Laidlaw Gas Recovery Systems

Newby Island Plant #1

Emissions Testing

Test Date: Sept. 22 & Oct. 9, 1992

BEST ENVIRONMENTAL, INC.
15890 Foothill Boulevard
San Leandro, California 94578
(510) 278-4011 FAX (510) 278-4018

October 9, 1992

Laidlaw Gas Recovery Systems
39899 Balentine Dr. Suite 275
Newark, CA. 94560

Attn: Mr. Matt L. Nourot, Mechanical Engineer

Subject: Newby Island Plant Site #1 I.C. Engine's Emissions Test

Test Dates: September 22 and October 9, 1992

Sampling Location: Muffler outlets of the #1 and 2 I.C. engines operated at Gas Recovery Systems Newby Island Plant #1 site in Milpitas, California.

Sampling Personnel: Jeff Mesloh and Dan Cartner of BEST ENVIRONMENTAL.

Process Description: Gas Recovery Systems operates seven engines at the Newby Island Plant. The two engines tested were Cooper Superior Model 8G825 I.C. engines with a maximum power rating of 500 KW. During the test runs each engine operated at 450 kilowatts and burned landfill gas fuel.

Test Program: Three thirty minute test runs for NOx, CO, CO2, O2, THC, and TNMHC were performed at the engine muffler 1 & 2 outlets. Stack gas temperatures, moisture content and volumetric flowrates were determined at both locations.

Sampling Methods: The following Source Test Methods of the Bay Area Air Quality Management District (BAAQMD) and the California Air Resources Board (CARB) were used:

Method ST-17	Stack Velocity and Volumetric Flow Rate
Method ST-23	Water Vapor Sampling
CARB 1-100	Continuous NOx, O2, CO2, CO, THC

Instrumentation:

TECO Model 10 NOx analyzer
Horiba Model PIR 2000 CO2 analyzer
Infrared Model IR-2200 O2 analyzer
TECO Model 48 CO analyzer
Bendix Model 8401 Hydrocarbon analyzer
Standard pitot tube, inclined manometer, thermocouple
Calibrated Dry Gas Meter
All Glass Impingers
Hewlett Packard Chart Recorders

Calibrated Omega Temperature Meter

Test Results: Table 1 presents the results of the #1 engine emissions tests. Average NOx concentration and emission rates were 184.3 ppm and 1.60 lbs/hr or 1.14 grams/Bhp-hr. CO concentration and emission rates were 1.0 ppm and 0.01 lbs/hr or 0.004 grams/Bhp-hr. No detectable level of TNMHC was measured.

Table 2 presents the results of the #2 engine emissions tests. Average NOx concentration and emission rates were 500 ppm and 4.16 lbs/hr or 2.97 grams/Bhp-hr. CO concentration and emission rate were 1086 ppm and 5.50 lbs/hr or 3.93 grams/Bhp-hr. No detectable level of TNMHC was measured.

Field data sheets, strip chart recordings, calibration gas certifications and volumetric flowrate calculations are appended to this report. If there are any questions, please call Dan Cartner at (415) 784-0706.

Submitted by,

Dan Cartner

Dan Cartner
Source Test Engineer

Laidlaw
Newby Island
Engine #1

TABLE 1
CEMS TEST RESULTS

TEST TEST LOCATION	1 OUTLET	2 OUTLET	3 OUTLET	AVERAGE
TEST TIME	0926-0956	1002-1032	1038-1108	
TEST DATE	09-22-92	09-22-92	09-22-92	
FLOWRATE, SDCFM	1,212	1,212	1,212	1,212
OUTPUT, KW	450	450	450	
O2, %	0.6	0.6	0.6	0.6
CO2, %	17.0	17.0	17.2	17.07
H2O, %	17.4	17.4	17.4	17.40
NOx, ppm	178.0	187.0	188.0	184.3
NOx, ppm corr. 3%, O2	157.0	164.9	165.8	162.54
NOx, lbs/hr	1.55	1.63	1.64	1.60
NOx, gr/Bhp-hr	1.106	1.162	1.168	1.145
CO, ppm	1.0	1.0	1.0	1.0
CO, lbs/hr	0.01	0.01	0.01	0.01
CO, gr/Bhp-hr	0.004	0.004	0.004	0.004
THC, ppm	1947.0	1688.0	1657.0	1764.00
TNMHC, ppm	< 25.0	< 25.0	< 25.0	< 25.0
TNMHC, lbs/hr	< 0.08	< 0.08	< 0.08	< 0.08
TNMHC, gr/Bhp-hr	< 0.054	< 0.054	< 0.054	< 0.054

WHERE,
NOx = Oxides of Nitrogen
THC = Tot. Hydrocarbons @CH4
TNMHC = Tot. Non-methane Hydrocarbons @CH4
ppm = Parts Per Million Concentration
lbs/hr = Pounds Per Hour Emission Rate
CO = Carbon Monoxide
CO2 = Carbon Monoxide

Calculations,
lbs/hr = ppm x SDCFM x (1.56e-7) x Mol. Wt.
gr/Bhp-hr = (lbs/hr)(453.6g/lb) / (kw/(.746 x 95%))

LAIDLAW
Newby Island
Engine #2

TABLE 2
CEMS TEST RESULTS

TEST TEST LOCATION	1 OUTLET	2 OUTLET	3 OUTLET	AVERAGE
TEST TIME	1142-1213	1220-1250	1254-1324	
TEST DATE	10-09-92	10-09-92	10-09-92	
FLOWRATE, SDCFM	1,160	1,160	1,160	1,160
OUTPUT, KW	450	450	450	
O2, %	1.5	1.4	1.5	1.5
CO2, %	17.2	17.4	17.4	17.33
H2O, %	16.6	16.6	16.6	16.60
NOx, ppm	520.0	480.0	500.0	500.0
NOx, ppm corr. 3%, O2	479.8	440.6	461.3	460.58
NOx, lbs/hr	4.33	4.00	4.16	4.16
NOx, gr/Bhp-hr	3.092	2.854	2.973	2.973
CO, ppm	1138.0	1045.0	1075.0	1086.0
CO, lbs/hr	5.77	5.29	5.45	5.50
CO, gr/Bhp-hr	4.119	3.783	3.891	3.931
THC, ppm	25.0	25.0	25.0	25.00
TNMHC, ppm	< 5.0	< 5.0	< 5.0	< 5.0
TNMHC, lbs/hr	< 0.01	< 0.01	< 0.01	< 0.01
TNMHC, gr/Bhp-hr	< 0.010	< 0.010	< 0.010	< 0.010

WHERE,
- NOx = Oxides of Nitrogen
- THC = Tot. Hydrocarbons @CH4
- TNMHC = Tot. Non-methane Hydrocarbons @CH4
- ppm = Parts Per Million Concentration
- lbs/hr = Pounds Per Hour Emission Rate
- CO = Carbon Monoxide
- CO2 = Carbon Monoxide

Calculations,
- lbs/hr = ppm x SDCFM x (1.56e-7) x Mol. Wt.
- gr/Bhp-hr = (lbs/hr)(453.6g/lb) / (kw/(.746 x 95%))

APPENDIX

BEST ENVIRONMENTAL
STACK VOLUMETRIC FLOW RATE DETERMINATION

LAIDLAW
Engine #1

Date: 9-22-92
Location: Outlet
Time: 1010

1. Temperature of Stack (Ts)	1294	F
2. Square Root of Delta P (√P)	1.109	"H20
3. Barometric Pressure (Pb)	29.98	"Hg
4. Stack Static Pressure	4	"H20
5. Percent of H20 in Stack	17.5	%
6. Mol. Weight of Stack Gas (MWs)	28.51	
A. Percent O2	3.6	%
B. Percent CO2	17	%
C. Percent CO	0	%
7. Area of Stack (As)	0.601	ft2
8. Pitot Tube Factor (Cp)	0.99	

STACK GAS VELOCITY (Vs)	133.79	ft/sec
STACK GAS VOLUMETRIC FLOWRATE (Qs)	1,212	SDCFM
STACK GAS VOLUMETRIC FLOWRATE (Qa)	4,825	ACFM

Vs = velocity of the stack gas (ft/sec)
Qs = Volumetric flowrate at standard conditions
MWs = Mol.Wt.Stack Gas wet
MWd = Mol. Wt. Stack Gas dry
Ps = stack pressure
Delta P = differential pressure measured by the pitot

Calculations,

MWs = MWd x (1-Bwo) + 18 (Bwo)
MWd = .44 (%CO2) + .32 (%O2) + .28 (%CO + %N2)
Ps = static /13.6 + Pb
Vs = 85.49 x (Cp) x sqrt P x (Ts+460) / (PsxMws)
Qs = 1058.8 (1-Bwo) x Vs x As x Ps / (Ts+460)
Qa = 60 x Vs x As

BEST ENVIRONMENTAL
MOISTURE DETERMINATION

LAIDLAW
Engine #1

Date: 9-22-92
Method: CARB M4
Time: 0925-0955
Fuel: Landfill Gas
RUN#: 1

1. Uncorrected Meter Volume (Vm)	17.691	ft3
2. Meter Factor (Yd)	0.9912	
3. Barometric Pressure (Pb)	29.98	" Hg
4. Meter Pressure (^H)	0.2	" H20
5. Meter Temperature (Tm)	75.4	F
6. Std. Temperature (Tstd)	70.0	F
7. Impinger H20 Gain (Vw)	72.0	ml
8. Silica Gel Wt. Gain (Vw)	6.5	gm
9. Moisture Vapor (Vw std)	3.71	ft3
Std. Meter Volume (Vm std)	17.402	ft3
Percent of H20 in Stack (% H20)	17.58	%

ft3 = Cubic Feet
Hg = Mercury
F = Fahrenheit
ml = milliliters
gm = grams
% = Percent

Calculations,

Moisture Vapor = 0.00267 x ml cond. x 460 + Std Temp. / 29.92
Std Meter Vol = Vm x Yd x Tstd + 460 x Pb + ^H / Tm + 460 x 29.92
Stack Moisture = Moisture Vapor / Moisture Vapor + Std. Vol.

STACK VOLUMETRIC FLOWRATE DETERMINATION

Date 9-22-92 client Laidlaw/Newby Is.#1 Operators DC/JM
Time 10:10 A.M. Barometric (Pb) Static
Location Eng #1 Pressure 29.98 Pressure +4.0
Pitot Factor .99 Duct dimen. 10.5" ID.
CO2% 17.0 Stack Area(As) .601
O2% 0.6 Round duct=π r_2 ÷ 144 (radius in inches)
H2O%

Velocity Traverse Data Remarks

Inches from wall	Port &pt.	Time	Delta P	Stack Temp	sqrt. ^P
			7		
		1010	1.25	1294	
			1.30		
			1.15		
			1.10		
			1.10		
			1.5		
					(1.109)
Averages					

Stack Gas Velocity
@ Stack conditions
(feet per second)

Vs = 85.49 x (Cp) x
sqrt^p avg. x
sqrt[Tsavgx460/PsxMWs]

Where,
Vs=velocity stack
Cp=pitot factor
Ts=Stack Temperature
Ps=Stack pressure
MWs=Molecular Wt.gas
where,
MWs=MWd x(1-Bwo)+18(Bwo)

MWd=.44(%CO2)+.32(%O2)
+.28(%CO+%N2)

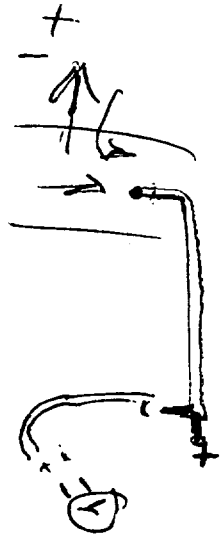
Bwo=%moisture/100
Ps=static/13.6 + Pb

Stack Gas Volume at
Standard Conditions
Qs = SCFM

Qs=60(1-Bwo) x Vsavg
x As x (528/Tsavg+460)
x (Ps/29.92)

Vs=

Qs=



Notes/Comments

BEST ENVIRONMENTAL Particulate Field Data Sheet

Run # 1 Method # 4

LAIDLAW

Plant NEWBY ISLAND
Date 9-22
Location ENGINE # 1
Port Dia. ____ "
Stack I.D. 10.5" "
Stack Area ____ ft2
Personnel DC/JM

ΔH@ 2.383
Meter Yd 0.9912
PBar. 29.98
Stat Press ____
%O2 Assum ____
%CO2 Assum ____

%H2O Assum. ____
Pitot Cp ____
Noz. Diam. ____
Noz I.D. ____
Meter # 8812
Probe # ____

Filter # ____
Pitot # ____
Net Imp Vol 72
Tot Imp Vol 272
Sample Time 30
Sqrt ΔP Ave ____

F.H. Wt. (mg) ____
P.H. Wt. (mg) ____
Gel Wt. (mg) 6.5
%CO2 Actual ____
%O2 Actual ____
Tot. Moisture ____
Std Vm ____

Pre leak ck .002 cfm 15 "Hg Post leak ck .001 cfm 5 "Hg

	Sample Point	Clock Time	Vel. ΔP	M.R. cfm	Orif. ΔH	Gas Meter Volume ft2	Gas Meter In	Gas Meter Out	Temperatures F Stack	Imp.	Filter	Probe	Pump Vac.	Comments
1						~~479.966~~	~~71~~	~~70~~					4	
2		9:25				480.029	71	70	1294°				4	
3		:30				483.050	75	71						
4		35				485.990	77	72						
5		40				488.920	79	72						
6		45				491.855	80	73						
7		50				494.790	82	74						
8		9:55				497.720	84	75					4	
9														
10						<17.691>		<75.4>						
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28	Average													

Notes:

Ms =
Ave. Vs =
Sample I.D. # =

	#1	#2
Final Imp Vol =	177	
Initial Imp Vol =	102	

E

BEST ENVIRONMENTAL
Stack Gas Volumetric Flowrate Determination

Client: Laidlaw	Location: Newby Island Eng #2
Date: 10/9/92 Time: 1305	Run#: 1
Pitot Factor (Cp): .99	Operators: DC / JM
Assumed %O2: Actual 1.5	Barometric (Pb): 29.95 Ps = 30.28
Assumed %CO2: Actual 17.4	Static Pressure (Pstatic): + 4.5
Assumed %CO: Actual	Stack Diameter, in: 10.5
Assumed %H²O: Actual 16.6	Stack Area , ft² (As): .601

Port ID & Point#	Point Location, Inches	Delta P, (˝P)	Stack Temp °F, (ts)	.SQRT ˝P
		.9	1160	
		1.1	↓	
		1.1	↓	
		1.0	↓	
				(1.012)
AVG				

CALCULATIONS

Stack Gas Velocity, actual feet per sec (Vs)

Vs = 85.49*Cp*(SQRT ˝P)avg*SQRT[(ts+460)/Ps*MWs]

Vs = 116.9

Molecular Weight of Stack Gas, g/g.mole (MWs)

MWs = MWd*(1-Bwo) + 18(Bwo)

MWs = 28.71

Molecular Weight of Dry Gas, g/g.mole (MWd)

MWd = 0.44(%CO2) + 0.32(%O2) + 0.28(%CO + N2)

MWd =

Stack Gas Volumetric Flow Rate, standard dry cubic feet/min (SDCFM)

SDCFM = 60(1-Bwo)*Vs*As*528/(ts+460)*Ps/29.92

SDCFM = 1160

WHERE;

Stack Pressure, "Hg (Ps)

Ps = Pb + (Pstatic/13.6)

Water Vapor Fraction, (Bwo)

Bwo = %H²O/100

Stack Area, ft² (As)

As = (Diameter/24)² * 3.1416

Comments:

FORMCFM.XLS

BEST ENVIRONMENTAL Particulate Field Data Sheet

Run # 1 Method # 4

Plant LAIDCAW | ΔH@ 2.383 | %H2O Assum. | Filter # | F.H. Wt. (mg)
Date 10-9 | Meter Yd 0.9912 | Pitot Cp | Pitot # | B.H. Wt. (mg)
Location BOILER #2 | PBar. 29.95 | Noz. Diam. | Net Imp Vol 47 | Gel Wt. (mg)
Port Dim. " | Stat Press | Noz I.D. | Tot Imp Vol 247 | %CO2 Actual
Stack I.D. " | %O2 Assum | Meter # 8812 | Sample Time 30 | %O2 Actual
Stack Area ft2 | %CO2 Assum | Probe # | Sqrt ΔP Ave | Tot. Moisture
Personnel DC/JM | Pre leak ck .002 cfm 17 "Hg | Post leak ck .001 cfm 5 "Hg | | Std Vm 17.242

16.6% H_2O

	Sample Point	Clock Time	Vel. ΔP	M.R. cfm	Orif. ΔH	Gas Meter Volume ft2	Gas Meter In	Gas Meter Out	Temperatures F Stack	Imp.	Filter	Probe	Pump Vac.	Comments
1		11:51			.3	551.450	110	109					2.5	
2		56			↓	534.825	110	115					↓	
3		12:01				557.925	110	116						
4		:06				561.020	111	117						
5		:11				564.110	114	118						
6		:16				567.230	114	118					↓	
7		12:21				570.358	113	118					2.5	
8														
9						18.908		115						
10														
11														
12														
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28	Average													

Notes:

$ml\ H_2O \times \frac{gal}{} \times .473 = H_2O\ @\ ft^3$

Ms =
Ave. Vs =
Sample I.D. # =

$100 \times \frac{\sim ft^3\ H_2O}{H_2O\ ft^3 + std\ Vol} = \%\ H_2O$

	#1	#2
Final Imp Vol =	163	104
Initial Imp Vol =		

BEST ENVIRONMENTAL
CONTINUOUS MONITOR DATA SHEET

Plant Laidlaw / Nowby Is. #1
Date 9-22-92
Test Location Eng #1
Run Number R-1, 2
Operator DC

Ambient Temperature 75
Barometric Pressure 29.98
Static Pressure Duct +4.0
Fuel Landfill gas
Number

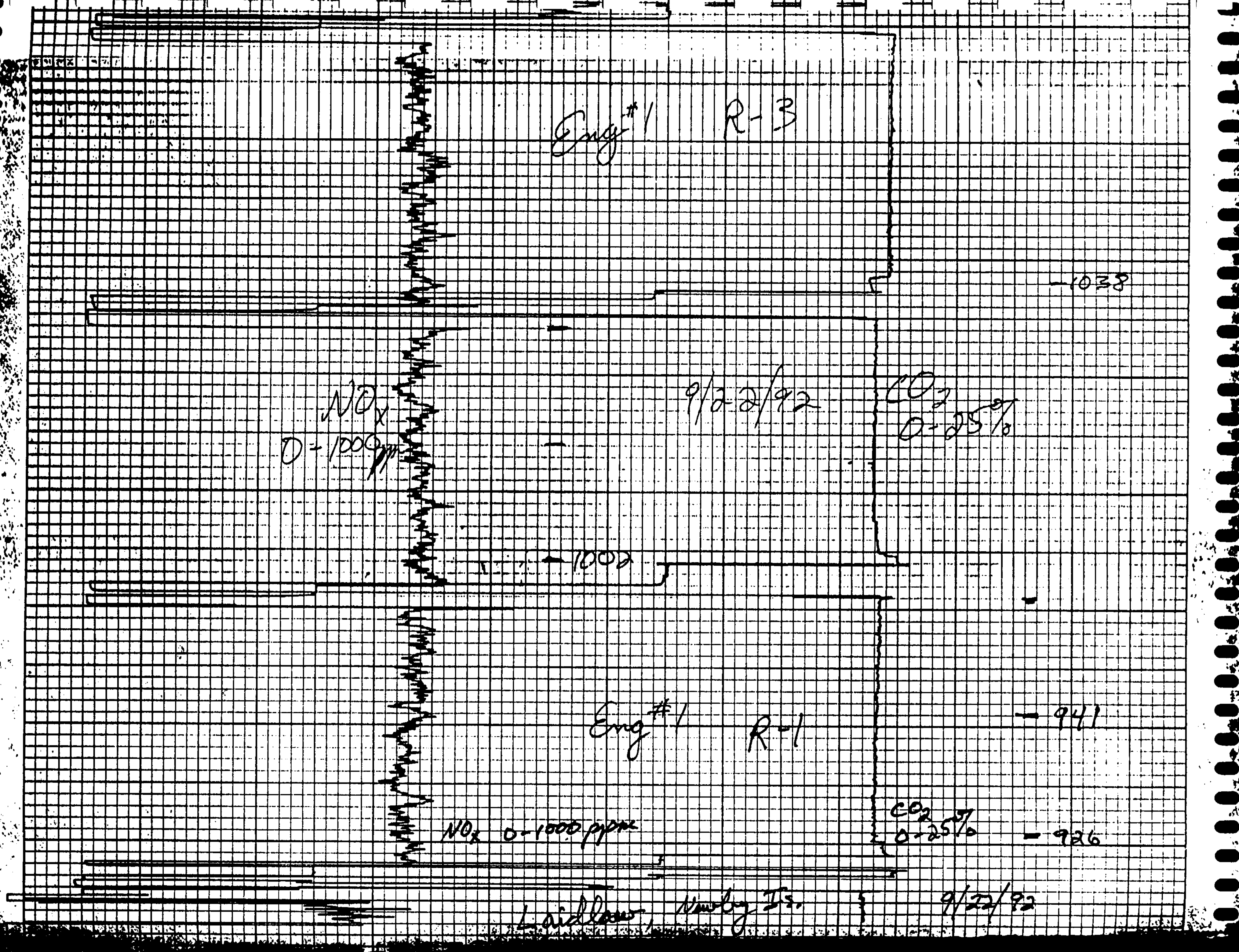
Time	Sample Point	Fuel Flow	Dry Uncorrected O_2 %	Dry Uncorrected CO_2 %	Dry Uncorrected CO ppm	Dry Uncorrected SO_2 ppm	Dry Uncorrected NO ppm	Dry Uncorrected NO_x ppm	3% O_2 Dry ppm	3% O_2 Dry NO_x ppm	Hydrocarbons THC	Hydrocarbons Non CH_4	Hydrocarbons ~~Tot~~ CH_4	TOC ppm	CO2 ppm	VOC ppm	Comments
			8.68	12.38	251.7 (80)			199.9			84.6						900 RPM
																	450 KW
926			0.6	17.0	1.0			275			1840	<25					
936			0.6	17.0	1.0			280			2000	<25					
946			0.6	17.1	1.0			280			2000	<25					
956	zero		0	0.1	0.4			0.3			0						
	cal		8.65	12.5	81			200			1750						
	Ave →		(0.6)	(17.0)	(1.0)			(178)									
1002			0.6	17.0	1.0			180			1700	<25					
1012			.6	17.0	1.0			190			1630	<25					
1022			.6	17.0	1.0			190			1680	<25					
1032	zero		0	0.1	0.5			0			0						
	cal		8.6	12.2	81			200			1780						
	Ave →		(0.6)	(17.0)	(1.0)			(187)			(1688)						
1038			0.6	17.2	1.0			190			1650	<25					
1048			0.7	17.3	1.0			190			1660	<25					
1058			0.6	17.2	1.0			185			1660	<25					
1108	zero		0	0.1	0.4			2			0						
	cal		8.7	12.5				200			1770						
	Ave →		(0.6)	(17.2)	(1.0)			(188)			(1657)						

BEST ENVIRONMENTAL
CONTINUOUS MONITOR DATA SHEET

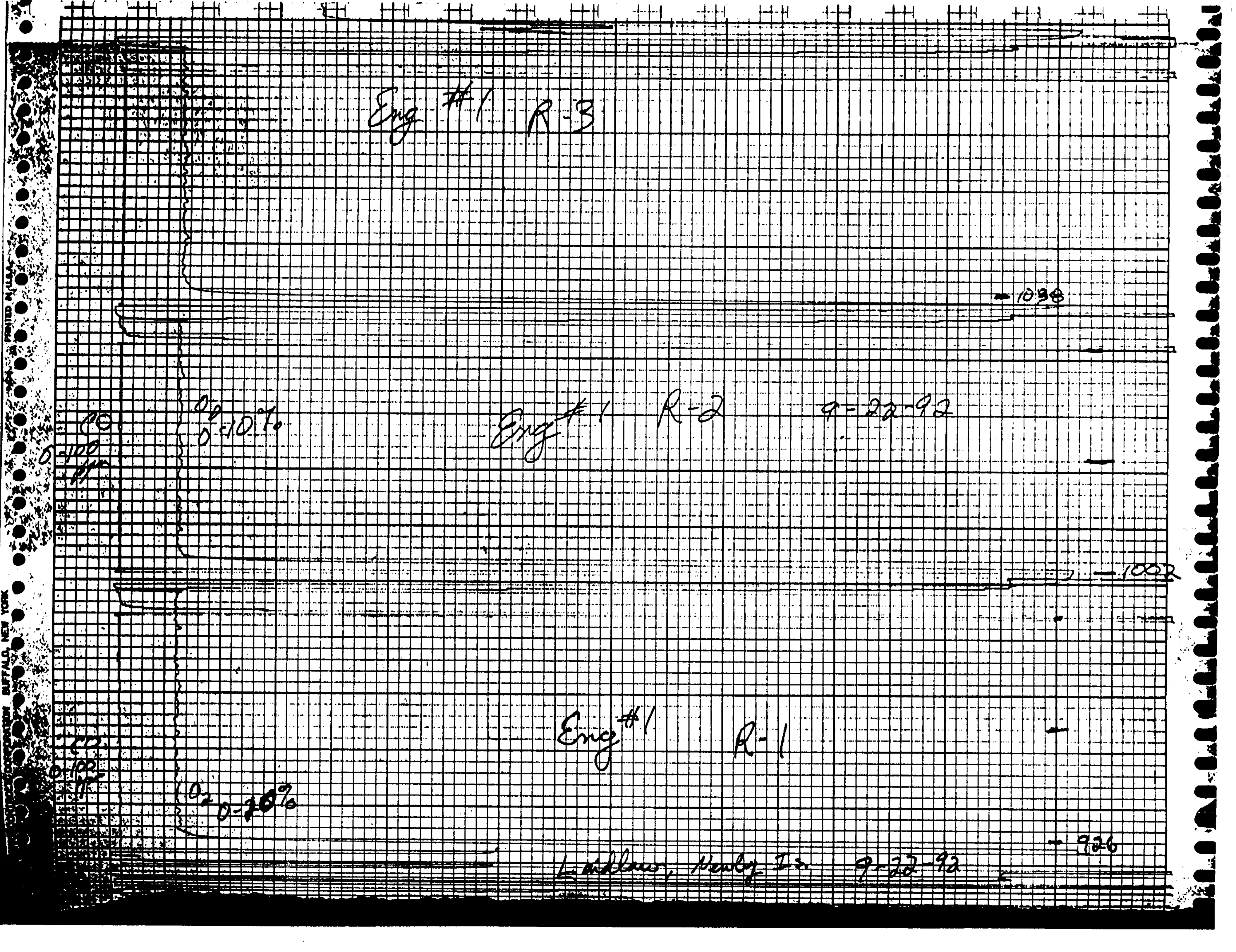
Plant Laidlaw
Date 10-9-92
Test Location Newby Is. Eng #2
Run Number 1, 2, 3
Operator DC

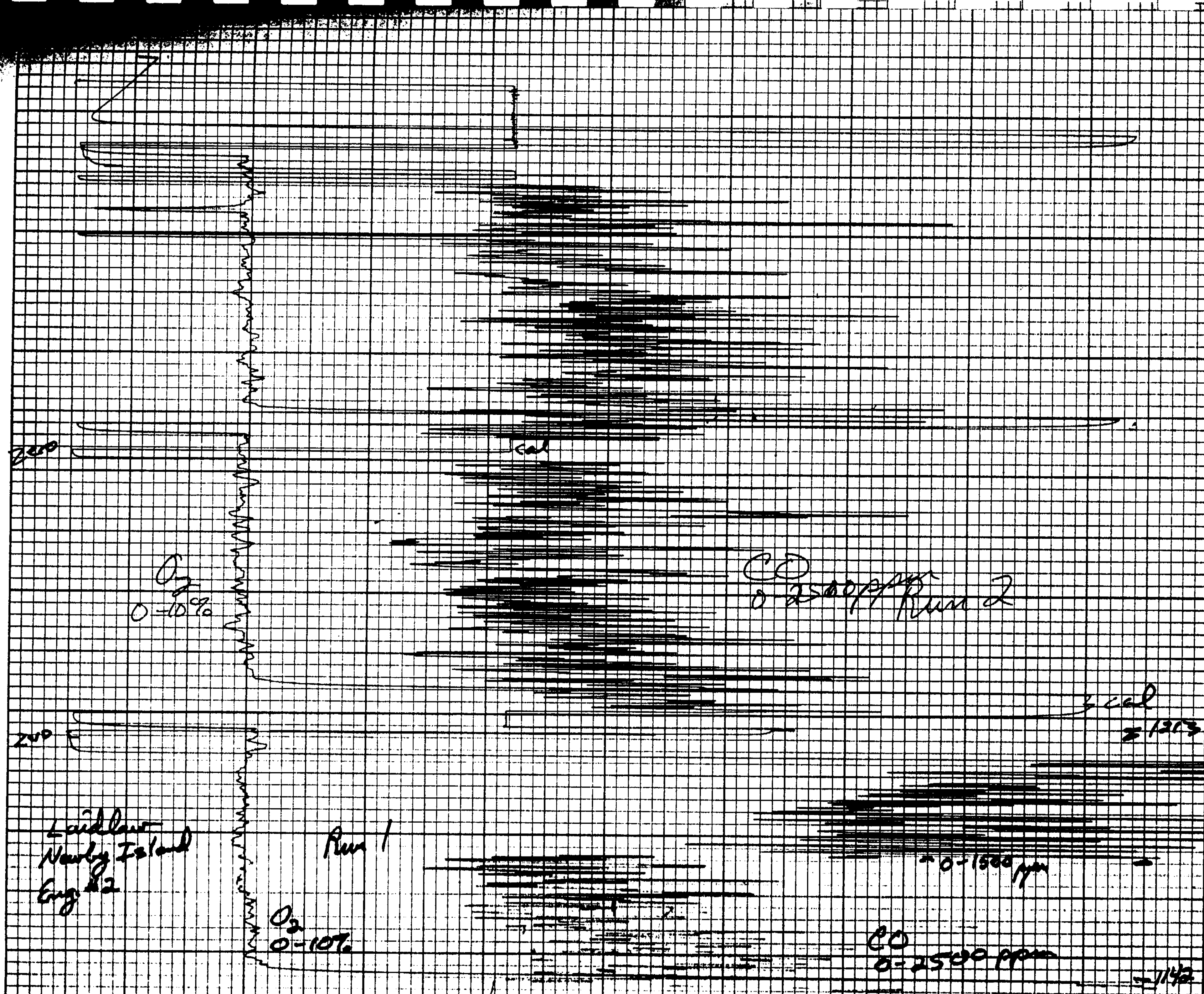
Ambient Temperature 72
Barometric Pressure 29.95
Static Pressure Duct
Fuel Landfill Gas
Number

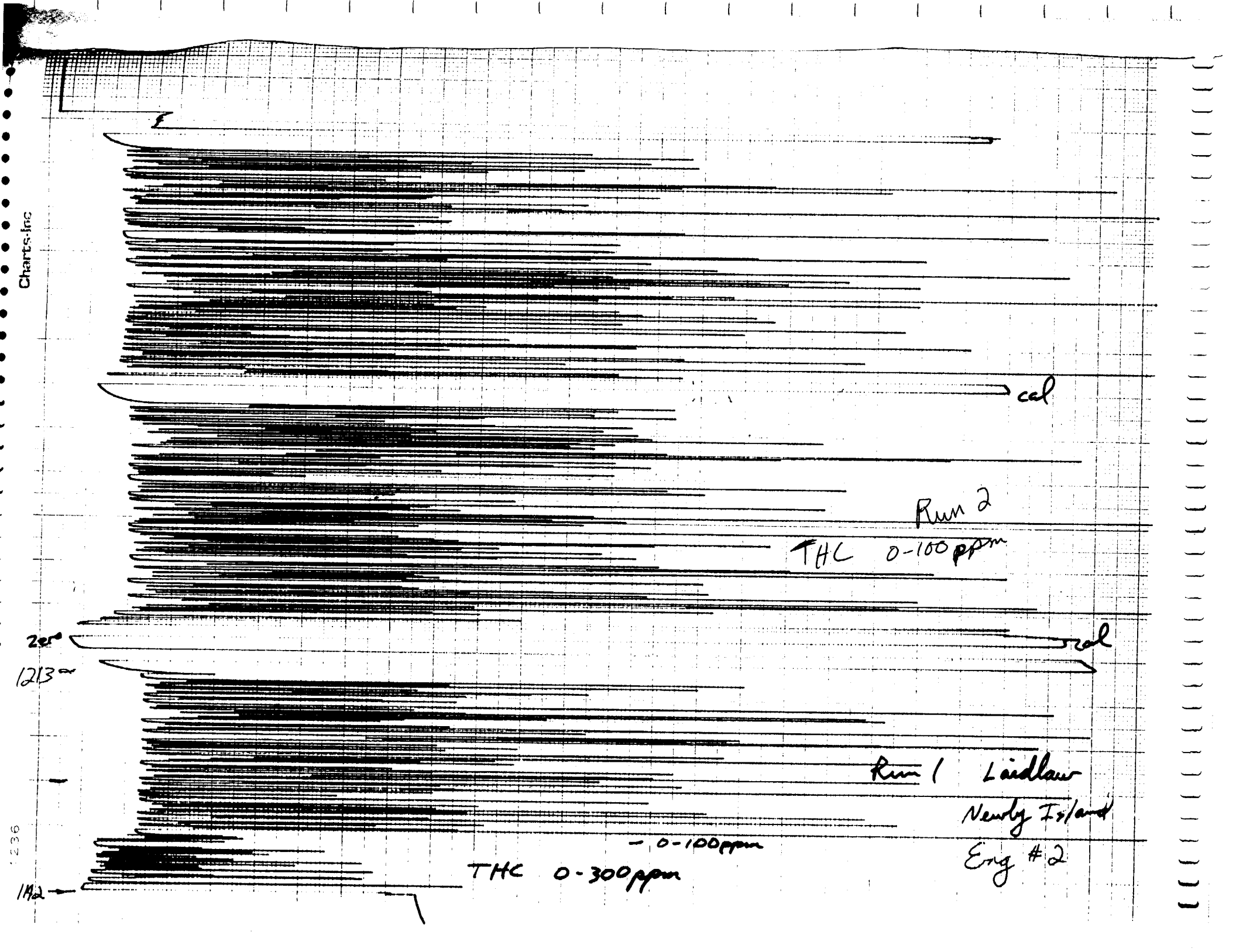
Time	Sample Point	Fuel Flow	Dry Uncorrected O_2 %	Dry Uncorrected CO_2 % .474	Dry Uncorrected CO ppm .366	Dry Uncorrected SO_2 ppm	Dry Uncorrected NO ppm	Dry Uncorrected NO_x ppm	3% O_2 Dry ppm	3% O_2 Dry NO_x ppm	Hydrocarbons THC x1.2	Hydrocarbons CH_4	Hydrocarbons Non CH_4	TOC ppm	CO2 ppm	VOC ppm	Comments
Span Cal			8.54	11.85	916			938			84.6						
1142			1.5	17.2	1150			520			24	24	<5				
1157			1.5	17.2	1140			500			25	25	<5				
1213			1.5	17.2	1125			540			25	25	<5				
	zero		0	0	0			0			-2						
	cal		8.5	11.9	890			930			89						
	Ave		(1.5)	(17.2)	(1138)			(520)			(25)		(<5)				
1220			1.4	17.3	1125			500			25	25	<5				
1235			1.4	17.4	1000			470			25	25	<5				
1250			1.4	17.4	1010			470			25	25	<5				
	zero		0	.1	0			8			0						
	cal		8.75	11.8	920			932			84						
	Ave		(1.4)	(17.4)	(1045)			(480)			(25)		(<5)				
1254			1.5	17.4	1100			500			25						
1309			1.5	17.4	1050			500			25						
1324			1.5	17.4	1075			500			25						
	zero		0	0	0			0			0						
	cal		8.9	11.8	900			934			82						
	Ave		1.5	17.4	1075			500			25						

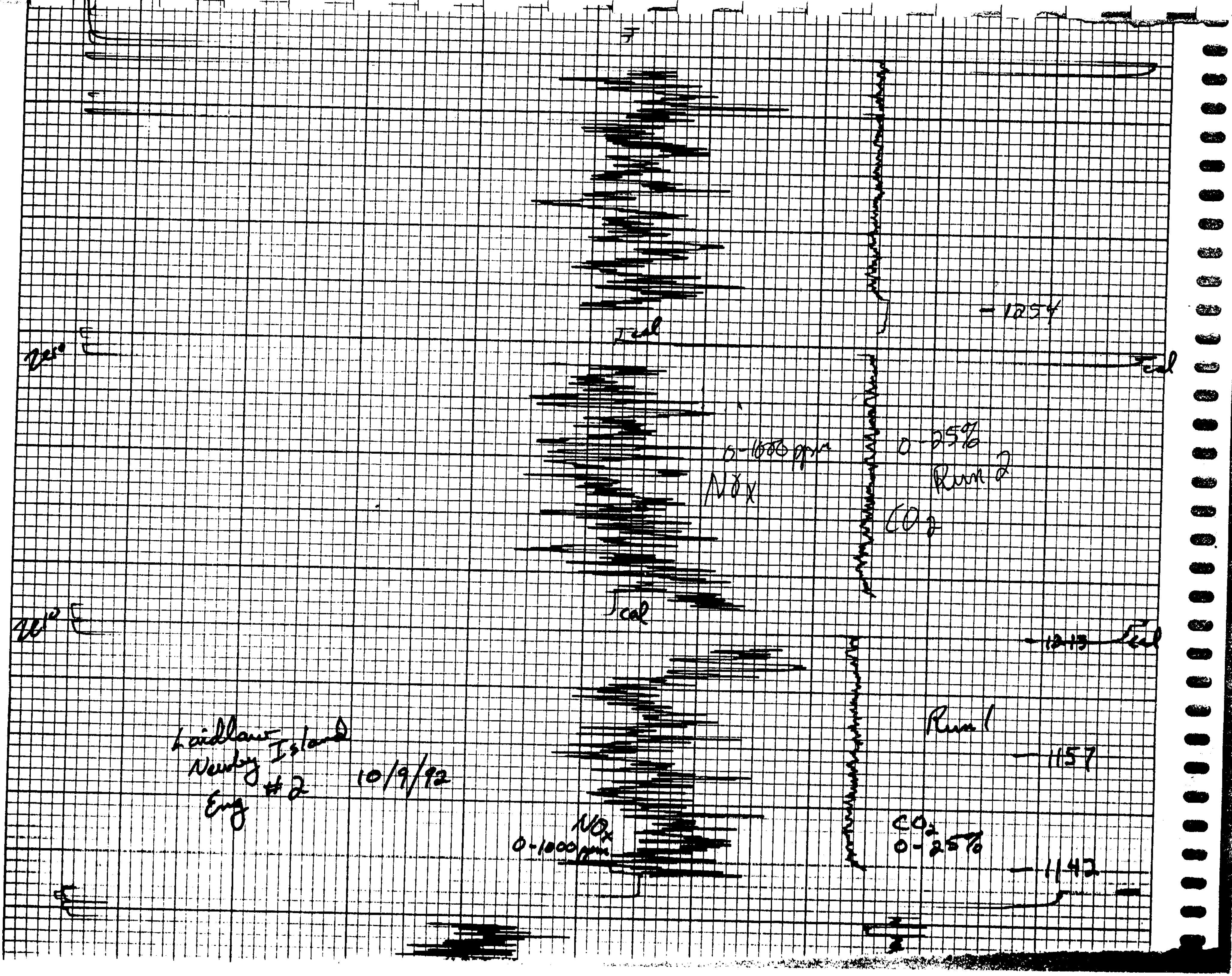

Eng #1 R-3
-1038
NOx
0-1000ppm
9/22/92
CO_2
0-25%
1002
Eng #1 R-1
941
NOx 0-1000 ppm
CO_2
0-25%
926
Laidlaw, Newby Is.
9/22/92

R-2
R-1
R-2
R-2


Eng #1 R-3
1038
CO 0-100 ppm
O_2 0-10%
Eng #1 R-2 9-22-92
1002
CO 0-100 ppm
Eng #1 R-1
O_2 0-20%
926
Laidlaw, Newby Is. 9-22-92
PRINTED IN U.S.A.
BUFFALO, NEW YORK


zero
cal
O2 0-10%
CO 0-2500ppm Run 2
cal
1203
zero
Laidlaw
Newby Island
Aug 82
Run 1
O2 0-10%
0-1500 ppm
CO 0-2500 ppm
1142


cal
Run 2
THC 0-100ppm
zero
cal
1213
Run 1 Laidlaw
Newby Island
Eng #2
0-100ppm
THC 0-300ppm
1142



-1254
cal
cal
0-1000 ppm
NOx
0-25%
Run 2
CO_2
cal
-1213
cal
Run 1
-1157
CO_2
0-25%
-1142
NOx
0-1000 ppm
Laidlaw Island
Newby
Eng #2
10/9/92

SCOTT-MARRIN, INC.
2001 THIRD ST. • UNIT H • RIVERSIDE, CA 92507
TELEPHONE (714) 784-1240

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

BEST01
TO: REGAN BEST
BEST ENVIRONMENTAL
27343 INDUSTRIAL BLVD.
SUITE E
HAYWARD, CA 94545

DATE: 05/31/91

CUSTOMER ORDER NUMBER: 8289

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC12793	Nitric Oxide Nitrogen,O2-Free	199.9 ± 4.0 ppm Balance	SRM 1685b

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above. Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: _____
B.E. Gross

Approved: _____
J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD. • RIVERSIDE. CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

BEST01

TO:

Craig Thiry
Best Environmental
15890 Foothill Blvd.
San Leandro, CA 94578-2101

DATE: 04/02/92

CUSTOMER ORDER NUMBER: 8416

CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC12567	Propane Zero Air	592 ± 6 ppm Balance	SRM 2646

ppm = umole/mole % = mole-%

The above analysis is traceable to the National Institute of Standards and Technology by intercomparison with the reference standard listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: _____
M.S. Calhoun

Approved: _____
J.T. Marrin

SCOTT-MARRIN, INC.
6531 BOX SPRINGS BLVD • RIVERSIDE, CA 92507
TELEPHONE (714) 653-6780 • FAX (714) 653-2430

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

BEST01

TO:

CRAIG THIRY
BEST ENVIRONMENTAL
15890 FOOTHILL BLVD.
SAN LEANDRO, CA 94578-2101

DATE: 08/06/92

CUSTOMER ORDER NUMBER: 8446

CYLINDER NUMBER	COMPONENT	CONCENTRATION (v/v)	NIST TRACEABLE REFERENCE STANDARD
CC114767	Carbon Monoxide	80.0 ± 0.8 ppm	SRM 1679c
	Carbon Dioxide	12.38 ± 0.12 %	SRM 1675b
	Oxygen	8.68 ± 0.09 %	SRM 2658a
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance, NIST Report No. MMAP 232.09/202491.

Analyst: _____
M.S. Calhoun

Approved: _____
J.T. Marrin