BK019

AIR POLLUTION SOURCE TESTING AT THE HIGH SIERRA LIMITED COGENERATION FACILITY, BAKERSFIELD, CALIFORNIA

Prepared for:

Destec Operating Company
34759 Lencioni Avenue
Bakersfield, California 93308

For Submittal to:

Kern County Air Pollution Control District
2700 M Street, Suite 275
Bakersfield, California 93301

Test Dates:

February 12, 1992

Report Date:

March 6, 1992

Prepared by:

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Project Manager
Engineering-Science, Inc.

3/17/92

SUMMARY OF SOURCE TEST RESULTS

Company : DESTEC HIGH SIERRA COGEN
Test Date : 12-Feb-92

Permit # 4162001 (73)
UNIT 1 / HRSG STACK

	gr/scf	gr/scf @12% CO2	ppm(v)	ppm(v) @15% O2	lb/hr	lb/MMBtu
AMMONIA						
Run 1			13.54			
2			12.71			
Mean:			13.13			
SULFATE						
Run 1						
2						
Mean:						
NOx as NO2, dry						
Run 1			3.20	2.67	2.50	0.0097
2			3.04	2.52	2.36	0.0092
Mean:			3.12	2.59	2.43	0.0095
CO						
Run 1			30.27	25.22	14.40	0.0560
2			30.45	25.26	14.41	0.0561
Mean:			30.36	25.24	14.40	0.0561
SO2						
Run 1						
2						
Mean:						
HC (non-methane)						
Run 1			0.00	0.00	0.00	0.0000
2			1.00	0.83	0.27	0.0011
3			1.00	0.83	0.27	0.0011
Mean:			0.67	0.55	0.18	0.0007

Scrubber Liquor Analysis :
Chlorides-

Specific Gravity-

Comments : ANNUAL 210.1 - PUC FAS F 25 MW TURBINE W H2O INJ, NH3/SCR, + CO CAT

For Regulatory Agency Use Only :

3/25/92

SUMMARY OF SOURCE TEST RESULTS

Company : DESTEC HIGH SIERRA COGEN
Test Date : 12-Feb-92

Permit # 4162002 (B)
UNIT 2 / HRSG STACK

	gr/scf	gr/scf @12% CO2	ppm(v)	ppm(v) @15% O2	lb/hr	lb/MMBtu
AMMONIA						
Run 1			10.72			
2			11.49			
Mean:			11.11			
SULFATE						
Run 1						
2						
Mean:						
NOx as NO2, dry						
Run 1			3.70	3.16	2.90	0.0115
2			3.01	2.54	2.32	0.0093
Mean:			3.35	2.85	2.61	0.0104
CO						
Run 1			32.94	28.14	15.74	0.0625
2			37.60	31.74	17.62	0.0705
Mean:			35.27	29.94	16.68	0.0665
SO2						
Run 1						
2						
Mean:						
HC (non-methane)						
Run 1			2.00	1.71	0.55	0.0022
2			2.00	1.69	0.54	0.0021
3			3.00	2.53	0.81	0.0032
Mean:			2.33	1.98	0.63	0.0025

Scrubber Liquor Analysis :
Chlorides- Specific Gravity-

Comments : ANNUAL 210.1 - PUC CASE 25 MW TURBINE W H_2O INJ, NH_3/SCR, + CO CAT

For Regulatory Agency Use Only :

3/24/92

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SECTION 1

INTRODUCTION

AIR POLLUTION SOURCE TESTING AT THE HIGH SIERRA LIMITED COGENERATION FACILITY, BAKERSFIELD, CALIFORNIA

SECTION 1

INTRODUCTION

On February 12, 1992 Engineering-Science, Inc.(ES), Bakersfield, California, conducted air pollution compliance tests on the exhaust stacks of the two gas turbines at the High Sierra Limited cogeneration facility. Testing was performed to demonstrate compliance with Kern County Air Pollution Control District (KCAPCD) Permit Nos. 4162001 and 4162002. This facility is owned and operated by Destec Operating Company and is located north of Bakersfield off of Oilfields Road.

The cogeneration facility is comprised of two natural gas fired, General Electric, Model LM-2500 gas turbines. Steam injection and a Selective Catalytic Reduction (SCR) system using ammonia injection are used to reduce NO_X emissions. A CO catalyst is used for Carbon Monoxide (CO) emission control. Both units were operated at 100% of the rated load during the source testing.

ES used continuous monitors to measure nitrogen oxides (NO_X), carbon monoxide (CO), and oxygen (O_2) concentration levels on each turbine. Two one hour test runs were conducted at the HRSG stack on each turbine. The testing was conducted in accordance CARB Method 1-100. In addition to continuous emissions monitoring, three grab samples of the exhaust gas were collected in Tedlar bags and analyzed for methane/non-methane hydrocarbons in accordance with EPA Method 18 as published in Title 40 CFR, Part 60, Appendix A, revised as of July 1, 1990. The hydrocarbon samples were analyzed by Zalco Laboratories, Inc., Bakersfield, California.

Ammonia slip was determined using wet impingement sampling trains configured in accordance with BAAQMD Method ST-1b. The ammonia samples were analyzed by

SECTION 2

DATA SUMMARIES

SECTION 2

DATA SUMMARIES

The test results for NO_X, CO, NH_3, and HC are presented in the Summary of Source Test Results at the front of this report. Additional data summaries are presented in the following tables of this section to supplement and clarify results. Section 3, Test Method Calculations presents emission calculations for NO_X, CO, NH_3, and HC along with the fuel calculations used for calculating these emissions.

TABLE 2–1
SUMMARY OF GAS COMPONENTS
DESTEC HIGH SIERRA COGEN
BAKERSFIELD, CALIFORNIA
FEBRUARY 11, 1992

	UNIT 1							UNIT 2						
RUN #	O2 %	NOx ppm	NOx lb/hr	NOx lb/MMBtu	CO ppm	CO lb/hr	CO lb/MMBtu	O2 %	NOx ppm	NOx lb/hr	NOx lb/MMBtu	CO ppm	CO lb/hr	CO lb/MMBtu
1	13.82	3.20	2.50	0.0097	30.27	14.40	0.0560	13.99	3.70	2.90	0.0115	32.94	15.74	0.0625
2	13.79	3.04	2.36	0.0092	30.45	14.41	0.0561	13.91	3.01	2.32	0.0093	37.60	17.62	0.0705
AVG	13.81	3.12	2.43	0.0095	30.36	14.40	0.0561	13.95	3.35	2.61	0.0104	35.27	16.68	0.0665

TABLE 2–2
SUMMARY OF GAS COMPONENTS
DESTEC HIGH SIERRA COGEN
BAKERSFIELD, CALIFORNIA
FEBRUARY 12, 1992

	UNIT 1					UNIT 2				
RUN #	O2 %	NH3 ppm	HC ppm	HC lb/hr	HC lb/MMBtu	O2 %	NH3 ppm	HC ppm	HC lb/hr	HC lb/MMBtu
1	13.82	13.54	0.00	0.00	0.0000	13.99	10.72	2.00	0.55	0.0022
2	13.79	12.71	1.00	0.27	0.0011	13.91	11.49	2.00	0.54	0.0021
3	13.79	–	1.00	0.27	0.0011	13.91	–	3.00	0.81	0.0032
AVG	13.81	13.13	0.67	0.18	0.0007	13.95	11.11	2.33	0.63	0.0025

EMISSION DATA SUMMARY
GAS COMPONENTS

DESTEC HIGH SIERRA COGEN
UNIT 1 / HRSG STACK

12-Feb-92

NITROGEN DIOXIDE

Run #	% O2	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	13.82	3.20	2.67	2.50	0.0097
2	13.79	3.04	2.52	2.36	0.0092
Average	13.80	3.12	2.59	2.43	0.0095

CARBON MONOXIDE

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	30.27	25.22	14.40	0.0560
2	30.45	25.26	14.41	0.0561
Average	30.36	25.24	14.40	0.0561

SULFUR DIOXIDE

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1				
2				
Average				

HYDROCARBON (NON-METHANE)

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	0.00	0.00	0.00	0.0000
2	1.00	0.83	0.27	0.0011
3	1.00	0.83	0.27	0.0011
Average	0.67	0.55	0.18	0.0007

EMISSION DATA SUMMARY
GAS COMPONENTS

DESTEC HIGH SIERRA COGEN
UNIT 2 / HRSG STACK

12-Feb-92

NITROGEN DIOXIDE

Run #	% O2	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	13.99	3.70	3.16	2.90	0.0115
2	13.91	3.01	2.54	2.32	0.0093
Average	13.94	3.35	2.85	2.61	0.0104

CARBON MONOXIDE

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	32.94	28.14	15.74	0.0625
2	37.60	31.74	17.62	0.0705
Average	35.27	29.94	16.68	0.0665

SULFUR DIOXIDE

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1				
2				
Average				

HYDROCARBON (NON-METHANE)

Run #	Corrected ppm (dry)	Corrected ppm (dry) @ 15% O2	lb/hr	lb/MMBtu
1	2.00	1.71	0.55	0.0022
2	2.00	1.69	0.54	0.0021
3	3.00	2.53	0.81	0.0032
Average	2.33	1.98	0.63	0.0025

SECTION 3

TEST METHOD CALCULATIONS

NOMENCLATURE

A_s	= Cross-sectional area of stack (ft^2)
A_n	= Cross-sectional area of nozzle (ft^2)
B_{ws}	= Water vapor in the gas stream, proportion by volume (dimensionless)
C_p	= Pitot tube coefficient (dimensionless)
dH	= Average pressure differential across the orifice meter (inches of water)
Md	= Dry molecular weight of stack gas (lb/lb-mole)
Ms	= Wet molecular weight of stack gas (lb/lb-mole)
N	= Normality of titrant (milliequivalents/ml)
dP	= Velocity pressure of stack gas (inches of water)
Pb	= Barometric pressure at sampling site (in. Hg)
Ps	= Absolute stack gas pressure (in. Hg)
Pstd	= Standard absolute pressure (29.92 in. Hg)
Qs(std)	= Dry volumetric stack gas flow rate, standard conditions (dscfm)
Ts	= Stack temperature (^oF)
Vm	= Dry gas volume as measured by dry gas meter (dcf)
Vm(std)	= Dry gas volume as measured by dry gas meter, corrected to standard conditions (dscf)
Vw(std)	= Volume of water vapor in the gas stream, corrected to standard conditions (scf)
Vlc	= Volume of water vapor condensed in impingers and silica gel (ml)
T(std)	= Standard temperature (^oF)
Tm	= Meter temperature (^oF)
SQ.RT.dP	= Square root of velocity pressure (dimensionless)
y	= Dry gas meter calibration factor (dimensionless)
Pstatic	= Static pressure of stack (in. H_2O)
Pstack	= Static pressure of stack (in. Hg)
I	= Isokinetic sample rate (percent)
vs	= Average velocity of the stack gas (ft/sec)
Qs	= Actual stack gas flow rate at stack conditions (ft^3/min)
Θ	= Total sampling time (min)
% O_2	= Percent oxygen by volume (dry basis)
% CO_2	= Percent carbon dioxide by volume (dry basis)
% CO	= Percent carbon monoxide by volume (dry basis)
% N_2	= Percent nitrogen by volume (dry basis)
Zcf	= Zero drift correction factor
Scf	= Span drift correction factor
Cz	= Zero correction concentration
MW	= Molecular weight (lb/lb-mole)
ppm	= Parts per million by volume

lb/MMBtu	= Emission concentration, pounds per million British thermal units
dscf/MMBtu	= Fuel factor, dry standard cubic feet per million British thermal units
gr/scf	= Emission concentration, grains per standard cubic foot
lb/hr	= Emission rate, pounds per hour
FHW	= Front Half Wash of sampling train
MF	= Mass Filter of sampling train
BHW	= Back Half Wash of Sampling train
gr/dscf	= Emission concentration, grains per dry standard cubic foot
ng	= Mass unit, nanograms
mg	= Mass unit, milligrams
g	= Mass unit, grams
ml	= Unit of volume, milliliters
L	= Unit of volume, liters
ul	= Unit of volume, microliters
H_2SO_4	= Chemical formula, sulfuric acid
$BaCl_2$	= Chemical formula, barium chloride
NaOH	= Chemical formula, sodium hydroxide
H_2S	= Chemical formula, hydrogen sulfide
FHS	= Front Half Sulfate of sampling train
BHS	= Back Half Sulfate of sampling train
F-Factor	= Fuel factor, volume of generated gases per unit of heat content (dscf/MMBtu)
^oF	= Degrees Fahrenheit
^oR	= Degrees Rankine
^oC	= Degrees Celsius
98.076	= Molecular weight of sulfuric acid
64.062	= Molecular weight of sulfur dioxide
46.006	= Molecular weight of nitrogen dioxide
28.010	= Molecular weight of carbon monoxide
60	= Conversion factor, minutes per hour
460	= Conversion factor, ^oF to ^oR
15.432	= Conversion factor, grains per gram
0.000143	= Converson factor, pounds per grain
32/98.076	= Conversion factor, equivalent weight of SO_2 to MW of H_2SO_4
1.60982	= Ideal Gas Law (lb-mole x dscf/ dscf/ ^oR x mg)
0.00000137	= Ideal Gas Law (lb-mole x $^oR/ft^3$)
0.280	= Molecular weight of N_2 or CO, divided by 100
0.320	= Molecular weight of O_2, divided by 100
0.440	= Molecular weight of CO_2, divided by 100
18.0	= Molecular weight of H_2O
32.064	= Equivalent weight of SO_2
85.49	= Pitot tube constant, ft/sec x [(lb/lb-mole) x (in.Hg)/((^oR) x (in.H_2O))] $^{0.5}$
8.223E-05	= Ideal gas constant (1.37E-06 lb-mole $^oR/ft^3$) x (60 min/hr)

EMISSION CALCULATIONS
GAS COMPONENTS

DESTEC HIGH SIERRA COGEN
UNIT 1 / HRSG STACK

DATA :

	Run 1	Run 2	Run 3	Average
Date	12-Feb-92	12-Feb-92	12-Feb-92	
Oxygen (%)	13.82	13.79	13.79	13.80
Qs(std), dscfm	107,435	106,796	106,796	107,009
F-Factor, dscf/MMBtu	8,493.44	8,493.44	8,493.44	8,493.44
NOx, ppm	3.20	3.04		3.12
CO, ppm	30.27	30.45		30.36
SO2, ppm				
HC (non-methane), ppm	0.00	1.00	1.00	0.67

CALCULATIONS :

NOx, lb/hr	2.50	2.36		2.43
NOx, ppm @ 15 %O2	2.67	2.52		2.59
NOx, lb/MMBtu	0.0097	0.0092		0.0095
CO, lb/hr	14.40	14.41		14.40
CO, ppm @ 15 %O2	25.22	25.26		25.24
CO, lb/MMBtu	0.0560	0.0561		0.0561
SO2, lb/hr				
SO2, ppm @ 15 %O2				
SO2, lb/MMBtu				
HC, lb/hr	0.00	0.27	0.27	0.18
HC, ppm @ 15 %O2	0.00	0.83	0.83	0.55
HC, lb/MMBtu	0.0000	0.0011	0.0011	0.0007

EQUATIONS :

lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

ppm @ 15 %O2 = ppm measured x [(20.9 - 15 %O2) / (20.9 - %O2 measured)]

lb/MMBtu = F-Factor x MW x [(1.3711E-6 Lb-Mole °R / ft3) / (T(std) + 460)] x [20.9 / (20.9 - O2%)] x ppm

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CONSTANTS :

Standard Temp. T(std): 60 °F
Oxygen Correction : 15 % O2

NOx, MW = 46.005 lb/lb-mole
CO, MW = 28.010 lb/lb-mole
SO2, MW = 64.058 lb/lb-mole
HC, MW = 16.043 lb/lb-mole

EMISSION CALCULATIONS
GAS COMPONENTS

DESTEC HIGH SIERRA COGEN
UNIT 2 / HRSG STACK

DATA :

	Run 1	Run 2	Run 3	Average
Date	12-Feb-92	12-Feb-92	12-Feb-92	
Oxygen (%)	13.99	13.91	13.91	13.94
Qs(std), dscfm	107,877	105,783	105,783	106,481
F-Factor, dscf/MMBtu	8,493.44	8,493.44	8,493.44	8,493.44
NOx, ppm	3.70	3.01		3.35
CO, ppm	32.94	37.60		35.27
SO2, ppm				
HC (non-methane), ppm	2.00	2.00	3.00	2.33

CALCULATIONS :

NOx, lb/hr	2.90	2.32		2.61
NOx, ppm @ 15 %O2	3.16	2.54		2.85
NOx, lb/MMBtu	0.0115	0.0093		0.0104
CO, lb/hr	15.74	17.62		16.68
CO, ppm @ 15 %O2	28.14	31.74		29.94
CO, lb/MMBtu	0.0625	0.0705		0.0665
SO2, lb/hr				
SO2, ppm @ 15 %O2				
SO2, lb/MMBtu				
HC, lb/hr	0.55	0.54	0.81	0.63
HC, ppm @ 15 %O2	1.71	1.69	2.53	1.98
HC, lb/MMBtu	0.0022	0.0021	0.0032	0.0025

EQUATIONS :

lb/hr = (0.00000137 Lb-Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

ppm @ 15 %O2 = ppm measured x [(20.9 - 15 %O2) / (20.9 - %O2 measured)]

lb/MMBtu = F-Factor x MW x [(1.3711E-6 Lb-Mole °R / ft3) / (T(std) + 460)] x [20.9 / (20.9 - O2%)] x ppm

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CONSTANTS :

Standard Temp. T(std): 60 °F
Oxygen Correction : 15 % O2

NOx, MW = 46.005 lb/lb-mole
CO, MW = 28.010 lb/lb-mole
SO2, MW = 64.058 lb/lb-mole
HC, MW = 16.043 lb/lb-mole

AMMONIA CALCULATIONS

Company Name	:	DESTEC HIGH SIERRA COGEN	O2 Correction	:	15 %
Source	:	UNIT 1 / HRSG STACK	Standard Temp.	:	60 °F
Date	:	12–Feb–92	Standard Press.	:	29.92 "Hg

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Tm, °F	57.83	63.33				
Y, meter correction factor	1.0030	1.0030				
Vm, ft3	19.005	18.853				
Pb, in.Hg.	28.74	28.74				
dH, in.H2O	1.50	1.50				
O2, percent	13.82	13.79				
Qs(std), dscfm	107435	106796				
Vm(std), dscf	18.458	18.117				
mg AMMONIA	5.10	4.70				
ppm AMMONIA	13.542	12.714				
ppm AMMONIA @ 15.0 %O2	11.285	10.551				

EQUATIONS :

Vm(std), dscf = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm +460)

ppm AMMONIA = 1.60982 x (Temp.Std. + 460) x (mg AMMONIA) / (MW x Vm,std)
Where : 1.60982 = Ideal Gas Law Factor
Where MW of AMMONIA = 17.08 Lb/Lb–Mole

ppm AMMONIA @ corrected O2% = ppm AMMONIA x [20.9 – O2 correction /
(20.9 – %O2 measured)

lb/hr = (0.00000137 Lb–Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

AMMONIA CALCULATIONS

Company Name	:	DESTEC HIGH SIERRA COGEN	O2 Correction	:	15 %
Source	:	UNIT 2 / HRSG STACK	Standard Temp.	:	60 °F
Date	:	12–Feb–92	Standard Press.	:	29.92 "Hg

	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6
Tm, °F	63.50	65.33				
Y, meter correction factor	1.0030	1.0030				
Vm, ft3	19.029	19.142				
Pb, in.Hg.	28.75	28.76				
dH, in.H2O	1.50	1.50				
O2, percent	13.99	13.91				
Qs(std), dscfm	107877	105783				
Vm(std), dscf	18.287	18.338				
mg AMMONIA	4.00	4.30				
ppm AMMONIA	10.720	11.492				
ppm AMMONIA @ 15.0 %O2	9.153	9.700				

EQUATIONS :

Vm(std), dscf = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm +460)

ppm AMMONIA = 1.60982 x (Temp.Std. + 460) x (mg AMMONIA) / (MW x Vm,std)
Where : 1.60982 = Ideal Gas Law Factor
Where MW of AMMONIA = 17.08 Lb/Lb–Mole

ppm AMMONIA @ corrected O2% = ppm AMMONIA x [20.9 – O2 correction /
(20.9 – %O2 measured)

lb/hr = (0.00000137 Lb–Mole °R / ft3) x 60 min/hr x Qs(std) x MW x ppm / [T(std) + 460]

FUEL BASED CALCULATIONS

DESTEC HIGH SIERRA COGEN
UNIT 1 / HRSG STACK

12-Feb-92

FUEL ANALYSIS DATA

Run #	Fuel Value (%), Moisture & Ash Free: Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur	GCV BTU/lb	ft3/lb	lb/gal
1	72.80	23.85	0.91	2.43	0.00	22,867		
2	72.80	23.85	0.91	2.43	0.00	22,867		

CALCULATIONS

Run #	Stack Gas Oxygen %	Fuel Gas Flowrate lb/hr	Fuel Gas Flowrate ft3/hr	Fuel Oil Flowrate lb/hr	Fuel Oil Flowrate gal/hr	Solid Fuel lb/hr	Heat Input MMBTU/hr	F-Factor dscf/MMBTU	Qs(std) dscfm
1	13.82	11,243					257.100	8,493.44	107,435
2	13.79	11,224					256.654	8,493.44	106,796

Heat Input, MMBTU/hr = (lb/hr fuel gas) x BTU/lb x MM/1E+06

= (ft3/hr fuel gas) x BTU/lb / (ft3/lb fuel gas) x MM/1E+06

= (lb/hr fuel oil) x BTU/lb x MM/1E+06

= (gal/hr fuel oil) x lb/gal x BTU/lb x MM/1E+06

= (lb/hr solid fuel) x BTU/lb x MM/1E+06

F-Factor, dscf/MMBTU = 1E+06 [3.64 x (% H) + 1.53 x (% C) + 0.57 x (% S) + 0.14 x (% N) - 0.46 x (% O2)] / (BTU/lb) x [(Tstd + 460) / 528]

Qs(std), dscfm = MMBTU/hr x [F-Factor x (20.9 / (20.9 - %O2)) x (hr / 60 min)]

GCV = Gross Calorific Value of fuel

Standard Temperature = 60 °F

FUEL BASED CALCULATIONS

DESTEC HIGH SIERRA COGEN
UNIT 2 / HRSG STACK

12-Feb-92

FUEL ANALYSIS DATA

Run #	Fuel Value (%), Moisture & Ash Free: Carbon	Hydrogen	Nitrogen	Oxygen	Sulfur	GCV BTU/lb	ft3/lb	lb/gal
1	72.80	23.85	0.91	2.43	0.00	22,867		
2	72.80	23.85	0.91	2.43	0.00	22,867		

CALCULATIONS

Run #	Stack Gas Oxygen %	Fuel Gas Flowrate lb/hr	Fuel Gas Flowrate ft3/hr	Fuel Oil Flowrate lb/hr	Fuel Oil Flowrate gal/hr	Solid Fuel lb/hr	Heat Input MMBTU/hr	F-Factor dscf/MMBTU	Qs(std) dscfm
1	13.99	11,018					251.959	8,493.44	107,877
2	13.91	10,930					249.927	8,493.44	105,783

Heat Input, MMBTU/hr = (lb/hr fuel gas) x BTU/lb x MM/1E+06

= (ft3/hr fuel gas) x BTU/lb / (ft3/lb fuel gas) x MM/1E+06

= (lb/hr fuel oil) x BTU/lb x MM/1E+06

= (gal/hr fuel oil) x lb/gal x BTU/lb x MM/1E+06

= (lb/hr solid fuel) x BTU/lb x MM/1E+06

F-Factor, dscf/MMBTU = 1E+06 [3.64 x (% H) + 1.53 x (% C) + 0.57 x (% S) + 0.14 x (% N) - 0.46 x (% O2)] / (BTU/lb) x [(Tstd + 460) / 528]

Qs(std), dscfm = MMBTU/hr x [F-Factor x (20.9 / (20.9 - %O2)) x (hr / 60 min)]

GCV = Gross Calorific Value of fuel

Standard Temperature = 60 °F

SECTION 4

CONTINUOUS TEST METHODS

GAS ANALYZER DATA

DESTEC HIGH SIERRA COGEN
UNIT 1 / HRSG STACK

Date : 12-Feb-92
Run No. : 1

	O2, %		CO2, %		NOx, ppm		CO, ppm		SO2, ppm	
	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading
Point #										
1	13.80	13.81	4.10	4.09	3.20	3.20	30.50	30.53		
2	13.80	13.82	4.15	4.13	3.15	3.14	30.50	30.58		
3	13.80	13.83	4.17	4.13	3.20	3.18	30.00	30.14		
4	13.80	13.84	4.20	4.14	3.25	3.22	29.80	29.99		
5	13.75	13.80	4.20	4.13	3.30	3.26	29.80	30.05		
6	13.75	13.81	4.20	4.11	3.25	3.20	30.00	30.31		
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30										
MEAN :		13.82		4.12		3.20		30.27		

Zero Check	-0.05	0.10	0.12	0.00
Span Check	14.00	9.12	5.64	44.50
Initial Span Value	14.07	9.02	5.64	45.00
Drift, Percent	-0.1	-0.0	-2.1	-1.1
Zero Drift, Zcf	-0.00833	0.01667	0.02000	0.00000
Span Drift, Scf	-0.00024	-0.00000	-0.00355	-0.00185

Drift, Percent = [(Span Check – Zero Check) – Calib. Gas] / Calib. Gas x 100

Zero Drift Correction Factor, Zcf = Zero Check / # of Readings

Span Drift Correction Factor, Scf = (% Drift / 100) / # of Readings

Cz, Zero Corr. Concentration = measured value – [Zcf x (Point # – 0.5)]

Drift Corrected Reading = Cz / [1 + (Scf x (Point # – 0.5))]

GAS ANALYZER DATA

DESTEC HIGH SIERRA COGEN
UNIT 1 / HRSG STACK

Date : 12-Feb-92
Run No. : 2

	O2, %		CO2, %		NOx, ppm		CO, ppm		SO2, ppm	
	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading
Point #										
1	13.83	13.82	4.10	4.10	2.97	2.98	31.00	30.97		
2	13.83	13.81	4.10	4.10	2.97	3.00	30.70	30.62		
3	13.83	13.80	4.10	4.10	3.00	3.05	30.50	30.36		
4	13.83	13.78	4.10	4.10	3.05	3.13	30.30	30.11		
5	13.83	13.77	4.10	4.10	2.95	3.05	30.50	30.25		
6	13.83	13.75	4.10	4.10	2.92	3.04	30.70	30.40		
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30										
MEAN :		13.79		4.10		3.04		30.45		

Zero Check	0.25	0.00	−0.12	1.00
Span Check	14.15	9.02	5.50	45.00
Initial Span Value	14.07	9.02	5.64	45.00
Drift, Percent	−1.2	0.0	−0.4	−2.2
Zero Drift, Zcf	0.04167	0.00000	−0.02000	0.16667
Span Drift, Scf	−0.00201	0.00000	−0.00059	−0.00370

Drift, Percent = [(Span Check − Zero Check) − Calib. Gas] / Calib. Gas x 100

Zero Drift Correction Factor, Zcf = Zero Check / # of Readings

Span Drift Correction Factor, Scf = (% Drift / 100) / # of Readings

Cz, Zero Corr. Concentration = measured value − [Zcf x (Point # − 0.5)]

Drift Corrected Reading = Cz / [1 + (Scf x (Point # − 0.5))]

GAS ANALYZER DATA

DESTEC HIGH SIERRA COGEN
UNIT 2 / HRSG STACK

Date : 12-Feb-92
Run No. : 1

	O2, %		CO2, %		NOx, ppm		CO, ppm		SO2, ppm	
	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading
Point #										
1	13.93	13.95	4.06	4.06	3.60	3.59	35.00	35.07		
2	13.93	13.98	4.06	4.06	3.65	3.62	34.30	34.51		
3	13.93	14.01	4.06	4.06	3.75	3.70	33.00	33.34		
4	13.90	14.01	4.06	4.06	3.80	3.73	32.50	32.97		
5	13.85	13.99	4.06	4.06	3.85	3.76	30.30	30.87		
6	13.85	14.02	4.06	4.06	3.90	3.79	30.20	30.89		
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MEAN :		13.99		4.06		3.70		32.94		

Zero Check	0.00	0.00	0.29	0.00
Span Check	13.88	9.02	5.67	43.90
Initial Span Value	14.07	9.02	5.64	45.00
Drift, Percent	−1.4	0.0	−4.6	−2.4
Zero Drift, Zcf	0.00000	0.00000	0.04833	0.00000
Span Drift, Scf	−0.00225	0.00000	−0.00768	−0.00407

Drift, Percent = [(Span Check − Zero Check) − Calib. Gas] / Calib. Gas x 100

Zero Drift Correction Factor, Zcf = Zero Check / # of Readings

Span Drift Correction Factor, Scf = (% Drift / 100) / # of Readings

Cz, Zero Corr. Concentration = measured value − [Zcf x (Point # − 0.5)]

Drift Corrected Reading = Cz / [1 + (Scf x (Point # − 0.5))]

GAS ANALYZER DATA

DESTEC HIGH SIERRA COGEN
UNIT 2 / HRSG STACK

Date : 12-Feb-92
Run No. : 2

	O2, %		CO2, %		NOx, ppm		CO, ppm		SO2, ppm	
	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading	Instrument Reading	Drift Corrected Reading
Point #										
1	13.93	13.93	4.06	4.06	2.85	2.85	39.20	39.34		
2	13.93	13.93	4.06	4.06	2.90	2.89	38.50	38.91		
3	13.85	13.85	4.06	4.06	2.97	2.96	44.50	45.34		
4	13.90	13.90	4.06	4.06	3.20	3.19	32.50	33.26		
5	13.93	13.93	4.02	4.02	3.05	3.03	33.50	34.53		
6	13.93	13.93	4.02	4.02	3.15	3.13	33.00	34.24		
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MEAN :		13.91		4.05		3.01		37.60		

Zero Check	0.25	0.00	−0.02	0.70
Span Check	14.07	9.02	5.70	43.00
Initial Span Value	14.07	9.02	5.64	45.00
Drift, Percent	−1.8	0.0	1.4	−6.0
Zero Drift, Zcf	0.04167	0.00000	−0.00333	0.11667
Span Drift, Scf	−0.00296	0.00000	0.00236	−0.01000

Drift, Percent = [(Span Check − Zero Check) − Calib. Gas] / Calib. Gas x 100

Zero Drift Correction Factor, Zcf = Zero Check / # of Readings

Span Drift Correction Factor, Scf = (% Drift / 100) / # of Readings

Cz, Zero Corr. Concentration = measured value − [Zcf x (Point # − 0.5)]

Drift Corrected Reading = Cz / [1 + (Scf x (Point # − 0.5))]

SECTION 5

LAB ANALYSIS DATA

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

REPORT TO: Destec NH3 DATE: _____

ES NO.: _____

AMMONIA DATA SHEET

STANDARD	
AMMONIA (M)	REL. Mv.
0	+036.3
1X10-5	+003.4
1X10-4	-051.4
1X10-3	-110.5
1X10-2	-169.3

ES.NO.	REL.Mv.	AMMONIA(M)	mg./L.	VOL.(L.)	mg./SAMPLE
920240	-088.7	4.1×10^{-4}	6.97	0.445	3.1
920245	-101.3	6.8×10^{-4}	11.6	0.405	4.7
920248	-097.7	6.0×10^{-4}	10.2	0.395	4.0
920253	-093.1	5.1×10^{-4}	8.67	0.445	3.9
920241	-084.7	3.7×10^{-4}	6.29	0.445	2.8
920242	-092.8	4.6×10^{-4}	7.82	0.425	3.3
920243	-094.9	5.4×10^{-4}	9.19	0.400	3.7
920244	-093.7	5.1×10^{-4}	8.67	0.415	3.60

Analyst _____
Page _____ of _____

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

REPORT TO: DESTEC NH3 DATE: _____

ES NO.: _____

AMMONIA DATA SHEET

STANDARD	
AMMONIA (M)	REL. Mv.
0	
$1X10^{-5}$	
$1X10^{-4}$	
$1X10^{-3}$	
$1X10^{-2}$	

ES.NO.	REL.Mv.	AMMONIA(M)	mg./L.	VOL.(L.)	mg./SAMPLE
920245	-100.0	6.8×10^{-4}	11.56	0.405	4.7
920246	-103.0	7.5×10^{-4}	12.75	0.400	5.1
920248	-095.4	5.4×10^{-4}	9.18	0.395	3.6
920250	-100.7	6.8×10^{-4}	11.56	0.325	3.8
920251	-089.1	4.5×10^{-4}	7.65	0.335	2.6
920252	-086.6	3.8×10^{-4}	6.46	0.415	2.7
920247	-097.0	6.0×10^{-4}	10.2	0.425	4.3
920253	-091.5	4.5×10^{-4}	7.65	0.445	3.4

Analyst _____
Page ___ of ___

ES
ENGINEERING-SCIENCE, INC.

6060 IRWINDALE AVENUE, SUITE J
P.O.BOX 2007
IRWINDALE, CA 91706
Tel: (818) 969-5758 Fax: (818) 969-4692

NH_3 Spike

1) 50 mL 920244
50 mL $1X10^{-2}$ M Standard soln.

2) 50 mL 920252
50 mL $1X10^{-2}$ M Standard soln.

Molarity = [(moles A)+(moles B)]./ volume L

1) Molarity Spike = $(0.05L)(5.1 \times 10^{-4}\ M/L) = 2.6X10^{-6}$ m
$(0.05L)(1 \times 10^{-2}\ M/L) = 5 \times 10^{-4}$ m

$[(2.6 \times 10^{-6}m) + (5 \times 10^{-4}m)]/(0.1\ L)$
$= 5.0 \times 10^{-3}$ M

Mv = - 152.5

Molarity from Graph = 5.0×10^{-3} M

2) Molarity Spike = $(0.05L)(3.8 \times 10^{-4}M/L) = 1.9 \times 10^{-5}$ m
$(0.05L)(1 \times 10^{-2}\ M/L) = 5 \times 10^{-4}$ m

$[(1.9 \times 10^{-5}m) + (5 \times 10^{-4}m)]/(0.1\ L)$
$= 5.2 \times 10^{-3}$ M

Mv = - 154.5

Molarity from Graph = 5.2×10^{-3} M

ZALCO LABORATORIES, INC.

Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_001
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202014 Run #1
Unit #1 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components		PPM, Volume
Methane	(C1)	35.6
Ethane	(C2)	.2
Propane	(C3)	<0.1
Butanes	(I+N C4)	<0.1
Pentanes	(I+N C5)	<0.1
Hexanes+	(C6+)	<0.1
Total Hydrocarbons		35.8
Total Non-Methane Hydrocarbons		0
Total Non-(C1+C2) Hydrocarbons		0
Total Non-Methane Hydrocarbons as C1		0

Kathe Zimmerman
Analyst

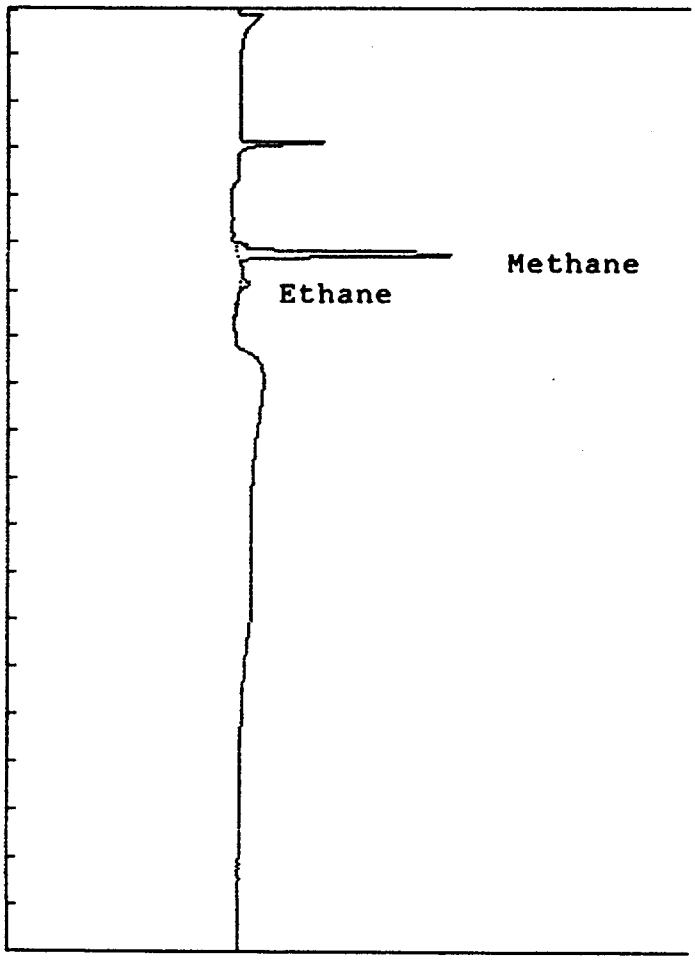
Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308

(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202014 Run #1
0141, 030488_001, Feb 13, 1992, Unit #1 Gas Turbine 2/12/92
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_001.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 9:12:25
Run Status : RunStatusOK
EndOffBaseline



RETENTION TIME	AREA	FACTOR	ppmvol
5.200	5814	6.12552E-03	35.6107
5.817	53	4.06129E-03	.2158
		Total Hydrocarbons	35.8264

Report Time: Tue Feb 18, 1992 8:46:03 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_002
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202015 Run #2
Unit #1 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume
Methane (C1)	35.9
Ethane (C2)	.5
Propane (C3)	<0.1
Butanes (I+N C4)	<0.1
Pentanes (I+N C5)	<0.1
Hexanes+ (C6+)	<0.1
Total Hydrocarbons	36.4
Total Non-Methane Hydrocarbons	1
Total Non-(C1+C2) Hydrocarbons	0
Total Non-Methane Hydrocarbons as C1	1

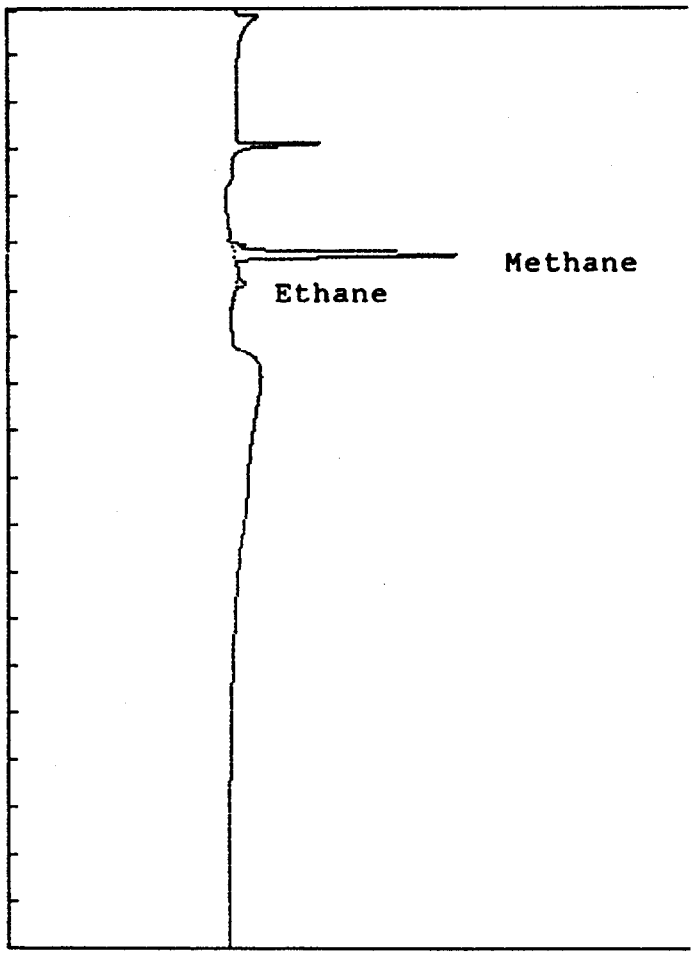
Katie Zimmerman
Analyst

Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202015 Run #2
0141, 030488_002, Feb 13, 1992, Unit #1 Gas Turbine 2/12/92
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_002.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 9:36:49
Run Status : RunStatusOK
EndOffBaseline



RETENTION TIME	AREA	FACTOR	ppmvol
5.200	5861	6.12552E-03	35.9016
5.820	128	4.06129E-03	.5209
		Total Hydrocarbons	36.4225

Report Time: Tue Feb 18, 1992 8:48:54 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_003
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202016 Run #3
Unit #1 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume
Methane (C1)	34.7
Ethane (C2)	.4
Propane (C3)	<0.1
Butanes (I+N C4)	<0.1
Pentanes (I+N C5)	<0.1
Hexanes+ (C6+)	<0.1
Total Hydrocarbons	35.2
Total Non-Methane Hydrocarbons	0
Total Non-(C1+C2) Hydrocarbons	0
Total Non-Methane Hydrocarbons as C1	1

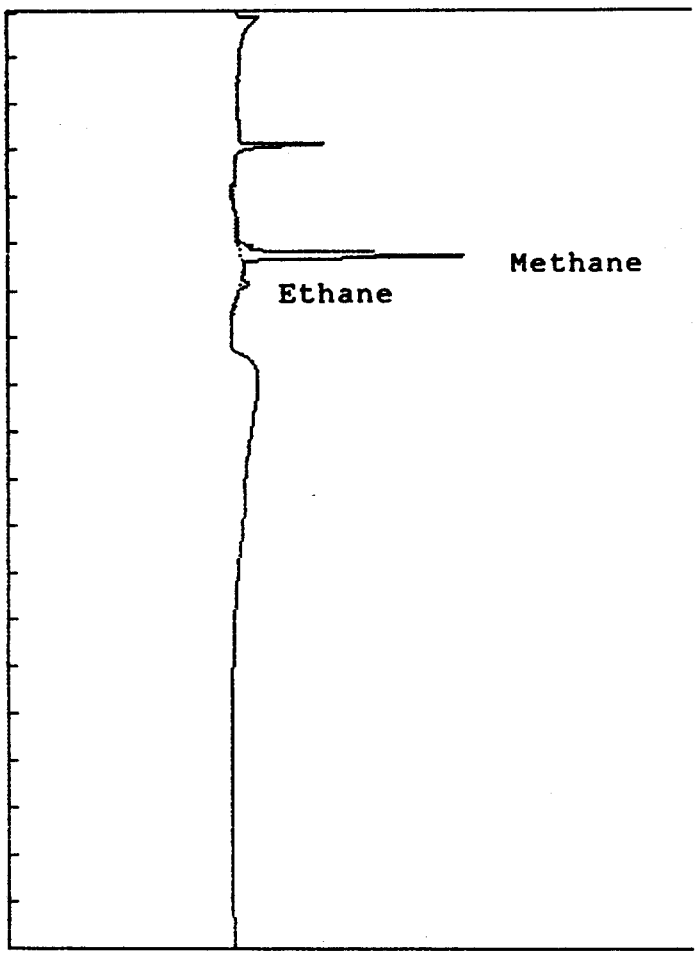
Katherine Zimmerman
Analyst

Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202016 Run #3
0141, 030488_003, Feb 13, 1992, Unit #1 Gas Turbine 2/12/92
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_003.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 10:07:37
Run Status : RunStatusOK
EndOffBaseline



RETENTION TIME	AREA	FACTOR	ppmvol
4.836	131	0.00000E+00	0.0000
5.200	5673	6.12552E-03	34.7478
5.830	106	4.06129E-03	.4321
		Total Hydrocarbons	35.1799

Report Time: Tue Feb 18, 1992 8:56:26 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_004
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202017 Run #1
Unit #2 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume
Methane (C1)	36.6
Ethane (C2)	1.0
Propane (C3)	<0.1
Butanes (I+N C4)	<0.1
Pentanes (I+N C5)	<0.1
Hexanes+ (C6+)	<0.1
Total Hydrocarbons	37.6
Total Non-Methane Hydrocarbons	1
Total Non-(C1+C2) Hydrocarbons	0
Total Non-Methane Hydrocarbons as C1	2

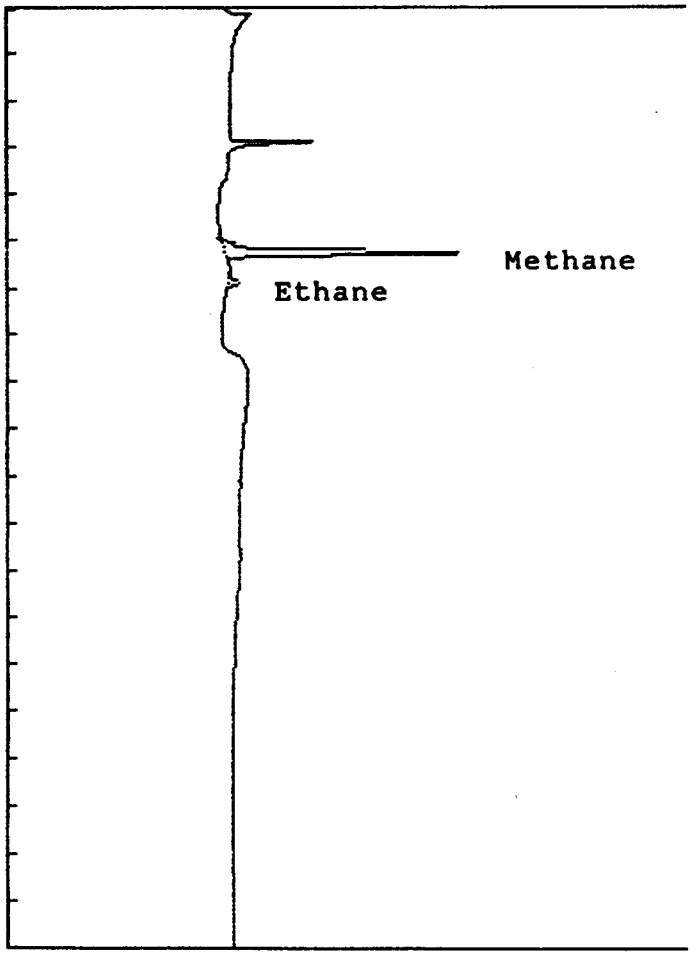
Kathe Zimmerman
Analyst

Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202017 Run #1
0141, 030488_004, Feb 13, 1992, Unit #2 Gas Turbine 2/12/92
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_004.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 10:47:22
Run Status : RunStatusOK
EndOffBaseline



RETENTION TIME	AREA	FACTOR	ppmvol
5.200	5983	6.12552E-03	36.6467
5.831	244	4.06129E-03	.9903
		Total Hydrocarbons	37.6370

Report Time: Tue Feb 18, 1992 8:59:40 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_005
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202018 Run #2
Unit #2 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume
Methane (C1)	44.1
Ethane (C2)	.9
Propane (C3)	<0.1
Butanes (I+N C4)	<0.1
Pentanes (I+N C5)	<0.1
Hexanes+ (C6+)	<0.1
Total Hydrocarbons	44.9
Total Non-Methane Hydrocarbons	1
Total Non-(C1+C2) Hydrocarbons	0
Total Non-Methane Hydrocarbons as C1	2

Kathie Zimmerman
Analyst

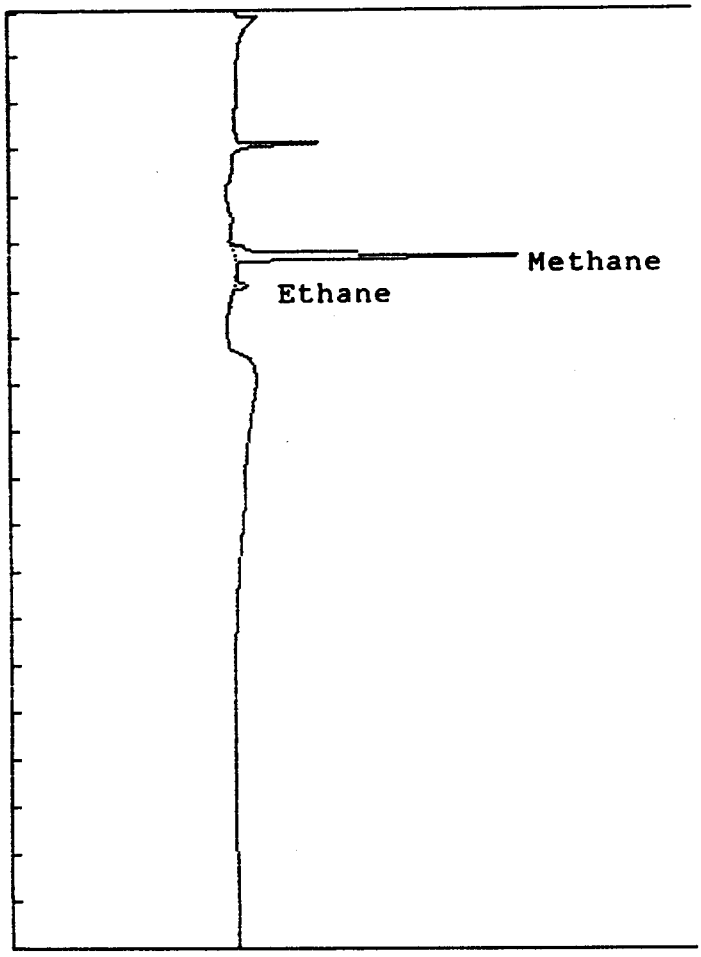
Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202018 Run #2
0141, 030488_005, Feb 13, 1992, Unit #2 Gas Turbine 2/12/92
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_005.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 11:11:59
Run Status : RunStatusOK
EndOffBaseline

RETENTION TIME	AREA	FACTOR	ppmvol
5.200	7198	6.12552E-03	44.0884
5.842	210	4.06129E-03	.8524
		Total Hydrocarbons	44.9408



Report Time: Tue Feb 18, 1992 9:02:50 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.

Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_006
Received: Feb 13, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202019 Run #3
Unit #2 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume

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Unit #2 Gas Turbine 2/12/92
* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components		PPM, Volume
Methane	(C1)	56.5
Ethane	(C2)	1.4
Propane	(C3)	<0.1
Butanes	(I+N C4)	<0.1
Pentanes	(I+N C5)	<0.1
Hexanes+	(C6+)	<0.1
Total Hydrocarbons		57.9
Total Non-Methane Hydrocarbons		1
Total Non-(C1+C2) Hydrocarbons		0
Total Non-Methane Hydrocarbons as C1		3

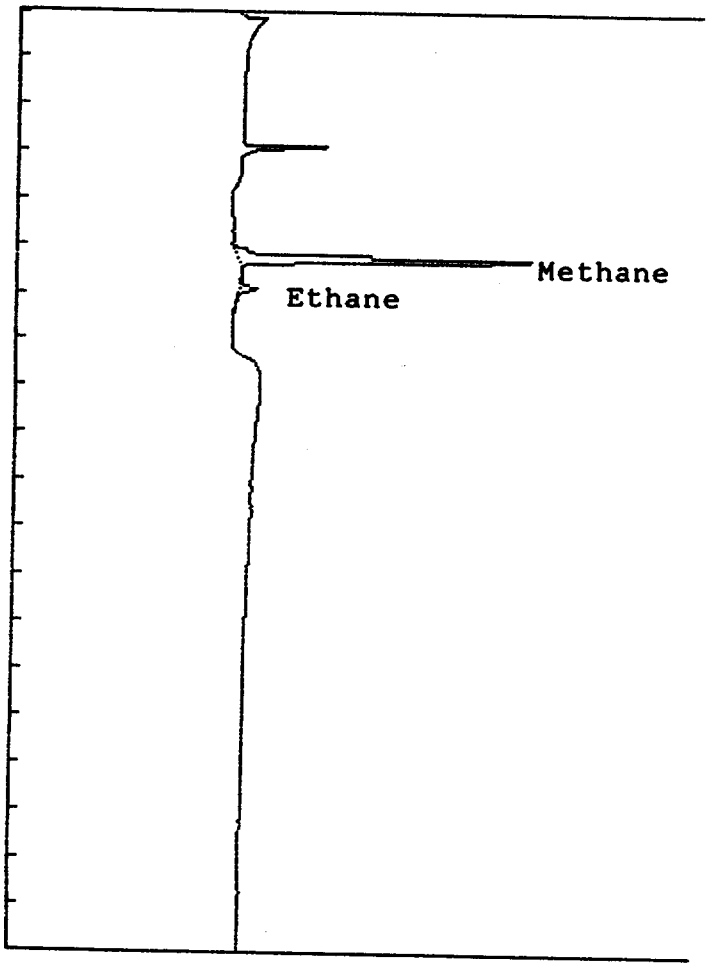
Kathie Zimmerman
Analyst

Jim Etherton
Laboratory Director

4309 Armour Avenue Bakersfield, California 93308
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Destec High Sierra BK202019 Run #3
0141, 030488_006, Feb 13, 1992, Unit #2 Gas Turbine 2/12/92
Peak Processor : Genie
Instument : ADC_2
Calculation : ExternalSTD
Result File : /DATA/LOOP/RESULT/ADC_2/ENG30488_006.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 11:42:11
Run Status : RunStatusOK
EndOffBaseline
Multilevel : False
Application : Loop
Quantitation: AreaUnits



RETENTION TIME	AREA	FACTOR	ppmvol
5.200	9222	6.12552E-03	56.4918
5.849	345	4.06129E-03	1.4026
		Total Hydrocarbons	57.8944

Report Time: Tue Feb 18, 1992 9:05:56 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: Cal_2_14_1
Received: Feb 14, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: Scotty's Gas Can Mix #243 2/14/92

* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components	PPM, Volume
Methane (C1)	16.3
Ethane (C2)	16.3
Propane (C3)	16.3
Butanes (I+N C4)	16.3
Pentanes (I+N C5)	16.4
Hexanes+ (C6+)	30.9
Total Hydrocarbons	112.5
Total Non-Methane Hydrocarbons	96
Total Non-(C1+C2) Hydrocarbons	80
Total Non-Methane Hydrocarbons as C1	374

Kathe Zimmerman
Analyst

Jim Etherton
Laboratory Director

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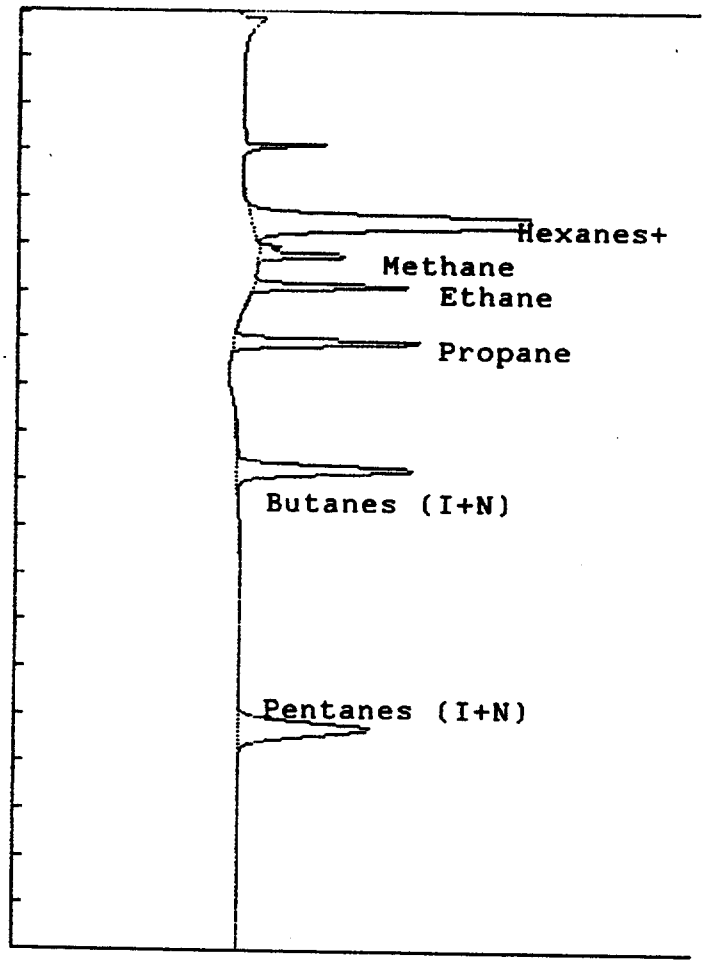
(805) 395-0539 FAX (805) 395-3069

Zalco C1-C6 PPM Report

Sample Name : Scotty's Gas Can Mix #243 2/14/92
0141, Cal_2_14_1, Feb 14, 1992
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/CAL_2_14_922.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 8:11:46
Run Status : RunStatusOK



RETENTION TIME	AREA	FACTOR	ppmvol
4.480	29429	1.04997E-03	30.9000
5.200	2661	6.12552E-03	16.3000
5.834	4014	4.06129E-03	16.3000
7.041	6460	2.52312E-03	16.3000
10.254	9913	1.64437E-03	16.3000
14.658	10927	1.50087E-03	16.4000
		Total Hydrocarbons	112.5000

Report Time: Tue Feb 18, 1992 8:24:06 am
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.
Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: Blank_2_14
Received: Feb 14, 1992
Reported: Feb 14, 1992

Attention: Gary McRae

Sample Description: 100% Helium Gas Blank 2/14/92

* CHROMATOGRAPHIC ANALYSIS (Z 1645) *

(FID with C6+ Backflush to Detector)

Components		PPM, Volume
Methane	(C1)	<0.1
Ethane	(C2)	<0.1
Propane	(C3)	<0.1
Butanes	(I+N C4)	<0.1
Pentanes	(I+N C5)	<0.1
Hexanes+	(C6+)	<0.1
Total Hydrocarbons		0.0
Total Non-Methane Hydrocarbons		0
Total Non-(C1+C2) Hydrocarbons		0
Total Non-Methane Hydrocarbons as C1		0

Kathy Zimmerman
Analyst

Jim Etherton
Laboratory Director

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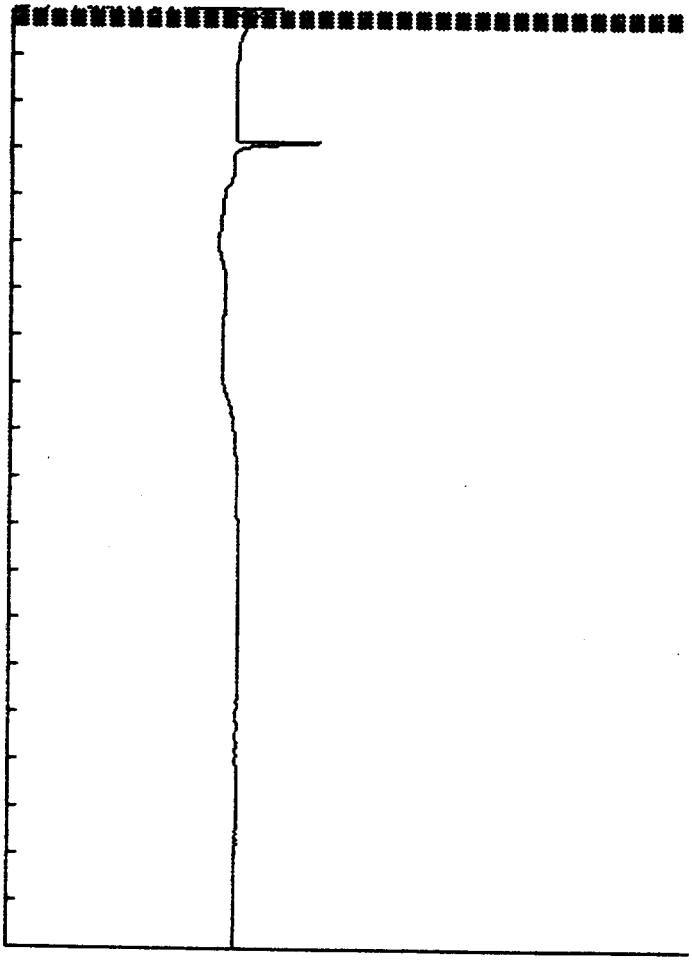
Zalco C1-C6 PPM Report

Sample Name : 100% Helium Gas Blank 2/14/92
0141, Blank_2_14, Feb 14, 1992
Peak Processor : Genie Multilevel : False
Instument : ADC_2 Application : Loop
Calculation : ExternalSTD Quantitation: AreaUnits
Result File : /DATA/LOOP/RESULT/ADC_2/BLK_2_14_921.RES
Run Time : 20.00 Minutes, injected on Fri Feb 14, 1992 8:41:26
Run Status : RunStatusOK
EndOffBaseline
NoPeaks
NoReference



Total Hydrocarbons	0.0000

Report Time: Fri Feb 14, 1992 1:17:13 pm
Method: /DATA/LOOP/METHOD/LOWPPMA.MTH
Format File: /DATA/LOOP/FORMAT/SIDE_BY_SIDE.FMT

ZALCO LABORATORIES, INC.

Analytical & Consulting Services

ENGINEERING SCIENCE
2520 Pegasus Drive
Bakersfield, CA 93308

Lab. No.: 030488_007
Received: Feb 13, 1992
Reported: Feb 13, 1992

Attention: Gary McRae

Sample Description: Destec High Sierra BK202020 Fuel Gas
Bomb #17 2/12/92

* CHROMATOGRAPHIC ANALYSIS (Z 1635) *

Components	Mole %	Wt %	CHONS	Wt %
Hydrogen	0.000	0.000	CARBON	72.80
Carbon Dioxide	1.255	3.290	HYDROGEN	23.85
Oxygen	.020	.038	OXYGEN	2.43
Nitrogen	.546	.911	NITROGEN	.91
Carbon Monoxide	0.000	0.000	SULFUR	0.00
Hydrogen Sulfide	0.000	0.000		
Methane	96.259	91.989	Totals	99.99
Ethane	1.643	2.942	Total H/C	.33
Propane	.197	.518		
IsoButane	.022	.075		
N-Butane	.030	.103		
IsoPentane	.010	.044		
N-Pentane	.009	.039		
Hexanes+	.010	.052		
Totals =	100.000	100.000		

SPECIFIC GRAVITY (Air = 1)		.5806
SPECIFIC VOLUME, cu.ft./lb	*	22.57
GROSS CALORIFIC VALUE, BTU/cu.ft.	*	995.97
GROSS CALORIFIC VALUE, BTU/cu.ft.	**	1013.19
GROSS CALORIFIC VALUE, BTU/lb	**	22867.02
NET CALORIFIC VALUE, BTU/cu.ft.	**	912.86
NET CALORIFIC VALUE, BTU/lb	**	20602.51
DSCF EXHAUST PER SCF FUEL (0% Oxygen)		8.5870
COMPRESSIBILITY FACTOR 'Z' (60 F,1 ATM)		.9980
EPA 'F' Factor @ 68 F:	8624.060 DSCF / MM Btu.	
KCAPCD 'F' Factor @ 60 F:	8494.700 DSCF / MM Btu.	

* Water Saturated

** Dry Gas @ 60 F, 14.73 psia

Kathie Zimmerman
Analyst

Jim Etherton
Laboratory Director

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SECTION 6

TEST METHODOLOGY

SECTION 6

METHODOLGY

Continuous Emissions Monitoring

Sample Extraction and Conditioning

Sampling was performed using a system which delivers a conditioned, continuous gas sample to the gas analyzers. The gas sample was extracted through a stainless steel probe, then passed through a heated (250^{o}F) teflon sample line, a sample condenser (for moisture removal), an in-line filter (for particulate removal), and a stainless steel pump. The clean, dry sample was then transported via unheated teflon line to the analyzer manifold (located within the mobile van) for sample distribution to the continuous emissions monitors.

Continuous Emissions Monitors (CEMS)

Table 1 describes the CEMS used in the mobile van to analyze the exhaust gases. Calibrations of the CEMS were performed using EPA Protocol 1 or NIST certified calibration gases. Copies of the gas certification are included in the appendix of this report.

Prior to performing the emissions testing, a leak check of the sample system was performed. A check of sampling system bias was performed by injecting calibration gas (for each parameter) at the sample probe and then observing instrument response. A response within $\pm$ 5 percent of instrument range was considered acceptable. The leak check was repeated at the conclusion of the test day to verify the validity of the tests.

Before each test run, an initial calibration of the analyzers was performed by introducing zero and span gases and making appropriate adjustments. During each test run, analyzer response data was recorded for each instrument. At the conclusion of the test run, a calibration check was performed to verify acceptable zero and span drift limits.

TABLE 6–1
CEM INSTRUMENT SPECIFICATIONS
CEM VAN NO. 2

PARAMETER	MANUFACTURER	MODEL NO.	ANALYZER PRINCIPLE	SENSITIVITY	LINEARITY	SPECIAL NOTES	RESPONSE TIME	NOISE	PRECISION
O2	MSA Instruments	4000	Electroconductivity Detection	+– .01%	< 2%	Galvanic Fuel Cell	90% Full Scale in 20 sec.	+– 1%	
CO2	Infrared Industries	732	Non–Dispersive Infrared		< 2%		90% Full Scale in 20 sec.		
NOx	Thermo Environmental Instruments Inc.	10	Chemiluminescent	.05 ppm	+– 1% from 0.05 to 10,000	High range has 02 feed.	Approx. 1.5 sec NO mode Approx. 1.7 sec NOx mode	< 1% of Full Scale	
CO	Thermo Environmental Instruments Inc.	48	Gas Filter Correlation	.1 ppm	< +– 1%		95% Full Scale in < 60 sec.	< 0.05 ppm	> +– 0.1ppm
SO2									
HC									

Ammonia Emissions Test

General

Ammonia testing was performed concurrently with the CEM testing. Ammonia slip testing is required when pollutant emissions are being controlled by ammonia injection. Testing was conducted in accordance with BAAQMD ST-1b.

Sampling Train

The impinger train was kept in an icebath during the test run. Impingers 1 and 2 contained 100 milliliters of 0.1 N HCl, impinger 3 was empty, and impinger 4 contained a tared amount of silica gel. The impingers were weighed before and after sampling to allow calculation of percent moisture in the gas stream. The probe and sample box were connected to the control module using an umbilical line. The control module consists of a vacuum pump, a calibrated dry gas meter, and a calibrated orifice meter. The control module components measure pressure, temperature, and flowrate throughout the train.

Sampling Procedure

A leak check was performed before sampling began by bringing the sample train to 15-inches of mercury vacuum. Leakage had to be less than 0.02 cfm or 4% of the average sampling rate prior to beginning a test. A leak check was also done on the S-type Pitot tube. After sampling was complete, a final leak check was performed on both the train and S-type Pitot tube. This leak check was performed at 15-inches of mercury vacuum or at the highest vacuum achieved during the test. All pertinent data was recorded on field data sheets and is included in this report.

Sample Recovery

Each impinger was removed from the icebath, wiped dry, and weighed to allow calculation of percent moisture in the gas stream. A polyethylene bottle labeled as NH_3 was used to collect the contents of the impingers and the distilled water rinses of the impingers and their connectors . A chain-of-custody form was filled out with sample numbers for tracking purposes.

Sample Analysis for Ammonia

The volume of the NH_3 sample bottle was measured and an aliquot was transferred to a 250 milliliter beaker using a 100 milliliter NBS class A pipet. A Teflon stir bar was carefully placed in the beaker and NH_3 ionic strength adjuster (ISA) solution was added until a blue color persisted. The ammonia content was determined using a specific ion electrode. The electrode was rinsed with distilled water, immersed in the liquid, and allowed to reach a stable millivolt reading. The ammonia content was determined by graphing the sample millivolts onto the semi-log calibration graph. A blank of the 0.1 N HCl impinger solution was also done.

Speciated Hydrocarbons: EPA Method 18

Integrated hydrocarbon samples were collected through a 316 stainless steel and teflon line directly into a new Tedlar bag by utilizing an evacuated chamber to draw the exhaust into the bag. The Tedlar bags were purged twice with the exhaust gas before collecting each sample. At the conclusion of sampling, the tedlar bag was closed off, labeled, and delivered to the laboratory along with a chain-of-custody form. The samples were analyzed by FID packed column gas chromotography for methane/non-methane hydrocarbons in accordance with EPA Method 18.

Fuel Gas

A fuel gas sample was collected in a stainless steel gas sample cylinder, properly labeled, and delivered to the laboratory with the accompanying chain-of-custody form. The samples were analyzed by gas chromotography for CHONS (carbon, hydrogen, oxygen, nitrogen, and sulfur) and heating value in accordance with ASTM Method D-3588.

SECTION 7

RAW DATA

ENGINEERING–SCIENCE, INC.
CEM FIELD DATA SHEET

PLANT TEST LOCATION: DESTEC: HIGH SIERRA COGEN UNIT 1 and 2
CEM VAN NO. 2
DATE 2-12-92
OPERATOR T. DELFINO

O2, %
Calibration Gases : CC83872
High 20.9 Cyl. # ~~EC412430~~
Mid 14.07 Cyl. # CC28366
Low 0.0 Cyl. # CC83872

CO2, %
Calibration Gases :
High ____ Cyl. #
Mid 9.02 Cyl. # CC28366
Low ____ Cyl. #

NOx, ppm
Calibration Gases :
High 9.29 Cyl. # CC56094
Mid 5.64 Cyl. # CC49684
Low 0.0 Cyl. # 83872

CO, ppm
Calibration Gases :
High 90.3 Cyl. # CC12438
Mid 45.0 Cyl. # CC12295
Low 22.90 Cyl. # CC28073

SO2, ppm
Calibration Gases :
High ____ Cyl. #
Mid ____ Cyl. #
Low ____ Cyl. #

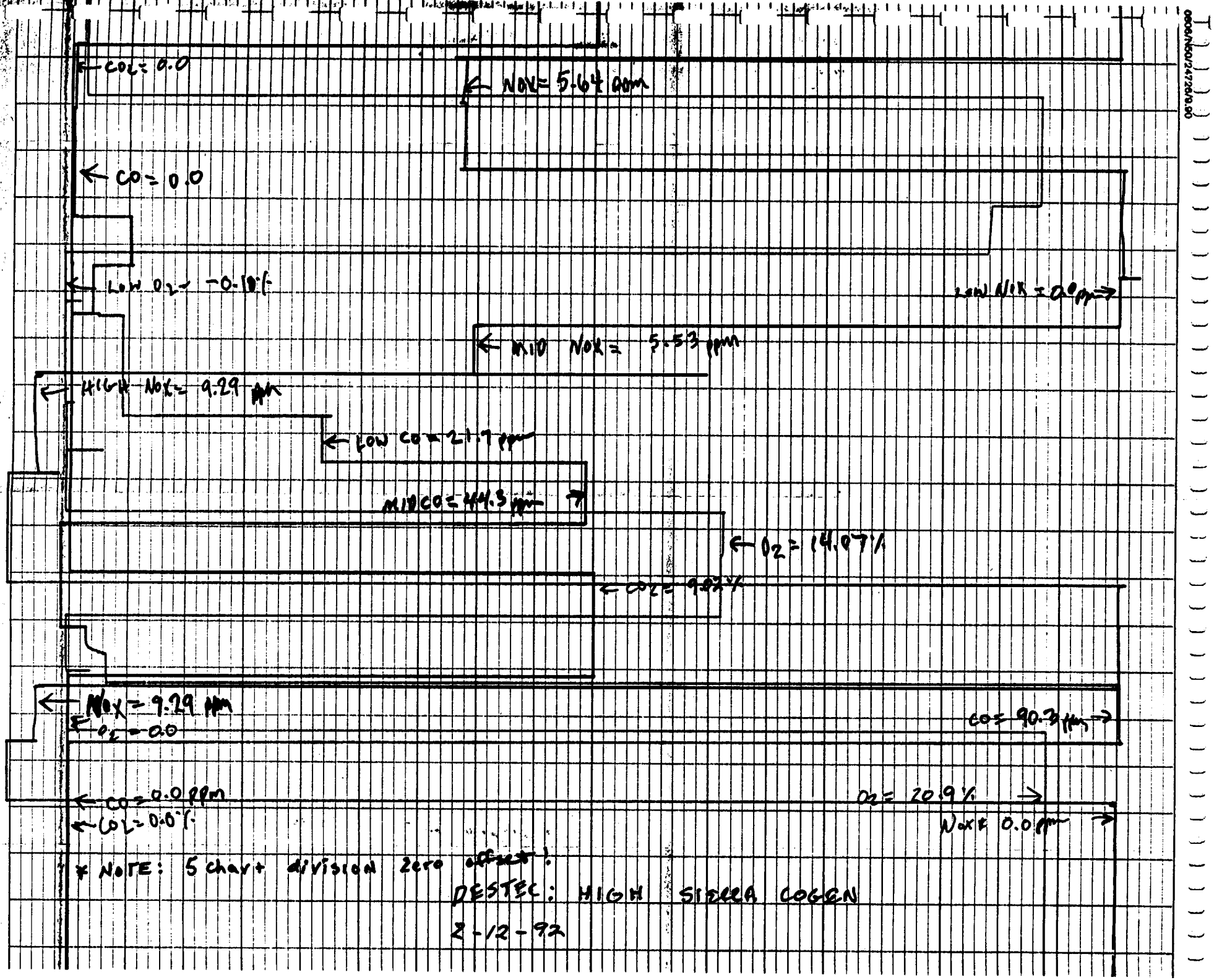
Calibration Gases :
High ____ Cyl. #
Mid ____ Cyl. #
Low ____ Cyl. #

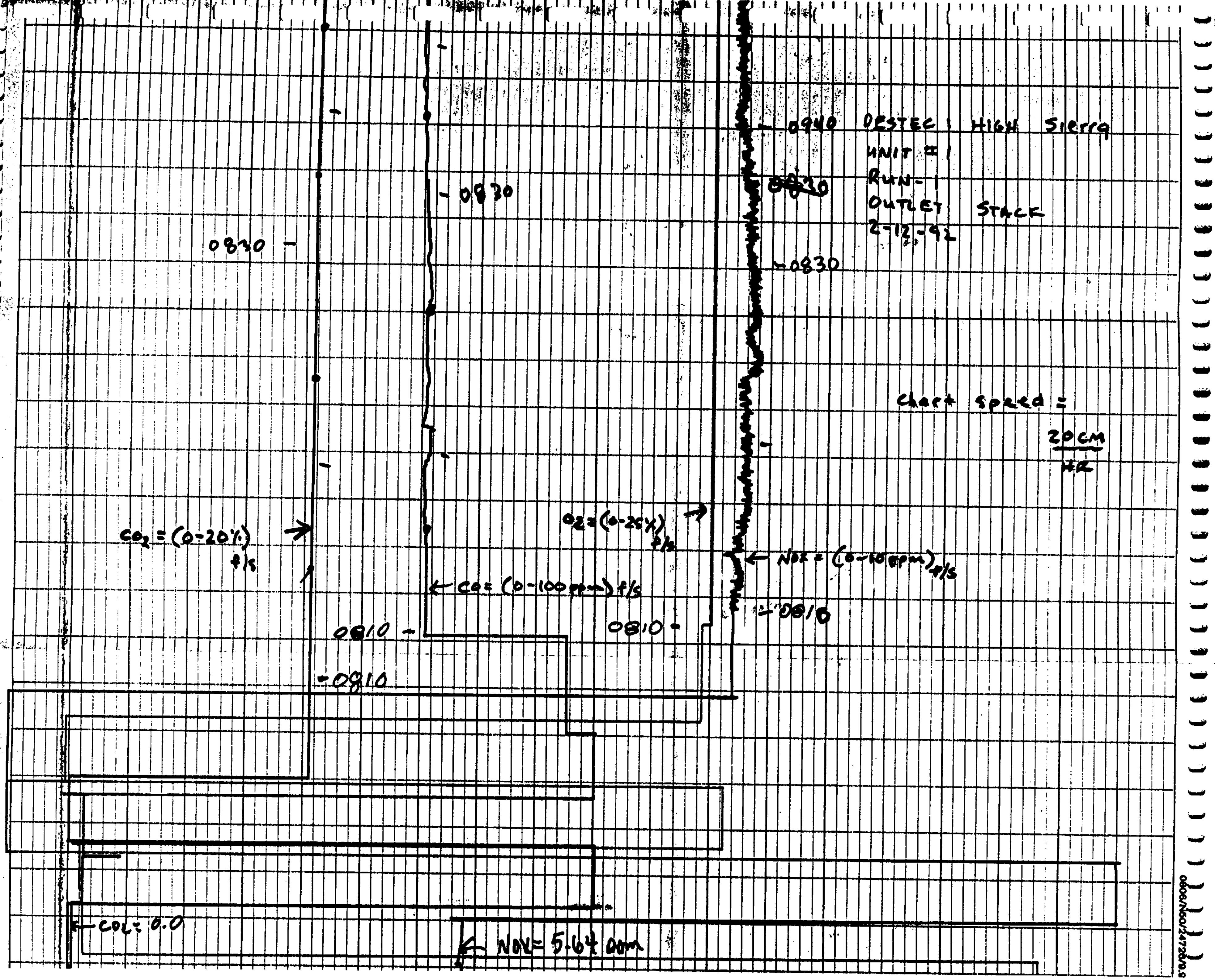
TIME	SAMPLE POINT	O2 (%)	CO2 (%)	NOx (ppm)	CO (ppm)	SO2 (ppm)		COMMENTS / RUN #
		14.07	9.02	5.64	45.0	N/A		Span gas values used for test.
		20.9	9.02	9.29	90.3			HIGH LINEARITY Check
		14.07		5.53	44.3			MID
		-0.1		0.0	21.7			LOW
								LEAK ✓ = 0.0 @ 20" Hg
0810	UNIT #1	13.8	4.1	3.2	30.5			RUN #1, UNIT #1
20		13.8	4.15	3.15	30.5			
30		13.8	4.17	3.2	30.0			
40		13.8	4.20	3.25	29.8			
50		13.75	4.20	3.30	29.8			
0900		13.75	4.20	3.25	30.0			
0910	CAL	-0.05	0.10	0.12	0.0			ZERO Check
		14.0	9.12	5.64	44.5			SPAN Check

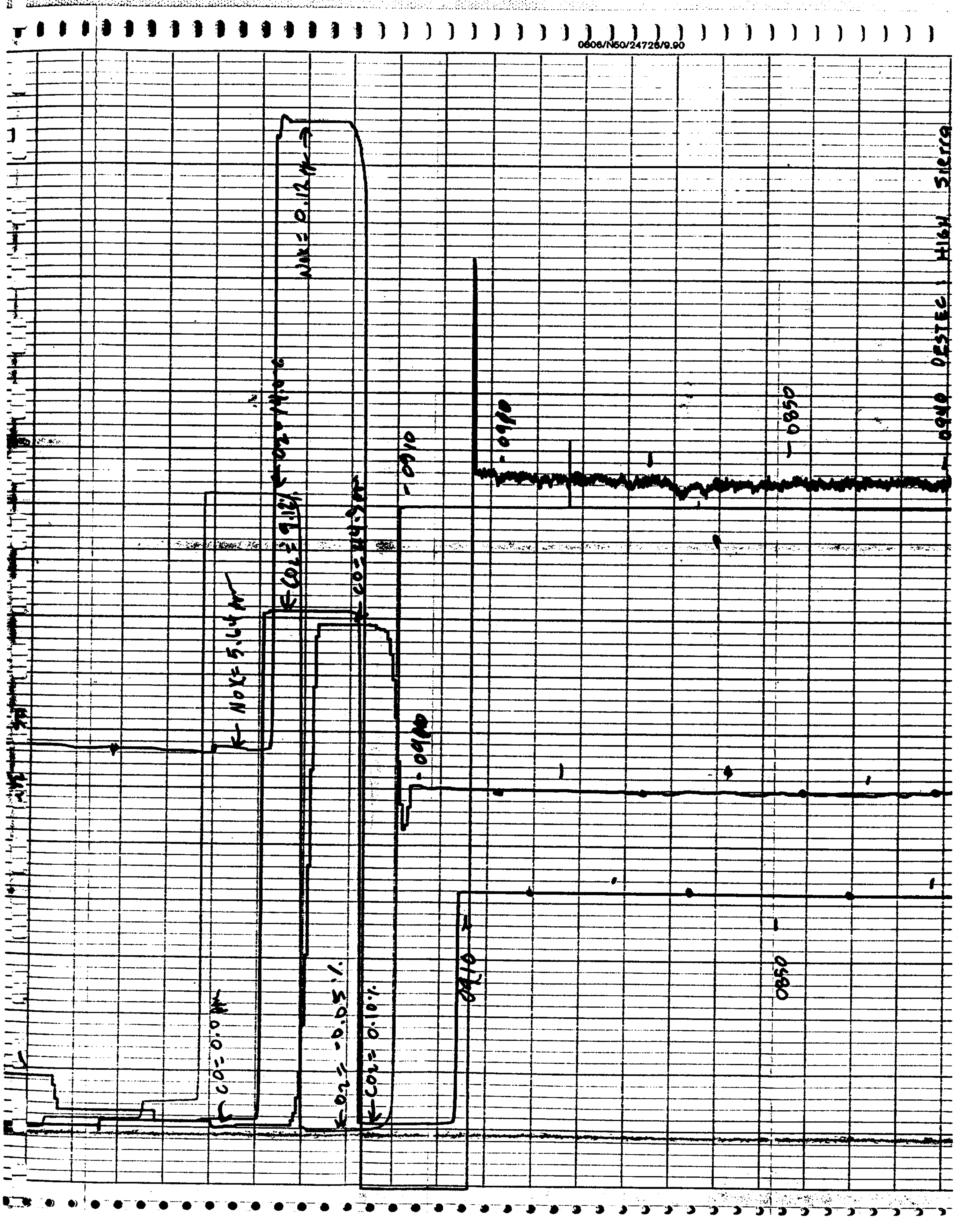
ENGINEERING–SCIENCE, INC.
CEM FIELD DATA SHEET

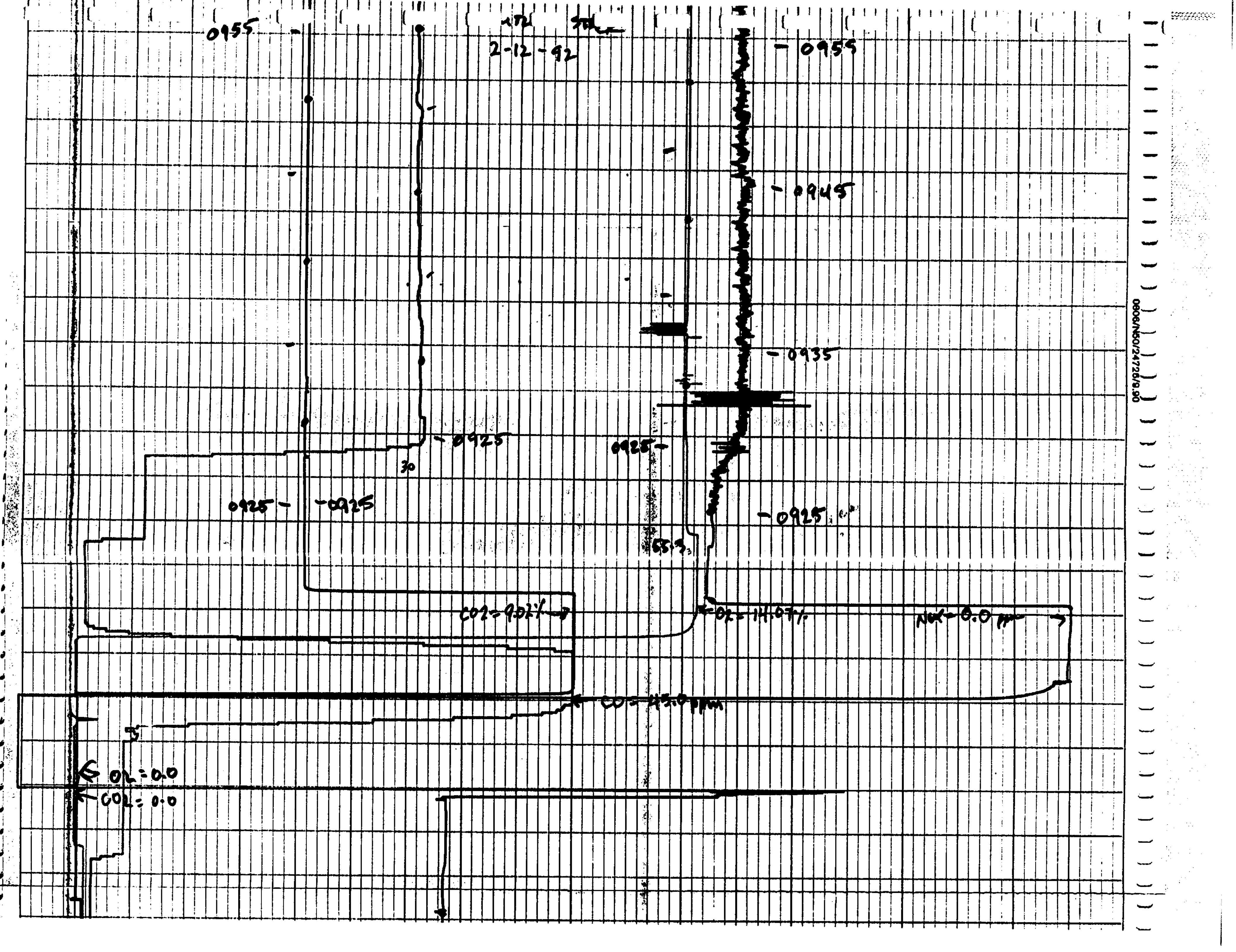
PLANT: DESTEC: HIGH Sierra cogen — CEM VAN NO. 2 — DATE 2-12-92
TEST LOCATION: UNIT 1+2 stack — OPERATOR TD

TIME	SAMPLE POINT	O2 (%)	CO2 (%)	NOx (ppm)	CO (ppm)	SO2 (ppm)		COMMENTS / RUN #
		14.07	9.02	5.64	45.0	N/A		Span gas values used for test.
0								
0925	UNIT 1	13.83	4.1	2.97	31.0			RUN-2, UNIT 1
35		13.83	4.1	2.97	30.7			
45		13.83	4.1	3.0	30.5			
55		13.83	4.1	3.05	30.3			
1005		13.83	4.1	2.95	30.5			
1015		13.83	4.1	2.92	30.7			
1025	CAL	0.0	0.0	-0.12	1.0			ZERO check
		14.15	9.02	5.50	45.0			SPAN check
1130	UNIT-2	13.93	4.06	3.60	35.0			RUN-1, UNIT-2
40		13.93	4.06	3.65	34.3			
50		13.93	4.06	3.75	33.0			
1200		13.90	4.06	3.80	32.5			
10		13.85	4.06	3.85	30.3			
20		13.85	4.06	3.90	30.2			
1230	CAL	0.0	0.0	0.29	0.0			ZERO check
		13.88	9.02	5.67	43.9			SPAN check
1245		13.93	4.06	2.85	39.2			RUN-2, UNIT-2
55		13.93	4.06	2.90	38.5			
1305		13.85	4.06	2.97	44.5			
15		13.90	4.06	3.2	32.5			
25		13.93	4.02	3.05	33.5			
35		13.93	4.02	3.15	33.0			
1345	CAL	0.0	0.0	-0.02	0.7			ZERO check
		14.07	9.02	5.70	43.0			SPAN CHECK
		14.0	9.0	5.57	43.8			EXTERNAL RESPONSE Check

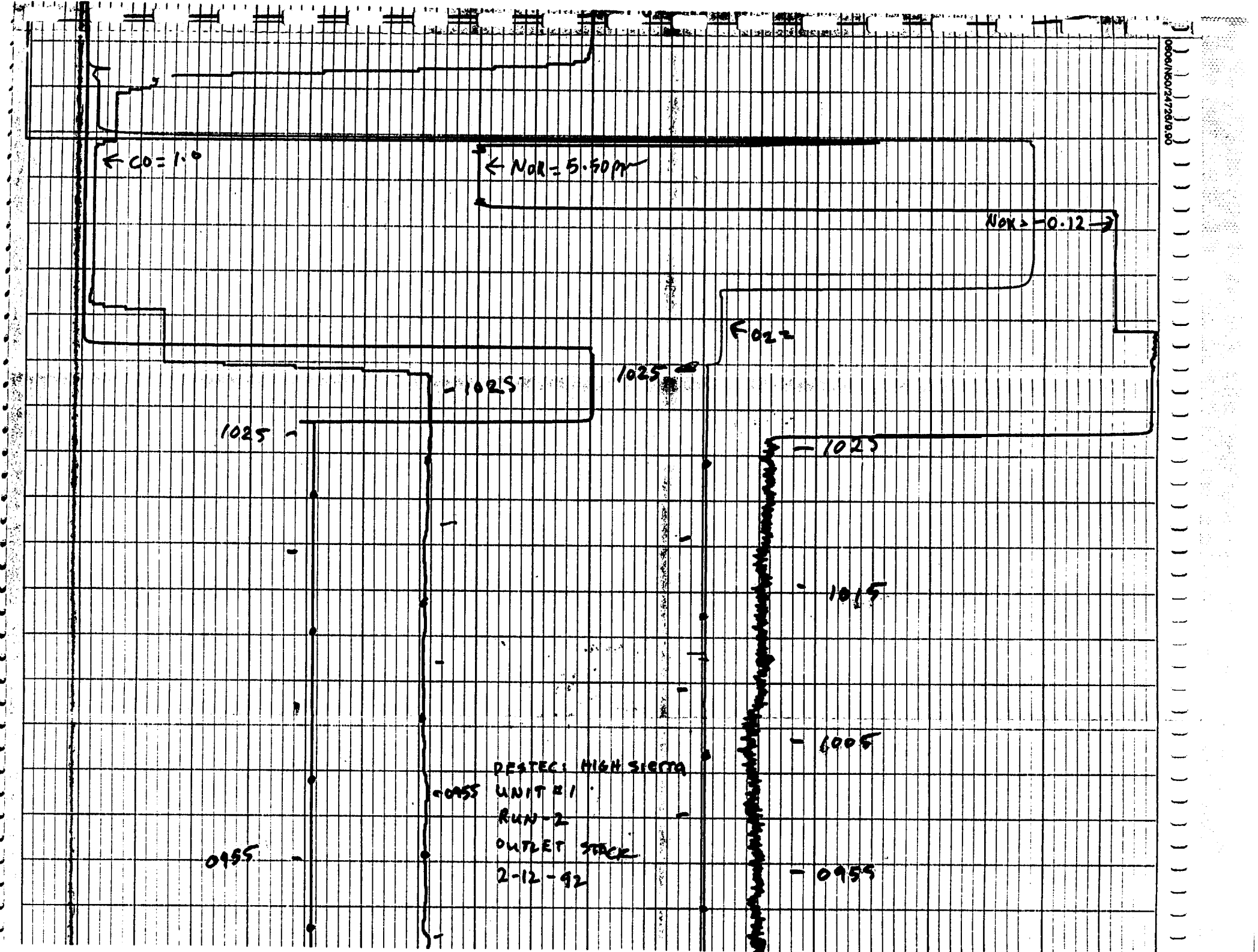

CO2 = 0.0
NOX = 5.64 ppm
CO = 0.0
LOW O2 = -0.1%
LOW NOX = 0.0 ppm
MID NOX = 5.53 ppm
HIGH NOX = 9.29 ppm
LOW CO = 21.7 ppm
MID CO = 44.3 ppm
O2 = 14.9%
CO2 = 9.0%
NOX = 9.29 ppm
O2 = 0.0
CO = 90.3 ppm
CO = 0.0 ppm
CO2 = 0.0%
O2 = 20.9%
NOX = 0.0 ppm
* NOTE: 5 chart division zero offset!
DESTEC: HIGH SIERRA COGEN
2-12-92

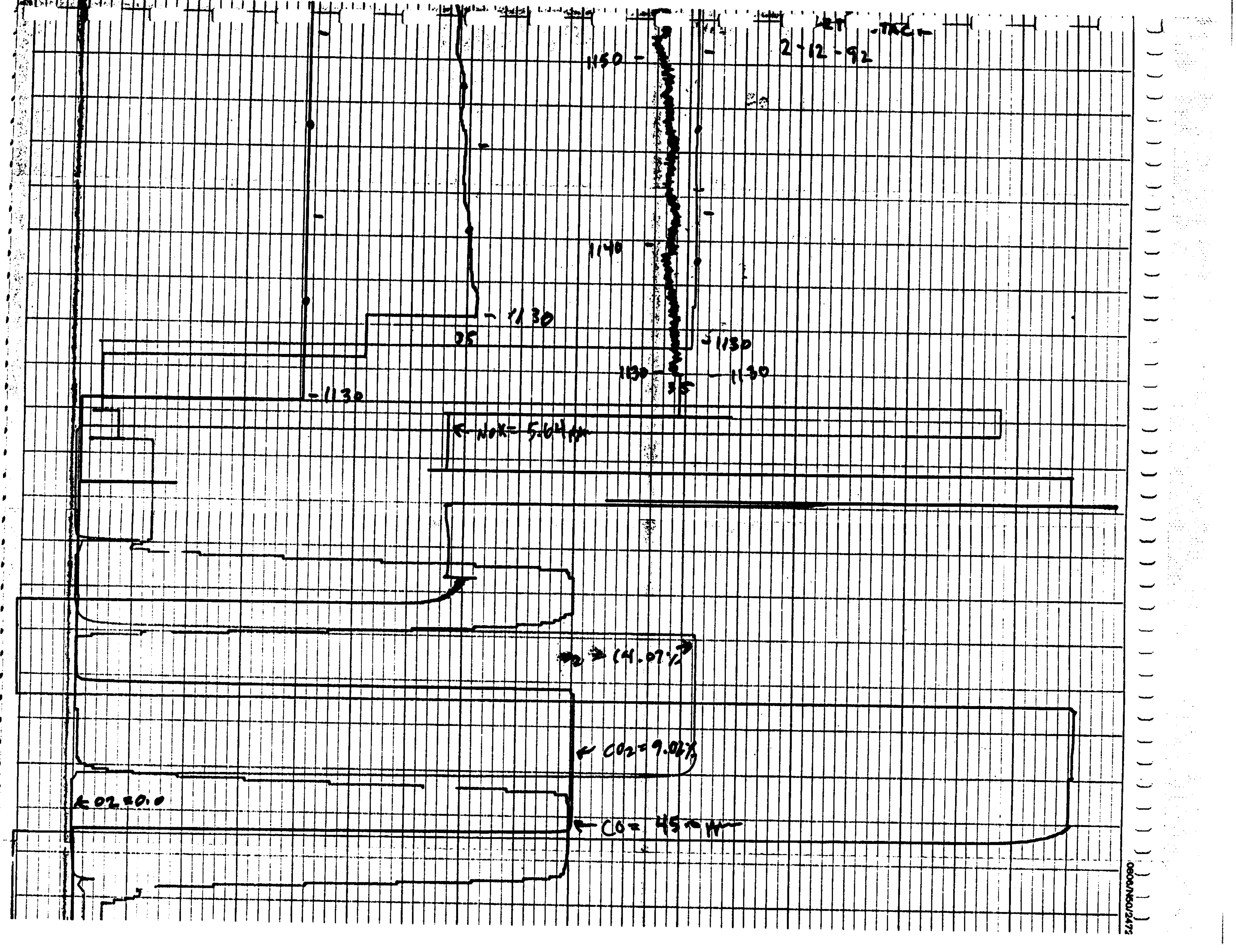

DESTEC : HIGH Sierra
UNIT #1
RUN-1
OUTLET STACK
2-12-92
Chart speed = 20 CM / HR
0940
0830
0810
O_2 = (0-25%) f/s
NOx = (0-10 PPM) f/s
CO = (0-100 ppm) f/s
CO_2 = (0-20%) f/s
NOx = 5.64 ppm
CO2 = 0.0
0606/N50/24726/9.9

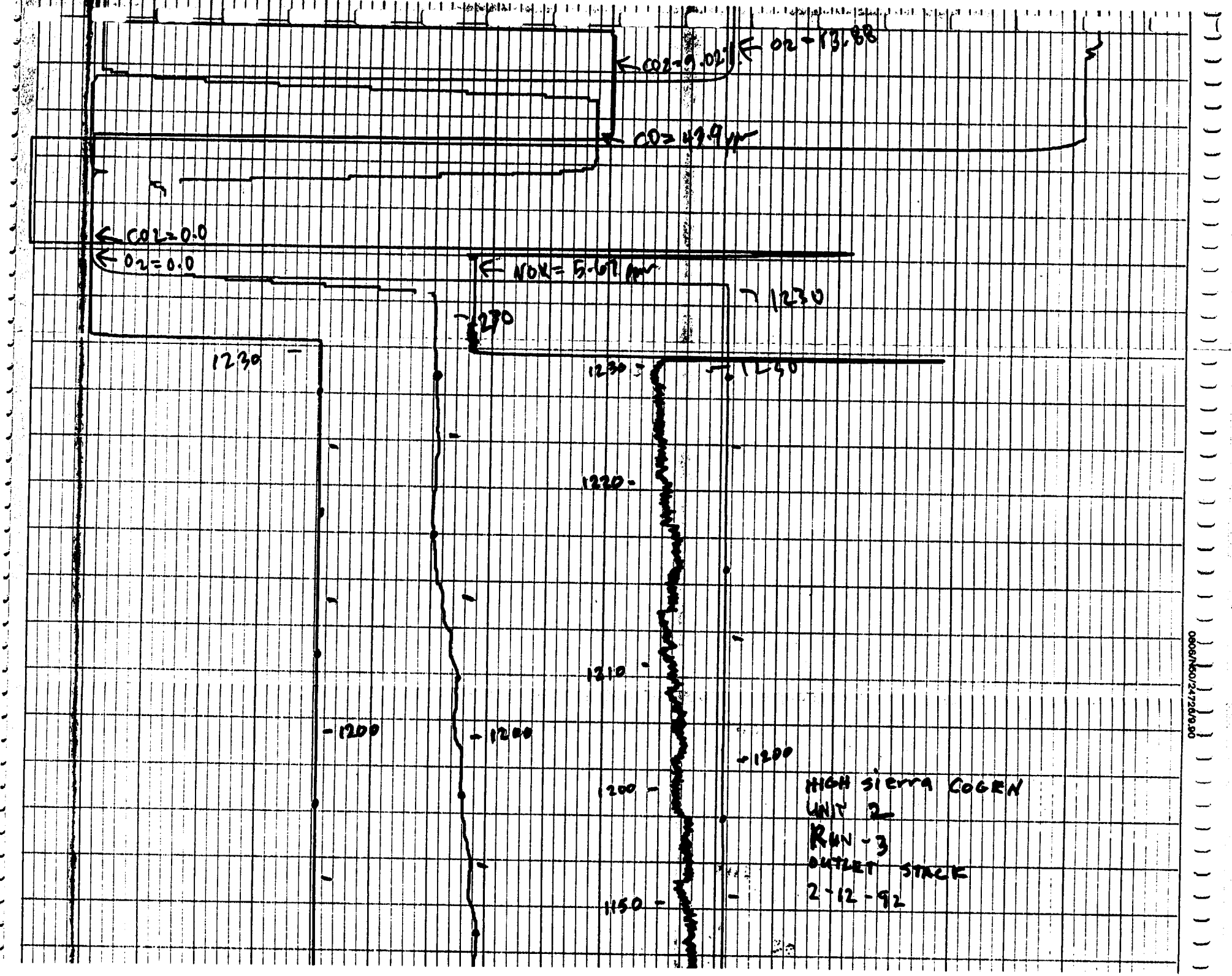

0606/N50/24726/9.90
0940 DESTEC : HIGH SIERRA
NOX = 0.12 PPM
O2 = 14.0 %
CO2 = 9.12 %
CO = 144.9 PPM
NOX = 5.64 PPM
CO = 0.0 PPM
O2 = -0.05 %
CO2 = 0.10 %
0910
0920
0900
0850
0910
0850

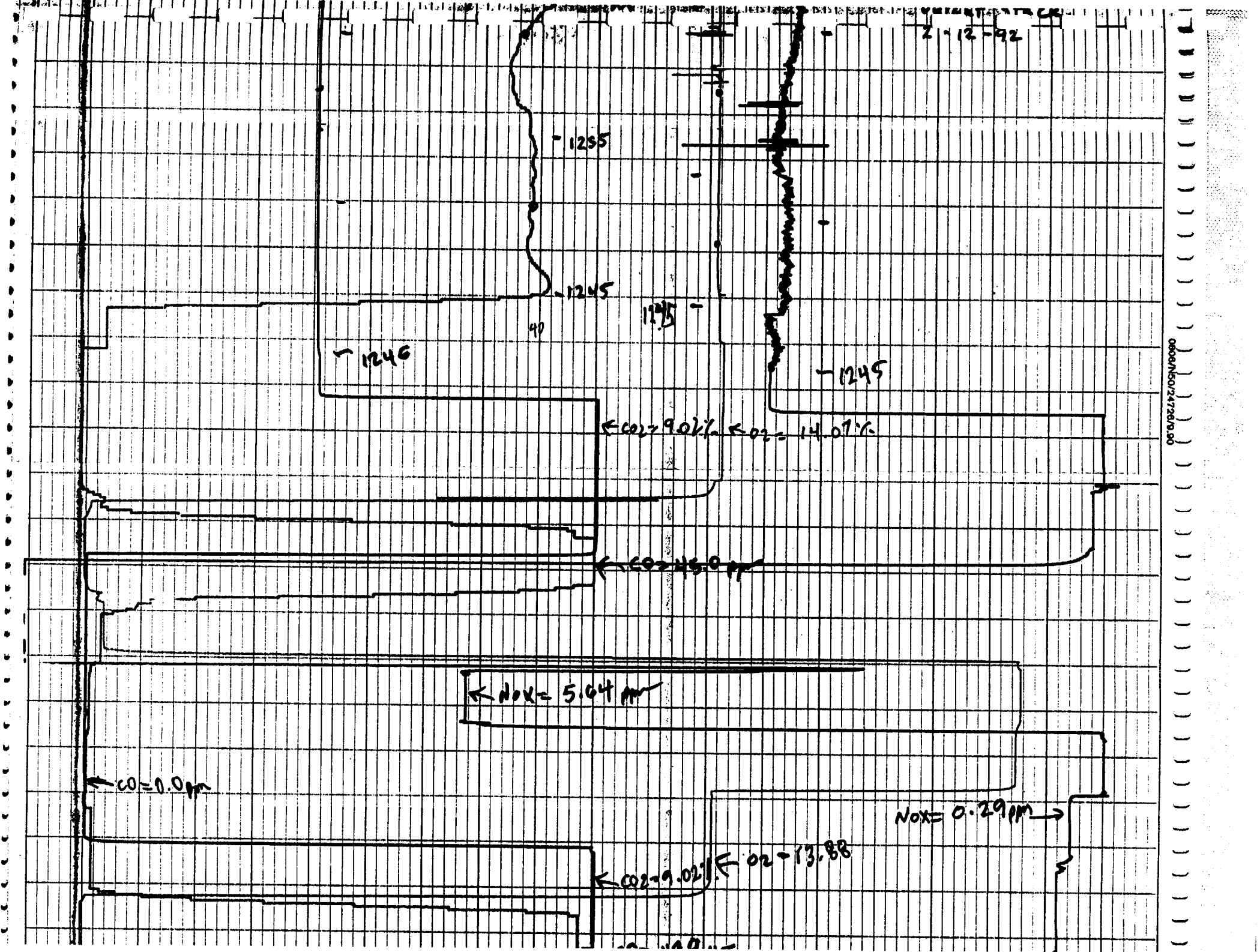


0806/N50/24726/9.90
2-12-92
0955
0945
0935
0925
30
O2 = 14.0%
CO2 = 9.0%
NOx = 0.0
O2 = 0.0
CO2 = 0.0

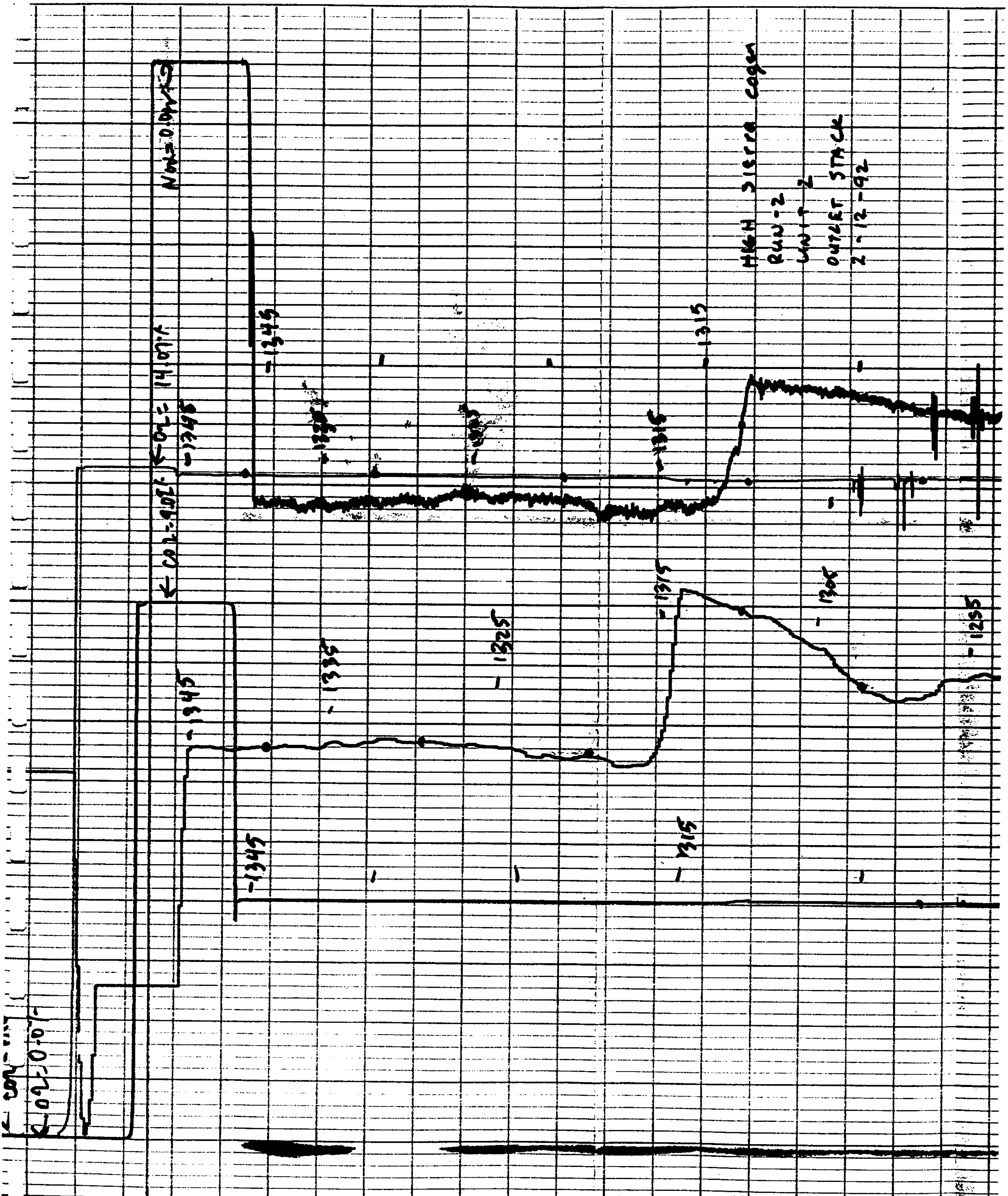

← CO = 1.0
← NOx = 5.50 ppm
NOx = 0.12 →
O2 →
1025
1025
1025
1025
1015
1005
0955
0955
PEETEC: HIGH SIERRA
UNIT #1
RUN-2
OUTLET STACK
2-12-92

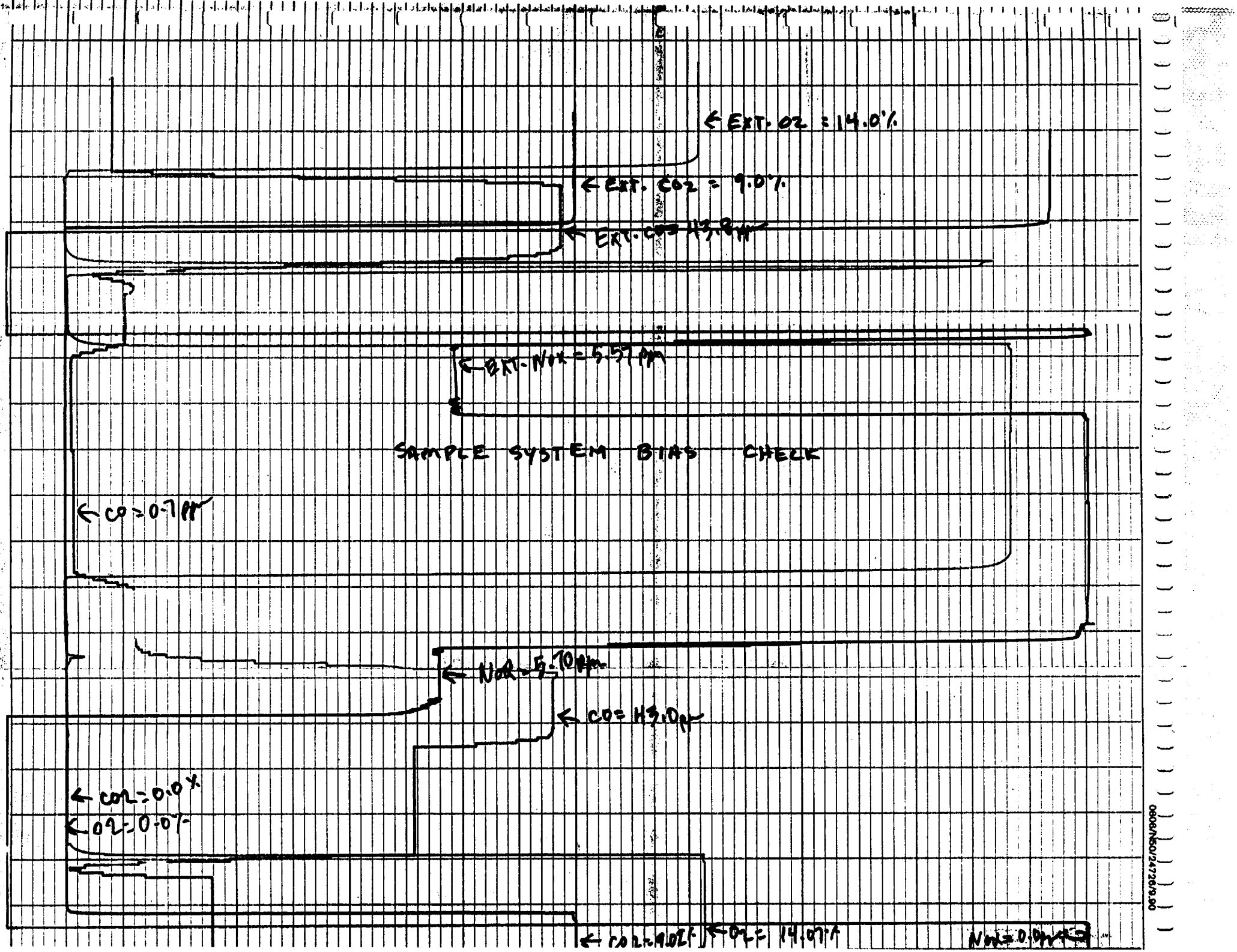

2-12-92
1150
1140
1130
← NOx= 5.64 ppm
14.07%
← CO2= 9.08%
← CO= 45 ppm
← O2 =0.0
0806/N50/2472


CO2=9.0%
O2=13.8%
CO=49.9 ppm
CO2=0.0
O2=0.0
NOx=5.6 ppm
1230
1230
1230
1240
1220
1210
1200
1200
1200
1200
1150
HIGH SIERRA COGEN
UNIT 2
RUN-3
OUTLET STACK
2-12-92


2-12-92
1255
1245
40
1245
1246
1245
CO2=9.0%
O2=14.0%
CO=6.0 ppm
NOx=5.64 ppm
CO=0.0 ppm
NOx=0.29 ppm
CO2=9.0%
O2=13.88
0608/N50/24726/0.90

0606/N50/24726/9.90




← EXT. O2 = 14.0%
← EXT. CO2 = 9.0%
← EXT. CO = 113.8 PPM
← EXT. NOx = 5.57 PPM
SAMPLE SYSTEM BIAS CHECK
← CO = 0.7 PPM
← NOx = 5.10 PPM
← CO = 113.0 PPM
← CO2 = 0.0%
← O2 = 0.0%
← CO2 = 9.0% ← O2 = 14.0%
NOx = 0.0 PPM

FIELD DATA SHEET

Company: OESTEC: High Sierra Cogen.
Test Location: Unit #1
Test Method / Parameter: BAAQMD SFIB/NH3

Run #: 1
Date: 2-12-92
Operator: GWM

ENGINEERING–SCIENCE, INC.

Stack Dimensions
Barometric Pressure: 28.74 "Hg
Static Pressure: "H2O
Pitot Coeff.: 0.84
Filter #: UNTARED
Control Box #: BRIE
Orifice dH@ / y: 1.88 / 1.003
Probe Type / Length: GL / 6'
Nozzle # / Size: N/A

IMPINGER CONTENTS, ml / grams				
Impinger	Contents	Final	Initial	Net
1	0.1N HCl	664.9	583.6	81.3
2	0.1N HCl	606.6	597.8	8.8
3	Dry	473.5	472.7	0.8
4				
5				
	Silica Gel	759.0	754.7	4.3
			TOTAL:	92.5g

GAS COMPOSITION			
Time	O2	CO2	CO

LEAK RATE	cfm / lpm	"Hg Vacuum
Initial	.004	15"
Final	.001	5"

Sample Point	Time 0825	Gas Meter (ft3 / liters)	dP "H2O	dH "H2O	Temperature, °F					Vacuum "Hg	Rotameter (liters/min)	Comments
					Meter	Stack	Probe	Oven	Impinger			
Center	0	417.750		1.5	52		260	255	50	2		
	5	420.9			57		265	253	47	2		
	10	424.0			57		260	255	45	2		
	15	427.2			59		258	254	43	2		
	20	430.4			60		257	253	45	2		
	25	433.6		↓	62		255	255	45	2		
	30	436.755										
TOTAL/AVG.	30.0	19.005		1.50	57.83							

FIELD DATA SHEET

ENGINEERING–SCIENCE, INC.

Company: DESTEC ; High Sierra Cogen
Test Location: UNIT # 1
Test Method / Parameter: BAAQMD ST1B / NH_3

Run # 2
Date 2-12-92
Operator GWM

Stack Dimensions
Barometric Pressure 28.74 "Hg
Static Pressure "H2O
Pitot Coeff. 0.84
Filter # UNTARED
Control Box # BKII
Orifice dH@ / y 1.88 / 1.003
Probe Type / Length GL / 6'
Nozzle # / Size N/A

IMPINGER CONTENTS, ml (grams)				
Impinger	Contents	Final	Initial	Net
1	0.1N HCl	650.0	589.0	61.0
2	0.1N HCl	630.1	600.5	29.6
3	Dry	481.7	480.3	1.4
4				
5				
	Silica Gel	796.2	785.3	4.9
			TOTAL :	96.9

GAS COMPOSITION			
Time	O2	CO2	CO

LEAK RATE	cfm / lpm	"Hg Vacuum
Initial	.005	15"
Final	.003	16"

Sample Point	Time	Gas Meter (ft3) liters)	dP "H2O	dH "H2O	Temperature, °F Meter	Stack	Probe	Oven	Impinger	Vacuum "Hg	Rotameter (liters/min)	Comments
	0930											
center	0	436.850		1.5	61		258	251	49	3.0		
	5	439.9			63		256	254	47	3.0		
	10	443.1			63		261	253	45	3.0		
	15	446.3			64		249	253	43	3.0		
	20	449.4			64		256	252	43	3.0		
	25	452.6			65		255	253	42	3.0		
	30	455.703										
TOTAL/AVG	30.0	18.853		1.50	63.33							

FIELD DATA SHEET

ENGINEERING–SCIENCE, INC.

Company: DESTEC HIGH SIERRA
Test Location: UNIT 2 - OUTLET STACK
Test Method / Parameter: BAAQMD - ST-1B

Run # 1 - UNIT 2
Date 2-12-92
Operator GWM

Stack Dimensions
Barometric Pressure 28.75 "Hg
Static Pressure "H2O
Pitot Coeff. 0.84
Filter # UNTARED
Control Box # BE II
Orifice dH@ / y 1.88 / 1.003
Probe Type / Length GL / 6'
Nozzle # / Size /

IMPINGER CONTENTS, ml / grams				
Impinger	Contents	Final	Initial	Net
1	0.1N HCl	640.6	583.2	55.6
2	0.1N HCl	626.0	598.6	27.4
3	Dry	473.0	473.0	0.0
4				
5		795.4	790.2	5.2
	Silica Gel		~~757.0~~	88.2
			TOTAL:	

GAS COMPOSITION			
Time	O2	CO2	CO

LEAK RATE	cfm / lpm	"Hg Vacuum
Initial	.005	15"
Final	.004	8"

Sample Point	Time	Gas Meter (ft3 / liters)	dP "H2O	dH "H2O	Temperature, °F					Vacuum "Hg	Rotameter (liters/min)	Comments
					Meter	Stack	Probe	Oven	Impinger			
	~~1130~~ 0	455.838		1.5	62		256	253	52	2.0		
	5	458.9			63		257	252	50	2.0		
	10	462.1			63		263	252	50	2.0		
	15	465.3			64		253	251	49	2.0		
	20	468.5			64		251	253	47	2.0		
	25	471.6			65		249	253	45	2.0		
	30	474.867										
TOTAL/AVG.	30.0	19.029		1.50	63.50							

FIELD DATA SHEET

Company: DESTEC / HIGH SIERRA COGEN
Test Location: UNIT 2 - OUTLET STACK
Test Method / Parameter: BAAQMD ST-1B / NH_3

Run #: #2 - UNIT 2
Date: 2-12-92
Operator: T. DELFINO

ENGINEERING–SCIENCE, INC.

Stack Dimensions
Barometric Pressure: 28.76 "Hg
Static Pressure: "H2O
Pitot Coeff.: 0.84
Filter #: UNTARED
Control Box #: BRT
Orifice dH@ / y: 1.88 / 1.003
Probe Type / Length: GL / 6'
Nozzle # / Size: N/A

IMPINGER CONTENTS, ml / grams				
Impinger	Contents	Final	Initial	Net
1	0.1N HCl	667.4	588.9	78.5
2	0.1N HCl	611.3	601.3	10.0
3	Dry	481.2	480.2	1.0
4				
5				
	Silica Gel	799.7	795.4	4.3
			TOTAL:	93.8

GAS COMPOSITION			
Time	O2	CO2	CO

LEAK RATE	cfm / lpm	"Hg Vacuum
Initial	.004	15"
Final	.001	5"

Sample Point	Time	Gas Meter (ft3 / liters)	dP "H2O	dH "H2O	Temperature, °F					Vacuum "Hg	Rotameter (liters/min)	Comments
					Meter	Stack	Probe	Oven	Impinger			
	1245											
center	0	475.048		1.5	63		251	252	52	3.0		
	5	478.2			64		256	257	50	3.0		
	10	481.4			65		251	253	48	3.0		
	15	484.6			66		247	252	47	3.0		
	20	487.8			67		246	251	47	3.0		
	25	490.9		↓	67		243	250	46	3.0		
	30	494.190										
TOTAL/AVG	30.0	19.142		1.50	65.33							

GAS SAMPLING
FIELD DATA SHEET

Company Destec; High Sierra Cogen
Test Location Units 1 & 2
Test Method / Parameter EPA Method 18 / HC

Date 2/12/92

ENGINEERING–SCIENCE, INC.

Sample Bag No.	Start Time	Rotameter (acfh) (cc/min)	End Time	Rotameter (acfh) (cc/min)	Total Time (min)	Leak Rate (acfh) (cc/min)	Comments: Bags purged twice prior to sampling. Gun
1	0810	600	0840	600	30.0	0.00	RUN #1 } UNIT #1
2	0850	600	0920	600	30.0	0.00	RUN #2 }
3	0930	600	1000	600	30.0	0.00	RUN #3 }
1	1130	600	1200	600	30.0	0.00	RUN #1 } UNIT #2
2	1210	600	1240	600	30.0	0.00	RUN #2 }
3	1250	600	1320	600	30.0	0.00	RUN #3 }

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HIGH SIERRA - LOG8 (DAILY)

1 GT-1 MWATTS
2 GAS FUEL FLOW
3 STEAM NOZZLE LOW FLOW ALARM
4 TURBINE 1 FUEL TO STEAM RATIO
5 STEAM CDP LOW FLOW ALARM
6 INLET CO CATALYTIC CONVERTER
7 SRC REACTOR INLET LOW TEMP SEL
8 TOTAL FUEL GAS FLOW TURBINE 1
9
10
11
12

HH:MM:SS	1 JI1964 MW AVG	2 W11BX AVG	3 W11BU AVG	4 W1STOF RATIO AVG	5 W11BV AVG	6 TE1402 DEG F AVG	7 T11456 DEG F AVG	8 G11FGTOT MMPPH AVG	9	10	11	12
14:00:00	25.1	11150.6	23330.8	2.09	26466.0	989.6	755.3	0.00				
15:00:00	25.1	11141.7	23284.8	2.09	26451.0	989.6	755.5	0.00				
16:00:00	25.1	11144.8	23336.0	2.09	26444.1	989.8	755.7	0.00				
17:00:00	25.1	11116.9	23216.5	2.09	26410.7	989.7	755.8	0.00				
18:00:00	25.0	11092.6	23125.0	2.08	26439.4	989.4	756.5	0.00				
19:00:00	25.1	11084.0	23100.6	2.08	26439.4	989.2	755.4	0.00				
20:00:00	25.1	11099.1	23206.6	2.09	26433.9	988.2	755.0	0.00				
21:00:00	25.3	11161.8	23383.8	2.10	26397.1	987.0	755.3	0.00				
22:00:00	25.3	11172.6	23409.4	2.10	26470.7	987.1	755.5	0.00				
23:00:00	25.3	11177.2	23355.0	2.09	26463.1	986.6	755.0	0.00				
00:00:00	25.3	11213.6	23399.6	2.09	26449.2	986.4	755.3	0.00				
01:00:00	25.3	11216.2	23419.7	2.09	26418.9	986.3	755.9	0.00				
02:00:00	25.4	11231.5	23438.3	2.09	26489.5	986.0	756.9	0.00				
03:00:00	25.4	11239.0	23423.6	2.08	26463.9	985.7	757.4	0.00				
04:00:00	25.4	11227.9	23446.5	2.09	26476.1	985.5	757.0	0.00				
05:00:00	25.4	11209.8	23458.7	2.09	26412.5	985.8	755.8	0.00				
06:00:00	25.3	11199.0	23416.4	2.09	26415.2	985.5	756.0	0.00				
07:00:00	25.4	11212.6	23387.4	2.09	26457.0	985.7	756.8	0.00				
08:00:00	25.4	11218.7	23397.8	2.09	26473.1	985.9	757.3	0.00				
09:00:00	25.4	11244.2	23467.9	2.09	26442.3	985.5	755.4	0.00				
10:00:00	25.4	11242.3	23433.9	2.08	26464.0	984.3	754.4	0.00				
11:00:00	25.3	11205.2	22687.7	2.02	26075.4	985.3	753.2	0.00				
12:00:00	25.1	11160.9	21760.7	1.95	25280.8	987.6	754.3	0.00				
13:00:00	25.5	11271.4	22214.2	1.97	27846.2	988.6	755.8	0.00				

Run #1
11,243.25 lb/hr

Run #2
11,223.75 lb/hr

SUMMARY DATA

AVG	25.3	11184.7	23212.6	2.08	26440.8	987.1	755.6	0.00
MAX	25.5	11271.4	23467.9	2.10	27846.2	989.8	757.4	0.00
TMAX	13:00:00	13:00:00	9:00:00	22:00:00	13:00:00	16:00:00	3:00:00	14:00:00
MIN	25.0	11084.0	21760.7	1.95	25280.8	984.3	753.2	0.00
TMIN	18:00:00	19:00:00	12:00:00	12:00:00	12:00:00	10:00:00	11:00:00	14:00:00

PD 12FE892 13:50:16

EMISSIONS MONITORING LOG3
HIGH SIERRA - LOG9 (DAILY)

LOG # 9 PAGE 1

1 GT-2 MWATTS
2 GAS FUEL FLOW
3 STEAM NOZZLE LOW FLOW ALARM
4 TURBINE 2 FUEL TO STEAM RATIO
5 STEAM CDP LOW FLOW ALARM
6 INLET CO CATALYTIC CONVERTER
7 COR NOX LEVEL AT STACK 02-101
8 COR CO LEVEL AT STACK 02-101
9 TOTAL FUEL GAS FLOW TURBINE 2
10 CEM SYSTEM IN CALIBRATION
11
12

HH:MM:SS	1 JI2964 MW AVG	2 W21BX AVG	3 W21BU AVG	4 W2S1OF RATIO AVG	5 W21BV AVG	6 TE2402 DEG F AVG	7 BLR2NOCR PPMVD AVG	8 BLR2COCR PPMVD AVG	9 G12FGTOT MMPPH AVG	10 XS1932 CALIBR	11	12
14:00:00	25.0	11179.8	17753.3	1.59	26961.3	983.38	2.3	27.1	150799.5	NORMAL		
15:00:00	24.9	11159.0	17679.5	1.58	26972.2	983.40	2.4	26.7	161971.7	NORMAL		
16:00:00	25.0	11180.2	17786.4	1.59	26982.2	983.17	2.2	27.2	173150.5	NORMAL		
17:00:00	25.1	11205.2	17792.0	1.59	26956.2	982.31	2.3	27.5	184357.1	NORMAL		
18:00:00	25.1	11199.5	17720.5	1.58	26985.2	981.82	2.4	27.6	195567.9	NORMAL		
19:00:00	25.1	11200.3	17722.8	1.58	26984.5	981.50	2.3	27.3	206780.3	NORMAL		
20:00:00	25.1	11191.4	17733.3	1.58	27018.0	980.63	2.5	27.1	217986.5	NORMAL		
21:00:00	25.1	11199.0	17724.5	1.58	27050.7	980.55	2.5	27.0	229191.3	NORMAL		
22:00:00	25.0	11157.4	17602.5	1.58	26995.0	981.61	2.4	26.6	240381.0	NORMAL		
23:00:00	24.7	11063.6	17240.2	1.56	27034.7	982.51	2.5	25.0	251487.7	NORMAL		
00:00:00	25.1	11201.7	17623.0	1.57	27004.6	981.58	2.4	26.9	262634.9	NORMAL		
01:00:00	24.9	11142.5	16756.6	1.50	26301.2	982.81	2.8	24.4	6639.42	NORMAL		
02:00:00	24.8	11108.6	16334.7	1.47	25961.5	983.65	3.1	21.4	16729.51	NORMAL		
03:00:00	24.9	11156.4	16493.3	1.48	25922.3	982.82	3.1	21.3	27874.29	NORMAL		
04:00:00	24.9	11136.6	16511.4	1.48	25901.3	982.46	3.2	21.2	39025.67	NORMAL		
05:00:00	24.8	11098.9	16369.9	1.47	25965.5	982.66	3.1	21.0	50161.18	NORMAL		
06:00:00	24.8	11126.5	16404.8	1.47	25920.2	982.58	3.1	20.9	61272.12	NORMAL		
07:00:00	24.9	11132.8	16461.4	1.48	25891.9	982.21	3.0	21.2	72415.98	NORMAL		
08:00:00	25.1	11195.3	16781.2	1.50	25933.3	976.79	3.0	22.1	83574.01	CALIBR		
09:00:00	22.3	10404.6	15428.9	1.46	14270.7	967.84	2.8	29.9	94566.93	NORMAL		
10:00:00	24.8	11094.3	17384.0	1.57	25228.4	936.96	2.3	28.0	105103.7	NORMAL		
11:00:00	25.1	11194.5	17259.0	1.54	26475.2	965.62	2.6	26.5	116318.1	NORMAL		
12:00:00	24.8	11107.8	17022.6	1.53	25848.8	977.13	2.8	25.2	127490.2	NORMAL		
13:00:00	24.3	10929.6	17157.8	1.57	26565.8	978.41	2.7	26.0	138497.5	NORMAL		

Run#1
11,018.45 lb/sec

Run#2
10,929.6 lb/hr

SUMMARY DATA

AVG	24.8	11115.2	17114.3	1.54	25963.8	978.51	2.7	25.2	133915.7			
MAX	25.1	11205.2	17792.0	1.59	27050.7	983.65	3.2	29.9	262634.9			
TMAX	21:00:00	17:00:00	17:00:00	16:00:00	21:00:00	2:00:00	4:00:00	9:00:00	0:00:00			
MIN	22.3	10404.6	15428.9	1.46	14270.7	936.96	2.2	20.9	6639.42			
TMIN	9:00:00	9:00:00	9:00:00	9:00:00	9:00:00	10:00:00	16:00:00	6:00:00	1:00:00			

PD 12FEB92 13:47:38 EMISSIONS MONITORING LOG1 LOG # 7 PAGE 1
HIGH SIERRA - LOG7 (12HR)

1 NOX LEVEL AT STACK 01-101
2 CO LEVEL AT STACK 01-101
3 COR NOX LEVEL AT STACK 01-101
4 COR CO LEVEL AT STACK 01-101
5 O2 LEVEL AT STACK 01-101
6 NOX LEVEL AT STACK 02-101
7 CO LEVEL AT STACK 02-101
8 COR NOX LEVEL AT STACK 02-101
9 COR CO LEVEL AT STACK 02-101
10 O2 LEVEL AT STACK 02-101
11 CEM SYSTEM IN CALIBRATION
12

HH:MM:SS	1 BLR1NOX PPMVD AVG	2 BLR1CO PPMVD AVG	3 BLR1NOCR PPMVD AVG	4 BLR1COCR PPMVD AVG	5 BLR1O2 PPMVD AVG	6 BLR2NOX PPMVD AVG	7 BLR2CO PPMVD AVG	8 BLR2NOCR PPMVD AVG	9 BLR2COCR PPMVD AVG	10 BLR2O2 PPMVD AVG	11 XS1932 CALIBR	12
02:00:00	3.22	27.62	2.5	21.2	13.17	3.99	27.04	3.0	21.1	13.28	NORMAL	
02:15:00	3.21	27.32	2.5	21.0	13.17	3.96	26.98	3.0	21.0	13.26	NORMAL	
02:30:00	3.22	27.40	2.5	21.1	13.17	3.96	27.58	3.0	21.4	13.24	NORMAL	
02:45:00	3.22	27.28	2.5	21.0	13.17	3.96	27.61	3.1	21.6	13.31	NORMAL	
03:00:00	3.21	27.18	2.5	20.9	13.17	4.07	27.02	3.2	21.2	13.33	NORMAL	
03:15:00	3.21	27.13	2.5	20.9	13.17	4.17	26.63	3.2	20.9	13.31	NORMAL	
03:30:00	3.20	27.10	2.5	20.9	13.17	4.15	26.97	3.2	21.3	13.37	NORMAL	
03:45:00	3.21	26.89	2.5	20.7	13.17	4.10	27.33	3.2	21.5	13.36	NORMAL	
04:00:00	3.22	26.89	2.5	20.7	13.17	4.03	27.20	3.0	21.2	13.27	NORMAL	
04:15:00	3.22	26.76	2.5	20.6	13.17	4.05	27.11	3.1	21.2	13.30	NORMAL	
04:30:00	3.22	26.95	2.5	20.7	13.17	4.22	26.61	3.2	20.9	13.33	NORMAL	
04:45:00	3.21	26.73	2.5	20.6	13.17	4.12	26.43	3.1	20.6	13.27	NORMAL	
05:00:00	3.22	26.89	2.5	20.7	13.17	3.96	26.95	3.1	21.1	13.31	NORMAL	
05:15:00	3.22	27.10	2.5	20.9	13.14	3.96	27.13	3.2	21.3	13.34	NORMAL	
05:30:00	3.21	26.92	2.5	20.7	13.17	4.04	26.67	3.1	20.7	13.24	NORMAL	
05:45:00	3.22	27.09	2.5	20.8	13.17	4.09	26.68	3.1	20.6	13.20	NORMAL	
06:00:00	3.22	26.96	2.5	20.7	13.17	3.96	26.95	3.0	20.9	13.23	NORMAL	
06:15:00	3.22	26.67	2.5	20.3	13.10	4.01	27.05	3.0	21.1	13.30	NORMAL	
06:30:00	3.22	26.53	2.5	20.3	13.17	4.11	26.90	3.1	21.1	13.32	NORMAL	
06:45:00	3.22	26.86	2.5	20.6	13.17	3.96	27.12	3.0	21.1	13.27	NORMAL	
07:00:00	3.21	26.98	2.5	20.8	13.17	3.96	27.35	3.0	21.3	13.27	NORMAL	
07:15:00	3.22	26.91	2.5	20.6	13.17	3.96	27.19	3.0	21.2	13.27	NORMAL	
07:30:00	3.21	26.94	2.5	20.5	13.11	3.96	27.34	3.0	21.3	13.27	NORMAL	
07:45:00	3.22	27.17	2.5	20.8	13.16	3.91	28.45	3.0	22.2	13.28	NORMAL	
08:00:00	3.22	27.22	2.5	20.9	13.17	3.71	30.73	3.0	23.9	13.27	CALIBR	
08:15:00	3.22	27.74	2.5	21.3	13.17	3.64	31.18	2.9	24.3	13.27	NORMAL	
08:30:00	3.22	28.39	2.5	21.8	13.16	5.08	28.86	4.2	22.8	13.43	NORMAL	
08:45:00	3.22	27.90	2.5	21.4	13.17	3.02	42.11	2.5	33.7	13.45	NORMAL	
09:00:00	3.22	27.58	2.5	21.1	13.13	1.72	46.65	1.5	39.0	13.81	NORMAL	
09:15:00	3.22	28.03	2.5	21.3	13.09	2.16	38.42	1.8	31.8	13.70	NORMAL	
09:30:00	3.17	28.66	2.4	21.9	13.13	3.28	34.55	2.5	27.2	13.35	NORMAL	
09:45:00	3.22	28.37	2.5	21.8	13.17	3.31	34.20	2.5	26.7	13.28	NORMAL	
10:00:00	3.22	28.35	2.5	21.8	13.17	3.23	33.36	2.5	26.4	13.37	NORMAL	
10:15:00	3.22	28.40	2.5	21.9	13.17	3.24	34.17	2.5	26.9	13.36	NORMAL	
10:30:00	3.22	28.27	2.5	21.7	13.17	3.22	34.12	2.5	26.9	13.36	NORMAL	
10:45:00	3.52	25.94	2.6	19.8	13.13	3.28	33.45	2.6	26.2	13.30	NORMAL	
11:00:00	3.96	23.59	3.0	18.1	13.15	3.47	32.80	2.7	25.9	13.37	NORMAL	
11:15:00	3.97	23.61	3.0	18.1	13.17	3.47	32.54	2.7	25.7	13.37	NORMAL	
11:30:00	3.97	23.57	3.0	18.1	13.18	3.47	32.43	2.7	25.6	13.33	NORMAL	
11:45:00	3.97	23.44	3.0	18.0	13.18	3.47	32.07	2.7	25.3	13.38	NORMAL	
12:00:00	4.14	23.04	3.2	17.7	13.18	3.54	30.67	2.8	24.2	13.38	NORMAL	
12:15:00	4.09	22.62	3.1	17.3	13.12	3.80	27.98	3.1	22.1	13.37	NORMAL	
12:30:00	3.97	23.78	3.0	18.1	13.08	3.91	27.15	3.2	21.5	13.37	NORMAL	
12:45:00	3.97	24.36	3.0	18.5	13.08	2.91	38.82	2.2	30.6	13.37	NORMAL	
13:00:00	3.97	24.12	3.0	18.3	13.07	2.76	38.01	2.2	30.0	13.38	NORMAL	
13:15:00	3.97	23.33	3.0	17.9	13.15	2.89	37.38	2.2	29.5	13.36	NORMAL	

HIGH SIERRA - LOG7 (12HR)

HH:MM:SS	1 BLR1NOX PPMVD AVG	2 BLR1CO PPMVD AVG	3 BLR1NOCR PPMVD AVG	4 BLR1COCR PPMVD AVG	5 BLR1O2 PPMVD AVG	6 BLR2NOX PPMVD AVG	7 BLR2CO PPMVD AVG	8 BLR2NOCR PPMVD AVG	9 BLR2COCR PPMVD AVG	10 BLR2O2 PPMVD AVG	11 XS1932 CALIBR	12
13:45:00	3.97	23.36	3.0	18.0	13.17	3.47	30.82	2.7	24.3	13.38	NORMAL	

SUMMARY DATA

AVG	3.42	26.36	2.6	20.2	13.16	3.67	30.51	2.9	24.0	13.34	
MAX	4.14	28.66	3.2	21.9	13.18	5.08	46.65	4.2	39.0	13.81	
TMAX	12:00:00	9:30:00	12:00:00	9:30:00	12:00:00	8:30:00	9:00:00	8:30:00	9:00:00	9:00:00	
MIN	3.17	22.62	2.4	17.3	13.07	1.72	26.43	1.5	20.6	13.20	
TMIN	9:30:00	12:15:00	9:30:00	12:15:00	13:00:00	9:00:00	4:45:00	9:00:00	5:45:00	5:45:00	

SECTION 8

QUALITY ASSURANCE

SECTION 8
QUALITY ASSURANCE

This report has been reviewed for technical and editorial quality and for compliance with project requirements.

All equipment used in testing has been checked for proper maintenance and calibrated prior to testing. Test equipment calibrations have been included in the appendix of this report. The dry gas meter accuracy was expressed as gamma and was determined as the difference between the meter box dry gas meter and the wet test meter used for calibration. The results of the orifice calibration are expressed as the delta H@ (dH@) at various pressure drops (inches of water), as specified in EPA publication APTD-0576. EPA Quality Assurance Branch annual audits are performed with an orifice check of each of the dry gas meters used for volumetric sampling.

Sample probe, filter, meter and impinger temperatures were monitored using a type-K thermocouple connected to a digital readout. The temperature readout and thermocouples were calibrated against an NIST certified thermometer. The calibrations are performed every six months using the procedures specified in the EPA Quality Assurance Handbook For Air Pollution Measurement Systems, 600/4-77-027b, Volume III, Stationary Source Methods.

At the conclusion of each test run the sampling train was leak checked at a vacuum equal to or greater than the highest vacuum observed during the test. The sampling train was considered leak free if the leak rate was less than 0.02 CFM, or 4% of sampling rate, whichever was less.

The analyzers employed for continuous monitoring of NO_x, CO, CO_2, and O_2 were California Air Resources Board (CARB) approved instruments. Sampling system bias checks of the continuous monitor sampling system was performed using either the EPA protocol 1 or NIST certified calibration gases (certificate copies included). All

other checks of the continuous monitor system required by the regulatory agency methodology were also performed.

All field samples were labeled and logged in on a chain-of-custody sheet. Chain-of-custody sheets remained with samples and documented sample movement. All laboratory data were recorded in bound laboratory notebooks. All weights were conducted on a calibrated Sartorius digital analytical balance. All analytical glassware used was NBS Class A. All reagents used in the field and in the laboratory were at least ACS reagent grade. Blanks of these reagents were evaluated for every set of tests.

SAMPLE SYSTEM BIAS CHECK

COMPANY High Sierra Cogen

TEST LOCATION Outlet Stack

DATE 2-12-92

OPERATOR T. DeFino

Parameter	Instrument Full Scale	Span Gas Value	Scale	Internal Response	System Response	Percent Difference
O2	25%		Zero	0.00		
		14.07	Upscale	14.07	14.00	0.50
CO2	20%		Zero	0.00		
		9.02	Upscale	9.02	9.00	0.22
NOx	10 ppm		Zero	-0.02		
		5.64	Upscale	5.70	5.57	2.28
CO	100 ppm		Zero	0.70		
		45.0	Upscale	43.0	43.8	1.86
SO2			Zero			
			Upscale			
HC			Zero			
			Upscale			
			Zero			
			Upscale			

For EPA :
Percent Difference = [(System Response – Internal Response) / Instrument Full Scale] x 100

For Kern County :
Percent Difference = [(Internal Response – System Response) / Internal Response] x 100

DRY GAS METER AND ORIFICE CALIBRATION

Meter Box # Brown IV Barometric Press. 29.60 IN. HG.

Date 31-Dec-91 Performed by G. McRae

Calibration Meter Y 1.00014

	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6
VACUUM ("Hg)	0	0	0	0	0	0
dHw ("H2O)	0.00	0.00	0.00	0.00	0.00	0.00
dHd ("H2O)	0.50	1.00	1.50	2.00	3.00	4.00
INITIAL WTM	443.226	409.808	451.371	465.292	480.789	499.808
FINAL WTM	451.022	421.671	464.948	480.325	499.425	521.040
INITIAL DGM	112.025	78.138	120.312	134.419	150.112	169.334
FINAL DGM	119.957	90.152	134.081	149.645	168.949	190.771
TEMP. WTM ("F)	64.5	49.5	54.5	56.5	57.5	58.5
TEMP. DGM ("F)	65.0	61.8	67.3	70.3	64.8	77.3
TEST TIME (MIN.)	20.0	22.0	21.0	20.0	20.0	20.0
CALCULATIONS :						
NET VOLUME WTM (Vw)	7.797	11.865	13.579	15.035	18.639	21.235
NET VOLUME DGM (Vd)	7.932	12.014	13.769	15.226	18.837	21.437
Y	0.983	1.009	1.007	1.009	0.996	1.016
ACCEPTABLE Y RANGE = 0.983 TO 1.023						
dH@	1.85	1.83	1.93	1.91	1.89	1.90
ACCEPTABLE dH@ RANGE = 1.73 TO 2.03						

AVERAGE Y = 1.003

AVERAGE dH@ = 1.88

CALCULATIONS :

Y = (Vw (Pb – (dHw / 13.6)) x (Td + 460)) / (Vd (Pb + (dHd / 13.6)) x (Tw + 460)

dH@ = 0.0317 x dHd / (Pb (Td + 460)) x ((Tw + 460) x time) / Vw) ^ 2

Thermometer / Pyrometer Calibration

Date : Jan 3, 1992

Calibrated by : Chas. McRae

I.D. : Brown IV Pyrometer

Reference Point #	Reference * Temperature °F	Pyrometer Temperature °F	Temperature difference ** %
1	33	33	0.00
2	89	90	−1.12
3	197	198	−0.51
4	298	299	−0.34
5	401	401	0.00
6	500	499	0.20
7	602	603	−0.17
8	699	699	0.00
9	804	804	0.00
10	900	899	0.11
11	1001	1000	0.10
12	1198	1197	0.08
13	1400	1398	0.14
14	1600	1596	0.25
15	1800	1795	0.28
16	1998	1997	0.05

* Digital Calibrator Thermometer, S/N 28494/991
−60 °F to 1999 °F

** Allowable % difference = 5 %

SCOTT-MARRIN, INC.
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(714) 653-6780

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

ENSI01

TO:
T.J. WIEMAN
ENGINEERING SCIENCES, INC.
P.O. BOX 2007
IRWINDALE, CA 91706

DATE : 10/08/91

CUSTOMER ORDER NUMBER: VERBAL C.HOLT

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC28366				
Oxygen	14.07 ± 0.14 %	GMIS Cylinder # CC12213 @ 23.89 %	Varian Model 1868 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 10/04/91	03/17/93	09/17/91 14.16 % 14.05 % 14.00 % Mean: 14.07 %
Carbon Dioxide	9.02 ± 0.09 %	GMIS Cylinder # CC68263 @ 17.60 %	Varian Model 1868 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 08/21/91	03/13/93	09/13/91 8.89 % 9.04 % 9.03 % Mean: 9.02 %
Nitrogen	Balance				
Cylinder Pressure: 2000 psig					
CYLINDER NO.:	CC81191				
Oxygen	14.06 ± 0.14 %	GMIS Cylinder # CC12213 @ 23.89 %	Varian Model 1868 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 10/04/91	03/17/93	09/17/91 14.05 % 14.07 % 14.04 % Mean: 14.06 %
Carbon Dioxide	8.97 ± 0.09 %	GMIS Cylinder # CC68263 @ 17.60 %	Varian Model 1868 S/N None Thermal Conductivity Gas Chromatography Last Cal Date: 08/21/91	03/13/93	09/13/91 8.97 % 8.96 % 8.97 % Mean: 8.97 %
Nitrogen	Balance				
Cylinder Pressure: 2000 psig					

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol 1, Section 3.0.4, Procedure G1.

Analyst: M.S. Calhoun Approved: J.T. Marrin

Our only liability of this company for gas which fails to comply with this analysis shall be replacement or reanalysis thereof by the company without extra cost.

STANDARD CALIBRATION GASES IN ALUMINUM CYLINDERS

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: FI-1144-26

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.: CC12823					03/25/91	04/08/91
Carbon Monoxide	6.83 ± 0.18 ppm	GMIS Cylinder # CC163 @ 6.65 ppm	Carle Insts Model 0000 S/N 0849 Methanation/FID Gas Chromatography Last Cal Date: 04/16/91	10/02/92	6.80 ppm	6.86 ppm
					6.86 ppm	6.79 ppm
					[illegible]	[illegible]
Nitrogen	Balance				Mean: 6.86 ppm	6.80 ppm
Cylinder Pressure: 2000 psig						
CYLINDER NO.: CC56894					03/26/91	04/02/91
Nitric Oxide	9.29 ± 0.19 ppm	GMIS Cylinder # CC7365 @ 10.63 ppm	Monitor Labs Model 8440 S/N 136 Continuous Chemiluminescence Last Cal Date: 01/31/91	10/02/91	9.37 ppm	9.27 ppm
					9.30 ppm	9.29 ppm
					9.14 ppm	9.28 ppm
Nitrogen, O2-Free Balance					Mean: 9.30 ppm	9.28 ppm
Cylinder Pressure: 2000 psig						
CYLINDER NO.: CC28278					03/26/91	04/02/91
Nitric Oxide	13.17 ± 0.26 ppm	GMIS Cylinder # CC84063 @ 10.31 ppm	Monitor Labs Model 8440 S/N 136 Continuous Chemiluminescence Last Cal Date: 01/31/91	10/02/91	13.21 ppm	13.14 ppm
					13.15 ppm	13.18 ppm
					13.21 ppm	13.08 ppm
					Mean: 13.20 ppm	13.13 ppm
					03/27/91	04/03/91
Carbon Monoxide	13.05 ± 0.26 ppm	GMIS Cylinder # CC12160 @ 17.79 ppm	Carle Insts Model 0000 S/N 0849 Methanation/FID Gas Chromatography Last Cal Date: 04/16/91	10/03/91	13.16 ppm	13.04 ppm
					13.02 ppm	13.02 ppm
					13.04 ppm	[illegible]
Nitrogen, O2-Free Balance					Mean: 13.04 ppm	13.05 ppm
Cylinder Pressure: 2000 psig						

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

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TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
EPA PROTOCOL GAS MIXTURES

RMSI61
TO: HUMBERT DERIADA
ENGINEERING SCIENCES, INC.
6868 N. IRWINDALE AVE.
SUITE J
IRWINDALE, CA 98607

DATE : 04/05/91

CUSTOMER ORDER NUMBER: FI-1144-26

COMPONENT	CONCENTRATION(v/v)	REFERENCE STANDARD	ANALYZER MAKE,MODEL,S/N,DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA
CYLINDER NO.:	CC7219				
			Monitor Labs Model 8440		03/26/91 04/02/91
Nitric Oxide	23.26 ± 0.23 ppm	GMIS	S/N 136	10/02/91	23.26 ppm 23.18 ppm
		Cylinder #	Continuous		23.24 ppm 23.22 ppm
		CC90635	Chemiluminescence		23.24 ppm 23.18 ppm
		@ 50.0 ppm	Last Cal Date: 01/31/91	Mean:	23.31 ppm 23.20 ppm
			Carle Instr Model 8000		03/28/91 04/03/91
Carbon Monoxide	23.26 ± 0.23 ppm	GMIS	S/N 8248	10/05/91	23.04 ppm 23.16 ppm
		Cylinder #	Methanation/FID		22.97 ppm 23.23 ppm
Nitrogen,O2-Free Balance		CC90863	Gas Chromatography		23.31 ppm 23.20 ppm
Cylinder Pressure: 2000 psig		@ 41.0 ppm	Last Cal Date: 04/16/91	Mean:	23.10 ppm 23.27 ppm
CYLINDER NO.:	CC49684				
			Monitor Labs Model 8440		03/26/91 04/02/91
Nitric Oxide	5.63 ± 0.11 ppm	GMIS	S/N 136	10/02/91	5.64 ppm 5.66 ppm
		Cylinder #	Continuous		5.63 ppm 5.64 ppm
		CC7305	Chemiluminescence		5.61 ppm 5.59 ppm
		@ 10.03 ppm	Last Cal Date: 01/31/91	Mean:	5.63 ppm 5.63 ppm
			Carle Instr Model 8000		03/27/91 04/03/91
Carbon Monoxide	6.24 ± 0.12 ppm	GMIS	S/N 8249	10/03/91	6.25 ppm 6.23 ppm
		Cylinder #	Methanation/FID		6.19 ppm 6.25 ppm
Nitrogen,O2-Free Balance		CC163	Gas Chromatography		6.22 ppm 6.27 ppm
Cylinder Pressure: 2000 psig		@ 9.85 ppm	Last Cal Date: 04/16/91	Mean:	6.22 ppm 6.25 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

Analyst: Mark Monson
M.J. Monson

Approved:
J.T. Marrin

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: FI-1216-24

COMPONENT	CONCENTRATION (v/v)	REFERENCE STANDARD	ANALYZER MAKE, MODEL, S/N, DETECTION	EXPIRATION DATE	REPLICATE ANALYSIS DATA	
CYLINDER NO.:	[redacted]					
[redacted]	[redacted]	GMIS Cylinder # CC88868 @ 102.4 ppm	Monitor Labs Model 8440 S/N 136 Continuous Chemiluminescence Last Cal Date: 08/07/91	03/04/92	08/28/91 90.0 ppm 90.8 ppm 90.6 ppm Mean: 90.8 ppm	09/04/91 90.9 ppm 91.1 ppm 90.8 ppm 91.0 ppm
Carbon Monoxide 90.3 ± 0.9 ppm Nitrogen, O2-Free Balance Cylinder Pressure: 2000 psig		GMIS Cylinder # CC81221 @ 106.7 ppm	Carle Insts Model 8668 S/N 8249 Methanation/FID Gas Chromatography Last Cal Date: 09/10/91	03/11/92	09/04/91 90.5 ppm 90.0 ppm 90.2 ppm Mean: 90.2 ppm	09/11/91 90.0 ppm 90.1 ppm 90.0 ppm 90.3 ppm

ppm = umole/mole % = mole-%

The above analyses were performed in accordance with EPA-1987 Traceability Protocol # 1, Section 3.0.4, Procedure G1.

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: Nik Nielsen/Reanalysis

CYLINDER NUMBER [redacted]

COMPONENT	CONCENTRATION (v/v)
Carbon Monoxide	45.0 ± 0.5 ppm
[redacted]	[redacted]
Nitrogen*	Balance

*Oxygen-Free

Cylinder Pressure: 1500 psig

Replicate	5/14/91	45.2 ppm
Analysis		45.3 ppm
Data On		45.7 ppm
CO:	Mean	45.4 ppm

Expiration Date CO: 11/14/91

Replicate	5/21/91	89.7 ppm
Analysis		89.4 ppm
Data On		89.4 ppm
NO:	Mean	89.5 ppm

Expiration Date NO: 5/1/91

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: Nik Nielsen/Reanalysis

CYLINDER NUMBER [redacted] CYLINDER NUMBER _____

COMPONENT	CONCENTRATION (v/v)	COMPONENT	CONCENTRATION (v/v)

(The Carbon Monoxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC66863 at 42.1 ppm Carbon Monoxide in Ultrapure Air. The analysis was performed using a Carle Model 8000 gas chromatograph with catalytic methanation/flame ionization detection. The last multipoint calibration was performed 4/16/91.)

CYLINDER NUMBER [redacted] CYLINDER NUMBER _____

COMPONENT	CONCENTRATION (v/v)	COMPONENT	CONCENTRATION (v/v)

(The Nitric Oxide analysis was performed in accordance with Section 3.0.4 of the revised EPA traceability protocol No. 1 dated June 9, 1987. The analysis is traceable to the National Institute of Standards and Technology by direct intercomparison with GMIS, cylinder number CC12643 at 99.4 ppm Nitric Oxide in Oxygen-Free Nitrogen. The analysis was performed using a Monitor Labs Model 8440, S/N 136 analyzer with continuous chemiluminescence detection. The last multipoint calibration was performed 5/1/91.)

CYLINDER NUMBER _____ CYLINDER NUMBER _____

COMPONENT	CONCENTRATION (v/v)	COMPONENT	CONCENTRATION (v/v)

CYLINDER NUMBER _____ CYLINDER NUMBER _____

COMPONENT	CONCENTRATION (v/v)	COMPONENT	CONCENTRATION (v/v)

SCOTT - MARRIN, INC. 2001 THIRD ST., UNIT H RIVERSIDE, CALIFORNIA 92507

REPORT OF ANALYSIS

CUSTOMER ORDER NUMBER: Nik Nielson/Reanalysis

CHRONOLOGICAL RECORD OF CERTIFIED CONCENTRATIONS

CYLINDER NUMBER: [redacted]

DATE	Carbon Monoxide	Nitric Oxide	
3/6/90	44.9 ppm	89.1 ppm	
3/15/90		89.4 ppm	
3/19/90	44.6 ppm		
10/29/90		89.3 ppm	
11/01/90	44.9 ppm		
5/14/91	45.4 ppm		
5/21/91		89.5 ppm	
AVERAGE	[redacted]	89.3 ppm	

ENGINEERING SCIENCE, INC.
2520 Pegasus Drive
Bakersfield, CA 93308
(805) 393-0272

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:	Analysis Required
BK0198	Destec (High Sierra and Double C)	G. McRae	ES in Irwindale	NH3
Samples Collected By: G. McRae	Regulatory Agency (EPA, CARB, SCAQMD, etc.): KCAPCD		By: L. McRae	

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	NH3
BK9202022	2/12/92	BAAQMD ST-1B – Run #1 – Gas Turbine Unit #1 (High Sierra)	Marked	.1N HCl	use Destec Kern Front Blank	X
BK9202023		BAAQMD ST-1B – Run #2 – Gas Turbine Unit #1				X
BK9202024		BAAQMD ST-1B – Run #1 – Unit #2 Gas Turbine				X
BK9202025	↓	BAAQMD ST-1B – Run #2 – Unit #2 Gas Turbine	↓	↓	↓	X
		(Double C)				
BK9202026	2/13/92	BAAQMD ST-1B – Run #1 – Unit #1 Gas Turbine	Marked	.1N HCl	use Destec Kern Front Blank	X
BK9202027		BAAQMD ST-1B – Run #2 – Unit #1 Gas Turbine				X
BK9202028		BAAQMD ST-1B – Run #1 – Unit #2 Gas Turbine				X
BK9202029	↓	BAAQMD ST-1B – Run #2 – Unit #2 Gas Turbine	↓	↓	↓	X

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
G. McRae Gary McRae Phone: (805) 393-0272	2/13/92	Linda McRae Linda McRae Of: ES	
Relinquished By: (Sign & Print) Linda McRae Linda McRae Phone: (805) 393-0272	Date/Time 2/13/92	Received By: (Sign & Print) Of:	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments:

L...INE...NG (..EN(_, .NC(
2520 Pegasus Drive
Bakersfield, CA 93308
(805) 393-0272

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:	Analysis Required
BK019	Destec Kern Front	G. McRae	ES in Irwindale	NH3
Samples Collected By: G. McRae	Regulatory Agency (EPA, CARB, SCAQMD, etc.): KCAPCD		By: L. McRae	

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	NH3
BK9202009	2/11/92	BAAQMD ST-1B - Run #1 - Unit #1 Gas Turbine	marked	.1N HCl		X
BK9202010	2/11/92	BAAQMD ST-1B - Run #2 - Unit #1 Gas Turbine	↓	↓		X
BK9202011	2/11/92	BAAQMD ST-1B - Run #1 - Unit #2 Gas Turbine				X
BK9202012	2/11/92	BAAQMD ST-1B - Run #2 - Unit #2 Gas Turbine				X
BK9202013	2/11/92	BAAQMD ST-1B - Blank - All units				X

Relinquished By: (Sign & Print)	Date/Time	Received By: (Sign & Print)	Comments:
G. McRae Gary McRae Phone: (805) 393-0272	2/11/92	Linda McRae Linda McRae Of: ES	
Linda McRae Linda McRae Phone: (805) 393-0272		Of:	
Phone:		Of:	

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Bakersfield, CA 93308
(805) 393-0272

30488

CHAIN OF CUSTODY RECORD

Project No.	Project Name	Project Manager	Samples Sent To:	Analysis Required
BK018	Destec - High Sierra	G. McRae	Zalco Laboratories	HC, CHDLS, Btu, GCV
Samples Collected By: G. McRae	Regulatory Agency (EPA, CARB, SCAQMD, etc.): KCAPCD		By: L. McRae	

ES Lab Control No.	Test Date	Field Sample ID (Method-Run#-Sample Source)	Sample Amount	Sample Medium	Comments	HC	CHDLS	Btu	GCV
BK9202014	2/12/92	EPA M18 - Run# 1 - Unit #1 Gas Turbine		Air	Tedlar Bag	X			
BK9202015	"	EPA M18 - Run #2 - Unit #1 Gas Turbine		"	"	X			
BK9202016	"	EPA M18 - Run #3 - Unit #1 Gas Turbine		"	"	X			
BK9202017	"	EPA M18 - Run #1 - Unit #2 Gas Turbine		"	"	X			
BK9202018	"	EPA M18 - Run #2 - Unit #2 Gas Turbine		"	"	X			
BK9202019	↓	EPA M18 - Run #3 - Unit #2 Gas Turbine		↓	↓	X			
BK9202020	2/12/92	Fuel Gas - High Sierra		Fuel	Bomb #17		X	X	X
BK9202021	↓	Fuel Gas - High Sierra		↓	Bomb #23	Back-up only			

Relinquished By: (Sign & Print) L. McRae Phone: (805) 393-0272	Date/Time 2/12/92	Received By: (Sign & Print) L. McRae Of: ES	Comments:
Relinquished By: (Sign & Print) L. McRae Phone: (805) 393-0272	Date/Time 2/13/92	Received By: (Sign & Print) Sheila Rawlins Of: ZALCO 2-13-92 8:25	Comments:
Relinquished By: (Sign & Print) Phone:	Date/Time	Received By: (Sign & Print) Of:	Comments: