GRANITE CONSTRUCTION
P.O. BOX 6744
GOLETA, Ca. 93111

COMPLIANCE TEST
ROTARY DRIER BAGHOUSE
MAY 8, 1990

SBCAPCD PERMIT TO OPERATE NUMBER
1957

Prepared By:

BTC ENVIRONMENTAL, INC.
1536 EASTMAN AVENUE
Ventura, CA 93003

Job Number
7019

Laboratory Report Number
A0-081

Test Team Leader
Mark Patrick

Results Verified By:
Tom Porter - Field Operations Manager
Matthew Pena - Division Manager

TABLE OF CONTENTS

EMISSION SUMMARY

CONSTITUENT	RUN #1	RUN #2	RUN #3	AVERAGE
Total Particulate				
gr/DSCF	0.0550	0.0350	0.0501	***0.0467***
lbs/hr	11.88	6.96	9.80	***9.55***
@ 12% CO_2 (gr/DSCF)	~~@ 12% CO~~ 0.1245	0.0764	.1078	0.1029
(ARB-100, Section 6.3)				
emissions @ 200 tons/hr	11.88 lbs/hr / 201 tons/hr	6.96 / 217 Tons hr	9.80 / 222 tons hr	

I. INTRODUCTION

SAMPLING AND ANALYTICAL PROCEDURES

On May 8, 1990, BTC Environmental performed source emissions tests for particulate matter on the Rotary Drier Baghouse located at Granite Construction in Buellton, California. The unit is natural gas fired to dry the aggregate prior to the mixing of the ashalt. The sampling was done on the exhaust stack of the baghouse.

The plant was operating at **201 tons/hour** during the first run, **217 tons/hour** during the second run and **222 tons/hour** during the third run.

STACK GAS ANALYSIS: Samples of the stack gas were taken from the exhaust stack and analyzed for oxygen and carbon dioxide. The oxygen was determined by a Teledyne electrochemical cell oxygen analyzer. The carbon dioxide was checked using an ACS Fuji non-dispersive infrared analyzer. Readings were obtained continuously during each run and then averaged together to obtain the stack gas composition. The data was recorded on the run sheets at 6 minute intervals and on a strip chart recorder.

STACK GAS VELOCITY: The stack gas velocity was determined using an "S" type pitot tube connected to a magnehelic gauge. The "S" type pitot was used to determine the stack velocity profile for each run.

The stack temperature was determined using a thermocouple and an indicating pyrometer. The proportion of water was determined gravimetrically and the dry molecular weight of the stack gas determined by E.P.A. Method 3, equation 3-2. Stack velocities were calculated using E.P.A. Method 2, equation 2-9; gas volumetric flow rate was determined by equation 2-10.

PARTICULATE EMISSIONS: Particulates were collected isokinetically using a Lace Model 31 stack sampler system that conforms to E.P.A. requirements for particulate sampling. The system consists of a heated probe, heated filter, and cooled impingers (see E.P.A. Method 5). After the weight of the particulates on the filter and in the probe is determined, the total dissolved solids in the the impingers is determined and added to the particulate weight in order to comply with Santa Barbara County APCD regulations. Blanks for the DI water and acetone were analyzed and substracted from the total particulate weight.

LEAK CHECKS: Leak rates were conducted on the sampling train and the pitot tubes before and after each test. The leak check for the sampling train was done at the nozzle.

All calculations for lb/hr were done by using the flow rate of the stack gas. All values were calculated by using Santa Barbara County APCD standard conditions (60^{o}F & 29.92 in Hg).

If you have any questions concerning this test or if we can be of further assistance, please contact the undersigned at (805) 644-1095.

All calculations for lb/hr were done by using the flow rate of the stack gas. All values were calculated by using Santa Barbara County APCD standard conditions (60°F & 29.92 in Hg).

If you have any questions concerning this test or if we can be of further assistance, please contact the undersigned at (805) 644-1095.

Respectfully submitted,

BTC Environmental, INC.

Tom Porter
Field Operations Manager

Reviewed by:
T. Porter
M. Pena

Copies: 3 Granite
1 File

II. WET TEST METHODS DATA SUMMARIES

FIELD DATA SUMMARY

Asphalt Baghouse	Run#1	Run#2	Run#3
Vlc - Volume of water collected, ml	350.2	360.2	369.0
Vm - Gas volume, meter cond., dcf	39.385	42.435	39.179
Y - Meter calibration factor	0.941	0.941	0.941
Pbar - Barometric pressure, in. Hg	29.74	29.74	29.70
Pg - Stack static pressure, in. H2O	-0.40	-0.40	-0.40
ΔH - Avg. meter press. diff., in. H2O	1.067	1.078	0.980
Tm - Absolute meter temperature, °R	531.8	544.1	550.9
Vm(std) - Standard sample gas vol., dscf	36.1189	38.0408	34.6301
Bws - Water vapor part in gas stream	0.311	0.305	0.331
CO2 - Dry concentration, volume %	5.3	5.5	5.2
O2 - Dry concentration, volume %	11.5	10.9	11.1
Md - Mol wt. stack gas, dry, g/gmole	29.303	29.320	29.280
Ms - Mol wt. stack gas, wet, g/gmole	25.790	25.863	25.547
Cp - Pitot tube coef., dimensionless	0.843	0.830	0.843
Δp - Avg. of sq. roots of each Δp	0.873	0.816	0.815
Ts - Absolute stack Temp. °R	719.7	727.2	726.7
A - Area of stack, square feet	13.93	13.93	13.93
Qstd - Volumetric flow rate, dscfm	25200	23215	22815
An - Area of nozzel, square feet	0.0002786	0.0003012	0.0002786
ø - Sampling time, minutes	72	72	72
I - Isokinetic variation, percent	103.8	109.8	109.8

FIELD DATA & CALCULATIONS SUMMARY

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **1**

Wlc	Water Condensate Weight	350.2	g		
Vlc	Water Condensate Volume	**350.8**	**ml**		
Vm	Metered Sample Gas Volume	**39.385**	**dcf**		
Lp	Avg. Leak Rate	0.000	cf		
Vn	Leak Corrected Sample Gas Volume	39.385	dcf		
Y	Dry Gas Meter Calibration Factor	**0.941**			
Pbar	Barometric Pressure	**29.74**	**In. Hg**		
Pg	Static Pressure	**-0.4**	**In. H2O**		
Ps	Stack Pressure, Absolute	29.71	in. Hg		
Δ H	Dry Gas Meter Press. Differential, Average	**1.067**	**In. H2O**		
Tm	Dry Gas Meter Temperature, Average	71.8	deg. F	**531.8**	**deg. R**
Vm(std)	Sample Gas Volume	**36.1189**	**dscf**		
Vm(wet)	Sample Gas Volume, Wet	52.4096	scf		
Vw(std)	Water Vapor Volume	16.2907	scf		
Bws	Water Content of Stack Gas	0.311		**31.1**	**%**
CO2	Carbon Dioxide, Dry	**5.3**	**%**		
O2	Oxygen, Dry	**11.5**	**%**		
N2	Nitrogen, Dry	83.2	%		
Md	Molecular Wt. of Stack Gas, Dry	**29.303**	**lb/lb mole**		
Ms	Molecular Wt. of Stack Gas, Wet	**25.790**	**lb/lb mole**		
Cp	Pitot Calibration Factor	**0.843**			
Δ P	Velocity Head, Average Square Root	**0.873**	**In. H20**		
Ts	Stack Gas Temperature, Average	**259.7**	deg. F	719.7	deg. R
As	Area of Stack	**13.93**	**sq ft**	50.5	in. dia.
Vs	Stack Gas Velocity	60.97	ft/sec		
Qa	Actual Flow Rate	50,964	cfm		
Qad	Actual Flow Rate, Dry	35,122	dcfm		
Q(std)	Stack Gas Flow Rate	**25,200**	**dscfm**		
An	Nozzle Area	**0.0002786**	**sq ft**	0.226	in. dia.
Theta	Sampling Time	**72**	**min.**		
I	Isokinetics	**103.8**	**%**		

FIELD DATA & CALCULATIONS SUMMARY

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **2**

Wlc	Water Condensate Weight	359.6	g		
Vlc	Water Condensate Volume	**360.2**	**ml**		
Vm	Metered Sample Gas Volume	**42.435**	**dcf**		
Lp	Avg. Leak Rate	0.000	cf		
Vn	Leak Corrected Sample Gas Volume	42.435	dcf		
Y	Dry Gas Meter Calibration Factor	**0.941**			
Pbar	Barometric Pressure	**29.74**	**In. Hg**		
Pg	Static Pressure	**-0.4**	**In. H2O**		
Ps	Stack Pressure, Absolute	29.71	in. Hg		
Δ H	Dry Gas Meter Press. Differential, Average	**1.078**	**In. H2O**		
Tm	Dry Gas Meter Temperature, Average	84.1	deg. F	**544.1**	**deg. R**
Vm(std)	Sample Gas Volume	**38.0408**	**dscf**		
Vm(wet)	Sample Gas Volume, Wet	54.7687	scf		
Vw(std)	Water Vapor Volume	16.7280	scf		
Bws	Water Content of Stack Gas	0.305		**30.5**	**%**
CO2	Carbon Dioxide, Dry	**5.5**	**%**		
O2	Oxygen, Dry	**10.9**	**%**		
N2	Nitrogen, Dry	83.6	%		
Md	Molecular Wt. of Stack Gas, Dry	**29.320**	**lb/lb mole**		
Ms	Molecular Wt. of Stack Gas, Wet	**25.863**	**lb/lb mole**		
Cp	Pitot Calibration Factor	**0.830**			
Δ P	Velocity Head, Average Square Root	**0.816**	**In. H20**		
Ts	Stack Gas Temperature, Average	**267.2**	deg. F	727.2	deg. R
As	Area of Stack	**13.93**	**sq ft**	50.5	in. dia.
Vs	Stack Gas Velocity	56.31	ft/sec		
Qa	Actual Flow Rate	47,070	cfm		
Qad	Actual Flow Rate, Dry	32,693	dcfm		
Q(std)	Stack Gas Flow Rate	**23,215**	**dscfm**		
An	Nozzle Area	**0.0003012**	**sq ft**	0.235	in. dia.
Theta	Sampling Time	**72**	**min.**		
I	Isokinetics	**109.8**	**%**		

FIELD DATA & CALCULATIONS SUMMARY

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **3**

Wlc	Water Condensate Weight	368.3	g		
Vlc	Water Condensate Volume	**369.0**	**ml**		
Vm	Metered Sample Gas Volume	**39.179**	**dcf**		
Lp	Avg. Leak Rate	0.000	cf		
Vn	Leak Corrected Sample Gas Volume	39.179	dcf		
Y	Dry Gas Meter Calibration Factor	**0.941**			
Pbar	Barometric Pressure	**29.70**	**In. Hg**		
Pg	Static Pressure	**-0.4**	**In. H2O**		
Ps	Stack Pressure, Absolute	29.67	in. Hg		
Δ H	Dry Gas Meter Press. Differential, Average	**0.980**	**In. H2O**		
Tm	Dry Gas Meter Temperature, Average	90.9	deg. F	**550.9**	**deg. R**
Vm(std)	Sample Gas Volume	**34.6301**	**dscf**		
Vm(wet)	Sample Gas Volume, Wet	51.7628	scf		
Vw(std)	Water Vapor Volume	17.1327	scf		
Bws	Water Content of Stack Gas	0.331		**33.1**	**%**
CO2	Carbon Dioxide, Dry	**5.2**	**%**		
O2	Oxygen, Dry	**11.1**	**%**		
N2	Nitrogen, Dry	83.7	%		
Md	Molecular Wt. of Stack Gas, Dry	**29.280**	**lb/lb mole**		
Ms	Molecular Wt. of Stack Gas, Wet	**25.547**	**lb/lb mole**		
Cp	Pitot Calibration Factor	**0.843**			
Δ P	Velocity Head, Average Square Root	**0.815**	**In. H20**		
Ts	Stack Gas Temperature, Average	**266.7**	deg. F	726.7	deg. R
As	Area of Stack	**13.93**	**sq ft**	50.5	in. dia.
Vs	Stack Gas Velocity	57.49	ft/sec		
Qa	Actual Flow Rate	48,056	cfm		
Qad	Actual Flow Rate, Dry	32,150	dcfm		
Q(std)	Stack Gas Flow Rate	**22,815**	**dscfm**		
An	Nozzle Area	**0.0002786**	**sq ft**	0.226	in. dia.
Theta	Sampling Time	**72**	**min.**		
I	Isokinetics	**109.8**	**%**		

BTC ENVIRONMENTAL
EPA methods 2, 3, 4, 5, 6, 8

CONSTANTS & CONVERSIONS

Tstd = 60, 68, or 70 °F
Pstd = 29.92 in. Hg
R = 21.85(in. Hg-cu ft/lb mole-°R)
Dw = 0.9982(g/ml)
MW(H2O) = 18.0 lb/lb mole
MW(Sulfur) = 32.03 lb/lb mole
M(H2SO4) = 98.08 lb/lb mole
MW(SO2) = 64.06 lb/lb mole
K(H2SO4) = 0.5 mg-g mole/g-meq
K(SO2) = 0.5 mg-g mole/g-meq

1 in. Hg = 13.6 in. H2O
1 lb = 453.6 g
1 lb = 7000 grain
1 g = 15.432 grain
1 mg = 0.001 g
1 hr = 60 min.
1 part/vol X = 1*10^6 ppmv X
1 bbl = 42 gal
M = 1000
La = 0.02 cfm

Kp = 85.49(ft/sec(sqrt{lb/lb mole-in.Hg/°R-in. H2O})
Kw,[cu ft/g-°R] = R / (453.6*MW(H2O)*Pstd)
Kf,[scf-ppm/lb mole] = R * (Tstd+460) * (1*10^6) / Pstd

INTERMEDIATE CALCULATIONS

F,[scf/MMBtu] = F Factor * (Tstd + 460) / 528
Ph,[in. Hg] = Pbar + (ΔH / 13.6)
N2,[%] = 100 - (O2% + CO2%)
Vlc,[ml] = Ww / Dw
Qa,[cfm] = 60 * Vs * As
Qad,[dcfm] = Qa * (1 - Bws)

CFR 40 - EPA EQUATIONS

eq. 2-8	T[°R] = T[°F]+460
eq. 2-6	Ps, [in. Hg] = Pbar+(Pg/13.6)
eq. 5-3	Bws, [%] = Vw(std) / { Vw(std) + Vm(std) }
eq. 3-2	Md, [lb/lb-mole] = 0.44*CO2%+0.32*O2%+0.28*(N2%+CO%)
eq. 2-5	Ms, [lb/lb mol] = Md*(1-Bws)+(MW(H2O)*Bws)
eq. 5-2	Vw(std), [scf] = Ww * Kw * (Tstd+460)
eq. 5-1	Vn, [cf] = Vm - ((Lp-La) * Theta)
eq. 5-1	Vm(std), [sdcf] = Vm * Y * ((Tstd+460) / (Tm+460)) * Ph / Pstd
eq. 2-9	Vs, [ft./sec.] = Kp*Cp*(ΔP*(Ts+460)/(Ps*Ms))^0.5
eq. 2-10	Qstd, [dscfm] =Qad*(Tstd+460)*Ps/((Ts+460)*Pstd)
eq. 5-8	I,[%] =100*(Ts+460)*Vm(std)*Pstd/(60*Vs*Theta*An*Ps*(1-Bws)*(Tstd+460))
eq. 5-6	Cx, [grain/dscf] = Wx,g*15.432/Vm(std)
eq. 8-2,3	Wx, [mg] = (Vt-Vtb)*N(std)*(Vsoln/Valq)*MWx*Kx
	Cx, [grain/dscf] = Wx,mg*0.001*15.432/Vm(std)
	CWx, [grain/scf] = Cx*(1-Bws)
	CCx, [grain/dscf @ 12% CO2] = Cx*12.0/CO2%
	CWCx, [grain/scf @ 12% CO2%] = CCx
	CPx, [ppmv dry] = Cx*Kf/(MWx*7000)
	CPCx, [ppmv @ N% O2] = CPX* ((20.9-N%)/(20.9-O2%))
	CFx, [lb/hr] = Cx*Q(std)*60/7000
	CEx, [lb/MMBtu] = F*(Cx/7000)*(20.9/(20.9-O2%))
	CBx, [lb/bbl] = CEx*(Fuel Btu/MM)*(Fuel lb/gal)*42
	CEsx, [lb S/MMBtu] = CEx*(MW(S) / MWx)

Where x represents, Particulate, Sulfuric Acid, Sulfate, or Sulfur Dioxide respectively.

III. WET TEST METHODS CALCULATIONS

CALCULATED EMISSION RESULTS

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **1**

Total Particulate

Ws	Particulate Weight	0.1287	g
Cs	Particulate Emissions	0.0550	grain/dscf
CFs	Particulate Flow Rate	11.88	lb/hr

BTC Environmental, Inc. - 1989

CALCULATED EMISSION RESULTS

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **2**

Total Particulate

Ws	Particulate Weight	0.0862	g
Cs	Particulate Emissions	0.0350	grain/dscf
CFs	Particulate Flow Rate	6.96	lb/hr

BTC Environmental, Inc. - 1989

CALCULATED EMISSION RESULTS

Client: **Granite Construction**
Site: **Buellton**
Unit: **Asphalt Baghouse**

Date: **5/8/90**
Type: ***T std = 60 F***
Run: **3**

Total Particulate

Ws	Particulate Weight	0.1125	g
Cs	Particulate Emissions	0.0501	grain/dscf
CFs	Particulate Flow Rate	9.80	lb/hr

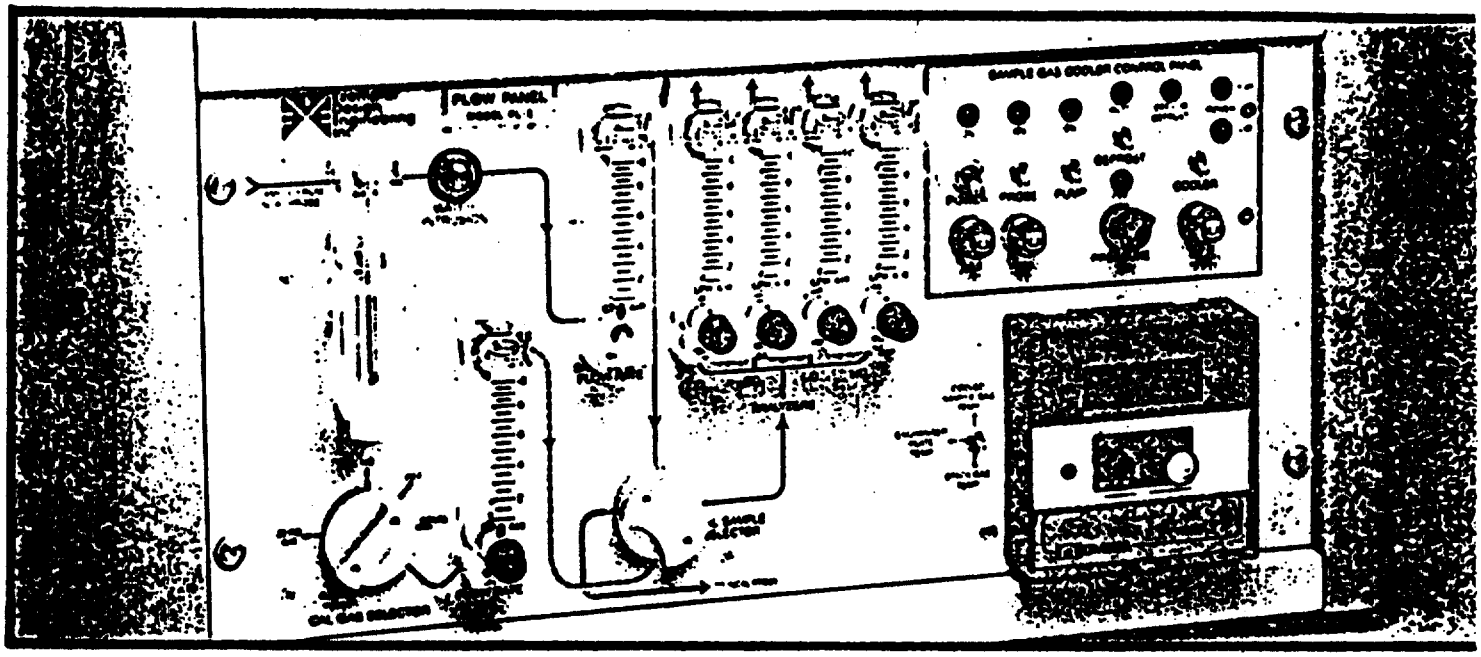
BTC Environmental, Inc. - 1989

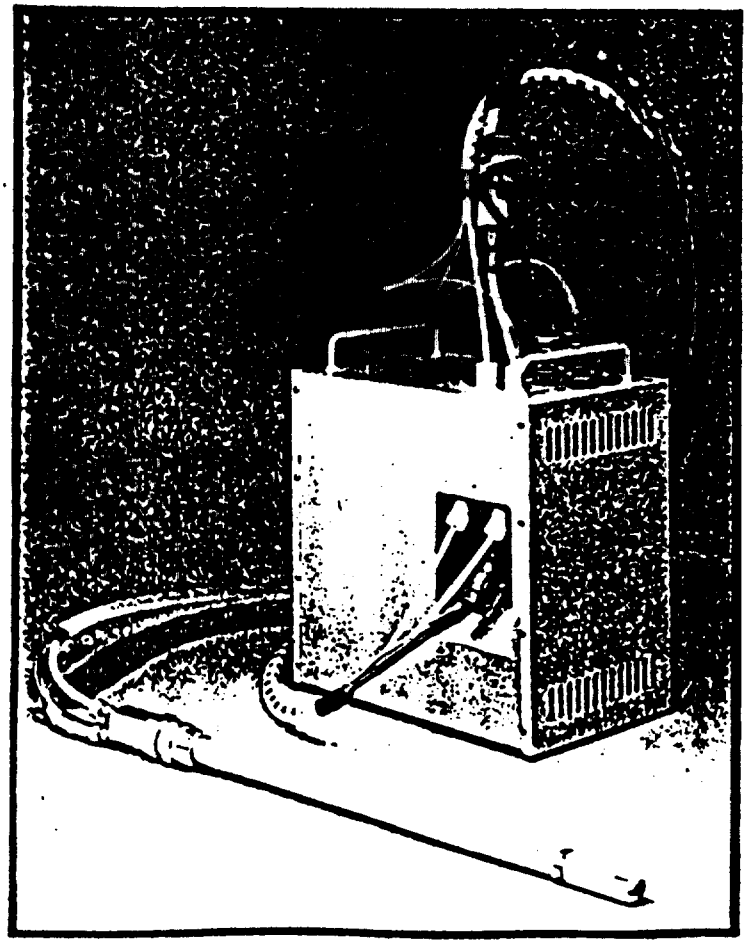
IV. CONTINUOUS TEST METHODS DATA

Extractive Gas Sampling System

Model EGS-1 (Patent Applied For)

Exemplar's Extractive Gas Sampling System, Model EGS-1 is specifically designed to be a complete, easy to use, portable extractive gas sampling system for use with continuous gas analyzers. By combining individual Exemplar components, a complete system requires only the addition of user specified analyzers and calibration gases. The system is easy to operate and difficult to mis-calibrate.



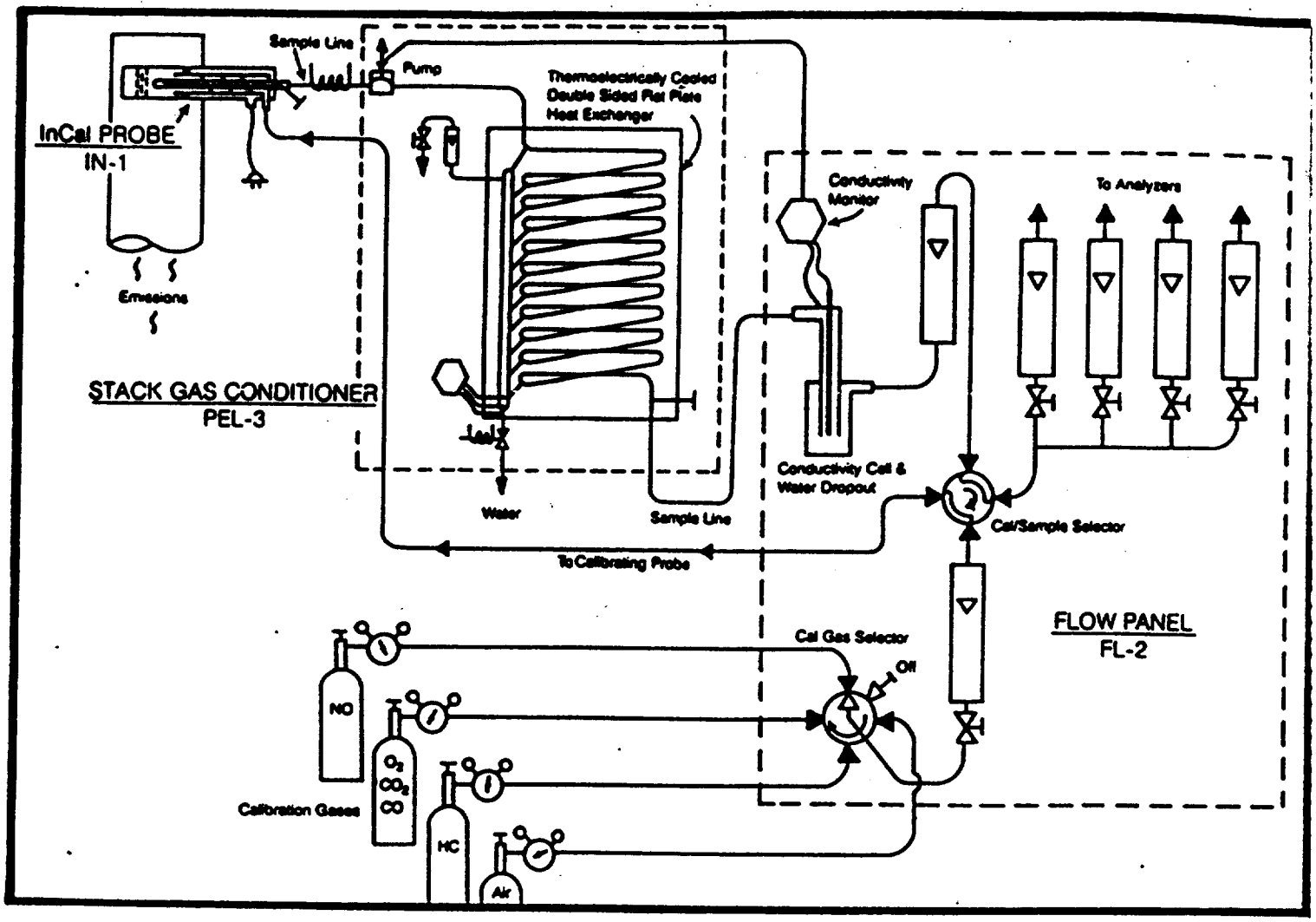


SPECIAL FEATURES

- Simple to use; only requires connecting to analyzers, cal gases and electrical power.
- Easily portable; system, analyzers and cal gases will fit into and operate from the back of a standard station wagon.
- Highly accurate; both internal and external calibration from probe tip system is easy to calibrate.
- High capacity and non-scrubbing; powerful thermoelectric coolers with special heat exchanger design removes condensing water as quickly as it is formed.
- Positive pressure design; eliminates concentration errors due to leaks.
- Corrosion and reaction resistant; sample contacts only non-reactive, non absorbing materials.

APPLICATIONS

- Use where EPA extractive sampling requirements are specified.
- Use where high accuracy is essential.
- Replace older, complex negative pressure systems.
- Complete extractive system without the need for a sampling van.
- Use where space is limited.

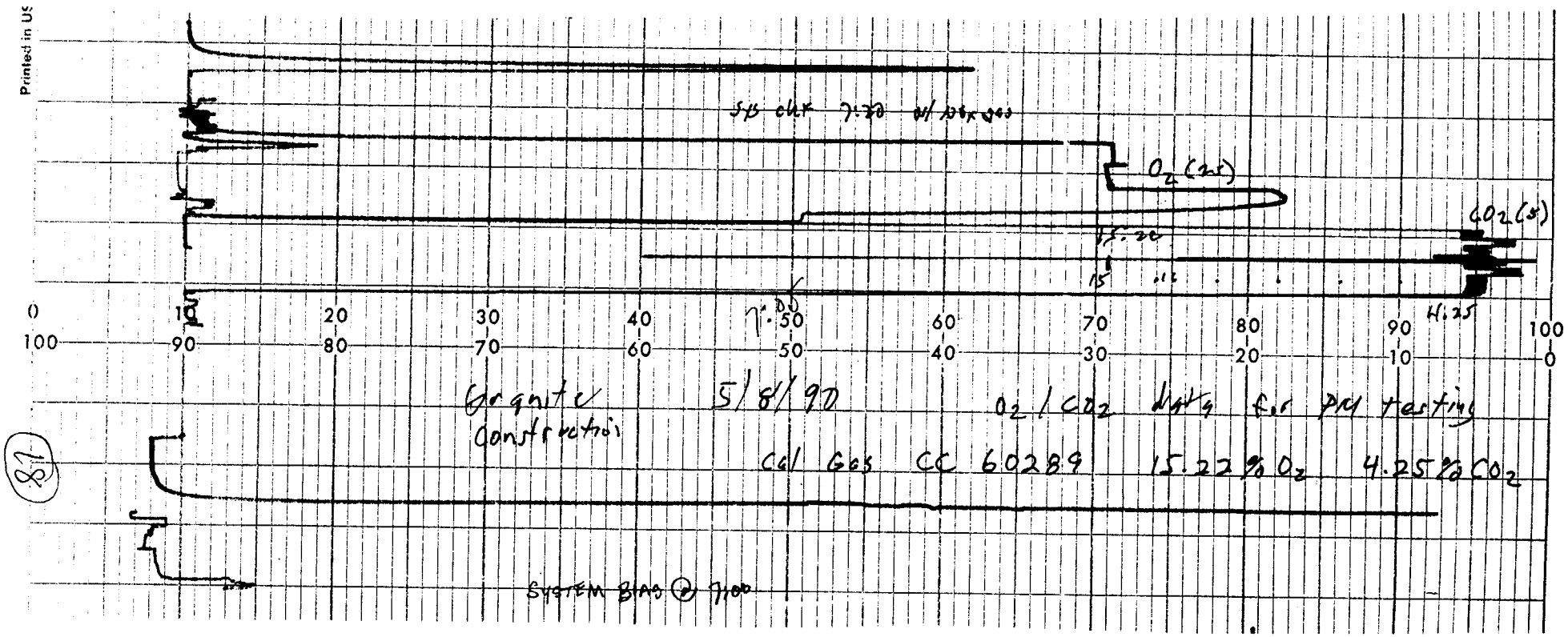


Components

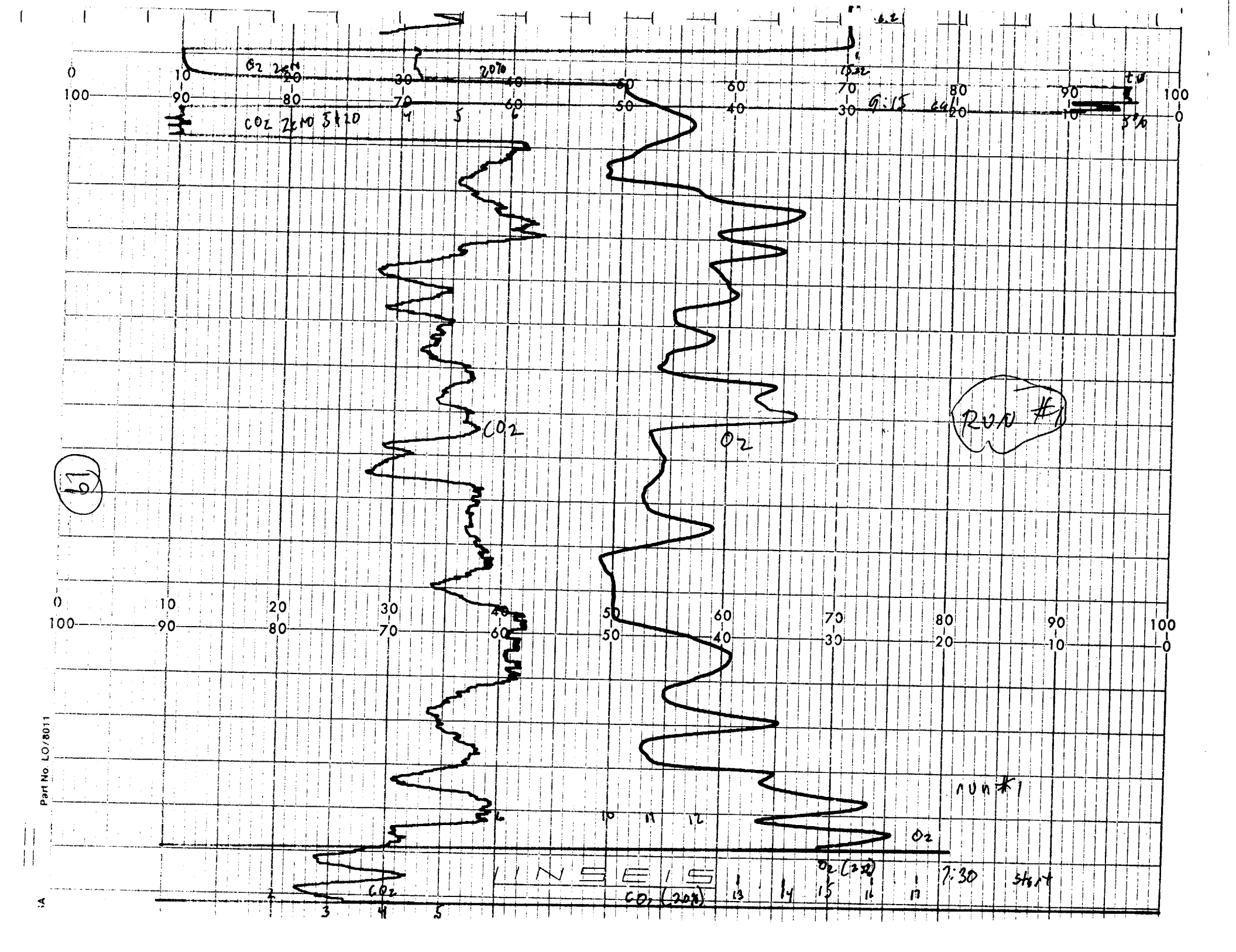
Exemplar's InCal IN-1 series of in-stream calibrating probes are used to provide filtered non-condensing sample gas from a wide range of sources. The probe's in-stream calibration feature allows the entire system (probe tip to analyzer) to be accurately calibrated. The probe's design, size and corrosion resistance make sample extraction easy.

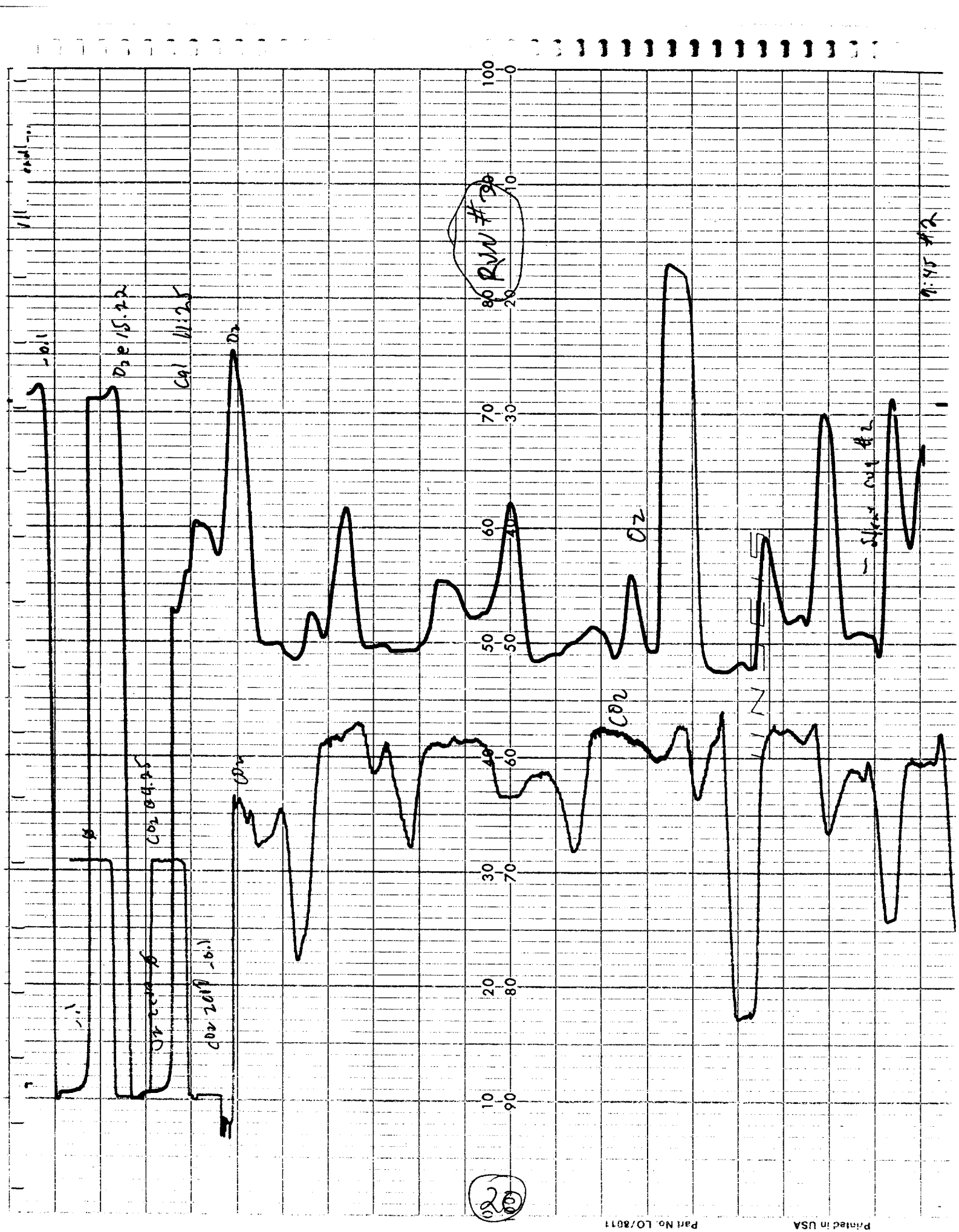
Exemplar's Sample Gas Conditioner PEL-3 provides the distribution panel with sample gas under positive pressure. A vibrating armature pump followed by a double sided, thermoelectrically cooled, flat plate heat exchanger with integral water separation channels,is capable of producing 5 lpm of 40°F dew point sample gas from a 160°F, water saturated (30%) sample stream. The condensing water dump is automatic allowing for continuous operation. The positive pressure nature of the system eliminates sample dilution due to tube fitting leaks. The unit is light weight and easily portable.

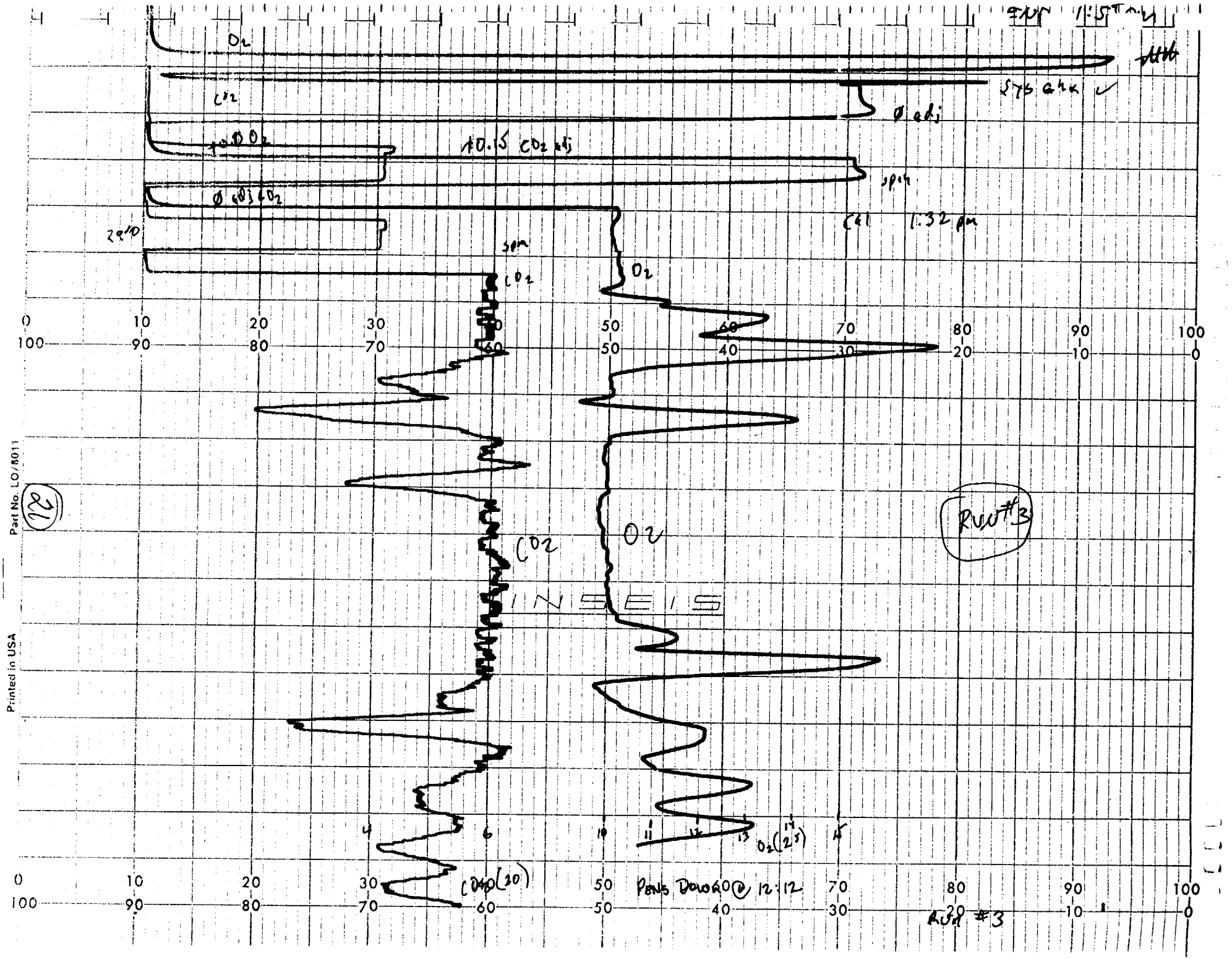
Exemplar's Sample Distribution Flow Panel FL-2 distributes dry, positive pressure, non-scrubbed sample gas to the appropriate instruments. The panel allows for both internal and probe tip calibration. Manual, click stop, rotary plug valves and an illustrative front panel provide leak free, fail-safe sample and calibration gas distribution. Flow paths are simple and easy to understand. This unit is small and easily transportable.


Printed in US
Sys chk 7:20 w/ 20% gas
O_2 (2nd)
CO_2 (5)
15:20
Hi 25
0 10 20 30 40 50 60 70 80 90 100
100 90 80 70 60 50 40 30 20 10 0
Granite Construction
5/8/90
O_2 / CO_2 Units for PM testing
Cal Gas CC 60289 15.22% O_2 4.25% CO_2
System Bias @ 7:00

(21)


O2 zero 20%
CO2 zero 5%
CO2
O2
RUN #1
run #1
O2
CO2
O2 (20%)
CO2 (20%)
7:30 start
LINSEIS
Part No LO/8011


RUN #20
O2
CO2
N2
100
90
80
70
60
50
40
30
20
10
0
Printed in USA
Part No. LO/8011


O2
CO2
10.5 CO2 adj
spike
CAL 1:32 pm
CO2
O2
RUN #3
CO2
O2
INSIGHT
PENS DOWN @ 12:12
RUN #3
Part No. LO/8011
Printed in USA

V. LABORATORY ANALYSIS

Run Set Up Sheet

Client : Granite Construction
Site : Buellton
Unit: Asphalt Baghouse

Date : 5/8/90
Job #: -
Lab #: A0-081

Method#:	5	Probe#:	2	Pryo#:	-
Run#:	1	Stack box#:	B	Nozzle#:	0.226
Hot box#:	-	Cold box#:	3	Pitot#:	0.843

Imp. #1:	gross	837.9
	tare	617.8
	final	220.1
Imp. #2:	gross	758.7
	tare	631.3
	final	127.4
Imp. #3:	gross	468.6
	tare	465.1
	final	3.5
Imp. #4:	gross	652.5
	tare	653.3
	final	-0.8
	Total	350.2

Probe blank		ml
Probe rinse		ml
Solution blank	Acetone	
Solution blank	DI Water	
Filter No:	C-15	
Filter Tare wt.		

	#	date
Solution Container		
Solution Container		

Sample Vol:	start	150.0	ml
Imp#1	finsh	370.0	ml
Amount Gained:		220.0	ml
Sample Vol:	start	150.0	ml
Imp #2	finsh	277.0	ml
Amount Gained:		122.0	ml

Total Vol #1 #2 & Rinse 500.0 ml

Comments:

Run Set Up Sheet

Client : Granite Construction
Site : Buellton
Unit: Asphalt Baghouse

Date : 5/8/90
Job #: -
Lab #: A0-081

Method#:	5	Probe#:	7	Pryo#:	-
Run#:	2	Stack box#:	B	Nozzle#:	0.235 ✓
Hot box#:	-	Cold box#:	2	Pitot#:	0.830 ✓

Imp. #1:	gross	858.2
	tare	620.6
	final	237.6 ✓
Imp. #2:	gross	701.9
	tare	590.2
	final	111.7 ✓
Imp. #3:	gross	486.0
	tare	482.1
	final	3.9 ✓
Imp. #4:	gross	632.5
	tare	626.1
	final	6.4 ✓
Total		359.6 ✓

Probe blank		ml
Probe rinse		ml
Solution blank	Acetone	
Solution blank	DI Water	
Filter No:	C-17	
Filter Tare wt.		

	#	date
Solution Container		
Solution Container		

Sample Vol:	start	150.0	ml
Imp#1	finsh	388.0	ml
Amount Gained:		238.0	ml
Sample Vol:	start	150.0	ml
Imp #2	finsh	262.0	ml
Amount Gained:		112.0	ml

Total Vol #1 #2 & Rinse 500.0 ml

Comments:

Run Set Up Sheet

Client : Granite Construction
Site : Buellton
Unit: Asphalt Baghouse

Date : 5/8/90
Job #: -
Lab #: A0-081

Method#:	5	Probe#:	2	Pryo#:	-
Run#:	3	Stack box#:	B	Nozzle#:	0.226
Hot box#:	-	Cold box#:	6	Pitot#:	0.843

Imp. #1:	gross	841.1
	tare	620.2
	final	220.9
Imp. #2:	gross	767.2
	tare	627.4
	final	139.8
Imp. #3:	gross	469.8
	tare	465.3
	final	4.5
Imp. #4:	gross	655.6
	tare	652.5
	final	3.1
	Total	368.3

Probe blank		ml
Probe rinse		ml
Solution blank	Acetone	
Solution blank	DI Water	
Filter No:	C-18	
Filter Tare wt.		

	#	date
Solution Container		
Solution Container		

Sample Vol: Imp#1	start	150.0	ml
	finsh	371.0	ml
Amount Gained:		221.0	ml
Sample Vol: Imp #2	start	150.0	ml
	finsh	290.0	ml
Amount Gained:		140.0	ml

Total Vol #1 #2 & Rinse 500.0 ml

Comments:

PARTICULATE WEIGHTS : DATA & CALCULATIONS

Client : Granite Construction
Site : Buellton
Unit : Asphalt Baghouse

Run #: 1
Box #: 3
Filter #: C-15

Date : 5/8/90
Job #: -
Lab #: A0-081

SOLUTION BLANKS

Acetone -			Volume: 100 ml	
	Gross: 65.6941 g	Tare: 65.6928 g	Residue: 0.0013 g	
Alcohol -			Volume: NA ml	
(80% ISO)	Gross: NA g	Tare: NA g	Residue: NA g	
Freon -			Volume: NA ml	
	Gross: NA g	Tare: NA g	Residue: NA g	
DI Water -			Volume: 100 ml	
	Gross: 67.5507 g	Tare: 67.5488 g	Residue: 0.0019 g	
Probe -			Volume: NA ml	
	Gross: NA g	Tare: NA g	Residue: NA g	
		(less DI blank) =	Net: NA g	

WEIGHTS & VOLUMES

A : Filter Catch - (C-15)

Gross: 0.4728 g Tare: 0.4095 g Net: **0.0633** g

C : Probe Catch -

Probe Blank: 0.0000 g

Acetone: 75 ml * 1.3E-05 g/ml = -0.0010 g

DI Water: 125 ml * 1.9E-05 g/ml = -0.0024 g

Gross: 70.4060 g Tare: 70.3758 g = 0.0302 g

Net: **0.0269** g

E : Impinger Catch -

DI Water: 300 ml * 1.9E-05 g/ml = -0.0057 g

Alcohol : NA ml * NA g/ml = 0.0000 g

Total: 500 ml Aliquot: 500 ml

Gross: 72.7483 g Tare: 72.7040 g = 0.0443 g

Net: **0.0386** g

G : Organic Extract -

Freon: NA ml * NA g/ml = 0.0000 g

Gross: NA g Tare: NA g = 0.0000 g

Net: **0.0000** g

Total Particulate Weight, (A+C+E+G) = 0.1287 g

BTC Environmental, Inc. - 1989

PARTICULATE WEIGHTS : DATA & CALCULATIONS

Client : Granite Construction
Site : Buellton
Unit : Asphalt Baghouse

Run #: 2
Box #: 2
Filter #: C-17

Date : 5/8/90
Job #: -
Lab #: A0-081

SOLUTION BLANKS

Acetone -			Volume: 100	ml
	Gross: 65.6941 g	Tare: 65.6928 g	Residue: 0.0013	g
Alcohol -			Volume: NA	ml
(80% ISO)	Gross: NA g	Tare: NA g	Residue: NA	g
Freon -			Volume: NA	ml
	Gross: NA g	Tare: NA g	Residue: NA	g
DI Water -			Volume: 100	ml
	Gross: 67.5507 g	Tare: 67.5488 g	Residue: 0.0019	g
Probe -			Volume: NA	ml
	Gross: NA g	Tare: NA g	Residue: NA	g
		(less DI blank) =	Net: NA	g

WEIGHTS & VOLUMES

A : Filter Catch - (C-17)

Gross: 0.4465 g Tare: 0.4060 g Net: **0.0405** g

C : Probe Catch -

Probe Blank: 0.0000 g

Acetone: 75 ml * 1.3E-05 g/ml = -0.0010 g

DI Water: 125 ml * 1.9E-05 g/ml = -0.0024 g

Gross: 70.4395 g Tare: 70.4028 g = 0.0367 g

Net: **0.0333** g

E : Impinger Catch -

DI Water: 300 ml * 1.9E-05 g/ml = -0.0057 g

Alcohol : NA ml * NA g/ml = 0.0000 g

Total: 500 ml Aliquot: 500 ml

Gross: 68.9110 g Tare: 68.8929 g = 0.0181 g

Net: **0.0124** g

G : Organic Extract -

Freon: NA ml * NA g/ml = 0.0000 g

Gross: NA g Tare: NA g = 0.0000 g

Net: **0.0000** g

Total Particulate Weight, (A+C+E+G) = 0.0862 g

PARTICULATE WEIGHTS : DATA & CALCULATIONS

Client : Granite Construction
Site : Buellton
Unit : Asphalt Baghouse

Run #: 3
Box #: 6
Filter #: C-18

Date : 5/8/90
Job #: -
Lab #: A0-081

SOLUTION BLANKS

Acetone -				Volume: 100	ml
	Gross: 65.6941 g	Tare: 65.6928 g		Residue: 0.0013	g
Alcohol -				Volume: NA	ml
(80% ISO)	Gross: NA g	Tare: NA g		Residue: NA	g
Freon -				Volume: NA	ml
	Gross: NA g	Tare: NA g		Residue: NA	g
DI Water -				Volume: 100	ml
	Gross: 67.5507 g	Tare: 67.5488 g		Residue: 0.0019	g
Probe -				Volume: NA	ml
	Gross: NA g	Tare: NA g		Residue: NA	g
		(less DI blank) =		Net: NA	g

WEIGHTS & VOLUMES

A : Filter Catch - (C-18)

Gross: 0.4502 g Tare: 0.4039 g Net: **0.0463 g**

C : Probe Catch -

Probe Blank:					0.0000 g
Acetone:	75 ml	* 1.3E-05 g/ml			-0.0010 g
DI Water:	125 ml	* 1.9E-05 g/ml			-0.0024 g
Gross:	72.9850 g	Tare:	72.9543 g		0.0307 g
				Net:	**0.0273 g**

E : Impinger Catch -

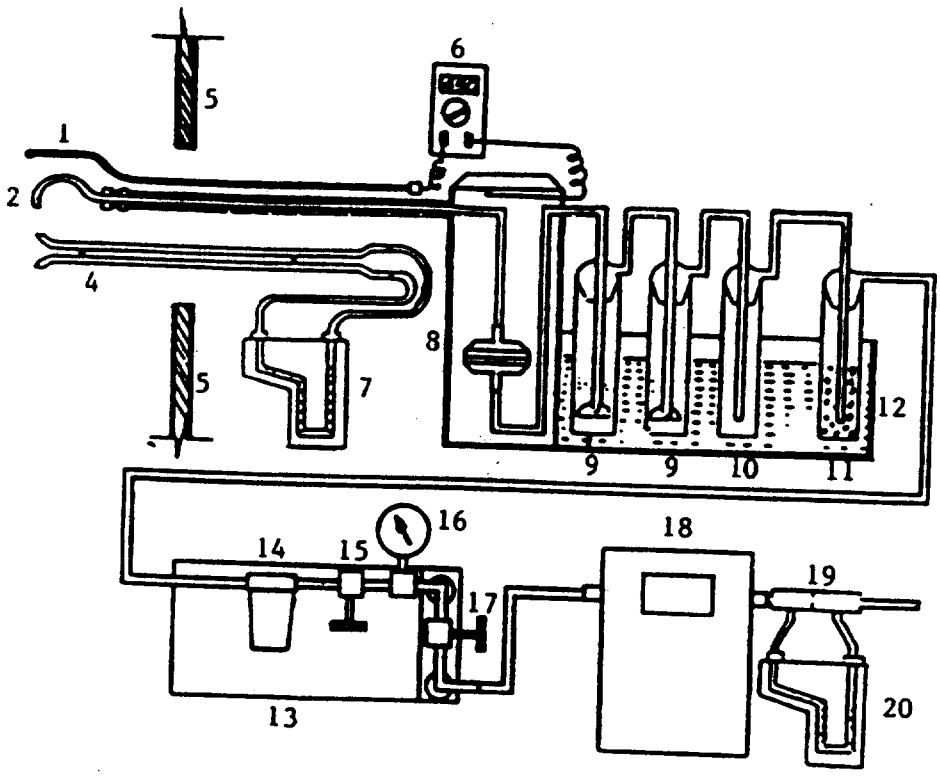
DI Water:	300 ml	* 1.9E-05 g/ml			-0.0057 g
Alcohol :	NA ml	* NA g/ml			0.0000 g
Total:	500 ml	Aliquot:	500 ml		
Gross:	71.6617 g	Tare:	71.6171 g		0.0446 g
				Net:	**0.0389 g**

G : Organic Extract -

Freon:	NA ml	* NA g/ml			0.0000 g
Gross:	NA g	Tare:	NA g		0.0000 g
				Net:	**0.0000 g**

Total Particulate Weight, (A+C+E+G) = 0.1125 g

VI. METHODOLOGY



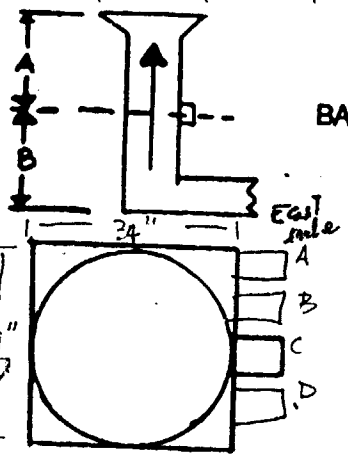
1. Temperature Sensor
2. Nozzle
3. Glass lined Stainless Steel Probe-Heated
4. S-type Pitot Tube
5. Stack Wall
6. Temperature Sensor Meter
7. Pitot Tube Inclined Manometer
8. Heated Box with Filter
9. Impinger with 100 ml H_2O
10. Empty Bubbler
11. Bubbler with Silica Gel
12. Ice Bath
13. Sealed Pump (Leak Free)
14. Filter for Pump
15. Metering Valve
16. Vacuum Gauge
17. By-pass Valve
18. Temperature Compensated Dry Gas Meter
19. Orifice
20. Orifice Inclined Manometer

Figure 5.2-1

Particulate Sampling Train Set-up with Heated Probe and Heated Filter

VII. RAW DATA

PLANT: GRANITE
LOCATION: Buellton
COUNTY: Santa Barbara
UNIT:
DATE: 7/18/90
RUN NO./METHOD: 1 / PART
COLD BOX NO.: 3
METER BOX NO.: B
METER FACTOR: Yc = .9411 ΔH@ = 1.8255
PITOT #/ FACTOR: #2 Cp = .84
PYROMETER #: T-1
MAGNEHELIC FACTOR: ΔP M3 ΔH M1-4



FILTER NO. C-15
AMBIENT TEMP.: 55
BAROMETRIC PRESS.,IN.HG.: 29.74
ASSUMED MOISTURE: 25% MW @ 28.6
HEATER BOX SETTING: H1
PROBE LENGTH,FT. 5 ft.
NOZZLE DIAMETER,IN.: #22 0.226" dia.
PROBE HEATER SETTING: 7 1/2
APPROX.WIND VEL.,MPH: 0
SAMPLE BOX TEMP.,(F): 225 F
STATIC PREASURE: -0.4 "H2O
OFFSET: 1 in. PORT DIA.: ____ in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O (INITIAL VEL TRAV.) ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
A-1	2.8	14.8	3.9	7:36 am 0	256	.8	.1	.98	562.610	62	62		40F
2	6.6	13.5	4.1	3	240	1.5	.1	1.87	64.6	67	64	13	
3	14.2	11.5	5.8	6	240	1.3	.1	1.61	66.9	68	64		
4	19.9	10.8	6.8	9	246	1.0		1.23	68.5	65	69		
5	25.6	13.5	4.2	12	251	0.8	.1	0.97	70.3	70	65		
6	31.3	11.5	3.6	15	253	0.8	.1	0.97	72.4	72	66		
				18				FINAL	573.965				
B-1	2.8	12.3	5.0	7:58/0	241	0.3		0.25		70	69		
2	8.5	10.8	5.9	3	251	0.3		0.25	75.0	71	67		
3	14.2	10.0	6.3	6	263	0.5		0.61	75.7	71	67		
4	19.9	10.0	6.3	9	268	0.7		0.96	77.2	74	67		
5	25.6	9.8	6.3	12	270	1.0		1.34	78.5	75	69	8	
6	31.3	11.3	5.2	15	273	0.8		1.07	80.3	77	69		
				18				FINAL	582.103				
AVERAGE													

PITOT LEAK CHECK:
BEFORE: TOP ΔP= 2.5 ΔP= 2.5 BOTTOM ΔP= 2.5 ΔP= 2.5
AFTER: TOP ΔP= 3.1 ΔP= 3.1 BOTTOM ΔP= 2.4 ΔP= 2.4

SAMPLE TRAIN LEAK:
BEFORE= <.002 CFM@ 15 IN. HG.
AFTER= .004 CFM@ 15 IN. HG.

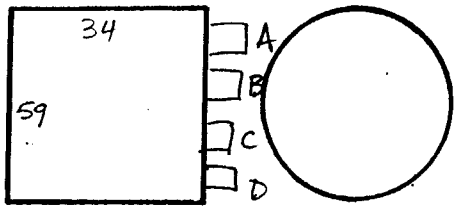
COMMENTS: PURGE .

Notes: cal gases — O2 CC60289 15.22 ppmv
CO2 CC60289 4.25

PRODUCTION 201 TONS/HR

PLANT: Graniteville
LOCATION: Evaluation
OPERATOR: LIRR MAF, RTR
DATE: 5/8/90
RUN NO.: 1 (cont'd)
SAMPLE BOX NO.: cold box #3
METER BOX NO.: B
PITOT FACTOR: #2, C_p = .8428
METER FACTOR: Y_c = .9911, $\Delta H@$ = 2.0255
FILTER NO.: C-15

STACK CROSS SECTION



AMBIENT TEMP., °F: 75
BAROMETRIC PRESS., IN. HG: 29.74
ASSUMED MOISTURE, %: 28%
HEATER BOX SETTING: HI
PROBE LENGTH, FT.: 5
NOZZLE DIAMETER, IN.: #22, 0.226" dia
PROBE HEATER SETTING: HI
APPROX. WIND VEL., MPH: 0
SAMPLE BOX TEMP., °F: 227
DRI-RITE WT.:

STATIC PRES -0.4 "H_2O _____ "Hg

TRAVERSE POINT NUMBER	DISTANCE INCHES	θ_2 (%)	CO_2 (%)	SAMPLE TIME θ MIN	STACK TEMP. (Ts), °F	VELOCITY HEAD IN. H_2O ΔP	VELOCITY HEAD IN. H_2O $\sqrt{\Delta P}$	PRESSURE DIFF. ORIFICE METER (ΔH), IN. H_2O	DRY GAS SAMPLE VOLUME (Vm), FT^3	GAS SAMPLE TEMP. @ DRY GAS METER INLET (Tm), °F	GAS SAMPLE TEMP. @ DRY GAS METER OUTLET (Tm), °F	PUMP VACUUM IN. HG	TEMP. OF GAS FROM LAST IMP. °F
C-1	2.8	10.6	5.7	0	248	0.7		0.97	582.103	74	73		
2	8.5	11.0	5.4	3	268	1.0		1.35	83.7	77	72		
3	14.2	10.8	5.4	6	272	1.1		1.48	85.6	79	72		
4	19.9	11.0	5.4	9	273	1.2		1.61	87.6	80	73	11	39
5	25.6	13.5	4.0	12	265	1.5		2.04	89.7	81	74	15	
6	31.3	12.5	4.6	15	260	1.3		1.91	91.9	81	75		
				8					594.488				
A-1	2.8	9.8	6.1	9:03 0	247	0.1		0.14		74	74	3	39
2	8.5	10.0	5.8	3	246	0.1		0.14	5.2	74	74		
3	14.2	11.5	5.2	6	267	0.5		0.67	5.8	74	74		
4	19.9	10.5	5.8	9	274	0.8		1.08	96.8	77	73	8	
5	25.6	—	—	12	278	0.8		1.06	8.5	78	73	9	
6	31.3	—	—	15	282	0.8		1.06	600.2	78	73		
AVERAGE	ZERO	0	0	18					601.995				
AVERAGE	SPAN	+.2	0	72	259.7		0.873	1.067	39.385	AVG. 77.8			

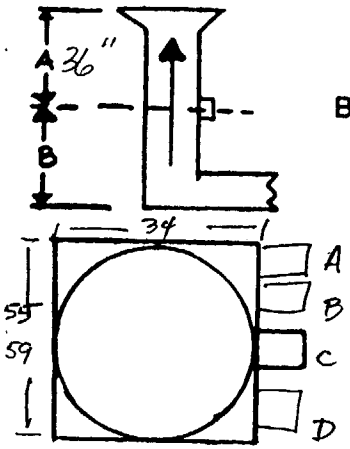
(33)

PITOT LEAK CHECK: 11.5 5.3
BEFORE TOP ΔP = _____ BOTTOM ΔP = _____
ΔP = _____ ΔP = _____
AFTER TOP ΔP = _____ BOTTOM ΔP = _____
ΔP = _____ ΔP = _____

SAMPLE TRAIN LEAK CHECK:
BEFORE = _____ CFM @ _____ IN. HG
AFTER = _____ CFM @ _____ IN. HG

COMMENTS: PURGE _____ - _____

PLANT: Granite
LOCATION: Buellton
COUNTY: Santa Barbara
UNIT:
DATE: 5/8/90
RUN NO./METHOD: 2 / LARB
COLD BOX NO.: 2
METER BOX NO.: B
METER FACTOR: Yc = .9411 ΔH@ = 2.025
PITOT #/ FACTOR: #7, Cp = .8299
PYROMETER #: 11
MAGNEHELIC FACTOR: ΔP M3 ΔH M4



FILTER NO. C-17
AMBIENT TEMP.: 71
BARAMETRIC PRESS.,IN.HG.: 29.74
ASSUMED MOISTURE: 28%
HEATER BOX SETTING: Hi
PROBE LENGTH,FT. 5'
NOZZLE DIAMETER,IN.: #24, 0.235 "dia
PROBE HEATER SETTING: Hi
APPROX.WIND VEL.,MPH: 0
SAMPLE BOX TEMP.,(F): 220
STATIC PREASURE: -.4 "H2O
OFFSET: in. PORT DIA.: in. (M / F)

$P_{stack} = 29.7$

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
				9:57									
A-1	2.8	10.3	5.9	0	265	0.3		0.45	602.296	72	72	4	
2	8.5	13.5	4.0	3	251	0.1		0.15	3.3	74	71		
3	14.2	10.8	5.6	6	260	0.2		0.31	4.0	74	72		
4	19.9	11.3	5.2	9	270	0.5		0.77	5.0	78	72		
5	25.6	9.5	6.6	12	274	0.7		1.07	6.4	80	73		
6	31.3	9.5	6.4	15	278	0.8		1.22	8.1	82	74		
				10:22				FINAL	609.857				
C-1	2.8	10.0	6.4	0	252	0.7		1.11		80	80		
2	8.5	10.5	6.0	3	250	1.0		1.58	611.6	83	78		
3	14.2	10.3	6.0	6	271	0.7		1.08	3.6	85	78		
4	19.9	10.0	6.4	9	278	0.7		1.08	5.4	86	79		
5	25.6	9.8	6.4	12	285	0.7		1.06	7.2	87	80		
6	31.3	11.3	5.8	15	288	1.0		1.37	8.9	88	81		
	ZERO	-0.1	-0.1					FINAL	620.825				
AVERAGE	SPAN	-0.1	0.0										

PITOT LEAK CHECK:
BEFORE: TOP ΔP= 2.8 ΔP= 2.75 BOTTOM ΔP= 2.2 ΔP= 2.15
AFTER: TOP ΔP= 1.4 ΔP= 1.3 BOTTOM ΔP= 0.8 ΔP= 0.7

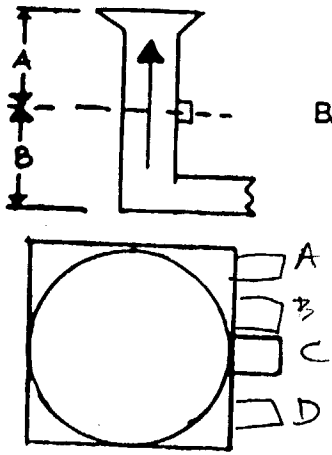
.11 - .12 30 sec
SAMPLE TRAIN LEAK:
BEFORE= .002 CFM@ 15 IN. HG.
AFTER= < .001 CFM@ 15 IN. HG.

COMMENTS: PURGE .

Production rate 217 Tons/hour

Run #2, page 2 of 2

PLANT: Granite
LOCATION: Bullhorn
COUNTY:
UNIT:
DATE: 5/8/90
RUN NO./METHOD: 2 (coal) DAT
COLD BOX NO.: 2
METER BOX NO.: B
METER FACTOR:
PITOT #/ FACTOR:
PYROMETER #:
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO. C-17
AMBIENT TEMP.: 81
BARAMETRIC PRESS.,IN.HG.: 29.74
ASSUMED MOISTURE:
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.: #24, 0.235
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH:
SAMPLE BOX TEMP.,(F): 230 F
STATIC PREASURE: "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM), FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
				10:45									
B-1	2.8	10.8	4.8	0	277	0.3		0.50	620.825	85	84	5	
2	8.5	11.3	5.2	3	231	0.4		0.67	2.0	88	83		
3	14.2	10.3	6.0	6	280	0.5		0.84		91	84		
4	19.9	9.8	6.2	9	280	0.7		1.08	25.0	91	85	7	
5	25.6	10	6.2	12	281	0.8		1.23	6.5	92	85	8	
6	31.3	11	5.8	15	280	0.8		1.23	8.4	94	86		restart @ 11:05
									632.117				
1	2.8	16.0	6.2	11:13 0	267	0.9		1.43		91	91		
2	8.5	16.0	5.9	3	270	0.9		1.43	4.0	91	90		
3	14.2	12.5	4.8	6	274	1.7		2.07	—	95	90		
4	19.9	12.0	4.6	9	272	1.2		1.91	8.4	95	91		
5	25.6	—	—	12	272	0.7		1.11	46.8	96	91		
6	31.3	—	—	15	271	0.7		1.11	2.6	96	91		
								FINAL	644.731				
AVERAGE		10.9	5.5	72	267.2		0.816	1.028	42.435	84.1			

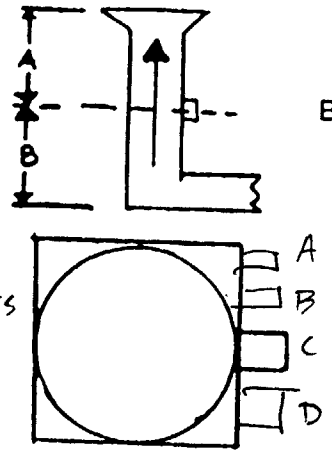
PITOT LEAK CHECK:
BEFORE: TOP ΔP= ΔP= BOTTOM ΔP= ΔP=
AFTER: TOP ΔP= ΔP= BOTTOM ΔP= ΔP=

SAMPLE TRAIN LEAK:
BEFORE= CFM@ IN. HG.
AFTER= CFM@ IN. HG.

COMMENTS: PURGE

Run #3 pg 1 of 2

PLANT: Grasville
LOCATION: Ductition
COUNTY: Santa Barbara
UNIT:
DATE: 5/8/90
RUN NO./METHOD: 3 PART
COLD BOX NO.: #6
METER BOX NO.: D
METER FACTOR: Yc = .9911, ΔH@ 2.025
PITOT #/ FACTOR: #2 Cp = .8428
PYROMETER #: T.C
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO. C-19
AMBIENT TEMP.: 74
BARAMETRIC PRESS.,IN.HG.: 29.7
ASSUMED MOISTURE: 28%
HEATER BOX SETTING: Hi
PROBE LENGTH,FT. 5'
NOZZLE DIAMETER,IN.: #22 0.226" dia
PROBE HEATER SETTING: Hi
APPROX.WIND VEL.,MPH: 0
SAMPLE BOX TEMP.,(F): 225
STATIC PREASURE: -0.4 "H2O
OFFSET: in. PORT DIA.: in. (M / F)

Pstatic = 29.7

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN. 12:15	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
D-1	2.8	13.3	4.2	0	248	1.4		1.98	645.088	83	83	13	
2	8.5	11.0	5.2	3	250	1.3		1.84	7.5	83	83		
3	14.2	12.0	4.4	6	254	0.9		1.27	50.0	85	83		
4	19.9	11	5.3	9	258	0.9		1.25	52.0	87	82		
5	25.6	12	4.9	12	258	0.7		.98		87	83		
6	31.3	11.8	5.9	15	263	0.7		.98	5.3	90	83		
								FINAL	657.039				
B-1	2.8	15.5	2.7	0	265	0.4		0.56		87	87		
2	8.5	11.3	5.2	3	256	0.4		0.56	8.2	91	86		
3	14.2	10.3	5.8	6	265	0.4		0.56	9.7	92	86		
4	19.9	16.0	5.8	9	268	0.6		0.83	60.9	93	87		
5	25.6	10.0	5.9	12	273	0.8		1.11	2.3	95	87	8	
6	31.3	9.9	6.1	15	277	1.0		1.53	4.1	96	89	10	
								FINAL	666.107				
AVERAGE													

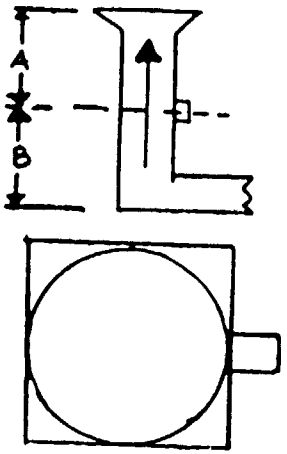
PITOT LEAK CHECK:
BEFORE: TOP ΔP= 1.0 BOTTOM ΔP= 3.2
ΔP= 1.0 ΔP= 3.2
AFTER: TOP ΔP= 3.0 BOTTOM ΔP= 2.7
ΔP= 3.0 ΔP= 2.7

30 dec .012 - 013
SAMPLE TRAIN LEAK:
BEFORE= .002 CFM@ 15 IN. HG.
AFTER= .006 CFM@ 15 IN. HG.
36 dec .03 to .033
COMMENTS: PURGE

Production Rate, run #3 = 222 Tons/hour.

K1 #7 C 21 2 C D

PLANT: Granite
LOCATION: Buellton
COUNTY: Santa Barbara
UNIT:
DATE: 5/8/90
RUN NO./METHOD: 2 Part
COLD BOX NO.: #6
METER BOX NO.:
METER FACTOR:
PITOT #/ FACTOR:
PYROMETER #:
MAGNEHELIC FACTOR: ΔP ΔH



FILTER NO. C-18
AMBIENT TEMP.: 74
BARAMETRIC PRESS.,IN.HG.: 29.7
ASSUMED MOISTURE: 28%
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.: .226
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH: 0
SAMPLE BOX TEMP.,(F): 225
STATIC PREASURE: -.4 "H2O
OFFSET: in. PORT DIA.: in. (M / F)

TRAVERSE POINT NUMBER	DISTANCE INCHES	O2 (%)	CO2 (%)	SAMPLE TIME MIN.	STACK TEMP. (Ts), F	VELOCITY HEAD IN. H2O ΔP	VELOCITY HEAD IN. H2O √ΔP	PRESSURE DIFF ORIFICE METER (ΔH) IN.H2O	DRY GAS SAMPLE VOLUME (VM),FT.	GAS SAMPLE TEMP. @DRY GAS METER INLET (Tm),	GAS SAMPLE TEMP. @DRY GAS METER OUTLET (TM)	PUMP VACUUM IN.HG	TEMP. LAST IMPINGER (F)
				12:57									
C-1	2.8	10.0	6.0	0	269	0.5		0.70	666.107	92	92		
2	8.5	9.8	5.8	3	284	0.6		0.82	7.5	95	91		
3	14.2	10.3	5.6	6	286	0.6		0.82	9.1	96	90		
4	19.9	13.3	4.0	9	279	~~1.2~~ .8		~~1.69~~ 1.64	70.5	97	92		
5	25.6	10.0	5.9	12	279	0.6		0.82	2.6	98	92		
6	31.3	11.3	5.2	15	279	0.9		1.23	4.0	99	92		
								FINAL	675.929				
A-1	1.8	11.0	5.2	1:21 0	~~240~~	0.1		0.14		96	95		
2	8.5	10.3	6.0	3	247	0.4		0.57	6.5	96	94		
3	14.2	10.3	5.8	6	270	0.5		0.72	7.7	98	94		
4	19.9	10.0	5.9	9	274	0.6		0.87	9.1	98	93		
5	25.6	—	—	12	277	0.8		1.11	680.6	99	93		
6	31.3	—	—	15	281	0.8		1.19	—	100	94		
		Ø	Ø					FINAL	684.267	98.9			
AVERAGE		Ø	+0.15						—	final @ 1:39			

PITOT LEAK CHECK: 11:11 512 12 266A 0.815
BEFORE: TOP ΔP= ΔP= BOTTOM ΔP= ΔP=
AFTER: TOP ΔP= ΔP= BOTTOM ΔP= ΔP=

0.980 39,179
SAMPLE TRAIN LEAK:
BEFORE= CFM@ IN. HG.
AFTER= CFM@ IN. HG.

COMMENTS: PURGE

VIII. QUALITY ASSURANCE

DRY GAS METER CALIBRATION

Date: 5/5/90 Unit: B

Ambient Conditions

Temp: 83 F/C

Baro: 29.85 in.Hg

ORIFICE MANOMETER SETTING D,H	GAS VOL WET TEST METER V,w	GAS VOL DRY GAS METER Vb,	wet test tw	Temperature				Y	DH@Y
				Dry IN	Dry Out	Ave f	Time e min		
				TD, IN	Tdo,	Td,			
0.5	5	544.909	77	86	84	87.25	13.22	0.9400	1.9597
		539.500	78	94	85				
1.0	5	550.614	78	91	87	91.00	9.58	0.9435	2.0479
		545.200	78	98	88				
1.5	5	556.543	78	91	90	92.75	7.83	0.9403	2.0456
		551.100	78	100	90				
2.0	5	562.356	78	96	91	95.00	6.8	0.9407	2.0488
		556.900	78	102	91				
								0.941	2.026

Calibration by: RTR

Reviewed by: _____

Meter Factor: 0.9411

Delta H: 2.0255

Equations:

$$Y = (Vw * Pb) * (Td+460))/Vdt-Vdb)+(DelH/13.6)) * (((Wt+wt)/2)+460))$$

$$Del\ H = (0.0317 * Del) * (((((WT+Wt)/2)+460) * e)/Vw)^2)/((Pb * (Td+460)$$

PITOT TUBE CALIBRATION RECORD

Date: 7/1/89

Unit: #7-5'

Ambient Condition

Temp: 76 F/C

Baro: 30.07 in. Hg

Run No.	AP In.H2O Standard	AP IN. H2O Type"S"		Cp (S)	
		A	B	A	B
1	0.27	0.39	0.38	0.8237	0.8345
2	0.62	0.88	0.89	0.8310	0.8263
3	0.95	1.34	1.35	0.8336	0.8305
			Average =	0.8294	0.8304
			Average Both Side =		0.8299

Calibrated by: RTR

Reviewed by: CDD

Cp(a)-Cp(b)= 0.001

Sa	Sb
0.005	0.004

PITOT TUBE CALIBRATION RECORD

Date: 7/5/89

Unit: #2-5'

Ambient Condition

Temp: 83 F/C

Baro: 30.04 in. Hg

Run No.	AP In.H2O Standard	AP IN. H2O Type"S"		Cp (S)	
		A	B	A	B
1	0.25	0.34	0.33	0.8489	0.8617
2	0.49	0.68	0.69	0.8404	0.8343
3	0.93	1.31	1.3	0.8341	0.8373
			Average =	0.8411	0.8444
			Average Both Side =	0.8428	

Calibrated by: RTR

Reviewed by: CDD

Cp(a)-Cp(b)= 0.003

Sa	Sb
0.007	0.015

THERMO COUPLE CALIBRATION

Date: 1/15/90 Unit: T-1

Point	* Standard Temperature *Tstd* deg. F	Pyrometer Temperature *Tpyr* deg. F	Error % ** *(Tstd-Tpyr)/Tstd*
1 Ambient	62.5	59.0	0.67%
2 Ice	33.0	31.4	0.32%
3 Boil	213.0	213.0	0.00%
4 Oil			#VALUE!

Std. Corr. Factor 1.037

Calibration by: RTR * Standard ID: Labcraft-#227-694

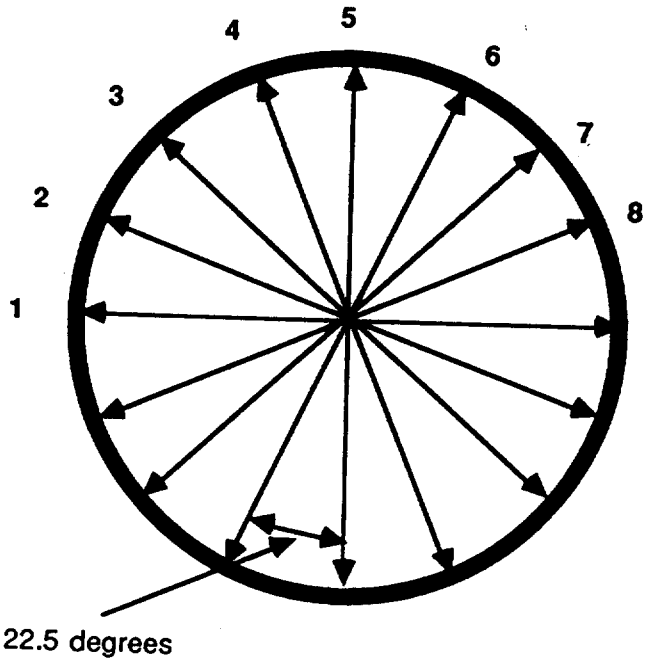
Reviewed by: ___

** in deg. K

Nozzle Calibration

Nozzle I.D. : #24

Date : 01/08/90



Points	
1 -	0.234
2 -	0.233
3-	0.235
4-	0.235
5-	0.237
6-	0.238
7-	0.236
8-	0.235

Average Nozzle Diameter = 0.235

Analyst : RTR

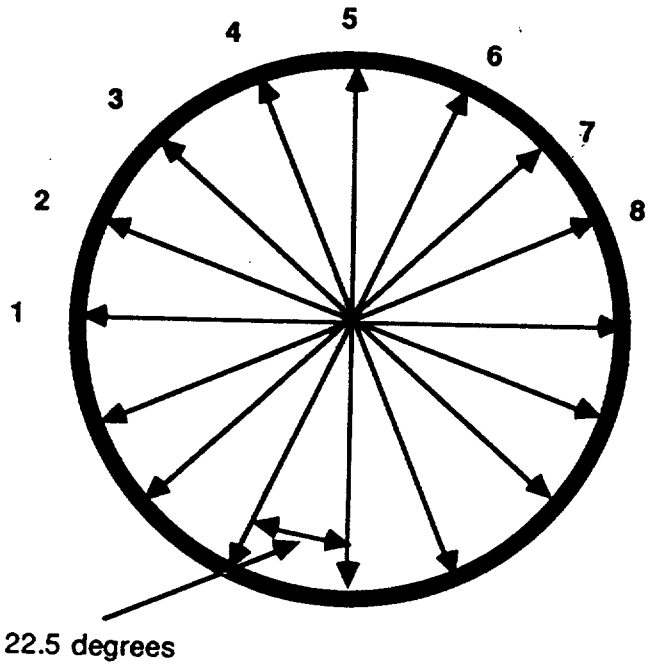
Reviewed :

BTC Environmental, Inc. - 1989

18

Nozzle Calibration

Nozzle I.D. : 22 Date : 1/8/90



Points	
1 -	0.227
2 -	0.226
3-	0.225
4-	0.225
5-	0.225
6-	0.225
7-	0.226
8-	0.226

Average Nozzle Diameter = 0.226

Analyst : RTR Reviewed :

BTC Environmental, Inc. - 1989

MAGNEHELIC CALIBRATION

DATE: 2/28/90
GAGE ID # M-3
RANGE 0-5 in. H20

SCHEULED CALIBRATION:
SEMI ANNUAL X
BI-MONTHLY
OTHER

REFERENCE ID # 0-10 DWYER MAN0

LEAK CHECK :

System:	† Set @ 10 in. H20	vacuum 10 in. P F	pressure 10 in. P F
Point:	†† Set @ 90 % FS in. H20	vacuum in. P F	pressure in. P F

Point	Incline Delta P *Pinc*	Magnehelic Delta P *Pmag*	% Deviation *(Pinc-Pmag)/Pinc x 100*
1	1.000	1.02	2.000%
	1.000	1.03	3.000%
	1.000	1.02	2.000%
average	1.00	1.02	** 2.333%
2	2.000	2.05	2.500%
	2.000	2.05	2.500%
	2.000	2.05	2.500%
average	2.00	2.05	** 2.500%
3	3.000	3.05	1.667%
	3.000	3.05	1.667%
	3.000	3.05	1.667%
average	3.00	3.05	** 1.667%
4	4.000	4.05	1.250%
	4.000	4.05	1.250%
	4.000	4.05	1.250%
average	4.00	4.05	** 1.250%
5	5.000	5.05	1.000%
	5.000	5.05	1.000%
	5.000	5.05	1.000%
average	5.00	5.05	** 1.000%

STANDARD CORRECTION FACTOR	**0.983**
AVERAGE DEVIATION	0.018
STANDARD DEVIATION	0.006
95% CONFIDENCE INTERVAL	0.015
PRECISION(within +/- 3%)	-0.97

† If pressure or vacuum decreases by more than 1 in. in 5 minutes then remove from service.
†† If pressure or vacuum decreases by more than 5% in 5 minutes then remove from service.
** These values must be within +/- 5% before the magnehelic can be put into operation.

Calibration by: RTR *Reviewed by:* MRP

MAGNEHELIC CALIBRATION

DATE: 2/28/90
GAGE ID # M-4
RANGE 0-2 in. H20

SCHEULED CALIBRATION:
SEMI ANNUAL [X]
BI-MONTHLY [ ]
OTHER [ ]

REFERENCE ID # 0-10 DWYER MAN0

LEAK CHECK :

System:	† Set @ 10 in. H20	vacuum 10 in. P F	pressure 10 in. P F
Point:	†† Set @ 90 % FS in. H20	vacuum in. P F	pressure in. P F

Point	Incline Delta P *Pinc*	Magnehelic Delta P *Pmag*	% Deviation *(Pinc-Pmag)/Pinc x 100*
1	0.400	0.43	7.500%
	0.400	0.42	5.000%
	0.400	0.43	7.500%
average	0.40	0.43	** 6.667%
2	0.800	0.83	3.750%
	0.800	0.84	5.000%
	0.800	0.83	3.750%
average	0.80	0.83	** 4.167%
3	1.200	1.25	4.167%
	1.200	1.25	4.167%
	1.200	1.25	4.167%
average	1.20	1.25	** 4.167%
4	1.600	1.64	2.500%
	1.600	1.63	1.875%
	1.600	1.63	1.875%
average	1.60	1.63	** 2.083%
5	2.000	2.05	2.500%
	2.000	2.05	2.500%
	2.000	2.05	2.500%
average	2.00	2.05	** 2.500%

STANDARD CORRECTION FACTOR	**0.963**
AVERAGE DEVIATION	0.039
STANDARD DEVIATION	0.017
95% CONFIDENCE INTERVAL	0.043
PRECISION(within +/- 3%)	-0.92

† If pressure or vacuum decreases by more than 1 in. in 5 minutes then remove from service.
†† If pressure or vacuum decreases by more than 5% in 5 minutes then remove from service.
** These values must be within +/- 5% before the magnehelic can be put into operation.

Calibration by: RTR *Reviewed by:* MRP

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

REPORT OF ANALYSIS
NIST TRACEABLE GAS MIXTURES

BTCE01

TO:

Matthew Pena
BTC Enviromental
1536 Eastman Ave. Suite B
Ventura, CA 93003

DATE : 02/21/90

CUSTOMER ORDER NUMBER: 02685

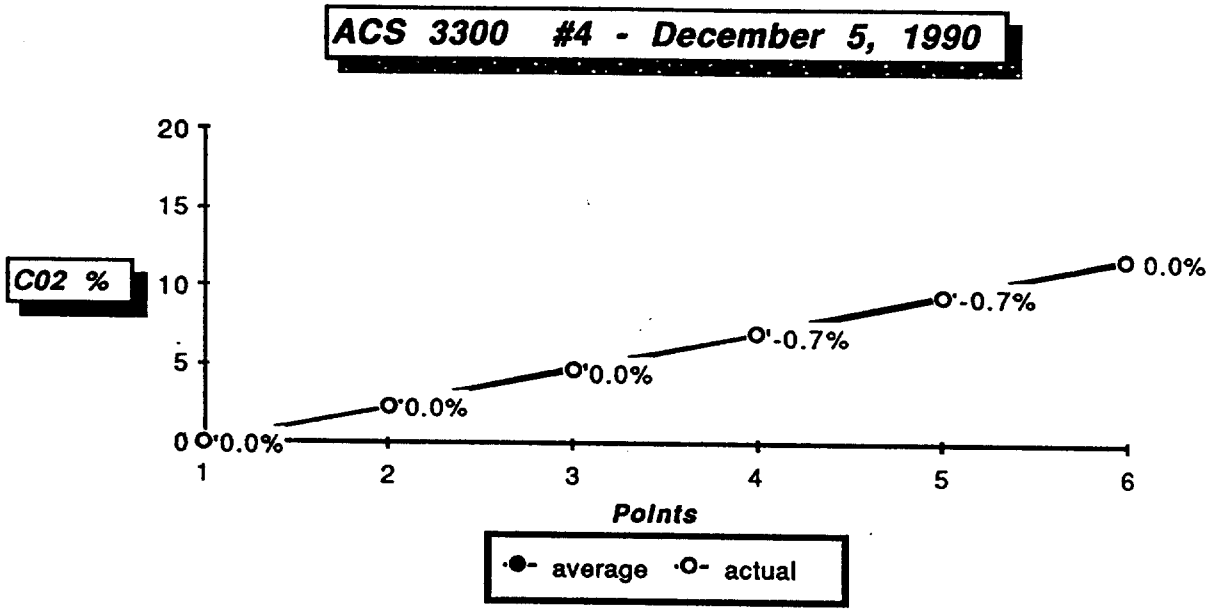
CYLINDER NUMBER	COMPONENT	CONCENTRATION(v/v)	NIST TRACEABLE REFERENCE STANDARD
CC28058	Oxygen	7.57 ± 0.08 %	SRM 2658a
	Carbon Monoxide	396 ± 4 ppm	SRM 1680b
	Carbon Dioxide	11.67 ± 0.12 %	SRM 1675b
	Nitrogen	Balance	
CC60289	Oxygen	15.22 ± 0.15 %	SRM 2659
	Carbon Monoxide	400 ± 4 ppm	SRM 1680b
	Carbon Dioxide	4.25 ± 0.04 %	SRM 2626a
	Nitrogen	Balance	
CC60380	Oxygen	7.84 ± 0.08 %	SRM 2658a
	Carbon Dioxide	11.58 ± 0.12 %	SRM 1675b
	Nitrogen	Balance	

ppm = umole/mole % = mole-%

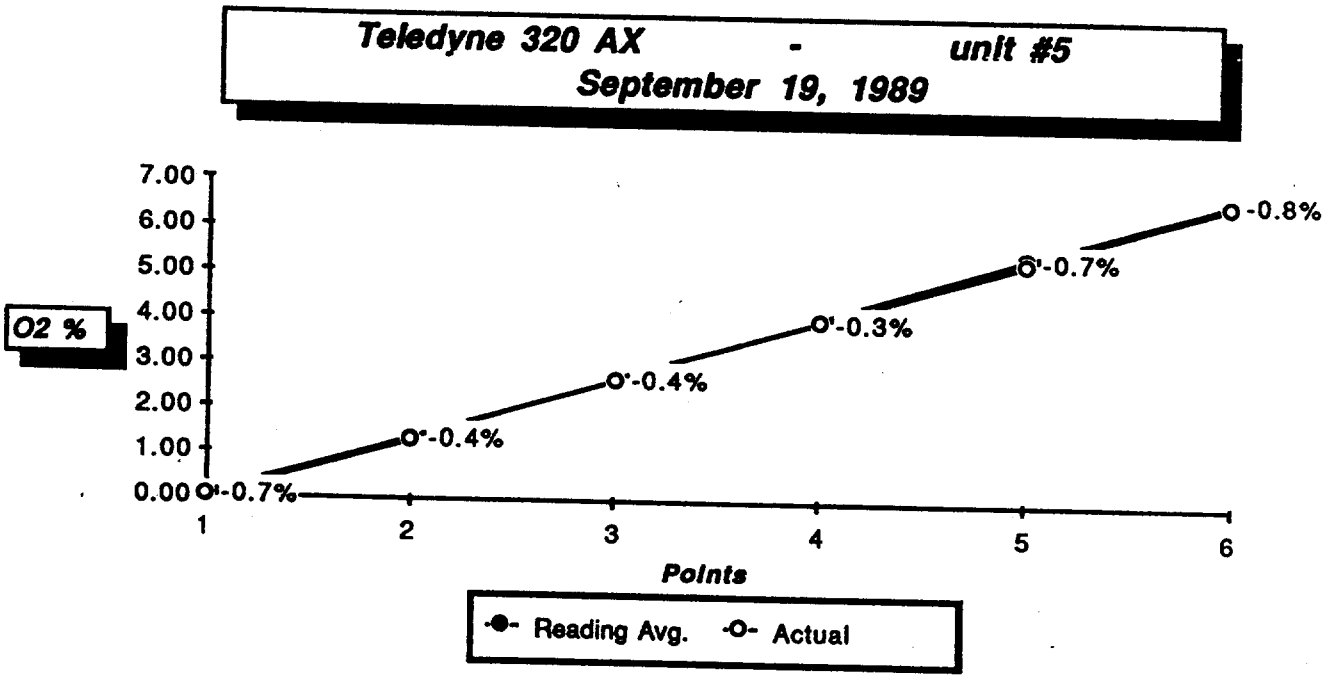
The above analyses are traceable to the National Institute of Standards and Technology by intercomparison with the reference standards listed above.
Where indicated, volumetric and gravimetric reference standards are traceable thru use of our analytical balance. NIST Report No. MMAP 232.09/202491.

Analyst: J.W. Gay

Approved: J.T.Marrin



1536 Eastman Avenue • Ventura, CA 93003 • (805) 644-1095



1536 Eastman Avenue • Ventura, CA 93003 • (805) 644-1095

SULFUR DIOXIDE - ULTRAVIOLET METHOD

Instrument Manufacture:	Anarad, Inc. 534 E. Ortega St. Santa Barbara, CA 93103
Unit #1 - Model: Serial Number:	AR-30, equipped with Model AR-50DD digital display. 2564, Measurement ranges: 0-100, 1000 ppmv SO_2.
Instrument Manufacture:	Western Research #122-1300 South Potomac St. Aurora,Colorado 80012
Unit #2 - Model: Serial Number:	721AT2 89-721AT2-7567-1, Measurement ranges: 0-200,0-2000

CARBON DIOXIDE - NON-DISPERSIVE INFRARED METHOD (2 units)

Instrument Manufacture:	Horiba Instruments, Inc. 1021 Duryea Avenue Irvine, CA 92714
Unit #1 - Model: Serial Number:	MEXA-221 4726203, Measurement range: 0-5, 20% CO_2
Unit #2 - Model: Serial Number:	MEXA-211E E70019, Measurement range: 0-5, 20% CO_2
Instrument Manufacture:	Automated Custom Systems inc. 1238 West Grove Avenue Orange,Ca. 92665-4134
Unit #3 - Model: Serial Number:	ACS 3300 NDIR N8M6611T, Measurement range: 0-5, 20% CO_2
Unit #4 - Model: Serial Number:	ACS 3300 NDIR N9c5479T, Measurement range: 0-5, 20% CO_2

OXYGEN- PARAMAGNETIC SUSCEPTIBILITY METHOD (3 units)

Instrument Manufacture:	Taylor Instrument Company 95 Omes Street Rochester, NY 14601
Unit #1 - Model: Serial number:	Servomex OA580 580/702/497, Measurement range: 0-10, 25, 100% O_2.
Unit #2 - Model: Serial number:	Servomex 570A 68771/B, Measurement range: 0-100% O_2.
Unit #3 - Model: Serial number:	Servomex 570A 4212B, Measurement range: 0-100% O_2.

OXYGEN-ELECTROCHEMICAL METHOD (2units)

Instrument Manufacture:	Teledyne Analytical Instruments 16830 Chestnut St. City of Industry, CA. 91749-1580
Unit #4 - Model: Serial number:	Teledyne 320AX 107294, Measurement range: 0-5, 10, 25% O_2
Unit #4 - Model: Serial number:	Teledyne 320AX 108743, Measurement range: 0-5, 10, 25% O_2

BIC ENVIRONMENTAL INCORPORATED

1536 Eastman Avenue
Ventura, CA 93003
(805) 644-1095

CHAIN OF CUSTODY RECORD

PROJ. NO.: A0081 | PROJECT NAME: Granite Const.

SAMPLERS: (Signature)

NO.	DATE	TIME	COMP	GRAB	SAMPLE I.D.	NO. OF CONTAINERS	ANALYSIS: Cross weight	ANALYSIS: Total Residue	REMARKS	CHECK IF RUSH
1	5-8-90		✓		run 1 Imps			✓		
2					run 1 Probe			✓		
3					run 1 Filter #C-15		✓			
4					run 2 Imps			✓		
5					run 2 Probe			✓		
6					run 2 Filter #C-17		✓			
7					run 3 Imps			✓		
8					run 3 Probe			✓		
9					run 3 Filter C-18		✓			
10					Acetone Blank			✓		
11					DI H2O Blank			✓		

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Jan Porter	5/9 9:00				
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	NAME ADDRESS	
				PHONE NO.	

WHITE COPY_____ CANARY COPY_____ PINK COPY_____