00	84.00	73	0.779	15.00	82.00	82.00	82.00
3.30	6.00	324.65	331.00	6.35	85.00	84.00	86.00	84.00	73	0.779	15.00	82.00	82.00	82.00

DRY GAS METER		ORIFICE			DRY GAS METER CALIBRATION FACTOR	ORIFICE CALIBRATION FACTOR	Individual Run	Individual Orifice	Orifice Average	Orifice Average
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	Y Value (number)	dH@ Value (in H2O)	0.95 < Y < 1.05?	Ymax - Ymin < 0.010?	0.98 < Y/Yd < 1.02?	dH@ - dH@ av < 0.155?
5.503	155.9	5.365	151.9	5.544	0.975	1.833	Pass			
5.497	155.7	5.362	151.9	5.547	0.976	1.833	Pass			
5.489	155.5	5.358	151.7	5.552	0.976	1.833	Pass			
				Average	0.975	1.833		Pass	Pass	Pass
5.886	166.7	5.740	162.6	5.959	0.975	1.720	Pass			
5.894	166.9	5.737	162.5	5.962	0.973	1.722	Pass			
5.892	166.9	5.735	162.4	5.965	0.973	1.722	Pass			
				Average	0.974	1.721		Pass	Pass	Pass
5.949	168.5	5.780	163.7	6.017	0.972	1.657	Pass			
5.939	168.2	5.777	163.6	6.020	0.973	1.655	Pass			
5.933	168.0	5.774	163.5	6.022	0.973	1.655	Pass			
				Average	0.972	1.656		Pass	Pass	Pass
6.201	175.6	6.003	170.0	6.261	0.968	1.777	Pass			
6.211	175.9	6.003	170.0	6.261	0.967	1.775	Pass			
6.193	175.4	6.003	170.0	6.261	0.969	1.773	Pass			
				Average	0.968	1.775		Pass	Pass	Pass

Average Yd: 0.972 **dH@: 1.746**

Q @ dH = 1: 0.568

SIGNED: _____ Date: 7-9-13

IMPORTANT **For valid test results, the Actual Vacuum should be 1 to 2 In. Hg greater than the Theoretical Critical Vacuum shown above.**
IMPORTANT **The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).**

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000059034

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 25027246
Customer P. O. Number: 04593013
Customer Reference Number:

Fill Date: 9/25/2013
Part Number: NI CD8.5O6E-AS
Lot Number: 109326806
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	9/30/2021	NIST Traceable
Cylinder Number:	CC272639	Analytical Uncertainty:
8.31 %	CARBON DIOXIDE	± 1 %
12.5 %	OXYGEN	± 1.2 %
Balance	NITROGEN	

Certifcation Information: *Certification Date:* 9/30/2013 *Term:* 96 Months *Expiration Date:* 9/30/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON DIOXIDE

Requested Concentration: 8.5 %
Certified Concentration: 8.31 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 9/24/2013

First Analysis Data:						Date:	9/30/2013
Z: 0	R: 9.96	C: 8.31	Conc:	8.31			
R: 9.96	Z: 0	C: 8.31	Conc:	8.31			
Z: 0	C: 8.31	R: 9.96	Conc:	8.31			
UOM: %		Mean Test Assay:		8.31 %			

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC207040
Ref. Std. Conc: 9.96%
Ref. Std. Traceable to SRM # : vs. 1674b
SRM Sample # : 7-F-32
SRM Cylinder # : CAL014645

Second Analysis Data:						Date:	
Z: 0	R: 0	C: 0	Conc:	0			
R: 0	Z: 0	C: 0	Conc:	0			
Z: 0	C: 0	R: 0	Conc:	0			
UOM: %		Mean Test Assay:		0 %			

2. Component: OXYGEN

Requested Concentration: 12.5 %
Certified Concentration: 12.5 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 9/24/2013

First Analysis Data:						Date:	9/30/2013
Z: 0	R: 10.02	C: 12.48	Conc:	12.468			
R: 10.02	Z: 0	C: 12.48	Conc:	12.468			
Z: 0	C: 12.48	R: 10.02	Conc:	12.468			
UOM: %		Mean Test Assay:		12.468 %			

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA15925
Ref. Std. Conc: 10.01%
Ref. Std. Traceable to SRM # : 2658a
SRM Sample # : 72-28-B
SRM Cylinder # : CLM-006896

Second Analysis Data:						Date:	
Z: 0	R: 0	C: 0	Conc:	0			
R: 0	Z: 0	C: 0	Conc:	0			
Z: 0	C: 0	R: 0	Conc:	0			
UOM: %		Mean Test Assay:		0 %			

Analyzed by: Yang Yu

Certified by: Jacqueline Fiero

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVP ID: F22013

DocNumber: 000055291

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 24009839
Customer P. O. Number: 04448150
Customer Reference Number:

Fill Date: 6/17/2013
Part Number: NI CD17O7ZE-AS
Lot Number: 109316809
Cylinder Style & Outlet: AS CGA 590
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	**6/24/2021**	NIST Traceable
Cylinder Number:	**CC107912**	Analytical Uncertainty:
16.7 %	**CARBON DIOXIDE**	± 1 %
21.0 %	**OXYGEN**	± 1 %
Balance	**NITROGEN**	

Certifcation Information: *Certification Date:* 6/24/2013 *Term:* 96 Months *Expiration Date:* 6/24/2021

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON DIOXIDE

Requested Concentration: 16.0 %
Certified Concentration: 16.7 %
Instrument Used: Horiba VIA-510 S/N 2807014
Analytical Method: NDIR
Last Multipoint Calibration: 5/24/2013

First Analysis Data:						**Date:**	6/21/2013
Z: 0	R: 17.97	C: 16.75	Conc: 16.75				
R: 17.97	Z: 0	C: 16.71	Conc: 16.71				
Z: 0	C: 16.71	R: 17.97	Conc: 16.71				
UOM: %		**Mean Test Assay:**	16.723 %				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC265304
Ref. Std. Conc: 17.97%
Ref. Std. Traceable to SRM # : 2745
SRM Sample # : 9-B-09
SRM Cylinder # : CAL-010765

Second Analysis Data:						**Date:**	
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: %		**Mean Test Assay:**	0 %				

2. Component: OXYGEN

Requested Concentration: 18 %
Certified Concentration: 21.0 %
Instrument Used: OXYMAT 5E
Analytical Method: PARAMAGNETIC
Last Multipoint Calibration: 5/30/2013

First Analysis Data:						**Date:**	6/24/2013
Z: 0	R: 19.98	C: 21.02	Conc: 21.016				
R: 20	Z: 0	C: 21.04	Conc: 21.036				
Z: 0	C: 21.04	R: 20	Conc: 21.036				
UOM: %		**Mean Test Assay:**	21.03 %				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC92589
Ref. Std. Conc: 19.99%
Ref. Std. Traceable to SRM # : 2659a
SRM Sample # : 71-37-B
SRM Cylinder # : CLM-006734

Second Analysis Data:						**Date:**	
Z: 0	R: 0	C: 0	Conc: 0				
R: 0	Z: 0	C: 0	Conc: 0				
Z: 0	C: 0	R: 0	Conc: 0				
UOM: %		**Mean Test Assay:**	0 %				

Analyzed by: Ying Yu

Certified by: H.K. (FT)
Henry Koung

PRAXAIR

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DocNumber: 000052222

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23176665
Customer P. O. Number: 04326925
Customer Reference Number:

Fill Date: 3/28/2013
Part Number: NI NO8.5ME-AS
Lot Number: 109308713
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	4/9/2016	NIST Traceable
Cylinder Number:	CC253049	Analytical Uncertainty:
8.54 ppm	NITRIC OXIDE	± 1 %
Balance	NITROGEN	

NOx = 8.58 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 4/9/2013 *Term:* 36 Months *Expiration Date:* 4/9/2016

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITRIC OXIDE

Requested Concentration: 8.5 ppm
Certified Concentration: 8.54 ppm
Instrument Used: Thermo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 3/11/2013

First Analysis Data:						Date:	4/1/2013
Z:	0	R:	9.88	C:	8.52	Conc:	8.52
R:	9.88	Z:	0	C:	8.52	Conc:	8.52
Z:	0	C:	8.51	R:	9.88	Conc:	8.51
UOM:	ppm			Mean Test Assay:			8.52 ppm

Analyzed by: Diego Mestanza

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC335674
Ref. Std. Conc: 9.83 ppm
Ref. Std. Traceable to SRM # : 2629a
SRM Sample # : 50-G-109
SRM Cylinder # : FF31631

Second Analysis Data:						Date:	4/8/2013
Z:	0	R:	9.88	C:	8.56	Conc:	8.56
R:	9.88	Z:	0	C:	8.55	Conc:	8.55
Z:	0	C:	8.55	R:	9.88	Conc:	8.55
UOM:	ppm			Mean Test Assay:			8.55 ppm

Certified by: Jack Fu

PRAXAIR

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PGVPID: F22012

DocNumber: 000042111

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 21057267
Customer P. O. Number: 04004890
Customer Reference Number:

Fill Date: 7/30/2012
Part Number: NI NO18ME-AS
Lot Number: 109221201
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	8/23/2014	NIST Traceable
Cylinder Number:	CC362482	Analytical Uncertainty:
18.4 ppm	NITRIC OXIDE	± 1 %
Balance	NITROGEN	

NOx = 18.6 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 8/23/2012 *Term:* 24 Months *Expiration Date:* 8/23/2014

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1
Do Not Use this Standard if Pressure is less than 150 PSIG

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITRIC OXIDE

Requested Concentration: 18 ppm
Certified Concentration: 18.4 ppm
Instrument Used: Thermo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 8/11/2012

Reference Standard Type: GMIS
Ref. Std. Cylinder #: SA17261
Ref. Std. Conc: 25.17 ppm
Ref. Std. Traceable to SRM #: 2629a
SRM Sample #: 50-G-109
SRM Cylinder #: FF31631

First Analysis Data:						Date: 8/7/2012
Z: 0	R: 25.2	C: 18.28	Conc: 18.3			
R: 25.2	Z: 0	C: 18.39	Conc: 18.4			
Z: 0	C: 18.33	R: 25.2	Conc: 18.3			
UOM: ppm		Mean Test Assay:	18.3 ppm			

Second Analysis Data:						Date: 8/14/2012
Z: 0	R: 25.2	C: 18.4	Conc: 18.4			
R: 25.2	Z: 0	C: 18.41	Conc: 18.4			
Z: 0	C: 18.41	R: 25.2	Conc: 18.4			
UOM: ppm		Mean Test Assay:	18.4 ppm			

Analyzed by: Jack Fu

Certified by: Diego Mestanza

PRAXAIR

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DocNumber: 000035822

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SIGNAL HILL
2677 SIGNAL PARKWAY
SIGNAL HILL CA 907550

Praxair Order Number: 19501717
Customer P. O. Number: 03773283
Customer Reference Number:

Fill Date: 2/24/2012
Part Number: NI NO42ME-AS
Lot Number: 109205512
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu ft

Certified Concentration:

Expiration Date:	3/13/2014		NIST Traceable
Cylinder Number:	CC307301		Analytical Uncertainty:
43.6	ppm	NITRIC OXIDE	± 1 %
	Balance	NITROGEN	

NOx = 43.9 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 3/13/2012 *Term:* 24 Months *Expiration Date:* 3/13/2014

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1
Do Not Use this Standard if Pressure is less than 150 PSIG
PGVP I.D.# F22012

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 , Component: NITRIC OXIDE

Requested Concentration: 42 ppm
Certified Concentration: 43.6 ppm
Instrument Used: Thermo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 2/10/2012

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC3401
Ref. Std. Conc. 51.11ppm
Ref. Std. Traceable to SRM # vs. 1683b
SRM Sample # : 45-U-37
SRM Cylinder # : CAL015617

First Analysis Data: **Date:** 3/1/2012

Z:	0	R:	51.1	C:	43.6	Conc:	43.6
R:	51.1	Z:	0	C:	43.8	Conc:	43.8
Z:	0	C:	43.7	R:	51.1	Conc:	43.7

UOM: ppm Mean Test Assay: 43.7 ppm

Second Analysis Data: **Date:** 3/8/2012

Z:	0	R:	51.1	C:	43.5	Conc:	43.5
R:	51.1	Z:	0	C:	43.5	Conc:	43.5
Z:	0	C:	43.6	R:	51.1	Conc:	43.6

UOM: ppm Mean Test Assay: 43.5 ppm

Analyzed by: Jack Fu

Certified by: Ying Yu

PRAXAIR

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DocNumber: 000059247

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 25104385
Customer P. O. Number: 04603463
Customer Reference Number:

Fill Date: 10/3/2013
Part Number: NI NO42ME-AS
Lot Number: 109327602
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:		**10/14/2016**	NIST Traceable
Cylinder Number:		**SA13976**	Analytical Uncertainty:
42.4	**ppm**	**NITRIC OXIDE**	**± 0.7 %**
	Balance	**NITROGEN**	

NOx = 42.6 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 10/14/2013 *Term:* 36 Months *Expiration Date:* 10/14/2016

This cylinder was certified according to the 2012 EPA Traceability Protocol, Document #EPA-600/R-12/531, using Procedure G1. Do Not Use this Standard if Pressure is less than 100 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: NITRIC OXIDE

Requested Concentration: 42 ppm
Certified Concentration: 42.4 ppm
Instrument Used: Thermo Electron 42C S/N 518112467
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 9/24/2013

First Analysis Data:						**Date:**	10/7/2013
Z:	0	**R:**	50	**C:**	42.4	**Conc:**	42.4
R:	50	**Z:**	0	**C:**	42.4	**Conc:**	42.4
Z:	0	**C:**	42.4	**R:**	50	**Conc:**	42.4
UOM:	ppm			**Mean Test Assay:**			42.4 ppm

Analyzed by: Jack Fu

Reference Standard Type: GMIS
Ref. Std. Cylinder #: CC362460
Ref. Std. Conc: 50.0 ppm
Ref. Std. Traceable to SRM #: 1683b
SRM Sample #: 45-U-37
SRM Cylinder #: CAL015617

Second Analysis Data:						**Date:**	10/14/2013
Z:	0	**R:**	50	**C:**	42.6	**Conc:**	42.6
R:	50	**Z:**	0	**C:**	42.3	**Conc:**	42.3
Z:	0	**C:**	42.4	**R:**	50	**Conc:**	42.4
UOM:	ppm			**Mean Test Assay:**			42.433 ppm

Certified by: Diego Mastanza

PRAXAIR

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PGVPID: F22013

DocNumber: 000052109

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23211280
Customer P. O. Number: 04331929
Customer Reference Number:

Fill Date: 3/20/2013
Part Number: NI NO85ME-AS
Lot Number: 109307905
Cylinder Style & Outlet: AS CGA 660
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	4/8/2021	NIST Traceable
Cylinder Number:	CC121068	Analytical Uncertainty:
87.4 ppm	NITRIC OXIDE	± 1 %
Balance	NITROGEN	

NOx = 87.4 ppm **NOx for Reference Only**

Certifcation Information: *Certification Date:* 4/8/2013 *Term:* 96 Months *Expiration Date:* 4/8/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . **Component:** NITRIC OXIDE

Requested Concentration: 85 ppm
Certified Concentration: 87.4 ppm
Instrument Used: Thermo Electron 42i S/N 072602432C
Analytical Method: Chemiluminescence
Last Multipoint Calibration: 3/27/2013

First Analysis Data:						**Date:**	3/25/2013
Z:	0	R:	103.2	C:	87.5	**Conc:**	87.5
R:	103.2	Z:	0	C:	87.3	**Conc:**	87.3
Z:	0	C:	87.1	R:	103.2	**Conc:**	87.1
UOM:	ppm			**Mean Test Assay:**			87.3 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC145330
Ref. Std. Conc: 103.2 ppm
Ref. Std. Traceable to SRM # : vs. 1684b
SRM Sample # : 44-S-81
SRM Cylinder # : CAL015454

Second Analysis Data:						**Date:**	4/1/2013
Z:	0	R:	103.2	C:	87.6	**Conc:**	87.6
R:	103.2	Z:	0	C:	87.5	**Conc:**	87.5
Z:	0	C:	87.2	R:	103.2	**Conc:**	87.2
UOM:	ppm			**Mean Test Assay:**			87.4 ppm

Analyzed by: Nelson Ma
Nelson Ma

Certified by:
Rolonda Kaywood

PRAXAIR

Praxair
5700 South Alameda Street
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Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000051900

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23090548
Customer P. O. Number: 04313129
Customer Reference Number:

Fill Date: 3/12/2013
Part Number: NI CO8.5ME-AS
Lot Number: 109306106
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	**4/4/2021**		NIST Traceable
Cylinder Number:	**CC351722**		Analytical Uncertainty:
9.05	**ppm**	**CARBON MONOXIDE**	± 1 %
	Balance	**NITROGEN**	

Certifcation Information: *Certification Date:* 4/4/2013 *Term:* 96 Months *Expiration Date:* 4/4/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON MONOXIDE

Requested Concentration: 8.5 ppm
Certified Concentration: 9.05 ppm
Instrument Used: Horiba VIA-510 S/N 576876015
Analytical Method: NDIR
Last Multipoint Calibration: 3/11/2013

First Analysis Data:						Date:	4/2/2013
Z:	0	R:	167.8	C:	149.7	Conc:	9.1
R:	169.2	Z:	0	C:	150.1	Conc:	9.05
Z:	0	C:	148.8	R:	168.5	Conc:	9.01
UOM:	ppm			Mean Test Assay:			9.05 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : SA6687
Ref. Std. Conc: 10.2 ppm
Ref. Std. Traceable to SRM # : 1677c
SRM Sample # : 5-I-42
SRM Cylinder # : XF 002143B

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm			Mean Test Assay:			0 ppm

Analyzed by: Ying Yu

Certified by: Shameela Jiffrey

PRAXAIR

Praxair
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PGVPID: F22013

DocNumber: 000052504

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23177434
Customer P. O. Number: 04326926
Customer Reference Number:

Fill Date: 3/20/2013
Part Number: NI CO18ME-AS
Lot Number: 109307808
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	4/13/2021	NIST Traceable
Cylinder Number:	SA7530	Analytical Uncertainty:
18.4 ppm	CARBON MONOXIDE	± 1 %
Balance	NITROGEN	

Certifcation Information: *Certification Date:* 4/13/2013 *Term:* 96 Months *Expiration Date:* 4/13/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . Component: CARBON MONOXIDE

Requested Concentration: 18 ppm
Certified Concentration: 18.4 ppm
Instrument Used: Horiba VIA-510, S/N 577172043
Analytical Method: NDIR
Last Multipoint Calibration: 3/20/2013

First Analysis Data:						Date: 4/2/2013
Z: 0	R: 24.7	C: 18.5	Conc: 18.5			
R: 24.7	Z: 0	C: 18.4	Conc: 18.4			
Z: 0	C: 18.4	R: 24.7	Conc: 18.4			
UOM: ppm		Mean Test Assay: 18.4 ppm				

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC147286
Ref. Std. Conc: 24.7 ppm
Ref. Std. Traceable to SRM # : 2635a
SRM Sample # : 58-C-32
SRM Cylinder # : CAL011907

Second Analysis Data:						Date:
Z: 0	R: 0	C: 0	Conc: 0			
R: 0	Z: 0	C: 0	Conc: 0			
Z: 0	C: 0	R: 0	Conc: 0			
UOM: ppm		Mean Test Assay: 0 ppm				

Analyzed by: Shameela Jiffrey

Certified by: Ying Yu

PRAXAIR

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PGVPID: F22013

DocNumber: 000051419

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23177434
Customer P. O. Number: 04326926
Customer Reference Number:

Fill Date: 3/20/2013
Part Number: NI CO850E-AS
Lot Number: 109307801
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	**3/28/2021**		NIST Traceable
Cylinder Number:	**CC160848**		Analytical Uncertainty:
857	**ppm**	**CARBON MONOXIDE**	± 1 %
Balance		**NITROGEN**	

Certifcation Information: *Certification Date:* 3/28/2013 *Term:* 96 Months *Expiration Date:* 3/28/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON MONOXIDE

Requested Concentration: 850 ppm
Certified Concentration: 857 ppm
Instrument Used: Horiba VIA-510, S/N 577172043
Analytical Method: NDIR
Last Multipoint Calibration: 3/4/2013

First Analysis Data:						Date:	3/27/2013
Z:	0	R:	1001	C:	856	Conc:	856
R:	1001	Z:	0	C:	857	Conc:	857
Z:	0	C:	857	R:	1001	Conc:	857
UOM:	ppm					Mean Test Assay:	857 ppm

Reference Standard Type: GMIS
Ref. Std Cylinder # : CC126587
Ref. Std. Conc: 1001 ppm
Ref. Std. Traceable to SRM # : 1689b
SRM Sample # : 1-28-I
SRM Cylinder # : CLM-009404

Second Analysis Data:						Date:	
Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0
UOM:	ppm					Mean Test Assay:	0 ppm

Analyzed by: Ying Yu

Certified by: Shameela Jiffrey

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVP ID: P22013

DocNumber: 000050355

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 22864530
Customer P. O. Number: 04279623
Customer Reference Number:

Fill Date: 2/21/2013
Part Number: NI CO1800E-AS
Lot Number: 109305203
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:		**3/9/2021**	NIST Traceable
Cylinder Number:		**CC101717**	Analytical Uncertainty:
1814	**ppm**	**CARBON MONOXIDE**	± 1 %
	Balance	**NITROGEN**	

Certifcation Information: *Certification Date:* 3/9/2013 *Term:* 96 Months *Expiration Date:* 3/9/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1. Component: CARBON MONOXIDE

Requested Concentration: 1800 ppm
Certified Concentration: 1814 ppm
Instrument Used: Horiba VIA-510, S/N 577172043
Analytical Method: NDIR
Last Multipoint Calibration: 3/4/2013

First Analysis Data: **Date:** 3/7/2013

Z:	0	R:	1736	C:	1813	Conc:	1813
R:	1736	Z:	0	C:	1814	Conc:	1814
Z:	0	C:	1814	R:	1736	Conc:	1814

UOM: ppm **Mean Test Assay:** 1814 ppm

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC74842
Ref. Std. Conc: 1736 ppm
Ref. Std. Traceable to SRM # : vs. 2637a
SRM Sample # : 56-E-40
SRM Cylinder # : FF23073

Second Analysis Data: **Date:**

Z:	0	R:	0	C:	0	Conc:	0
R:	0	Z:	0	C:	0	Conc:	0
Z:	0	C:	0	R:	0	Conc:	0

UOM: ppm **Mean Test Assay:** 0 ppm

Analyzed by: Ying Yu

Certified by: Shameela Jiffrey

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
(951) 653-6780 • FAX (951) 653-2430 • WWW.SCOTTMARRIN.COM

Report Of Analysis
NIST-Traceable Gas Mixtures

SCEC01
TO: SCEC - Air Quality Specialists
Attn: Chris Lovett
1582-1 North Batavia Street
Orange, CA 92867
(714) 282-8240

REPORT NO: 63964-02
REPORT DATE: November 5, 2013
CUSTOMER PO NO: 100413

CYLINDER NUMBER: **CC311802**

COMPONENT	CONCENTRATION (v/v)	NIST TRACEABLE REFERENCE STANDARD
Nitrogen dioxide	17.32 ± 0.35 ppmv	SRM 1683b
Nitrogen	Balance	

Cylinder Size: 150A (71 std cu ft)
Cylinder Pressure: 1000 psig
Shelf Life: 6 months

ppm = umole/mole **% = mole-%**

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed herein. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Certificate Numbers 822/272801-6 and 822/274081-06.

ANALYST: D.C. Marrin — D.C.Marrin
APPROVED: J. T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE, CA 92507
(951) 653-6780 • FAX (951) 653-2430 • WWW.SCOTTMARRIN.COM

Report Of Analysis
NIST-Traceable Gas Mixtures

SCEC01
TO: SCEC - Air Quality Specialists
Attn: Chris Lovett
1582-1 North Batavia Street
Orange, CA 92867
(714) 282-8240

REPORT NO: 63964-03
REPORT DATE: November 5, 2013
CUSTOMER PO NO: 100413

CYLINDER NUMBER: **CC74096**

COMPONENT	CONCENTRATION (v/v)	NIST TRACEABLE REFERENCE STANDARD
Nitrogen dioxide	35.8 ± 0.7 ppmv	SRM 1683b
Nitrogen	Balance	

Cylinder Size: 150A (137 std cu ft)
Cylinder Pressure: 1950 psig
Shelf Life: 6 months

ppm = umole/mole **% = mole-%**

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed herein. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Certificate Numbers 822/272801-6 and 822/274081-06.

ANALYST: D.C. Marrin _____ **APPROVED:** _____ J. T. Marrin

PRAXAIR

Praxair
5700 South Alameda Street
Los Angeles, CA 90058
Tel: (323) 585-2154 Fax:(714) 542-6689
PGVPID: F22013

DocNumber: 000052508

CERTIFICATE OF ANALYSIS / EPA PROTOCOL GAS

Customer & Order Information:

PRAXAIR WHSE SANTA ANA CA
1545 E EDINGER AVE
SANTA ANA CA 927050

Praxair Order Number: 23177434
Customer P. O. Number: 04326926
Customer Reference Number:

Fill Date: 3/19/2013
Part Number: NI CO42.5ME-AS
Lot Number: 109307812
Cylinder Style & Outlet: AS CGA 350
Cylinder Pressure & Volume: 2000 psig 140 cu. ft.

Certified Concentration:

Expiration Date:	**4/13/2021**		NIST Traceable
Cylinder Number:	**CC163770**		Analytical Uncertainty:
42.3	**ppm**	**CARBON MONOXIDE**	± 1 %
	Balance	**NITROGEN**	

Certifcation Information: *Certification Date:* 4/13/2013 *Term:* 96 Months *Expiration Date:* 4/13/2021

This cylinder was certified according to the 1997 EPA Traceability Protocol, Document #EPA-600/R-97/121, using Procedure G1. The certification expiration date was assigned using the May 2012 revision of the EPA Traceability Protocol document.Do Not Use this Standard if Pressure is less than 150 PSIG.

Analytical Data: *(R=Reference Standard, Z=Zero Gas, C=Gas Candidate)*

1 . Component: CARBON MONOXIDE

Requested Concentration: 42.5 ppm
Certified Concentration: 42.3 ppm
Instrument Used: Horiba VIA-510, S/N 577172043
Analytical Method: NDIR
Last Multipoint Calibration: 3/10/2013

First Analysis Data:						Date: 4/2/2013
Z: 0	R: 50.6	C: 42.2	Conc:	42.2		
R: 50.6	Z: 0	C: 42.4	Conc:	42.4		
Z: 0	C: 42.3	R: 50.6	Conc:	42.3		
UOM: ppm		Mean Test Assay:		42.3 ppm		

Reference Standard Type: GMIS
Ref. Std. Cylinder # : CC272592
Ref. Std. Conc: 50.6 ppm
Ref. Std. Traceable to SRM # 1678c
SRM Sample # : 4-J-21
SRM Cylinder # : XF001068B

Second Analysis Data:						Date:
Z: 0	R: 0	C: 0	Conc:	0		
R: 0	Z: 0	C: 0	Conc:	0		
Z: 0	C: 0	R: 0	Conc:	0		
UOM: ppm		Mean Test Assay:		0 ppm		

Analyzed by: Ying Yu

Certified by: Shameela Jiffrey

SCEC

Appendix H

Chain of Custody Information

AAC# 131678

Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AAC**
Project Location: **Plant 1 and 2 Engines Exhaust**											Lab Contact: **Marcus Hueppe**
Contact: **Rudy Nunez**		Sampler (Signature):									Lab Phone No.: **(805) 650 - 1642**
		SAMPLE									Turnaround Time **N.T.A.T.**
Sample #	Description	Date	Time	Type	SCAQMD 25.3						Remarks:
168081	P1E1 RUN1A	12/4/2013		TANK 256	x						Please Include Data Package
	P1E1 RUN1A	12/4/2013		TRAP A	x						
168082	P1E1 RUN1B	12/4/2013		TANK 255							
	P1E1 RUN1B	12/4/2013		TRAP B							
168083	P2E3 RUN1A	12/11/2013		TANK 131							
	P2E3 RUN1A	12/11/2013		TRAP A							
168084	P2E3 RUN1B	12/11/2013		TANK 208							
	P2E3 RUN1B	12/11/2013		TRAP B							

Relinquished by (Signature):	Company:	Date	Time:	Received by (Signature):	Company:	Date:	Time:
	SCEC	12/12/13	9:41		ACS	12/12/13	17:04
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:
					AAC	12/12/13	1440
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:

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Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**
Project Location: **Plant 1 and 2 Engine Exhaust Samples**											Lab Contact: **Mike Porter**
Contact: **Rudy Nunez**		Sampler (Signature)									Lab Phone No.: **(818) 223 - 3277**
		SAMPLE									Turnaround Time: **NORMAL**
Sample #	Description	Date	Time	Type	TGNMO/CH4 Per SCAQMD 25.1						Remarks:
	P1E3 RUN1A	12/2/2013		TANK 206	x						Please Include Data Package
	P1E3 RUN1A	12/2/2013		TRAP 303	x						
	P1E3 RUN1B	12/2/2013		TANK 207	x						
	P1E3 RUN1B	12/2/2013		Trap 304	x						
	P1E2 RUN1A	12/3/2013		TANK 91	x						
	P1E2 RUN1A	12/3/2013		TRAP 170	x						
	P1E2 RUN1B	12/3/2013		TANK 93	x						
	P1E2 RUN1B	12/3/2013		TRAP 181	x						
	P2E2 RUN1A	12/5/2013		TANK 58	x						
	P2E2 RUN1A	12/5/2013		TRAP 305	x						
	P2E2 RUN1B	12/5/2013		TANK 62	x						
	P2E2 RUN1B	12/5/2013		TRAP 306	x						

Relinquished by (Signature):	Company: SCEC	Date: 12/12/13	Time: 9:43	Received by (Signature):	Company: HCS	Date: 12/12/13	Time: 11:04
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature): M. Porter	Company: AtmAA	Date: 12/12/13	Time:
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature):	Company:	Date:	Time:

13463
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Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**		
Project Location: **Plant 1 and 2 Engine Exhaust Samples**					TGNMO/CH4 Per SCAQMD 25.1						Lab Contact: **Mike Porter**		
Contact: **Rudy Nunez**		Sampler (Signature)									Lab Phone No.: **(818) 223 - 3277**		
		SAMPLE									Turnaround Time: **NORMAL**		
Sample #	Description	Date	Time	Type							Remarks:		
	P2E4 RUN1A	12/6/2013		TANK 9	x						Please Include Data Package		
	P2E4 RUN1A	12/6/2013		TRAP 110	x								
	P2E4 RUN1B	12/6/2013		TANK 14	x								
	P2E4 RUN1B	12/6/2013		TRAP 128	x								
	P2E5 RUN1A	12/9/2013		TANK 50	x								
	P2E5 RUN1A	12/9/2013		TRAP 319	x								
	P2E5 RUN1B	12/9/2013		TANK 92	x								
	P2E5 RUN1B	12/9/2013		TRAP 320	x								
	P2E1 RUN1A	12/10/2013		TANK 30	x								
	P2E1 RUN1A	12/10/2013		TRAP 308	x								
	P2E1 RUN1B	12/10/2013		TANK 31	x								
	P2E1 RUN1B	12/10/2013		TRAP 137	x								

Relinquished by (Signature):	Company: SCEC	Date: 12/12/13	Time: 9:43	Received by (Signature):	Company: ACS	Date: 12/12/13	Time: 11:02
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature): M. Porter	Company: AtmAA	Date: 12/12/13	Time:
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature):	Company:	Date:	Time:

13463-59
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AAC# 131678

SCEC

1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Chain of Custody Record
Analytical Services Request

Client/Project Name **OCSD**	Client Project No. **2061.1053**	ANALYSES REQUESTED	Laboratory Name **AAC**
Project Location **Plant 2**		Aldehydes (Formaldehyde and Acetylaldehyde) per EPA Method 323	Lab Contact Sucha Parmer
Contact **Rudy Nunez (714)936 8050**	Sampler (Signature)		Lab Phone No. (805)650-1642
			Turnaround Time Normal

Sample No.	Description	SAMPLE Date	Time	Type	Aldehydes	Remarks:
68085	P2E1 Run- 1	12/10/2013	1046-1146	VOA Vial	X	**Please supply complete analytical**
68086	P2E1 Run- 2	12/10/2013	1150-1250	VOA Vial	X	**data package**
68087	P2E1 Run- 3A	12/10/2013	1255-1355	VOA Vial	X	
68088	P2E1 Run- 3B	12/10/2013	1255-1355	VOA Vial	X	
68089	P2E1-FB	12/10/2013	1600	VOA Vial	X	
68090	P2E1-RB	12/10/2013	1615	VOA Vial	X	
68091	P2E3 Run- 1	12/11/2013	1016-1116	VOA Vial	X	
68092	P2E3 Run- 2A	12/11/2013	1207-1307	VOA Vial	X	
68093	P2E3 Run- 2B	12/11/2013	1207-1307	VOA Vial	X	
68094	P2E3 Run- 3	12/11/2013	1319-1419	VOA Vial	X	
68095	P2E3-FB	12/11/2013	1500	VOA Vial	X	
68096	P2E3-RB	12/11/2013	1525	VOA Vial	X	

Relinquished by (Signature)	Company	Date	Time	Received by (Signature)	Company	Date	Time
	SCEC	12/12/13	940		ACS	12/12/13	11:04
	Company:	Date	Time	Received by (Signature):	Company: AAC	Date: 12/12/13	Time: 1440
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:

-0.5°C

C:\Users\run007\Desktop\OCSD RULE 1110.2\OCSD Chain of Custody.xls

Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**
Project Location: **Plant 2/ Fuel Samples**											Lab Contact: **Mike Porter**
Contact: **Rudy Nunez**		Sampler (Signature)									Lab Phone No.: **(818) 223 - 3277**
		SAMPLE									Turnaround Time: **NORMAL**
Sample #	Description	Date	Time	Type	SCAQMD Mod. 307.91 (Sulfur, H2S & TRS)	SCAQMD Method 10.1 Fixed Gases (O2, CO2, N2)	ASTM D3588 (C1-C6+, BTU, CHONS)				Remarks:
	P2-C	12/10/13	1530	Tedlar Bag	x	x	x				13453-9
Relinquished by (Signature):		Company: SCEC		Date 12/10	Time 1533		Received by (Signature): FED EX				Company: FED EX	Date: 12/10	Time: 1630
Relinquished by (Signature):		Company:		Date	Time		Received by (Signature):				Company:	Date:	Time:
Relinquished by (Signature):		Company:		Date	Time		Received by (Signature):				Company:	Date: 12-11-13	Time: 10:00

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Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**
Project Location: **Plant 2/ Fuel Samples**					SCAQMD Mod. 307.91 (Sulfur, H2S & TRS)	SCAQMD Method 10.1 Fixed Gases (O2, CO2, N2)	ASTM D3588 (C1-C6+, BTU, CHONS)				Lab Contact: **Mike Porter**
Contact: **Rudy Nunez**	Sampler (Signature)										Lab Phone No.: **(818) 223 - 3277**
Sample #	Description	SAMPLE Date	Time	Type							Turnaround Time: **NORMAL**
											Remarks:
	P2E2	12/5/13	1315	Tedlar Bag	x	x	x				134035

Relinquished by (Signature):	Company: SCEC	Date 12/5/13	Time 1320	Received by (Signature): FEDEX	Company: FEDEX	Date: 12/5/13	Time: 1400
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company: AtmAA	Date: 12/6/13	Time: 9:15

Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**
Project Location: **Plant 2/ Fuel Samples**											Lab Contact: **Mike Porter**
Contact: **Rudy Nunez**		Sampler (Signature)									Lab Phone No.: **(818) 223 - 3277**
		SAMPLE									Turnaround Time: **NORMAL**
Sample #	Description	Date	Time	Type	SCAQMD Mod. 307.91 (Sulfur, H2S & TRS)	SCAQMD Method 10.1 Fixed Gases (O2, CO2, N2)	ASTM D3588 (C1-C6+, BTU, CHONS)				Remarks:
	P2E3	12/11/13	1600	Tedlar Bag	x	x	x				13463-40

Relinquished by (Signature):	Company: SCEC.	Date: 12/11/13	Time: 1609	Received by (Signature):	Company: ACS	Date: 12/12/13	Time: 11:04
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature):	Company:	Date:	Time:
Relinquished by (Signature):	Company:	Date:	Time:	Received by (Signature):	Company: AtmAA	Date: 12-12-13	Time: 1:00

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Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **OCSD**		Client Project No.: **2061.1053**			ANALYSES REQUESTED						Laboratory Name: **AtmAA Inc**
Project Location: **Plant 2/ Fuel Samples**					SCAQMD Mod. 307.91 (Sulfur, H2S & TRS)	SCAQMD Method 10.1 Fixed Gases (O2, CO2, N2)	ASTM D3588 (C1-C6+, BTU, CHONS)				Lab Contact: **Mike Porter**
Contact: **Rudy Nunez**	Sampler (Signature)										Lab Phone No.: **(818) 223 - 3277**
Sample #	Description	SAMPLE Date	Time	Type							Turnaround Time: **NORMAL**
	P2E4	12/6/13	1200	Tedlar Bag	x	x	x				Remarks: 13443-1
	P2E5	12/9/13	1100	↓	x	x	x				-2

Relinquished by (Signature):	Company: SCEC	Date: 12/9/13	Time: 11:10	Received by (Signature): FedEx	Company: FedEx	Date: 12/9	Time: 1400
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date:	Time:
Relinquished by (Signature):	Company:	Date	Time	Received by (Signature):	Company:	Date: 12-10-13	Time: 1030

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Chain of Custody Record
Analytical Services Request

SCEC
1582-1 N. Batavia St. Orange, CA 92867
(714) 282-8240 phone, (714) 282-8247 fax

Client/Project Name: **Orange County Sanitation District (Plant 1 and 2)**		**Client Project No.:** 2061.1053			**ANALYSES REQUESTED**						**Laboratory Name:** **ATMAA**		
Project Location: **Engine Exhuast**					TO-15						Lab Contact: **Mike Porter**		
Contact: Rudy Nunez (714) 936 - 8050		Sampler (Signature)									Lab Phone No.: **(818) 223-3277**		
		SAMPLE									**Turnaround Time** **N.T.A.T.**		
Sample #	Description	Date	Time	Type							Remarks:		
1	P1E2 RUN1	12/3/2013		TANK 397	x								
2	P1E2 RUN2	12/3/2013		TANK 114	x								
3	P1E2 RUN3	12/3/2013		TANK 151	x								
4	P1E1 RUN1	12/4/2013		TANK 129	x								
5	P1E1 RUN2	12/4/2013		TANK 343	x								
6	P1E1 RUN3	12/4/2013		TANK 166	x								
7	P2E1 RUN1	12/10/2013		TANK 286	x								
8	P2E1 RUN2	12/10/2013		TANK 362	x								
9	P2E1 RUN3	12/10/2013		TANK 396	x								
10	P2E2 RUN 1 P2E3	12/11/2013		TANK 2011	x								
11	P2E2 RUN 2 P2E3	12/11/2013		TANK 170	x								
12	P2E2 RUN 3 P2E3	12/11/2013		TANK 366	x								
Relinquished by (Signature):		Company: SCEC		Date 12/12/13	Time 9:42	Received by (Signature):					Company: ACS	Date: 12/13/13	Time: 1528
Relinquished by (Signature):		Company:		Date	Time	Received by (Signature):					Company:	Date:	Time:
Relinquished by (Signature):		Company:		Date	Time	Received by (Signature):					Company:	Date:	Time:

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SCEC
IN-HOUSE CHAIN-OF-CUSTODY

CLIENT: OCSD P1 AND P2
PROJECT NO.: 2061.1053
PROJECT MANAGER: RN

TEST DATE(S): 12/2 - 11/13
LAB HOURS:
(In Budget)
RESULTS DUE BY: 12/31/13 OR 1/3/14

IN-HOUSE ANALYSIS

Compound(s) to be Analyzed	Method	Probe & Nozzles (Quantity)	Filters (Quantity)	Condensables (Quantity)	
				Inorganic	Organic
PM	SCAQMD 5.1	8	8	8	8
(UNITS = P1E1, E2, E3)					
(UNITS = P2E1, E2, E3					
E4, E5)					
H2O BLANK 200mls					
MECH BLANK 200ml					

OUTSIDE LABORATORY ANALYSIS

Compound(s) to be Analyzed	Methodology	TAT	No. Of Samples	Receiving Laboratory	Method of Shipment	Shipping Instructions *

* Example: "Chilled in Cooler, On dry-ice, etc."

PROJECT MANAGER IS RESPONSIBLE FOR ATTACHING COMPLETED CHAIN-OF-CUSTODY TO BE SENT WITH SAMPLES TO OUTSIDE LABORATORY.

SCEC

Appendix I

Process Operating Data and Fuel Usage

P2E1 NORNAL LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/10/13 13:00	76.80566667	14.066	660.6973333
12/10/13 13:06	77.902	14.13583333	661.3401667
12/10/13 13:12	78.606	14.27533333	666.5843333
12/10/13 13:18	79.2275	14.20583333	661.5093333
12/10/13 13:24	78.727	14.27566667	662.2198333
12/10/13 13:30	77.374	14.229	661.4416667
12/10/13 13:36	77.715	14.41516667	671.321
12/10/13 13:42	79.02766667	14.392	670.103
12/10/13 13:48	80.3	14.39183333	672.0991667
12/10/13 13:54	79.53733333	14.43833333	670.3398333
12/10/13 14:00	78.782	14.299	668.3436667
12/10/13 14:06	81.367	14.50833333	675.2795
AVERAGE	**78.78**	**14.30**	**666.77**

P2E1 HIGH LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/10/13 14:42	101.5355	18.6465	820.3906667
12/10/13 14:48	100.3053333	18.69316667	825.3641667
12/10/13 14:54	101.3393333	18.78616667	824.3491667
AVERAGE	**101.06**	**18.71**	**823.37**

P2E1 LOW LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/10/13 15:18	69.33666667	11.92733333	587.4143333
12/10/13 15:24	69.46133333	12.06666667	587.5835
AVERAGE	**69.40**	**12.00**	**587.50**

P2E2 NORMAL

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/5/13 11:24	83.13983333	13.41533333	676.4975
12/5/13 11:30	82.863	13.2525	675.8885
12/5/13 11:36	83.2865	13.0665	671.9638333
12/5/13 11:42	81.76666667	13.15966667	672.5728333
12/5/13 11:48	84.29483333	12.99666667	673.6555
12/5/13 11:54	85.272	13.50833333	684.3468333
12/5/13 12:00	85.47916667	13.4615	686.343
12/5/13 12:06	82.99133333	13.2525	683.0611667
12/5/13 12:12	83.88416667	13.41516667	683.8055
12/5/13 12:18	85.657	13.462	687.4933333
12/5/13 12:24	83.204	13.60133333	686.546
AVERAGE	**83.80**	**13.33**	**680.20**

P2E2 HIGH LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/5/13 13:12	102.0268333	17.368	815.8231667
12/5/13 13:18	104.2103333	17.43733333	819.714
12/5/13 13:24	104.2121667	17.01883333	810.8835
AVERAGE	**103.48**	**17.27**	**815.47**

P2E2 LOW LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/5/13 13:36	75.416	11.602	619.556
12/5/13 13:42	75.45083333	11.532	622.9055
12/5/13 13:48	76.6645	11.97416667	626.1873333
AVERAGE	**75.84**	**11.70**	**622.88**

P2E3 NORMAL LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/11/13 10:36	81.114	15.48416667	687.0873333
12/11/13 10:42	79.695	15.1125	675.2795
12/11/13 10:48	78.1275	15.1125	675.1103333
12/11/13 10:54	80.93983333	15.32166667	682.6551667
12/11/13 11:00	82.58983333	15.46116667	690.4706667
12/11/13 11:06	82.74566667	15.55416667	691.8578333
12/11/13 11:12	82.2745	15.53083333	689.3541667
12/11/13 11:18	82.91983333	15.57733333	691.2488333
12/11/13 11:24	82.74016667	15.6005	691.7563333
12/11/13 11:30	79.92416667	15.554	686.4106667
12/11/13 11:36	80.7675	15.39133333	684.4821667
AVERAGE	**81.26**	**15.43**	**685.97**

P2E3 LOW LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/11/13 14:48	75.82483333	14.415	650.4796667
12/11/13 14:54	73.3755	14.485	646.5211667
12/11/13 15:00	74.47733333	14.1125	632.4126667
12/11/13 15:06	77.05133333	14.76383333	661.8138333
AVERAGE	**75.18**	**14.44**	**647.81**

P2E3 HIGH LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/11/13 15:24	106.0913333	19.8555	871.3098333
12/11/13 15:30	104.302	19.69316667	870.3963333
12/11/13 15:36	108.8065	19.809	870.058
AVERAGE	**106.40**	**19.79**	**870.59**

P2E4 NORMAL LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/6/13 10:06	77.50783333	14.97316667	640.1605
12/6/13 10:12	77.90566667	14.92683333	638.6718333
12/6/13 10:18	77.8415	14.99666667	643.9836667
12/6/13 10:24	77.30616667	14.60133333	633.3938333
12/6/13 10:30	78.60233333	14.927	646.2505
12/6/13 10:36	78.232	15.01983333	648.2128333
12/6/13 10:42	78.12383333	15.11283333	643.0025
12/6/13 10:48	78.133	14.78733333	635.0516667
12/6/13 10:54	76.70116667	14.857	639.8221667
12/6/13 11:00	77.08066667	15.06633333	648.5511667
12/6/13 11:06	80.96183333	15.229	654.3366667
AVERAGE	**78.04**	**14.95**	**642.86**

P2E4 LOW LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/6/13 11:24	72.81083333	13.57816667	596.82
12/6/13 11:30	68.72433333	13.36866667	589.2075
12/6/13 11:36	69.45583333	13.29883333	585.7565
AVERAGE	**70.33**	**13.42**	**590.59**

P2E4 HIGH LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/6/13 11:54	100.5601667	18.83216667	790.6173333
12/6/13 12:00	99.85983333	19.1345	801.3086667
12/6/13 12:06	98.22633333	19.11166667	793.5946667
12/6/13 12:12	97.8725	18.949	786.6926667
AVERAGE	**99.13**	**19.01**	**793.05**

P2E5 HIGH LOAD

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/9/13 13:12	99.3685	19.065	810.0038333
12/9/13 13:18	102.0561667	19.53	824.5183333
12/9/13 13:24	102.8335	19.57666667	821.2026667
12/9/13 13:30	100.1036667	19.29766667	810.8158333
AVERAGE	**101.09**	**19.37**	**816.64**

P2E5 LOW

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/9/13 13:42	68.93883333	12.183	592.7261667
12/9/13 13:48	69.65933333	12.06683333	592.5231667
12/9/13 13:54	70.79783333	12.71816667	611.2668333
12/9/13 14:00	79.0735	14.11283333	661.6785
AVERAGE	**72.12**	**12.77**	**614.55**

P2E5 NORMAL

Date/Time	Title1-ICE % Load	Title2-Natural Gas Flow (dscfm)	Title3-Digester Gas Flow (dscfm)
12/9/13 14:42	89.42083333	17.15816667	749.7128333
12/9/13 14:48	90.68033333	17.158	750.8631667
12/9/13 14:54	91.61166667	17.06533333	743.792
12/9/13 15:00	88.18333333	17.135	746.7355
12/9/13 15:06	89.29433333	17.27466667	744.9423333
12/9/13 15:12	90.77016667	17.1815	744.6716667
12/9/13 15:18	88.27133333	17.25133333	746.1265
12/9/13 15:24	87.10533333	17.1585	744.5025
12/9/13 15:30	83.8365	15.99583333	707.6918333
12/9/13 15:36	83.127	15.624	699.4703333
12/9/13 15:42	83.68983333	24.99366667	684.11
AVERAGE	**87.82**	**17.64**	**732.97**

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS
OCSD PLANT 2
ENGINE #1

PARAMETER	UNITS	NORM LOAD	HIGH LOAD	LOW LOAD
DATE		12/10/2013	12/10/2013	12/10/2013
FUEL FLOW - @ 60 DEG F	SCFM	666.77	823.37	587.50
CALORIFIC VALUE - @ 60 DEG F	BTU/CF	627.0	627.0	627.0
F FACTOR (Fd) - @ 60 DEG F	DSCF/MMBTU	9,259	9,259	9,259
EXHAUST O2 CONCENTRATION	%VD	11.94	12.26	11.32
HEAT INPUT - DIGESTER GAS	MMBTU/MIN	0.41806479	0.51625299	0.3683625
EXHAUST VOLUME FLOW RATE @ 60 DEG F	**DSCFM**	**9,029**	**11,567**	**7,440**

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS
OCSD PLANT 2
ENGINE #2

PARAMETER	UNITS	NORM LOAD	HIGH LOAD	LOW LOAD
DATE		12/5/2013	12/5/2013	12/5/2013
FUEL FLOW - @ 60 DEG F	SCFM	680.20	815.47	622.88
CALORIFIC VALUE - @ 60 DEG F	BTU/CF	641.0	641.0	641.0
F FACTOR (Fd) - @ 60 DEG F	DSCF/MMBTU	9,251	9,251	9,251
EXHAUST O2 CONCENTRATION	%VD	11.54	11.70	11.16
HEAT INPUT - DIGESTER GAS	MMBTU/MIN	0.4360082	0.52271627	0.39926608
EXHAUST VOLUME FLOW RATE @ 60 DEG F	**DSCFM**	**9,011**	**10,982**	**7,925**

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS
OCSD PLANT 2
ENGINE #3

PARAMETER	UNITS	NORM LOAD	HIGH LOAD	LOW LOAD
DATE		12/11/2013	12/11/2013	12/11/2013
FUEL FLOW - @ 60 DEG F	SCFM	685.97	870.59	647.81
CALORIFIC VALUE - @ 60 DEG F	BTU/CF	633.0	633.0	633.0
F FACTOR (Fd) - @ 60 DEG F	DSCF/MMBTU	9,303	9,303	9,303
EXHAUST O2 CONCENTRATION	%VD	12.07	11.91	12.36
HEAT INPUT - DIGESTER GAS	MMBTU/MIN	0.43421901	0.55108347	0.41006373
EXHAUST VOLUME FLOW RATE @ 60 DEG F	**DSCFM**	**9,565**	**11,918**	**9,334**

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS
OCSD PLANT 2
ENGINE #4

PARAMETER	UNITS	NORM LOAD	HIGH LOAD	LOW LOAD
DATE		12/6/2013	12/6/2013	12/6/2013
FUEL FLOW - @ 60 DEG F	SCFM	642.86	793.05	590.59
CALORIFIC VALUE - @ 60 DEG F	BTU/CF	640.0	640.0	640.0
F FACTOR (Fd) - @ 60 DEG F	DSCF/MMBTU	9,251	9,251	9,251
EXHAUST O2 CONCENTRATION	%VD	11.77	12.20	11.44
HEAT INPUT - DIGESTER GAS	MMBTU/MIN	0.4114304	0.507552	0.3779776
EXHAUST VOLUME FLOW RATE @ 60 DEG F	**DSCFM**	**8,710**	**11,278**	**7,729**

SUMMARY OF EPA METHOD 19 SOURCE TEST DATA AND CALCULATIONS
OCSD PLANT 2
ENGINE #5

PARAMETER	UNITS	NORM LOAD	HIGH LOAD	LOW LOAD
DATE		12/9/2013	12/9/2013	12/9/2013
FUEL FLOW - @ 60 DEG F	SCFM	732.970	816.640	614.550
CALORIFIC VALUE - @ 60 DEG F	BTU/CF	641.0	641.0	641.0
F FACTOR (Fd) - @ 60 DEG F	DSCF/MMBTU	9,236	9,236	9,236
EXHAUST O2 CONCENTRATION	%VD	12.46	12.72	12.21
HEAT INPUT - DIGESTER GAS	MMBTU/MIN	0.46983377	0.52346624	0.39392655
EXHAUST VOLUME FLOW RATE @ 60 DEG F	**DSCFM**	**10,747**	**12,351**	**8,750**

SCEC

Appendix J

Certifications

CERTIFICATE OF NO CONFLICT OF INTEREST

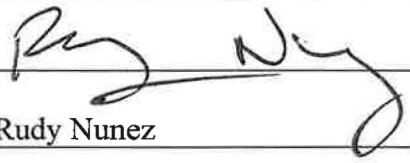
SCEC
1582-1 N. Batavia Street
Orange, California 92867

I certify that I am responsible for the testing operations of SCEC and am authorized to sign this certificate on the company's behalf.

SCEC may conduct tests as an independent tester as certified by South Coast Air Quality Management District (SCAQMD) and California Air Resource Board (CARB). SCEC is fully compliant with SCAQMD Rule 304. I further certify that SCEC has no conflict of interests and is not related or owned in any way to the company being tested.

Facility To Be Tested: OCSD P2 CGS ICE 1, 2, 3, 4, 5

Facility ID No.: A/N 540708, 540709, 540710, 540711, 540712

Signature: 

Name (printed/typed): Rudy Nunez

Title: Program Manager

Date: February 10, 2014

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

October 8, 2013

Mr. Jason R. Wirth
SCEC
1582-1 North Batavia Street
Orange, CA 92867

Subject: LAP Approval Notice
Reference # 94LA0215

Dear Mr. Wirth:

We completed our review of the renewal application you submitted for approval under the South Coast Air Quality Management District's Laboratory Approval Program (SCAQMD LAP). We are pleased to inform you that your firm is approved for the period beginning October 31, 2013, and ending October 31, 2014 for the following methods, subject to the requirements in the LAP Conditions For Approval Agreement and conditions listed in the attachment to this letter:

SCAQMD Methods 1-4
SCAQMD Method 100.1
SCAQMD Methods 25.1 and 25.3 (Sampling)
SCAQMD Methods 5.1, 5.2, 5.3, 6.1 (Sampling)
SCAQMD Rule 1420 – (Lead) Source Sampling
SCAQMD Rule 1121/ 1146.2 Protocol
USEPA CTM-030 and ASTM D6522-00

Your LAP approval to perform nitrogen oxide emissions compliance testing for SCAQMD Rule 1121/ 1146.2 Protocols includes satellite facilities located at:

McKenna Boiler
1510 North Spring Street
Los Angeles, CA 90012

Noritz America Corp.
11160 Grace Avenue
Fountain Valley, CA 92708

Ajax Boiler, Inc.
2701 S. Harbor Blvd.
Santa Ana, CA 92704

Thank you for participating in the SCAQMD LAP. Your cooperation helps us to achieve the goal of the LAP: to maintain high standards of quality in the sampling and analysis of source emissions. You may direct any questions or information to LAP Coordinator, Glenn Kasai. He may be reached by telephone at (909) 396-2271, by facsimilie at (909) 396-2099, or via e-mail at gkasai@aqmd.gov.

Sincerely,

Rudy Eden, Senior Manager
Laboratory Services &
Source Test Engineering

RE:GK/gk

cc: Mike Garibay

131008 LapRenewal.doc

ATTACHMENT

Conditions For SCEC's LAP Approval For Rules 1121/ 1146.2 Testing

1) Both Mr. Keith Shannon and Mr. Travis Fago shall conduct Rules 1121/ 1146.2 testing until other SCEC personnel have been trained to conduct these tests. A record book listing the names of SCEC personnel who are trained by Mr. Shannon and Mr. Fago for these tests shall be maintained. The entries to the record book must be legible; note that word processing entries are acceptable. This record book shall also include the location of the tests, the sampling procedures conducted, and the training provided to the SCEC testers. A copy of the record book shall be provided to the District upon request.

2) At least seven days prior to conducting Rules 1121/ 1146.2 tests, a notification must be made to Glenn Kasai by e-mail at gkasai@aqmd.gov. The notification shall provide the facility name, address, phone number, and contact name of the test site. Additionally, the notification shall list safety items required to observe testing, and whether any special training or equipment are mandatory.

3) Calibration data of the humidity instruments shall be provided for District review prior to commencement of testing.

4) The fuel meter flow measurements during testing shall be limited to the range calibrated in the most recent calibration report. Calibration of the fuel meter must be performed by an independent laboratory.

Air Resources Board

Mary D. Nichols, Chairman
1001 I Street • P.O. Box 2815
Sacramento, California 95812 • www.arb.ca.gov

Matthew Rodriquez
Secretary for
Environmental Protection

Edmund G. Brown Jr.
Governor

July 12, 2013

Mr. Jason Wirth
SCEC
1582-1 North Batavia Street
Orange, California 92867

Dear Mr. Wirth:

I am pleased to inform you that the Air Resources Board has renewed SCEC's approval to perform the test methods identified in enclosed Executive Order I-13-030. This approval is valid through June 30, 2014, during which time a field audit of SCEC's testing ability may be performed. I have also enclosed two certificates of approval.

If you have questions or need further assistance, please contact Kathryn Gugeler at (916) 322-0221 or via email at kgugeler@arb.ca.gov or Angus MacPherson at (916) 445-4686 or via email at amacpher@arb.ca.gov.

Sincerely,

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

Enclosures (3)

cc: Angus MacPherson, Manager
Testing and Certification Section

Kathryn Gugeler
Testing and Certification Section

10. SCEC uses caps on all probes, nozzles, lines, and/or impingers used in accordance with section 4.2 of ARB Test Method 5 or 17, as appropriate;

11. SCEC calibrates and repairs its nozzles used in isokinetic testing in accordance with section 5.1 of ARB Test Method 5 or 17, as appropriate, and establishes and maintains a log of the calibrations which shall include notes on the repairs on each nozzle;

12. SCEC participates in the United States Environmental Protection Agency Stationary Source Compliance Audit Program for approved methods;

13. SCEC back flushes the filter in the probe in accordance with section 2.1.2 of ARB Test Method 100 as necessary;

14. SCEC includes the following information on all strip charts and/or emissions data sheets: pollutant of interest, source, analyzer range, date and time, zero offsets, and the name of the person operating the instruments;

15. The person performing VEE passed ARB's Compliance Training Course #100: Fundamentals of Enforcement (FOE)/Visible Emissions Evaluation (Smoke School) and is currently certified to conduct VEE. Any recertification for VEE, following the initial passage of ARB's FOE, must be from a certifying body recognized by ARB at the time VEE is performed; and

WHEREAS, ARB Executive Officer, pursuant to California Health and Safety Code section 39516, issued Executive Order G-02-008, delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to approve independent testers in accordance with Cal. Code Regs., title 17, section 91200 and following.

NOW, THEREFORE, I, Michael T. Benjamin, Chief of MLD, order that SCEC is granted approval from the date of execution of this order until June 30, 2014, to perform the test methods identified above, subject to compliance with Cal. Code Regs., title 17, section 91200 and following.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his authorized representative may field audit one or more tests performed pursuant to this order for each test method identified above.

Executed at Sacramento, California, this 12 day of July 2013.

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

10. SCEC uses caps on all probes, nozzles, lines, and/or impingers used in accordance with section 4.2 of ARB Test Method 5 or 17, as appropriate;

11. SCEC calibrates and repairs its nozzles used in isokinetic testing in accordance with section 5.1 of ARB Test Method 5 or 17, as appropriate, and establishes and maintains a log of the calibrations which shall include notes on the repairs on each nozzle;

12. SCEC participates in the United States Environmental Protection Agency Stationary Source Compliance Audit Program for approved methods;

13. SCEC back flushes the filter in the probe in accordance with section 2.1.2 of ARB Test Method 100 as necessary;

14. SCEC includes the following information on all strip charts and/or emissions data sheets: pollutant of interest, source, analyzer range, date and time, zero offsets, and the name of the person operating the instruments;

15. The person performing VEE passed ARB's Compliance Training Course #100: Fundamentals of Enforcement (FOE)/Visible Emissions Evaluation (Smoke School) and is currently certified to conduct VEE. Any recertification for VEE, following the initial passage of ARB's FOE, must be from a certifying body recognized by ARB at the time VEE is performed; and

WHEREAS, ARB Executive Officer, pursuant to California Health and Safety Code section 39516, issued Executive Order G-02-008, delegating to the Chief of ARB Monitoring and Laboratory Division (MLD) the authority to approve independent testers in accordance with Cal. Code Regs., title 17, section 91200 and following.

NOW, THEREFORE, I, Michael T. Benjamin, Chief of MLD, order that SCEC is granted approval from the date of execution of this order until June 30, 2014, to perform the test methods identified above, subject to compliance with Cal. Code Regs., title 17, section 91200 and following.

BE IT FURTHER ORDERED that during the approved period the Executive Officer or his authorized representative may field audit one or more tests performed pursuant to this order for each test method identified above.

Executed at Sacramento, California, this 12 day of July 2013.

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

SCEC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, until June 30, 2014, for those test methods listed below:

Air Resources Board Test Methods:

1, 2, 3, 4, 5, 6, 8, 17, 20

100 (CO, CO_2, NO_x, O_2, SO_2, THC)

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

State of California

Air Resources Board

Approved Independent Contractor

SCEC

This is to certify that the company listed above has been approved by the Air Resources Board to conduct compliance testing pursuant to California Code of Regulations, title 17, section 91207, until June 30, 2014, for those test methods listed below:

Visible Emissions Evaluation

Dr. Michael T. Benjamin, Chief
Monitoring and Laboratory Division

SCEC

Appendix K

SCAQMD Permits

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

PERMIT TO OPERATE

Permit No. G27394
A/N 540708

Equipment Description:

RESOURCE RECOVERY SYSTEM NO. 1 CONSISTING OF:

INTERNAL COMBUSTION ENGINE (CG1-HB), COOPER BESSMER, SPARK IGNITION, FOUR STROKE, WITH A MODIFIED TURBOCHARGED-INTERCOOLED V-16 TYPE, MODEL NO. LSVB-16-SGC, 4166 HP, NATURAL GAS AND/OR DIGESTER GAS FIRED, DRIVING A 3000 KW ELECTRIC GENERATOR, WITH AN EXHAUST HEAT RECOVERY STEAM GENERATOR, 6,010,200 BTU/HR CAPACITY, UNFIRED.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THIS ENGINE SHALL HAVE AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER TO DETERMINE THE ENGINE ELAPSED OPERATING TIME FOR EACH FUEL BLEND BURNED.
   [RULE 1110.2]

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE FUEL GAS, OR FUEL BLEND, SUPPLY LINE TO THE ENGINE TO MEASURE AND RECORD THE QUANTITY OF EACH FUEL GAS (IN SCFM) BURNED.
   [RULE 204]

6. SAMPLING PORT SHALL BE INSTALLED FOR THE INLET GAS LINE TO THE ENGINE TO ALLOW THE COLLECTION OF A FUEL GAS OR FUEL BLEND SAMPLES.
   [RULE 204]

7. MONTHLY READINGS OF THE BTU CONTENT OF FUEL GAS (BTU/SCF) AT THE COMBINED INLET TO THE CGS ENGINES SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
   [RULE 204]

8. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
   [RULE 204]

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9. THE TOTAL HEAT INPUT OF GASEOUS FUEL, OR FUEL BLEND, BURNED IN THIS ENGINE SHALL NOT EXCEED 33 MM BTU PER HOUR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF FUEL GAS, OR FUEL BLEND, BURNED IN THIS ENGINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) AND 1303 (b) (2)-MODELING AND EMISSIONS OFFSET]

10. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH RULES 218, 431.1 AND 1110.2.
[RULE 218, 431.1 AND 1110.2]

11. THIS EQUIPMENT SHALL BE OPERATED IN SUCH A MANNER THAT THE FOLLOWING EMISSION RATES ARE NOT EXCEEDED.

AIR CONTAMINANT	
CARBON MONOXIDE	600 PPMV AT 15% O2
PARTICULATES (PM10)	0.0058 GRAINS/ DSCF
ROG OR TNMHC (AS CARBON)	115 PPMV AT 15% O2

[RULE 1303 (a) (1), 1303(b) (1) AND 1303 (b) (2)-BACT, MODELING AND EMISSIONS OFFSET]

12. THE COMBINED EMISSIONS FROM THE FOUR (4) CGS ENGINES, USING CALENDAR MONTHLY EMISSIONS DIVIDED BY 30, SHALL NOT EXCEED THE FOLLOWING:

AIR CONTAMINANT	LBS/DAY
CARBON MONOXIDE	2,644
NITROGEN OXIDES (AS NO2)	828
PARTICULATES (PM10)	72
ROG OR TNMHC (AS CH4)	372
SULFUR DIOXIDE	84

[RULE 1303 (b) (2)-EMISSIONS OFFSET]

13. THE OPERATOR SHALL INSTALL AND MAINTAIN A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), OR AN ALTERNATIVE SYSTEM, AS APPROVED BY THE EXECUTIVE OFFICER, TO MEASURE THE ENGINE EXHAUST FOR NOx AND O2 CONCENTRATIONS ON A DRY BASIS, EXCEPT DURING SHUTDOWN FOR MAINTENANCE OF THE SYSTEM. IN ADDITION, THE CEMS SHALL CONVERT THE ACTUAL NOx TO MASS EMISSION RATES; AND RECORD THE ACTUAL AND CORRECTED ENGINE NOx CONCENTRATION AT 15% O2 AND MASS EMISSION RATES ON AN HOURLY AND DAILY BASIS.
[RULE 218, RULE 1110.2]

14. THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS ANNUALLY. WRITTEN NOTICE OF THE PERFORMANCE TEST SHALL BE PROVIDED TO THE AQMD AT LEAST 7 DAYS PRIOR TO THE TEST SO THAT AN OBSERVER MAY BE PRESENT. A COMPLETE FINAL REPORT OF THE TEST (LBS/HR, PPMVD AT 15% O2, LBS/MMBTU, ETC.) SHALL BE PROVIDED TO THE AQMD WITHIN 45 DAYS AFTER TESTING. ALL TEST RUNS REQUIRED BY AQMD SHALL BE REPORTED. THE TESTS SHALL INCLUDE BUT NOT BE LIMITED TO, A TEST OF THE FUELS BURNED AND ENGINE EXHAUST FOR:

A. TOTAL NON-METHANE HYDROCARBONS (EXHAUST ONLY)
B. CARBON MONOXIDE (EXHAUST ONLY)
C. TOTAL PARTICULATE MATTER (EXHAUST ONLY).
D. OXIDES OF NITROGEN (EXHAUST ONLY).

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E. OXYGEN
F. FLOW RATE
G. MOISTURE
H. TOXIC AIR CONTAMINANTS (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
I. ALDEHYDES (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
J. TOTAL REDUCED SULFUR COMPOUNDS (FUEL ONLY)
K. NITROGEN AND CARBON DIOXIDE
L. BTU CONTENTS (FUEL ONLY)
M. POWER OUTPUT

[RULE 1303(b) (1) AND 1303(b) (2) - MODELING AND EMISSION OFFSET], [RULE 1110.2], [RULE 404]

15 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS FOR THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

Emissions And Requirements:

16. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

CO: 2000 PPMV, RULE 1110.2
NOx: 45.4 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
ROG: 315 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS.

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

PERMIT TO OPERATE

Permit No. G27395
A/N 540709

Equipment Description:

RESOURCE RECOVERY SYSTEM NO. 2 CONSISTING OF:

INTERNAL COMBUSTION ENGINE (CG2-HB), COOPER BESSMER, SPARK IGNITION, FOUR STROKE, WITH A MODIFIED TURBOCHARGED-INTERCOOLED V-16 TYPE, MODEL NO. LSVB-16-SGC, 4166 HP, NATURAL GAS AND/OR DIGESTER GAS FIRED, DRIVING A 3000 KW ELECTRIC GENERATOR, WITH AN EXHAUST HEAT RECOVERY STEAM GENERATOR, 6,010,200 BTU/HR CAPACITY, UNFIRED.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THIS ENGINE SHALL HAVE AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER TO DETERMINE THE ENGINE ELAPSED OPERATING TIME FOR EACH FUEL BLEND BURNED.
   [RULE 1110.2]

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE FUEL GAS, OR FUEL BLEND, SUPPLY LINE TO THE ENGINE TO MEASURE AND RECORD THE QUANTITY OF EACH FUEL GAS (IN SCFM) BURNED.
   [RULE 204]

6. SAMPLING PORT SHALL BE INSTALLED FOR THE INLET GAS LINE TO THE ENGINE TO ALLOW THE COLLECTION OF A FUEL GAS OR FUEL BLEND SAMPLES.
   [RULE 204]

7. MONTHLY READINGS OF THE BTU CONTENT OF FUEL GAS (BTU/SCF) AT THE COMBINED INLET TO THE CGS ENGINES SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
   [RULE 204]

8. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
   [RULE 204]

FACILITY PERMIT TO OPERATE
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9. THE TOTAL HEAT INPUT OF GASEOUS FUEL, OR FUEL BLEND, BURNED IN THIS ENGINE SHALL NOT EXCEED 33 MM BTU PER HOUR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF FUEL GAS, OR FUEL BLEND, BURNED IN THIS ENGINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) AND 1303 (b) (2)-MODELING AND EMISSIONS OFFSET]

10. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH RULES 218, 431.1 AND 1110.2.
[RULE 218, 431.1 AND 1110.2]

11. THIS EQUIPMENT SHALL BE OPERATED IN SUCH A MANNER THAT THE FOLLOWING EMISSION RATES ARE NOT EXCEEDED.

AIR CONTAMINANT	
CARBON MONOXIDE	600 PPMV AT 15% O2
PARTICULATES (PM10)	0.0058 GRAINS/ DSCF
ROG OR TNMHC (AS CARBON)	115 PPMV AT 15% O2

[RULE 1303 (a) (1), 1303(b) (1) AND 1303 (b) (2)-BACT, MODELING AND EMISSIONS OFFSET]

12. THE COMBINED EMISSIONS FROM THE FOUR (4) CGS ENGINES, USING CALENDAR MONTHLY EMISSIONS DIVIDED BY 30, SHALL NOT EXCEED THE FOLLOWING:

AIR CONTAMINANT	LBS/DAY
CARBON MONOXIDE	2,644
NITROGEN OXIDES (AS NO2)	828
PARTICULATES (PM10)	72
ROG OR TNMHC (AS CH4)	372
SULFUR DIOXIDE	84

[RULE 1303 (b) (2)-EMISSIONS OFFSET]

13. THE OPERATOR SHALL INSTALL AND MAINTAIN A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), OR AN ALTERNATIVE SYSTEM, AS APPROVED BY THE EXECUTIVE OFFICER, TO MEASURE THE ENGINE EXHAUST FOR NOx AND O2 CONCENTRATIONS ON A DRY BASIS, EXCEPT DURING SHUTDOWN FOR MAINTENANCE OF THE SYSTEM. IN ADDITION, THE CEMS SHALL CONVERT THE ACTUAL NOx TO MASS EMISSION RATES; AND RECORD THE ACTUAL AND CORRECTED ENGINE NOx CONCENTRATION AT 15% O2 AND MASS EMISSION RATES ON AN HOURLY AND DAILY BASIS.
[RULE 218, RULE 1110.2]

14. THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS ANNUALLY. WRITTEN NOTICE OF THE PERFORMANCE TEST SHALL BE PROVIDED TO THE AQMD AT LEAST 7 DAYS PRIOR TO THE TEST SO THAT AN OBSERVER MAY BE PRESENT. A COMPLETE FINAL REPORT OF THE TEST (LBS/HR, PPMVD AT 15% O2, LBS/MMBTU, ETC.) SHALL BE PROVIDED TO THE AQMD WITHIN 45 DAYS AFTER TESTING. ALL TEST RUNS REQUIRED BY AQMD SHALL BE REPORTED. THE TESTS SHALL INCLUDE BUT NOT BE LIMITED TO, A TEST OF THE FUELS BURNED AND ENGINE EXHAUST FOR:

A. TOTAL NON-METHANE HYDROCARBONS (EXHAUST ONLY)
B. CARBON MONOXIDE (EXHAUST ONLY)
C. TOTAL PARTICULATE MATTER (EXHAUST ONLY).
D. OXIDES OF NITROGEN (EXHAUST ONLY).

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E. OXYGEN
F. FLOW RATE
G. MOISTURE
H. TOXIC AIR CONTAMINANTS (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
I. ALDEHYDES (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
J. TOTAL REDUCED SULFUR COMPOUNDS (FUEL ONLY)
K. NITROGEN AND CARBON DIOXIDE
L. BTU CONTENTS (FUEL ONLY)
M. POWER OUTPUT

[RULE 1303(b) (1) AND 1303(b) (2) - MODELING AND EMISSION OFFSET], [RULE 1110.2], [RULE 404]

15 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS FOR THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

Emissions And Requirements:

16. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

CO: 2000 PPMV, RULE 1110.2
NOx: 45.4 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
ROG: 315 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26).
PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

PERMIT TO OPERATE

Permit No. G27396
A/N 540710

Equipment Description:

RESOURCE RECOVERY SYSTEM NO. 3 CONSISTING OF:

INTERNAL COMBUSTION ENGINE (CG3-HB), COOPER BESSMER, SPARK IGNITION, FOUR STROKE, WITH A MODIFIED TURBOCHARGED-INTERCOOLED V-16 TYPE, MODEL NO. LSVB-16-SGC, 4166 HP, NATURAL GAS AND/OR DIGESTER GAS FIRED, DRIVING A 3000 KW ELECTRIC GENERATOR, WITH AN EXHAUST HEAT RECOVERY STEAM GENERATOR, 6,010,200 BTU/HR CAPACITY, UNFIRED.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THIS ENGINE SHALL HAVE AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER TO DETERMINE THE ENGINE ELAPSED OPERATING TIME FOR EACH FUEL BLEND BURNED.
   [RULE 1110.2]

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE FUEL GAS, OR FUEL BLEND, SUPPLY LINE TO THE ENGINE TO MEASURE AND RECORD THE QUANTITY OF EACH FUEL GAS (IN SCFM) BURNED.
   [RULE 204]

6. SAMPLING PORT SHALL BE INSTALLED FOR THE INLET GAS LINE TO THE ENGINE TO ALLOW THE COLLECTION OF A FUEL GAS OR FUEL BLEND SAMPLES.
   [RULE 204]

7. MONTHLY READINGS OF THE BTU CONTENT OF FUEL GAS (BTU/SCF) AT THE COMBINED INLET TO THE CGS ENGINES SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
   [RULE 204]

8. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
   [RULE 204]

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ORANGE COUNTY SANITATION DISTRICT

9. THE TOTAL HEAT INPUT OF GASEOUS FUEL, OR FUEL BLEND, BURNED IN THIS ENGINE SHALL NOT EXCEED 33 MM BTU PER HOUR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF FUEL GAS, OR FUEL BLEND, BURNED IN THIS ENGINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) AND 1303 (b) (2)-MODELING AND EMISSIONS OFFSET]

10. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH RULES 218, 431.1 AND 1110.2.
[RULE 218, 431.1 AND 1110.2]

11. THIS EQUIPMENT SHALL BE OPERATED IN SUCH A MANNER THAT THE FOLLOWING EMISSION RATES ARE NOT EXCEEDED.

AIR CONTAMINANT	
CARBON MONOXIDE	600 PPMV AT 15% O2
PARTICULATES (PM10)	0.0058 GRAINS/ DSCF
ROG OR TNMHC (AS CARBON)	115 PPMV AT 15% O2

[RULE 1303 (a) (1), 1303(b) (1) AND 1303 (b) (2)-BACT, MODELING AND EMISSIONS OFFSET]

12. THE COMBINED EMISSIONS FROM THE FOUR (4) CGS ENGINES, USING CALENDAR MONTHLY EMISSIONS DIVIDED BY 30, SHALL NOT EXCEED THE FOLLOWING:

AIR CONTAMINANT	LBS/DAY
CARBON MONOXIDE	2,644
NITROGEN OXIDES (AS NO2)	828
PARTICULATES (PM10)	72
ROG OR TNMHC (AS CH4)	372
SULFUR DIOXIDE	84

[RULE 1303 (b) (2)-EMISSIONS OFFSET]

13. THE OPERATOR SHALL INSTALL AND MAINTAIN A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), OR AN ALTERNATIVE SYSTEM, AS APPROVED BY THE EXECUTIVE OFFICER, TO MEASURE THE ENGINE EXHAUST FOR NOx AND O2 CONCENTRATIONS ON A DRY BASIS, EXCEPT DURING SHUTDOWN FOR MAINTENANCE OF THE SYSTEM. IN ADDITION, THE CEMS SHALL CONVERT THE ACTUAL NOx TO MASS EMISSION RATES; AND RECORD THE ACTUAL AND CORRECTED ENGINE NOx CONCENTRATION AT 15% O2 AND MASS EMISSION RATES ON AN HOURLY AND DAILY BASIS.
[RULE 218, RULE 1110.2]

14. THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS ANNUALLY. WRITTEN NOTICE OF THE PERFORMANCE TEST SHALL BE PROVIDED TO THE AQMD AT LEAST 7 DAYS PRIOR TO THE TEST SO THAT AN OBSERVER MAY BE PRESENT. A COMPLETE FINAL REPORT OF THE TEST (LBS/HR, PPMVD AT 15% O2, LBS/MMBTU, ETC.) SHALL BE PROVIDED TO THE AQMD WITHIN 45 DAYS AFTER TESTING. ALL TEST RUNS REQUIRED BY AQMD SHALL BE REPORTED. THE TESTS SHALL INCLUDE BUT NOT BE LIMITED TO, A TEST OF THE FUELS BURNED AND ENGINE EXHAUST FOR:

A. TOTAL NON-METHANE HYDROCARBONS (EXHAUST ONLY)
B. CARBON MONOXIDE (EXHAUST ONLY)
C. TOTAL PARTICULATE MATTER (EXHAUST ONLY).
D. OXIDES OF NITROGEN (EXHAUST ONLY).

E. OXYGEN
F. FLOW RATE
G. MOISTURE
H. TOXIC AIR CONTAMINANTS (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
I. ALDEHYDES (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
J. TOTAL REDUCED SULFUR COMPOUNDS (FUEL ONLY)
K. NITROGEN AND CARBON DIOXIDE
L. BTU CONTENTS (FUEL ONLY)
M. POWER OUTPUT

[RULE 1303(b) (1) AND 1303(b) (2) - MODELING AND EMISSION OFFSET], [RULE 1110.2], [RULE 404]

15 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS FOR THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

Emissions And Requirements:

16. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

CO: 2000 PPMV, RULE 1110.2
NOx: 45.4 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
ROG: 315 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

PERMIT TO OPERATE

Permit No. G27397
A/N 540711

Equipment Description:

RESOURCE RECOVERY SYSTEM NO. 4 CONSISTING OF:

INTERNAL COMBUSTION ENGINE (CG4-HB), COOPER BESSMER, SPARK IGNITION, FOUR STROKE, WITH A MODIFIED TURBOCHARGED-INTERCOOLED V-16 TYPE, MODEL NO. LSVB-16-SGC, 4166 HP, NATURAL GAS AND/OR DIGESTER GAS FIRED, DRIVING A 3000 KW ELECTRIC GENERATOR, WITH AN EXHAUST HEAT RECOVERY STEAM GENERATOR, 6,010,200 BTU/HR CAPACITY, UNFIRED.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THIS ENGINE SHALL HAVE AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER TO DETERMINE THE ENGINE ELAPSED OPERATING TIME FOR EACH FUEL BLEND BURNED.
   [RULE 1110.2]

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE FUEL GAS, OR FUEL BLEND, SUPPLY LINE TO THE ENGINE TO MEASURE AND RECORD THE QUANTITY OF EACH FUEL GAS (IN SCFM) BURNED.
   [RULE 204]

6. SAMPLING PORT SHALL BE INSTALLED FOR THE INLET GAS LINE TO THE ENGINE TO ALLOW THE COLLECTION OF A FUEL GAS OR FUEL BLEND SAMPLES.
   [RULE 204]

7. MONTHLY READINGS OF THE BTU CONTENT OF FUEL GAS (BTU/SCF) AT THE COMBINED INLET TO THE CGS ENGINES SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
   [RULE 204]

8. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
   [RULE 204]

9. THE TOTAL HEAT INPUT OF GASEOUS FUEL, OR FUEL BLEND, BURNED IN THIS ENGINE SHALL NOT EXCEED 33 MM BTU PER HOUR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF FUEL GAS, OR FUEL BLEND, BURNED IN THIS ENGINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) AND 1303 (b) (2)-MODELING AND EMISSIONS OFFSET]

10. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH RULES 218, 431.1 AND 1110.2.
[RULE 218, 431.1 AND 1110.2]

11. THIS EQUIPMENT SHALL BE OPERATED IN SUCH A MANNER THAT THE FOLLOWING EMISSION RATES ARE NOT EXCEEDED.

AIR CONTAMINANT	
CARBON MONOXIDE	600 PPMV AT 15% O2
PARTICULATES (PM10)	0.0058 GRAINS/ DSCF
ROG OR TNMHC (AS CARBON)	115 PPMV AT 15% O2

[RULE 1303 (a) (1), 1303(b) (1) AND 1303 (b) (2)-BACT, MODELING AND EMISSIONS OFFSET]

12. THE COMBINED EMISSIONS FROM THE FOUR (4) CGS ENGINES, USING CALENDAR MONTHLY EMISSIONS DIVIDED BY 30, SHALL NOT EXCEED THE FOLLOWING:

AIR CONTAMINANT	LBS/DAY
CARBON MONOXIDE	2,644
NITROGEN OXIDES (AS NO2)	828
PARTICULATES (PM10)	72
ROG OR TNMHC (AS CH4)	372
SULFUR DIOXIDE	84

[RULE 1303 (b) (2)-EMISSIONS OFFSET]

13. THE OPERATOR SHALL INSTALL AND MAINTAIN A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), OR AN ALTERNATIVE SYSTEM, AS APPROVED BY THE EXECUTIVE OFFICER, TO MEASURE THE ENGINE EXHAUST FOR NOx AND O2 CONCENTRATIONS ON A DRY BASIS, EXCEPT DURING SHUTDOWN FOR MAINTENANCE OF THE SYSTEM. IN ADDITION, THE CEMS SHALL CONVERT THE ACTUAL NOx TO MASS EMISSION RATES; AND RECORD THE ACTUAL AND CORRECTED ENGINE NOx CONCENTRATION AT 15% O2 AND MASS EMISSION RATES ON AN HOURLY AND DAILY BASIS.
[RULE 218, RULE 1110.2]

14. THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS ANNUALLY. WRITTEN NOTICE OF THE PERFORMANCE TEST SHALL BE PROVIDED TO THE AQMD AT LEAST 7 DAYS PRIOR TO THE TEST SO THAT AN OBSERVER MAY BE PRESENT. A COMPLETE FINAL REPORT OF THE TEST (LBS/HR, PPMVD AT 15% O2, LBS/MMBTU, ETC.) SHALL BE PROVIDED TO THE AQMD WITHIN 45 DAYS AFTER TESTING. ALL TEST RUNS REQUIRED BY AQMD SHALL BE REPORTED. THE TESTS SHALL INCLUDE BUT NOT BE LIMITED TO, A TEST OF THE FUELS BURNED AND ENGINE EXHAUST FOR:

A. TOTAL NON-METHANE HYDROCARBONS (EXHAUST ONLY)
B. CARBON MONOXIDE (EXHAUST ONLY)
C. TOTAL PARTICULATE MATTER (EXHAUST ONLY).
D. OXIDES OF NITROGEN (EXHAUST ONLY).

E. OXYGEN
F. FLOW RATE
G. MOISTURE
H. TOXIC AIR CONTAMINANTS (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
I. ALDEHYDES (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
J. TOTAL REDUCED SULFUR COMPOUNDS (FUEL ONLY)
K. NITROGEN AND CARBON DIOXIDE
L. BTU CONTENTS (FUEL ONLY)
M. POWER OUTPUT

[RULE 1303(b) (1) AND 1303(b) (2) - MODELING AND EMISSION OFFSET], [RULE 1110.2], [RULE 404]

15 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS FOR THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

Emissions And Requirements:

16. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

CO: 2000 PPMV, RULE 1110.2
NOx: 45.4 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
ROG: 315 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

PERMIT TO OPERATE

Permit No. G27398
A/N 540712

Equipment Description:

RESOURCE RECOVERY SYSTEM NO. 5 CONSISTING OF:

INTERNAL COMBUSTION ENGINE (CG5-HB), COOPER BESSMER, SPARK IGNITION, FOUR STROKE, WITH A MODIFIED TURBOCHARGED-INTERCOOLED V-16 TYPE, MODEL NO. LSVB-16-SGC, 4166 HP, NATURAL GAS AND/OR DIGESTER GAS FIRED, DRIVING A 3000 KW ELECTRIC GENERATOR, WITH AN EXHAUST HEAT RECOVERY STEAM GENERATOR, 6,010,200 BTU/HR CAPACITY, UNFIRED.

Conditions:

1. OPERATION OF THIS EQUIPMENT SHALL BE CONDUCTED IN ACCORDANCE WITH ALL DATA AND SPECIFICATIONS SUBMITTED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED UNLESS OTHERWISE NOTED BELOW.
   [RULE 204]

2. THIS EQUIPMENT SHALL BE PROPERLY MAINTAINED AND KEPT IN GOOD OPERATING CONDITION AT ALL TIMES.
   [RULE 204]

3. THIS EQUIPMENT SHALL BE OPERATED BY PERSONNEL PROPERLY TRAINED IN ITS OPERATION.
   [RULE 204]

4. THIS ENGINE SHALL HAVE AN OPERATIONAL NON-RESETTABLE TOTALIZING TIME METER TO DETERMINE THE ENGINE ELAPSED OPERATING TIME FOR EACH FUEL BLEND BURNED.
   [RULE 1110.2]

5. A FLOW INDICATING AND RECORDING DEVICE SHALL BE INSTALLED IN THE FUEL GAS, OR FUEL BLEND, SUPPLY LINE TO THE ENGINE TO MEASURE AND RECORD THE QUANTITY OF EACH FUEL GAS (IN SCFM) BURNED.
   [RULE 204]

6. SAMPLING PORT SHALL BE INSTALLED FOR THE INLET GAS LINE TO THE ENGINE TO ALLOW THE COLLECTION OF A FUEL GAS OR FUEL BLEND SAMPLES.
   [RULE 204]

7. MONTHLY READINGS OF THE BTU CONTENT OF FUEL GAS (BTU/SCF) AT THE COMBINED INLET TO THE CGS ENGINES SHALL BE TAKEN USING AN INSTRUMENT APPROVED BY THE SCAQMD. ALL RESULTS SHALL BE RECORDED.
   [RULE 204]

8. ALL RECORDING DEVICES SHALL BE SYNCHRONIZED WITH RESPECT TO THE TIME OF THE DAY.
   [RULE 204]

FACILITY PERMIT TO OPERATE
ORANGE COUNTY SANITATION DISTRICT

9. THE TOTAL HEAT INPUT OF GASEOUS FUEL, OR FUEL BLEND, BURNED IN THIS ENGINE SHALL NOT EXCEED 33 MM BTU PER HOUR. A LOG SHALL BE KEPT INDICATING THE TOTAL HEATING VALUE OF FUEL GAS, OR FUEL BLEND, BURNED IN THIS ENGINE BASED ON THE RECORDED FLOW RATE (SCFM) AND THE LATEST MONTHLY BTU CONTENT READING.
[RULE 1303 (b) (1) AND 1303 (b) (2)-MODELING AND EMISSIONS OFFSET]

10. THIS EQUIPMENT SHALL BE OPERATED IN COMPLIANCE WITH RULES 218, 431.1 AND 1110.2.
[RULE 218, 431.1 AND 1110.2]

11. THIS EQUIPMENT SHALL BE OPERATED IN SUCH A MANNER THAT THE FOLLOWING EMISSION RATES ARE NOT EXCEED.

AIR CONTAMINANT	
CARBON MONOXIDE	600 PPMV AT 15% O2
PARTICULATES (PM10)	0.0058 GRAINS/ DSCF
ROG OR TNMHC (AS CARBON)	115 PPMV AT 15% O2

[RULE 1303 (a) (1), 1303(b) (1) AND 1303 (b) (2)-BACT, MODELING AND EMISSIONS OFFSET]

12. THE COMBINED EMISSIONS FROM THE FOUR (4) CGS ENGINES, USING CALENDAR MONTHLY EMISSIONS DIVIDED BY 30, SHALL NOT EXCEED THE FOLLOWING:

AIR CONTAMINANT	LBS/DAY
CARBON MONOXIDE	2,644
NITROGEN OXIDES (AS NO2)	828
PARTICULATES (PM10)	72
ROG OR TNMHC (AS CH4)	372
SULFUR DIOXIDE	84

[RULE 1303 (b) (2)-EMISSIONS OFFSET]

13. THE OPERATOR SHALL INSTALL AND MAINTAIN A CONTINUOUS EMISSION MONITORING SYSTEM (CEMS), OR AN ALTERNATIVE SYSTEM, AS APPROVED BY THE EXECUTIVE OFFICER, TO MEASURE THE ENGINE EXHAUST FOR NOx AND O2 CONCENTRATIONS ON A DRY BASIS, EXCEPT DURING SHUTDOWN FOR MAINTENANCE OF THE SYSTEM. IN ADDITION, THE CEMS SHALL CONVERT THE ACTUAL NOx TO MASS EMISSION RATES; AND RECORD THE ACTUAL AND CORRECTED ENGINE NOx CONCENTRATION AT 15% O2 AND MASS EMISSION RATES ON AN HOURLY AND DAILY BASIS.
[RULE 218, RULE 1110.2]

14. THE OPERATOR SHALL CONDUCT PERFORMANCE TESTS ANNUALLY. WRITTEN NOTICE OF THE PERFORMANCE TEST SHALL BE PROVIDED TO THE AQMD AT LEAST 7 DAYS PRIOR TO THE TEST SO THAT AN OBSERVER MAY BE PRESENT. A COMPLETE FINAL REPORT OF THE TEST (LBS/HR, PPMVD AT 15% O2, LBS/MMBTU, ETC.) SHALL BE PROVIDED TO THE AQMD WITHIN 45 DAYS AFTER TESTING. ALL TEST RUNS REQUIRED BY AQMD SHALL BE REPORTED. THE TESTS SHALL INCLUDE BUT NOT BE LIMITED TO, A TEST OF THE FUELS BURNED AND ENGINE EXHAUST FOR:

A. TOTAL NON-METHANE HYDROCARBONS (EXHAUST ONLY)
B. CARBON MONOXIDE (EXHAUST ONLY)
C. TOTAL PARTICULATE MATTER (EXHAUST ONLY).
D. OXIDES OF NITROGEN (EXHAUST ONLY).

E. OXYGEN
F. FLOW RATE
G. MOISTURE
H. TOXIC AIR CONTAMINANTS (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
I. ALDEHYDES (EXHAUST ONLY), FOR ONE ENGINE PER YEAR
J. TOTAL REDUCED SULFUR COMPOUNDS (FUEL ONLY)
K. NITROGEN AND CARBON DIOXIDE
L. BTU CONTENTS (FUEL ONLY)
M. POWER OUTPUT

[RULE 1303(b) (1) AND 1303(b) (2) - MODELING AND EMISSION OFFSET], [RULE 1110.2], [RULE 404]

15 RECORDS SHALL BE KEPT AND MAINTAINED TO PROVE COMPLIANCE WITH ALL CONDITIONS FOR THIS PERMIT. THE RECORDS SHALL BE KEPT ON FILE FOR AT LEAST FIVE YEARS AND SHALL BE MADE AVAILABLE TO AQMD PERSONNEL UPON REQUEST.
[RULE 204]

Emissions And Requirements:

16. THIS EQUIPMENT IS SUBJECT TO THE APPLICABLE REQUIREMENTS OF THE FOLLOWING RULES AND REGULATIONS:

CO: 2000 PPMV, RULE 1110.2
NOx: 45.4 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
ROG: 315 PPMV, RULE 1110.2 (WITH ECF ADJUSTMENT FACTOR = 1.26)
PM: RULE 404, SEE APPENDIX B FOR EMISSION LIMITS

ORANGE COUNTY SANITATION DISTRICT
PLANT NO. 2 – UNITS 2 and 4
RULE 1110.2 8760 HOUR & PERMIT COMPLIANCE
TEST REPORT YEAR 2014

PREPARED FOR:
Orange County Sanitation District
10844 Ellis Avenue
Fountain Valley, California 92708-7018

EQUIPMENT LOCATION:
Treatment Plant No. 2
Huntington Beach, California

EQUIPMENT DESCRIPTION:
Engine 2 A/N: # 540709 & PTO: # G27395
Engine 4 A/N: # 540711 & PTO: # G27397

TEST DATES:
December 18, 2014
January 28, 2015

ISSUE DATE:
April 15, 2015

PREPARED BY:
Ellice Lin
SCEC
1631 East Saint Andrew Place
Santa Ana, California 92705

Report No: **2061.1060.rpt3**

Tested By: _____
Rudy Nunez, QSTI

Reviewed By: _____
Kevin Cahill, Project Manager

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1.0 Executive Summary and Results

On December 18, 2014, SCEC performed a compliance source test program on two (2) internal combustion (IC) engines at the Orange County Sanitation District's Treatment Plant No. 2. The test program included nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (CO_2) and oxygen (O_2) concentration emission measurements. The tests were performed on each IC engine at high, normal and low loads. The normal load test was 60 minutes in duration. The low and high loads were each 15 minutes in duration. In addition, 60-minute total gaseous non-methane/ethane organics (TNMHC) samples and 72-minute particulate matter (PM) samples were collected at normal load. The TNMHC samples were conducted on December 18, 2014 and were resampled again on January 28, 2015. Digester gas fuel samples were collected at the inlet of each IC engine and analyzed for total reduced sulfurs (TRS), BTU content and fixed gases. All tests were conducted while each IC engine was fired on 5% natural gas and 95% digester gas fuel. All testing was performed under steady-state operating conditions at the outlets of (IC) Engines No. 2 and 4.

The purpose of this testing was to document emissions for comparison with South Coast Air Quality Management District (SCAQMD) Rule 1110.2 limits and to verify compliance with permit requirements. The test program was performed as part of the annual source test required by SCAQMD Rule 1110.2 and permit conditions.

NO_x, CO, CO_2 and O_2 concentrations were determined according to SCAQMD Method 100.1. The SCAQMD Method 100.1 results were recorded using a Data Acquisition System (DAS) in parts per million (ppm) for NO_x and CO and percent volume (%) for O_2 and CO_2 every 2 seconds and presented in one minute averages. All mass emissions were calculated based on pitot-measured volumetric flow rates (SCAQMD Methods 1.1-4.1) determined at high, normal and low loads. The results of the test program are summarized in Tables 1.1 through 1.4.

On-site source testing personnel for SCEC included Mr. Rudy Nunez – District Manager and Mr. Anthony L. Weiss and Mr. Jason Deberg– Project Technicians. Mr. Vladimir Kogan and Ms. Randa AbuShaban of OCSD coordinated all IC engine requirements. This compliance report presents the sampling methodology, data, calculations and results.

TABLE 1.1
SUMMARY OF RESULTS SCAQMD RULE 1110.2 8760 HOUR TEST & PERMIT COMPLIANCE
OCSD PLANT 2
ENGINE #2
December 18, 2014

Parameter	Units	Normal Load	High Load	Low Load	Average
NO_x	ppmvd	46.1	47.7	45.6	46.5
	ppmvd @ 15% O_2	30.0	31.9	29.0	30.3
	lb/MMBtu	0.12	0.13	0.12	0.12
	lb/hr	3.04	3.53	2.46	3.01
	lb/MMcf	75.6	80.5	73.2	76.4
CO	ppmvd	509	535	494	513
	ppmvd @ 15% O_2	331	358	314	334
	lb/MMBtu	0.80	0.87	0.76	0.81
	lb/hr	20.4	24.1	16.2	20.2
	lb/MMcf	508	549	483	513
PM	gr/DSCF	0.0061	-	-	0.0061
	lb/hr	0.47	-	-	0.47
O_2	%	11.8	12.1	11.6	11.8
CO_2	%	7.44	7.22	7.61	7.42
N_2	%	80.74	80.70	80.78	80.74
Inlet TRS	ppmv	10.6	-	-	10.6
	lb/hr as SO_2	0.97	-	-	0.97
Fuel Heating Value	BTU/SCF	622	-	-	622
Fuel Flow	SCFM	700	836	636	724
Load	kW	2,583	3,000	2,269	2,617
Volume Flow [1]	DSCFM	9,056	10,156	7,400	8,871

[1] Calculated based on SCAQMD Methods 1-4.

TABLE 1.2
SUMMARY OF RESULTS SCAQMD RULE 1110.2 8760 HOUR TEST & PERMIT COMPLIANCE
OCSD PLANT 2
ENGINE #4
December 18, 2014

Parameter	Units	Normal Load	High Load	Low Load	Average
NO_x	ppmvd	43.4	44.6	42.8	43.6
	ppmvd @ 15% O_2	29.9	31.0	28.5	29.8
	lb/MMBtu	0.12	0.12	0.11	0.12
	lb/hr	2.98	3.36	2.41	2.92
	lb/MMcf	75.6	78.4	71.9	75.3
CO	ppmvd	571	581	552	568
	ppmvd @ 15% O_2	393	404	367	388
	lb/MMBtu	0.95	0.97	0.88	0.94
	lb/hr	23.9	26.6	18.9	23.1
	lb/MMcf	605	621	564	597
PM	gr/DSCF	0.0033	-	-	0.0033
	lb/hr	0.27	-	-	0.27
O_2	%	12.3	12.4	12.0	12.3
CO_2	%	7.11	6.98	7.29	7.12
N_2	%	80.56	80.60	80.68	80.61
Inlet TRS	ppmv	12.2	-	-	12.2
	lb/hr as SO_2	1.17	-	-	1.17
Fuel Heating Value	BTU/SCF	627	-	-	627
Fuel Flow	SCFM	709	779	631	706
Load	kW	2,539	3,000	2,225	2,588
Volume Flow [1]	DSCFM	9,425	10,331	7,733	9,163

[1] Calculated based on SCAQMD Methods 1-4.

TABLE 1.3
SUMMARY OF VOC RESULTS
OCSD PLANT 2
ENGINE #2
January 28, 2015

Parameter	Units	Normal Load
TNMHC	ppmv	111.8
	ppmvd @ 15% O_2	76.6
	lb/MMBtu	0.103
	lb/hr as CH_4	2.66
	lbs/MMcf	64.4
O_2	%	12.3
CO_2	%	6.82
N_2	%	80.88
Fuel Heating Value	BTU/SCF	614
Fuel Flow	SCFM	683
Load	kW	2,461
Volume Flow [(1)]	DSCFM	9,383

[(1)] Calculated based on SCAQMD Methods 1-4.

TABLE 1.4
SUMMARY OF VOC RESULTS
OCSD PLANT 2
ENGINE #4
January 28, 2015

Parameter	Units	Normal Load
TNMHC	ppmv	63.6
	ppmvd @ 15% O_2	42.7
	lb/MMBtu	0.057
	lb/hr as CH_4	1.50
	lbs/MMcf	35.9
O_2	%	12.1
CO_2	%	6.72
N_2	%	81.16
Fuel Heating Value	BTU/SCF	614
Fuel Flow	SCFM	660
Load	kW	2,278
Volume Flow [(1)]	DSCFM	9,294

[(1)] Calculated based on SCAQMD Methods 1-4.

2.0 Introduction and Test Description

OCSD retained SCEC to source test two (2) Cooper-Bessemer engines subject to the requirements of SCAQMD Rule 1110.2 and site specific permit conditions. Gaseous, PM, TRS and fuel analysis test results for Engines 2 and 4 are presented in Table 1.1 – Table 1.2, respectively.

2.1 Test Conditions

Each IC engine was operated at three conditions (low, normal, and high load) while firing on 95% digester gas fuel. Engine data were monitored and recorded throughout each test period. These data are provided in Table 3.1 and Appendix H.

2.2 Sample Locations

All engine exhaust emissions samples were collected from each IC engine at its main exhaust stack. Emissions testing on each engine was conducted on the thirty-inch diameter discharge stack located approximately 59 feet above ground level on the engine building rooftop. Two sample ports 90° apart were utilized for sampling on the exhaust stack. The sample ports are located approximately 4.5 duct diameters downstream and 1.8 duct diameters upstream from the nearest flow disturbances.

Engine inlet fuel samples were analyzed for heat content, TRS and fixed gases. These samples were collected at the digester gas fuel line input to each IC engine.

3.0 Source Information and Equipment Description

Legal Owner: Orange County Sanitation District
10844 Ellis Avenue
Fountain Valley, CA 92708

Facility Contact: Mr. Vladimir Kogan
Environmental Compliance Division
Site No.: (714) 593-7085

Equipment Location: Treatment Plant No. 2
22212 Brookhurst Avenue
Huntington Beach, CA 92646

Equipment Description:

Engines 2 and 4 are Cooper LSVB-16-SGC reciprocating internal combustion engines and are located at the Orange County Sanitation District's facility in Huntington Beach, California. Each engine is a four-stroke turbocharged lean-burn spark-ignited unit, utilizing pre-combustion chambers to minimize NO_x emissions. Each engine is directly coupled to a synchronous generator and is rated at 3000 kW. Each engine was operated at high, normal and low loads while firing a 5%/95% natural-gas/digester-gas mixture.

TABLE 3.1
ENGINE OPERATING PARAMETERS

Engine 2 – Operating Parameters on December 18, 2014

Parameter	Units	High Load	Normal Load	Low Load
Load	KW	3,000	2,583	2,269
Fuel Usage (Di-gas)	SCFM	836	700	636
Speed	RPM	360	360	360

Engine 4 – Operating Parameters on December 18, 2014

Parameter	Units	High Load	Normal Load	Low Load
Load	KW	3,000	2,338	2,290
Fuel Usage (Di-gas)	SCFM	798	660	650
Speed	RPM	360	360	360

Engine 2 – Operating Parameters on January 28, 2015

Parameter	Units	Normal Load
Load	KW	2,461
Fuel Usage (Di-gas)	SCFM	683
Speed	RPM	360

Engine 4 – Operating Parameters on January 28, 2015

Parameter	Units	Normal Load
Load	KW	2,278
Fuel Usage (Di-gas)	SCFM	660
Speed	RPM	360

4.0 Test Critique

The Orange County Sanitation District retained the services of SCEC to perform the annual 8760 hour SCAQMD Rule 1110.2 and permit compliance source emissions test program on their Central Generation System natural gas/digester gas fired IC Engines 2 and 4 at Plant No. 2 in Huntington Beach, California. The test program was performed in accordance with SCAQMD Rule 1110.2 and each individual testing method. The results of the test program are considered to be representative of the engine emissions at the time of the test.

The TNMHCs were tested on January 28, 2015. The lab associate who conducted the testing commented that "the trap associated with the sample P2E4 Run – 1A released excess water upon burning, indicating it contained frozen water and biased the results high." Therefore the test results for Run – 1A was found to be inconclusive and were omitted from the final reporting results. The test results from Run – 1B was used to calculate the TNMHC lb/hr and report final test results.

Calibration error checks were performed at the start and end of each test day. System bias checks were performed before and after each Method 100.1 sampling run. All system bias and calibration error checks were within the allowable tolerance. A NO_x converter efficiency check was performed daily. The NO_x converter efficiency checks conducted on December 18, 2014 for both Engines #2 and #4 was 95.5%.

Complete laboratory QA/QC data packages are provided in electronic PDF format on a CD-ROM included with this report.

All mass emissions were calculated based on pitot-tube measured volumetric flow rates. Moisture content from the particulate sample train was utilized during all volumetric flow rate calculations.

5.0 Sampling and Analytical Methods

The test procedures used for the inlet and exhaust measurements are summarized below in Table 5.1.

TABLE 5.1
TEST PROCEDURES
OCSD Plant 2: Engines 2 and 4

Parameter	Method	Number of Repetitions	Duration	Permit Required	Rule 1110.2 Required
Inlet Sample Location					
BTU	ASTM D3588	1	Grab	X	---
N_2, O_2, CO_2	SCAQMD 10.1	1	Grab	X	---
TRS	SCAQMD 307	1	Grab	X	---
Flow Rate	CEMS Fuel Meter	1	60 min	X	X
Exhaust Sample Location(Normal Load)					
Moisture	SCAQMD 4.1	1	60 min	X	---
Flow Rate	SCAQMD 1.1, 2.1, 3.1	1	60 min	X	X
N_2, O_2, CO_2	SCAQMD 100.1	1	60 min	X	X
NO_x	SCAQMD 100.1	1	60 min	X	X
CO	SCAQMD 100.1	1	60 min	X	X
TNMHC/CH_4	SCAQMD 25.1	1 Tray	60 min	X	X
PM	SCAQMD 5.1	1	60 min	X	---
Exhaust Sample Location(High and Low Load)					
Flow Rate	SCAQMD 1.1, 2.1, 3.1	1	15 min	X	---
N_2, O_2, CO_2	SCAQMD 100.1	1	15 min	X	---
NO_x	SCAQMD 100.1	1	15 min	X	---
CO	SCAQMD 100.1	1	15 min	X	---

There were no method deviations from the submitted source test protocol during the performance of the source test. PM sample time was increased from 60 to 72 minutes as sampling was done for three minutes at each traverse point.

List of Appendices

SCEC

Appendix A

SCAQMD Methods 100.1, 25.1/25.3, 1.1-4.1 and 5.1 Results

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		NORMAL LOAD	
SOURCE ID:	ENGINE #2	DATE:	12/18/14	TIME:	1630-1730
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.00	0.21	0.80	1.20	---
INITIAL SPAN BIAS	12.45	8.33	42.40	854.10	---
FINAL ZERO BIAS	0.00	0.18	0.60	0.90	---
FINAL SPAN BIAS	12.51	8.25	43.00	855.30	---
AVERAGE ZERO BIAS	0.00	0.20	0.70	1.05	---
AVERAGE SPAN BIAS	12.48	8.29	42.70	854.70	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	11.80	7.51	46.13	507.28	---
CORRECTED CONC.	**11.82**	**7.44**	**46.08**	**508.81**	---
PPMV @ 15 % O2			29.95	330.74	---
LB/HR BASED ON PITOT FLOW (DSCFM)	9,056		3.04	20.42	---

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		HIGH LOAD	
SOURCE ID:	ENGINE #2	DATE:	12/18/14	TIME:	1825-1840
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.00	0.18	0.60	0.90	---
INITIAL SPAN BIAS	12.51	8.25	43.00	855.30	---
FINAL ZERO BIAS	0.01	0.15	0.90	1.60	---
FINAL SPAN BIAS	12.36	8.36	43.00	854.90	---
AVERAGE ZERO BIAS	0.01	0.17	0.75	1.25	---
AVERAGE SPAN BIAS	12.44	8.31	43.00	855.10	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	12.02	7.30	48.03	533.18	---
CORRECTED CONC.	**12.08**	**7.22**	**47.67**	**534.51**	---
PPMV @ 15 % O2			31.90	357.71	---
LB/HR BASED ON PITOT FLOW (DSCFM)	10,156		3.53	24.06	---

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		LOW LOAD	
SOURCE ID:	ENGINE #2	DATE:	12/18/14	TIME:	1753-1808
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.01	0.18	0.60	0.80	---
INITIAL SPAN BIAS	12.51	8.25	43.00	855.30	---
FINAL ZERO BIAS	0.00	0.16	1.40	1.60	---
FINAL SPAN BIAS	12.36	8.36	43.00	854.90	---
AVERAGE ZERO BIAS	0.01	0.17	1.00	1.20	---
AVERAGE SPAN BIAS	12.44	8.31	43.00	855.10	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	11.56	7.69	46.00	493.15	---
CORRECTED CONC.	**11.62**	**7.61**	**45.64**	**494.31**	---
PPMV @ 15 % O2			29.01	314.21	---
LB/HR BASED ON PITOT FLOW (DSCFM)	7,400		2.46	16.21	---

OCSD PLANT 2 ENGINE 2 COMPLIANCE (NORM LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 1

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	16:30:19	11.86	7.46	46.5	498.9
2	12/18	16:31:19	11.82	7.50	46.0	494.9
3	12/18	16:32:19	11.84	7.48	46.2	498.9
4	12/18	16:33:19	11.83	7.49	46.8	490.9
5	12/18	16:34:19	11.91	7.42	46.0	496.5
6	12/18	16:35:19	11.92	7.42	44.1	511.3
7	12/18	16:36:19	11.89	7.44	44.4	505.7
8	12/18	16:37:19	11.89	7.43	45.8	496.1
9	12/18	16:38:19	11.91	7.42	45.8	499.3
10	12/18	16:39:19	11.83	7.50	47.1	498.9
11	12/18	16:40:19	11.79	7.53	47.1	496.5
12	12/18	16:41:19	11.80	7.52	46.3	505.7
13	12/18	16:42:19	11.81	7.51	46.1	510.1
14	12/18	16:43:19	11.82	7.50	46.5	502.9
15	12/18	16:44:19	11.78	7.52	45.8	510.1
16	12/18	16:45:19	11.78	7.53	46.2	506.5
17	12/18	16:46:19	11.83	7.49	46.8	505.7
18	12/18	16:47:19	11.81	7.51	46.3	508.5
19	12/18	16:48:19	11.80	7.51	46.8	505.7
20	12/18	16:49:19	11.76	7.54	46.3	510.5
21	12/18	16:50:19	11.80	7.52	46.9	508.5
22	12/18	16:51:19	11.83	7.48	47.2	507.3
23	12/18	16:52:19	11.78	7.52	46.4	506.5
24	12/18	16:53:19	11.80	7.50	46.1	509.3
25	12/18	16:54:19	11.78	7.52	46.1	505.3
26	12/18	16:55:19	11.77	7.53	48.4	497.7
27	12/18	16:56:19	11.82	7.49	46.8	508.9
28	12/18	16:57:19	11.87	7.45	45.3	518.6
29	12/18	16:58:19	11.87	7.45	45.2	522.2
30	12/18	16:59:19	11.80	7.50	44.6	521.4

31	12/18	17:00:19	11.78	7.52	45.9	512.1
32	12/18	17:01:19	11.76	7.54	45.8	515.4
33	12/18	17:02:19	11.81	7.51	45.9	511.3
34	12/18	17:03:19	11.78	7.53	45.9	512.1
35	12/18	17:04:19	11.80	7.51	45.4	514.1
36	12/18	17:05:19	11.79	7.53	45.9	506.5
37	12/18	17:06:19	11.77	7.54	46.5	502.5
38	12/18	17:07:19	11.80	7.51	47.1	501.7
39	12/18	17:08:19	11.80	7.53	45.4	510.1
40	12/18	17:09:19	11.82	7.52	45.7	511.3
41	12/18	17:10:19	11.78	7.54	44.8	515.0
42	12/18	17:11:19	11.77	7.55	46.0	509.7
43	12/18	17:12:19	11.83	7.52	46.9	509.7
44	12/18	17:13:19	11.81	7.53	45.5	512.9
45	12/18	17:14:19	11.76	7.55	45.4	512.1
46	12/18	17:15:19	11.76	7.57	46.0	511.3
47	12/18	17:16:19	11.77	7.55	46.8	505.7
48	12/18	17:17:19	11.78	7.55	46.8	503.3
49	12/18	17:18:19	11.77	7.55	46.9	504.5
50	12/18	17:19:19	11.78	7.54	45.8	513.3
51	12/18	17:20:19	11.83	7.50	45.3	512.1
52	12/18	17:21:19	11.76	7.56	46.2	504.9
53	12/18	17:22:19	11.75	7.57	47.2	500.1
54	12/18	17:23:19	11.78	7.54	47.2	508.1
55	12/18	17:24:19	11.81	7.54	46.5	508.1
56	12/18	17:25:19	11.75	7.55	45.5	512.5
57	12/18	17:26:19	11.75	7.57	46.0	505.3
58	12/18	17:27:19	11.78	7.54	47.0	505.3
59	12/18	17:28:19	11.77	7.54	45.8	508.5
60	12/18	17:29:19	11.80	7.52	45.4	513.3
61	12/18	17:30:19	11.78	7.54	45.3	512.1
AVERAGES			**11.80**	**7.51**	**46.13**	**507.28**

OCSD PLANT 2 ENGINE 2 COMPLIANCE (HIGH LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 2

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	18:25:19	11.99	7.34	47.5	537.8
2	12/18	18:26:19	12.00	7.33	47.9	535.4
3	12/18	18:27:19	12.02	7.31	48.1	534.2
4	12/18	18:28:19	12.01	7.31	48.3	530.2
5	12/18	18:29:19	12.01	7.33	48.1	531.4
6	12/18	18:30:19	12.04	7.29	48.0	530.6
7	12/18	18:31:19	12.03	7.30	48.1	530.2
8	12/18	18:32:19	12.03	7.30	48.2	534.2
9	12/18	18:33:19	12.06	7.28	47.4	541.0
10	12/18	18:34:19	12.04	7.28	47.9	535.4
11	12/18	18:35:19	11.99	7.32	48.0	529.4
12	12/18	18:36:19	12.02	7.29	49.1	527.8
13	12/18	18:37:19	12.01	7.29	48.4	528.2
14	12/18	18:38:19	12.03	7.28	48.5	533.8
15	12/18	18:39:19	12.04	7.29	47.4	534.2
16	12/18	18:40:19	12.02	7.30	47.5	537.0
AVERAGES			**12.02**	**7.30**	**48.03**	**533.18**

OCSD PLANT 2 ENGINE 2 COMPLIANCE (LOW LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 3

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	17:53:19	11.55	7.62	44.0	496.9
2	12/18	17:54:19	11.49	7.69	44.1	498.5
3	12/18	17:55:19	11.54	7.69	46.5	487.3
4	12/18	17:56:19	11.54	7.69	46.6	491.7
5	12/18	17:57:19	11.58	7.68	45.7	496.1
6	12/18	17:58:19	11.55	7.70	46.0	495.3
7	12/18	17:59:19	11.53	7.71	47.5	486.1
8	12/18	18:00:19	11.57	7.68	46.3	492.5
9	12/18	18:01:19	11.56	7.70	46.2	494.1
10	12/18	18:02:19	11.60	7.67	45.6	502.1
11	12/18	18:03:19	11.59	7.68	45.9	494.5
12	12/18	18:04:19	11.59	7.69	46.8	488.9
13	12/18	18:05:19	11.58	7.69	45.5	495.3
14	12/18	18:06:19	11.55	7.70	45.4	495.3
15	12/18	18:07:19	11.56	7.70	47.3	488.1
16	12/18	18:08:19	11.55	7.71	46.6	487.7
AVERAGES			**11.56**	**7.69**	**46.00**	**493.15**

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		NORMAL LOAD	
SOURCE ID:	ENGINE #4	DATE:	12/18/14	TIME:	1304-1404
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.02	0.25	0.00	1.20	---
INITIAL SPAN BIAS	12.37	8.29	41.90	856.50	---
FINAL ZERO BIAS	0.00	0.14	0.30	0.80	---
FINAL SPAN BIAS	12.61	8.10	41.80	862.90	---
AVERAGE ZERO BIAS	0.01	0.20	0.15	1.00	---
AVERAGE SPAN BIAS	12.49	8.20	41.85	859.70	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	12.32	7.10	42.68	572.73	---
CORRECTED CONC.	**12.33**	**7.11**	**43.45**	**571.27**	---
PPMV @ 15 % O2			29.93	393.48	---
LB/HR BASED ON PITOT FLOW (DSCFM)	9,425		2.98	23.86	---

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		HIGH LOAD	
SOURCE ID:	ENGINE #4	DATE:	12/18/14	TIME:	1528-1543
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.00	0.14	0.30	0.80	---
INITIAL SPAN BIAS	12.61	8.10	41.80	862.90	---
FINAL ZERO BIAS	0.01	0.21	0.80	1.20	---
FINAL SPAN BIAS	12.45	8.33	42.40	854.10	---
AVERAGE ZERO BIAS	0.01	0.18	0.55	1.00	---
AVERAGE SPAN BIAS	12.53	8.22	42.10	858.50	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	12.45	6.99	44.06	581.71	---
CORRECTED CONC.	**12.42**	**6.98**	**44.61**	**581.05**	---
PPMV @ 15 % O2			31.04	404.34	---
LB/HR BASED ON PITOT FLOW (DSCFM)	10,331		3.36	26.61	---

SUMMARY OF CONTINUOUS MONITORING DATA

FACILITY:	OCSD PLANT 2	DATA FOR SAMPLING RUN:		LOW LOAD	
SOURCE ID:	ENGINE #4	DATE:	12/18/14	TIME:	1457-1512
OPERATOR:	RN	PROJECT No.:	2061.1060		
PARAMETER UNITS	O_2 % VOL DRY	CO_2 % VOL DRY	NO_x PPMV,D	CO PPMV,D	SO_2 PPMV,D
INITIAL ZERO BIAS	0.00	0.14	0.30	0.80	---
INITIAL SPAN BIAS	12.61	8.10	41.80	862.90	---
FINAL ZERO BIAS	0.01	0.21	0.80	1.20	---
FINAL SPAN BIAS	12.45	8.33	42.40	854.10	---
AVERAGE ZERO BIAS	0.01	0.18	0.55	1.00	---
AVERAGE SPAN BIAS	12.53	8.22	42.10	858.50	---
BIAS GAS CONCENTRATION	12.50	8.23	42.60	858.00	---
FULL SCALE RANGE	25.00	20.00	100.00	2000.00	---
UNCORRECTED CONC.	12.06	7.29	42.28	552.63	---
CORRECTED CONC.	**12.03**	**7.29**	**42.79**	**551.95**	---
PPMV @ 15 % O2			28.47	367.25	---
LB/HR BASED ON PITOT FLOW (DSCFM)	7,733		2.41	18.92	---

OCSD PLANT 2 ENGINE 4 COMPLIANCE (NORM LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 1

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	13:04:19	12.28	7.08	39.3	563.5
2	12/18	13:05:19	12.31	7.06	40.2	567.1
3	12/18	13:06:19	12.30	7.08	40.1	571.9
4	12/18	13:07:19	12.28	7.10	41.5	562.7
5	12/18	13:08:19	12.28	7.10	41.8	560.7
6	12/18	13:09:19	12.35	7.07	41.5	567.5
7	12/18	13:10:19	12.33	7.08	40.3	576.8
8	12/18	13:11:19	12.33	7.09	39.9	574.8
9	12/18	13:12:19	12.32	7.10	41.0	572.7
10	12/18	13:13:19	12.28	7.14	44.3	563.5
11	12/18	13:14:19	12.28	7.14	47.0	558.7
12	12/18	13:15:19	12.29	7.12	45.6	565.5
13	12/18	13:16:19	12.26	7.15	44.4	567.5
14	12/18	13:17:19	12.27	7.14	44.9	569.5
15	12/18	13:18:19	12.22	7.18	43.9	568.7
16	12/18	13:19:19	12.25	7.16	44.8	560.7
17	12/18	13:20:19	12.27	7.14	44.2	565.5
18	12/18	13:21:19	12.28	7.14	44.0	565.9
19	12/18	13:22:19	12.28	7.14	42.9	571.1
20	12/18	13:23:19	12.27	7.14	43.2	568.7
21	12/18	13:24:19	12.29	7.13	43.7	570.7
22	12/18	13:25:19	12.29	7.14	44.6	571.5
23	12/18	13:26:19	12.39	7.10	42.6	584.0
24	12/18	13:27:19	12.38	7.08	41.9	584.0
25	12/18	13:28:19	12.42	7.05	41.8	583.2
26	12/18	13:29:19	12.41	7.04	40.6	595.2
27	12/18	13:30:19	12.38	7.08	41.7	582.8
28	12/18	13:31:19	12.39	7.08	40.9	585.2
29	12/18	13:32:19	12.42	7.06	40.2	593.2
30	12/18	13:33:19	12.42	7.04	40.4	596.4

31	12/18	13:34:19	12.41	7.03	39.9	600.8
32	12/18	13:35:19	12.34	7.09	40.7	586.8
33	12/18	13:36:19	12.31	7.10	42.6	572.3
34	12/18	13:37:19	12.33	7.09	42.6	572.3
35	12/18	13:38:19	12.32	7.10	43.0	569.9
36	12/18	13:39:19	12.31	7.10	42.0	576.8
37	12/18	13:40:19	12.32	7.10	42.6	571.9
38	12/18	13:41:19	12.34	7.09	41.9	576.0
39	12/18	13:42:19	12.31	7.12	43.1	573.6
40	12/18	13:43:19	12.32	7.10	42.7	574.8
41	12/18	13:44:19	12.34	7.09	42.2	577.2
42	12/18	13:45:19	12.37	7.08	43.2	569.9
43	12/18	13:46:19	12.35	7.08	43.3	570.7
44	12/18	13:47:19	12.37	7.08	42.3	578.8
45	12/18	13:48:19	12.41	7.05	42.8	577.6
46	12/18	13:49:19	12.34	7.09	44.0	572.3
47	12/18	13:50:19	12.30	7.12	45.3	554.3
48	12/18	13:51:19	12.28	7.14	45.6	553.9
49	12/18	13:52:19	12.30	7.12	45.0	554.7
50	12/18	13:53:19	12.31	7.12	43.2	572.7
51	12/18	13:54:19	12.27	7.16	43.2	569.5
52	12/18	13:55:19	12.32	7.12	44.4	561.9
53	12/18	13:56:19	12.35	7.10	43.9	568.7
54	12/18	13:57:19	12.35	7.08	43.0	572.3
55	12/18	13:58:19	12.35	7.09	42.8	574.8
56	12/18	13:59:19	12.34	7.10	42.0	573.6
57	12/18	14:00:19	12.31	7.12	42.3	574.0
58	12/18	14:01:19	12.33	7.10	42.7	571.5
59	12/18	14:02:19	12.32	7.11	43.4	572.3
60	12/18	14:03:19	12.31	7.12	42.6	576.8
61	12/18	14:04:19	12.34	7.10	42.0	574.8
AVERAGES			**12.32**	**7.10**	**42.68**	**572.73**

OCSD PLANT 2 ENGINE 4 COMPLIANCE (HIGH LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 2

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	15:28:19	12.25	7.16	45.9	551.1
2	12/18	15:29:19	12.33	7.09	45.1	564.3
3	12/18	15:30:19	12.38	7.05	44.0	573.6
4	12/18	15:31:19	12.41	7.03	42.8	581.6
5	12/18	15:32:19	12.42	7.02	42.2	580.8
6	12/18	15:33:19	12.39	7.03	42.4	583.2
7	12/18	15:34:19	12.42	7.02	43.4	578.4
8	12/18	15:35:19	12.42	7.01	42.6	582.0
9	12/18	15:36:19	12.44	7.00	42.6	590.0
10	12/18	15:37:19	12.46	6.98	43.9	583.2
11	12/18	15:38:19	12.39	7.04	42.5	591.2
12	12/18	15:39:19	12.41	7.02	48.1	555.9
13	12/18	15:40:19	12.63	6.84	49.6	570.3
14	12/18	15:41:19	12.62	6.86	44.0	602.8
15	12/18	15:42:19	12.63	6.84	43.2	608.9
16	12/18	15:43:19	12.62	6.86	42.7	610.1
AVERAGES			**12.45**	**6.99**	**44.06**	**581.71**

OCSD PLANT 2 ENGINE 4 COMPLIANCE (LOW LOAD)
December 18, 2014
RAW DAS DATA - RM RUN 3

DATA PT	DATE	TIME	O2 % VD	CO2 % VD	NOx PPMVD	CO PPMVD
1	12/18	14:57:19	12.12	7.19	41.0	558.3
2	12/18	14:58:19	12.13	7.21	41.1	557.1
3	12/18	14:59:19	12.09	7.25	40.2	559.9
4	12/18	15:00:19	12.08	7.26	40.9	559.9
5	12/18	15:01:19	12.00	7.35	41.9	553.1
6	12/18	15:02:19	12.03	7.32	42.7	547.5
7	12/18	15:03:19	12.02	7.33	43.0	546.7
8	12/18	15:04:19	12.09	7.28	42.8	549.9
9	12/18	15:05:19	12.07	7.29	42.5	555.9
10	12/18	15:06:19	12.08	7.29	43.0	551.1
11	12/18	15:07:19	12.10	7.28	41.9	558.7
12	12/18	15:08:19	12.08	7.30	42.2	552.7
13	12/18	15:09:19	12.03	7.33	42.9	550.3
14	12/18	15:10:19	12.01	7.34	42.9	551.1
15	12/18	15:11:19	12.01	7.36	44.1	544.3
16	12/18	15:12:19	12.05	7.32	43.4	545.5
AVERAGES			**12.06**	**7.29**	**42.28**	**552.63**

DAQ32 Historical Viewer R10.02.01 Software ID
Start Time 2014/12/18 11:31:37.5
End Time 2014/12/18 12:10:37.5
Sample Rate 60.0 Sec
Data Count 40
Group 01 - 01

Date	Time	Ch. msec	CH001 % O2	CH002 % CO2	CH003 ppmNOx	CH004 ppm CO	
12/18	11:31:37	0.5	0.01	0.29	0.01	7.6	
12/18	11:32:37	0.5	0.00	0.25	0.01	7.6	ZERO
12/18	11:33:37	0.5	0.00	0.24	-0.01	7.6	
12/18	11:34:37	0.5	0.00	0.23	-0.01	7.6	
12/18	11:35:37	0.5	0.00	0.22	-0.01	7.6	
12/18	11:36:37	0.5	0.00	0.21	-0.01	7.6	
12/18	11:37:37	0.5	0.00	0.21	-0.01	7.6	
12/18	11:38:37	0.5	17.34	16.60	16.64	1670.8	
12/18	11:39:37	0.5	17.27	16.59	18.36	1776.4	
12/18	11:40:37	0.5	17.27	16.57	18.34	1776.4	SPAN
12/18	11:41:37	0.5	17.28	16.54	18.26	997.6	
12/18	11:42:37	0.5	17.28	16.52	8.52	864.4	
12/18	11:43:37	0.5	17.29	16.49	8.46	861.6	
12/18	11:44:37	0.5	17.29	16.46	8.44	861.6	MID
12/18	11:45:37	0.5	17.31	16.42	8.46	863.6	
12/18	11:46:37	0.5	17.32	16.38	15.86	22.4	
12/18	11:47:37	0.5	17.34	16.35	16.22	7.6	
12/18	11:48:37	0.5	17.36	16.30	16.28	7.6	
12/18	11:49:37	0.5	17.37	16.27	16.34	7.6	NOX RESPONSE TO NO2 GAS
12/18	11:50:37	0.5	20.65	0.46	9.34	23.6	
12/18	11:51:37	0.5	20.64	0.45	0.21	7.6	
12/18	11:52:37	0.5	20.65	0.45	0.07	7.6	
12/18	11:53:37	0.5	20.64	0.45	0.05	7.6	
12/18	11:54:37	0.5	20.65	0.45	0.03	7.6	
12/18	11:55:37	0.5	20.65	0.45	0.03	7.6	
12/18	11:56:37	0.5	20.64	0.45	0.01	7.6	
12/18	11:57:37	0.5	20.64	0.45	0.01	7.6	NO RESPONSE TO NO2 GAS
12/18	11:58:37	0.5	20.64	0.44	0.01	7.6	
12/18	11:59:37	0.5	20.65	0.44	0.01	7.6	
12/18	12:00:37	0.5	20.65	0.44	0.01	7.6	
12/18	12:01:37	0.5	20.64	0.44	0.01	7.6	
12/18	12:02:37	0.5	20.64	0.44	0.01	7.6	
12/18	12:03:37	0.5	20.64	0.44	0.01	7.6	
12/18	12:04:37	0.5	20.64	0.44	-0.01	7.6	
12/18	12:05:37	0.5	20.64	0.44	-0.01	7.6	
12/18	12:06:37	0.5	20.63	0.44	-0.01	7.6	
12/18	12:07:37	0.5	20.64	0.44	-0.01	7.6	
12/18	12:08:37	0.5	20.65	0.42	-0.01	7.6	
12/18	12:09:37	0.5	20.66	0.42	-0.01	7.6	
12/18	12:10:37	0.5	20.66	0.41	-0.01	7.6	

DAQ32 Historical Viewer R10.02.01 Software ID
Start Time 2014/12/18 12:28:19.5

End Time		2014/12/18		19:12:19.5			
Sample Rate		60.0 Sec					
Data Count		405					
Group		01	-	01			
		Ch.	CH001	CH002	CH003	CH004	
Date	Time	msec	% O2	% CO2	ppmNOx	ppm CO	
12/18	12:28:19	0.5	0.00	0.00	0.0	0.8	
12/18	12:29:19	0.5	0.00	0.00	0.0	0.8	ZERO
12/18	12:30:19	0.5	20.92	17.01	16.6	1025.1	
12/18	12:31:19	0.5	20.93	16.56	86.4	1766.8	
12/18	12:32:19	0.5	20.93	16.55	86.6	1756.0	
12/18	12:33:19	0.5	12.52	8.34	86.7	1794.9	SPAN
12/18	12:34:19	0.5	12.45	8.33	64.1	879.0	
12/18	12:35:19	0.5	12.44	8.32	42.9	863.7	MID
12/18	12:36:19	0.5	12.45	8.32	42.8	864.1	
12/18	12:37:19	0.5	3.79	0.52	27.3	407.8	
12/18	12:38:19	0.5	12.42	8.10	1.5	2.0	
12/18	12:39:19	0.5	12.65	8.03	0.1	0.8	
12/18	12:40:19	0.5	12.51	8.18	0.1	0.4	
12/18	12:41:19	0.5	12.37	8.29	0.0	0.8	O2/CO2 BIAS
12/18	12:42:19	0.5	12.37	8.32	0.0	0.8	
12/18	12:43:19	0.5	3.25	2.43	0.0	2.0	
12/18	12:44:19	0.5	0.04	0.30	0.0	842.1	
12/18	12:45:19	0.5	0.02	0.25	0.0	856.5	CO BIAS
12/18	12:46:19	0.5	0.03	0.24	0.0	855.3	
12/18	12:47:19	0.5	0.01	0.20	0.0	804.7	
12/18	12:48:19	0.5	0.01	0.19	41.2	2.8	
12/18	12:49:19	0.5	0.01	0.18	41.9	1.2	NOX BIAS
12/18	12:50:19	0.5	0.01	0.17	41.9	0.8	
12/18	12:51:19	0.5	20.60	0.23	40.1	0.8	
12/18	12:52:19	0.5	20.67	0.23	0.3	0.8	
12/18	12:53:19	0.5	12.80	6.03	1.3	121.2	
12/18	12:54:19	0.5	13.07	6.26	30.0	508.1	
12/18	12:55:19	0.5	12.93	6.23	32.7	514.1	
12/18	12:56:19	0.5	13.18	6.33	33.4	499.3	
12/18	12:57:19	0.5	20.58	0.22	32.1	267.3	
12/18	12:58:19	0.5	20.59	0.20	0.1	0.8	
12/18	12:59:19	0.5	20.61	0.19	0.0	0.4	
12/18	13:00:19	0.5	20.63	0.19	0.0	0.8	
12/18	13:01:19	0.5	20.62	0.18	0.0	0.8	
12/18	13:02:19	0.5	20.52	0.22	0.0	0.8	
12/18	13:03:19	0.5	12.32	7.02	18.3	447.9	
12/18	13:04:19	0.5	12.28	7.08	39.3	563.5	START NORMAL LOAD P2E4
12/18	13:05:19	0.5	12.31	7.06	40.2	567.1	
12/18	13:06:19	0.5	12.30	7.08	40.1	571.9	
12/18	13:07:19	0.5	12.28	7.10	41.5	562.7	
12/18	13:08:19	0.5	12.28	7.10	41.8	560.7	
12/18	13:09:19	0.5	12.35	7.07	41.5	567.5	
12/18	13:10:19	0.5	12.33	7.08	40.3	576.8	
12/18	13:11:19	0.5	12.33	7.09	39.9	574.8	
12/18	13:12:19	0.5	12.32	7.10	41.0	572.7	
12/18	13:13:19	0.5	12.28	7.14	44.3	563.5	
12/18	13:14:19	0.5	12.28	7.14	47.0	558.7	
12/18	13:15:19	0.5	12.29	7.12	45.6	565.5	
12/18	13:16:19	0.5	12.26	7.15	44.4	567.5	

12/18	13:17:19	0.5	12.27	7.14	44.9	569.5	
12/18	13:18:19	0.5	12.22	7.18	43.9	568.7	
12/18	13:19:19	0.5	12.25	7.16	44.8	560.7	
12/18	13:20:19	0.5	12.27	7.14	44.2	565.5	
12/18	13:21:19	0.5	12.28	7.14	44.0	565.9	
12/18	13:22:19	0.5	12.28	7.14	42.9	571.1	
12/18	13:23:19	0.5	12.27	7.14	43.2	568.7	
12/18	13:24:19	0.5	12.29	7.13	43.7	570.7	
12/18	13:25:19	0.5	12.29	7.14	44.6	571.5	
12/18	13:26:19	0.5	12.39	7.10	42.6	584.0	
12/18	13:27:19	0.5	12.38	7.08	41.9	584.0	
12/18	13:28:19	0.5	12.42	7.05	41.8	583.2	
12/18	13:29:19	0.5	12.41	7.04	40.6	595.2	
12/18	13:30:19	0.5	12.38	7.08	41.7	582.8	
12/18	13:31:19	0.5	12.39	7.08	40.9	585.2	
12/18	13:32:19	0.5	12.42	7.06	40.2	593.2	
12/18	13:33:19	0.5	12.42	7.04	40.4	596.4	
12/18	13:34:19	0.5	12.41	7.03	39.9	600.8	
12/18	13:35:19	0.5	12.34	7.09	40.7	586.8	
12/18	13:36:19	0.5	12.31	7.10	42.6	572.3	
12/18	13:37:19	0.5	12.33	7.09	42.6	572.3	
12/18	13:38:19	0.5	12.32	7.10	43.0	569.9	
12/18	13:39:19	0.5	12.31	7.10	42.0	576.8	
12/18	13:40:19	0.5	12.32	7.10	42.6	571.9	
12/18	13:41:19	0.5	12.34	7.09	41.9	576.0	
12/18	13:42:19	0.5	12.31	7.12	43.1	573.6	
12/18	13:43:19	0.5	12.32	7.10	42.7	574.8	
12/18	13:44:19	0.5	12.34	7.09	42.2	577.2	
12/18	13:45:19	0.5	12.37	7.08	43.2	569.9	
12/18	13:46:19	0.5	12.35	7.08	43.3	570.7	
12/18	13:47:19	0.5	12.37	7.08	42.3	578.8	
12/18	13:48:19	0.5	12.41	7.05	42.8	577.6	
12/18	13:49:19	0.5	12.34	7.09	44.0	572.3	
12/18	13:50:19	0.5	12.30	7.12	45.3	554.3	
12/18	13:51:19	0.5	12.28	7.14	45.6	553.9	
12/18	13:52:19	0.5	12.30	7.12	45.0	554.7	
12/18	13:53:19	0.5	12.31	7.12	43.2	572.7	
12/18	13:54:19	0.5	12.27	7.16	43.2	569.5	
12/18	13:55:19	0.5	12.32	7.12	44.4	561.9	
12/18	13:56:19	0.5	12.35	7.10	43.9	568.7	
12/18	13:57:19	0.5	12.35	7.08	43.0	572.3	
12/18	13:58:19	0.5	12.35	7.09	42.8	574.8	
12/18	13:59:19	0.5	12.34	7.10	42.0	573.6	
12/18	14:00:19	0.5	12.31	7.12	42.3	574.0	
12/18	14:01:19	0.5	12.33	7.10	42.7	571.5	
12/18	14:02:19	0.5	12.32	7.11	43.4	572.3	
12/18	14:03:19	0.5	12.31	7.12	42.6	576.8	
12/18	14:04:19	0.5	12.34	7.10	42.0	574.8	
12/18	14:05:19	0.5	12.34	7.10	42.0	575.6	
12/18	14:06:19	0.5	12.56	7.99	40.7	296.6	
12/18	14:07:19	0.5	12.61	8.10	2.7	1.2	O2/CO2 BIAS
12/18	14:08:19	0.5	12.63	8.13	2.0	0.8	
12/18	14:09:19	0.5	10.08	6.55	1.7	2.8	
12/18	14:10:19	0.5	0.73	0.35	1.4	799.9	
12/18	14:11:19	0.5	0.70	0.28	1.1	828.4	