0157

WILLAMETTE INDUSTRIES,INC.
P.O. Box 519
Port Hueneme, Ca 93401

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AB2588 TOXIC EMISSION TESTING

LM 2500 Cogen
October 21, 1991

Prepared By:

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

Job Number
23002

Laboratory Report Number
291-168

Test Team Leader
Dan Laren

Results Verified By:
Tom Porter - Vice President Air Test Division

BTC ENVIRONMENTAL INCORPORATED

TABLE OF CONTENTS

		Page
Summary of Source Test Results		1
I.	Introduction	2
II.	Wet Test Methods Data Summaries	5
	A. Field Data Summary	6
	B. Equations	7
III.	Wet Test Methods Calculations	8
	A. Formaldehyde	9
	B. Propylene	10
IV.	Continuous Test Methods Data	12
	A. C.A.R.B. Method 100 Data	13
	B. Strip Charts	14
	C. Continuous Analyzers Sampling System	15
V.	Laboratory Analysis	17
	A. Benzene (BTC #912037)	18
	B. Propylene (BTC #912037)	22
	C. Formaldehyde (AtmAA #92941)	27
	D. Impinger Weights	27A
VI.	Methodology	28
	A. Equipment List	29
	B. Sample Train Diagrams	32
VII.	Raw Data	35
VIII.	Quality Assurance	51
	A. Dry Gas Meter Calibration	52
	B. SKC Air Pump Calibration	53
	C. Pyrometer Calibration	54
	D. Pitot Tube Calibration	55
	E. Continuous Analyzer Linerity Graphs	56
	F. Claigration Gases	58
	G. Chain of Custodies	59

SUMMARY
LM 2500 Cogen

Constituent	ppmv	lb/hr
Propylene Run #1	<0.1	<0.079
Propylene Run #2	<0.1	<0.079
Propylene Run #3	<0.1	<0.079
Propylene Average	**<0.1**	**<0.079**

Formaldehyde Run #1	0.007	0.004
Formaldehyde Run #2	0.050	0.028
Formaldehyde Run #3	0.004	0.002
Formaldehyde Average	**0.020**	**0.011**

I. INTRODUCTION

November 21, 1991

Job Number: 23002
Lab Number: 291-168

Willamette Industries Inc.
P.O. Box 519.
Port Hueneme, Ca. 93401

ATTENTION: Rudy Rehbein

REGARDING: Air Toxics testing on The LM 2500 Cogen.

Dear Mr. Rehbein:

On October 21, 1991, BTC Environmental performed air toxics testing on a natural gas fired LM 2500 cogen located at 5936 Perkins Road, Oxnard, California. The following is a summary of the procedures used in that test:

PROPYLENE SAMPLING AND ANALYSIS: Exhaust gas samples were taken into three (3)Tedlar bags. A Teflon tube was attached to the Tedlar bag which was placed into a vacuum chamber. A vacuum was applied to the chamber allowing the exhaust gases to enter the bag directly. The bag was then evacuated and refilled to assure that the probe line was completely purged. The sampling system was leaked check to meet CARB Method 18 requirements.

The bags were labeled and placed into a dark plastic bag and returned to the laboratory for analysis. The propylene was analyzed by GC/MS.

FORMALDEHYDE ANALYSIS: The formaldehyde was sampled according the CARB Method 430. The exhaust gases were withdrawn into midget impingers containing DNPH solution. The resultant impinger solution was retrieved in the field, kept in a charcoal container, refrigerated and returned to the laboratory for analysis. The samples were subcontracted to AtmAA and analyzed by HPLC.

STACK GAS ANALYSIS: Samples of the stack gas were taken through a heated sample line from the exhaust stack to a stack gas conditioner and analyzed for oxygen and carbon dioxide using CARB 100.1. The oxygen was determined by a Teledyne 320 AX electrochemical oxygen analyzer. The carbon dioxide was checked using an ACS (Fuji) 3000 NDIR analyzer. For a description of the sample conditioner and system please refer to the attachments.

STACK GAS FLOW RATE: The stack gas velocity was determined using an "S" type pitot tube connected to an inclined draft gauge or a magnehelic gauge. 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 CARB Method 3.1, equation 3-2. A four (4) point, eight (8) port traverse was conducted on the exhaust stack.

LEAK CHECKS: Leak rates were conducted on the sampling trains and the pitot tubes before and after each test. The leak check for the moisture train was done at the probe. Any leak rate greater than 0.02 cfm was corrected for in the volume calculations.

The stack exhaust calculations for lb/hr were done by using the flow rate of the stack gas which was determined from pitot traverse. All values were calculated by using VCAPCD standard conditions (70°F & 29.92 in. Hg).

Benzene results were not reported due to inadequate detection limits.

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

Tom Porter
Vice President - Air Test Division

II. WET TEST METHODS DATA SUMMARIES

FIELD DATA & CALCULATIONS SUMMARY

Client: **Willamette**
Site: **Oxnard**
Unit: **Cogen LM 2500**

Date: **10/21/91**
Type: ***T std = 68 F***
Run: **1**

Wlc	Water Condensate Weight	33.3	g		
Vlc	Water Condensate Volume	**33.4**	**ml**		
Vm	Metered Sample Gas Volume	**16.265**	**dcf**		
Lp	Avg. Leak Rate	0.000	cf		
Vn	Leak Corrected Sample Gas Volume	16.265	dcf		
Y	Dry Gas Meter Calibration Factor	**0.997**			
Pbar	Barometric Pressure	**30.17**	**in. Hg**		
Pg	Static Pressure	**0.54**	**in. H2O**		
Ps	Stack Pressure, Absolute	30.21	in. Hg		
Δ H	Dry Gas Meter Press. Differential, Average	**1.750**	**in. H2O**		
Tm	Dry Gas Meter Temperature, Average	75.9	deg. F	**535.9**	**deg. R**
Vm(std)	Sample Gas Volume	**16.2455**	**dscf**		
Vm(wet)	Sample Gas Volume, Wet	17.8244	scf		
Vw(std)	Water Vapor Volume	1.5788	scf		
Bws	Water Content of Stack Gas	0.089		**8.9**	**%**
CO2	Carbon Dioxide, Dry	**3.5**	**%**		
O2	Oxygen, Dry	**14.5**	**%**		
N2	Nitrogen, Dry	82.0	%		
Md	Molecular Wt. of Stack Gas, Dry	**29.140**	**lb/lb mole**		
Ms	Molecular Wt. of Stack Gas, Wet	**28.153**	**lb/lb mole**		
Cp	Pitot Calibration Factor	**0.846**			
Δ P	Velocity Head, Average Square Root	**0.899**	**in. H20**		
Ts	Stack Gas Temperature, Average	**323.5**	deg. F	783.5	deg. R
As	Area of Stack	**51.53**	**sq ft**	97.2	in. dia.
Vs	Stack Gas Velocity	62.40	ft/sec		
Qa	Actual Flow Rate	192,915	cfm		
Qad	Actual Flow Rate, Dry	175,827	dcfm		
Q(std)	Stack Gas Flow Rate	**120,090**	**dscfm**		
Theta	Sampling Time	**20**	**min.**		

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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

FORMALDYHDE

Client :	Willamette	P bar:	30.14 in. Hg	Date :	10/21/91
Site :	Oxnard	T std:	70 °F	Job #:	23002
Unit :	Cogen LM 2500	Pump #:	Speedair	Lab #:	291-168

RUN ID	Q ml/min Avg.	Time min	V ml	Tm °F	Vstd dscm	Wd µg less blank	Cf µg/dscm	Cs ppmv
1	578.1	30	17,343	68	1.75E-02	0.15	8.55	0.0069
2	578.1	30	17,343	68	1.75E-02	1.08	61.59	0.0495
3	578.1	30	17,343	67	1.76E-02	0.07	3.98	0.0032
							Average	0.020

ppm	Dscfm	lb/hr	Average lb/hr
0.0069	120,090	0.0039	0.0112
0.0495	120,090	0.0278	
0.0032	120,090	0.0018 0.00182	

Equations:

V = Q pump, ml/min * Time, min

Vstd = V * (Tstd/Tm) * (Pbar/Pstd)

Cf = Wd/ Vstd

Cs = Cf * 0.08205*(Tstd,°K) / 30 , 30 = MW of HCHO

lb/hr= ppm * MW * Dscfm * 0.0000001 * 1.885

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.0032 ft³ [illegible] x 120090 ft³/min x 60 [illegible] x [illegible] / 3811 ft³ [illegible]

EXHAUST GAS PROPYLENE ANALYSIS

Client :	Willamette	Date :	10/21/91
Site :	Oxnard	Job #:	23002
Unit :	Cogen LM 2500	Lab #:	291-168
Load:	**Normal**	Fuel:	So,Cal, Gas

FIELD AND LAB DATA

Exhaust Flow Rate, Q(std):	120,090	dscfm(avg)
Exhaust Outlet O2:	14.5	%
Standard Temperature, T std:	70	° F

Components	#1 8:30 AM time		#2 9:15 AM time		#3 9:45 AM time	
	ppmv	*lb/hr*	*ppmv*	*lb/hr*	*ppmv*	*lb/hr*
Propylene	< 0.10	< 0.0785	< 0.10	< 0.0785	< 0.10	< 0.0785
	=========	=========	==========	==========	==========	==========
Totals	< 0.10	**< 0.0785**	< 0.10	**< 0.0785**	< 0.10	**< 0.0785**

The above constituents are measured by gas chromatography using FID.
T factor = 60 * 29.92 * 10^-6 / (21.85 * (460 + Tstd))
MQL of Propylene = 0.02 ppmv
lb/hr = Q (std) * [ppmv] * MW * T factor
Mw Propylene = 42

RESULTS

Propylene **< 0.10 ppmv**
< 0.0785 lb/hr = $\frac{0.0785}{2} = 0.039$

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IV. CONTINUOUS TEST METHODS DATA

Date: 10/21/91

EMISSIONS TEST - C.A.R.B. METHOD 100

** Test Information **

Client: Willamette
County: Ventura
Site(s): Port Hueneme
Unit(s): Cogen

** Personnel **

BTC: Dan Larin
Client: Rudy Rehdein
APCD: -

** Instrument Information **

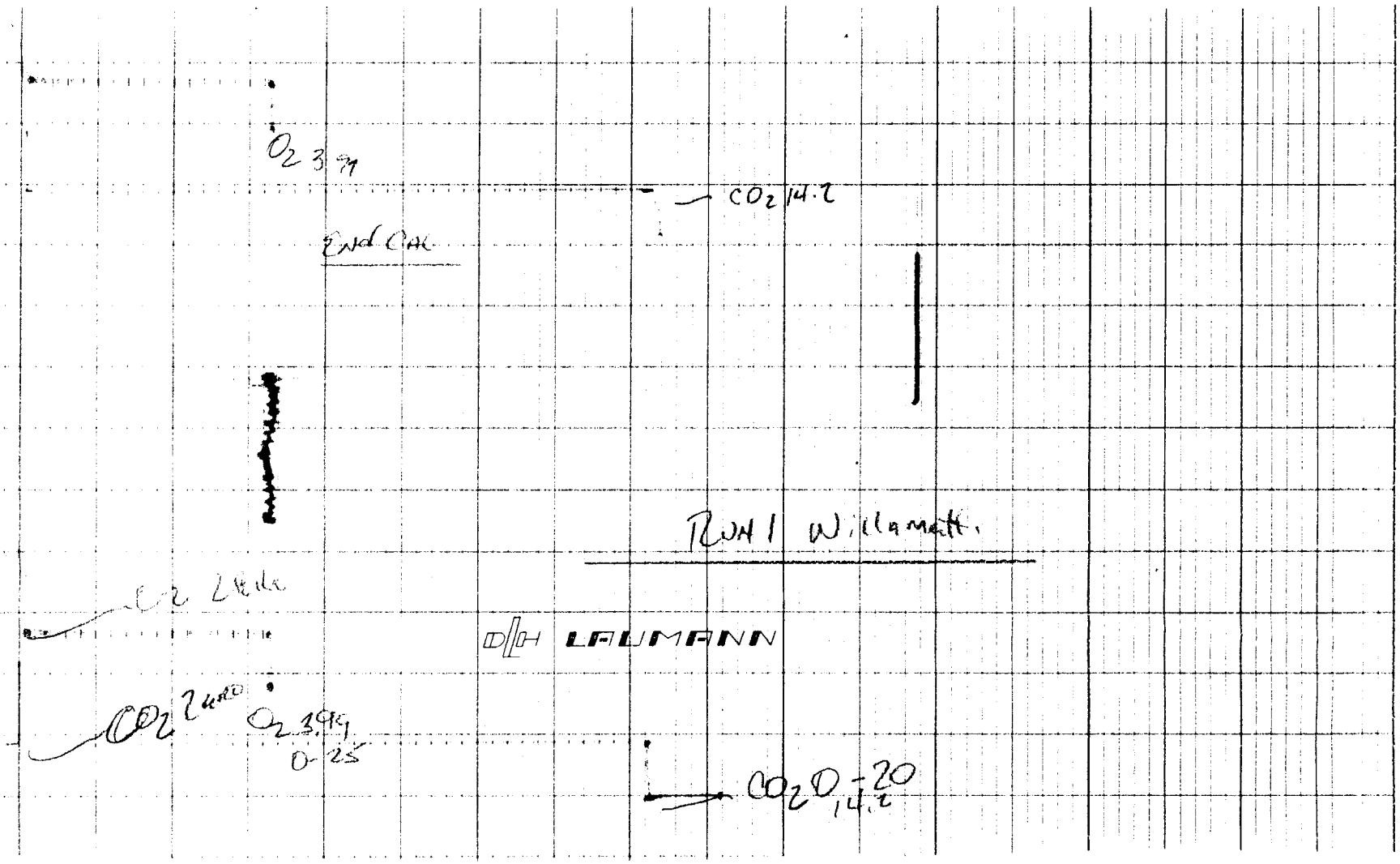
Instrument	"On"	Unit#	Make/Model	Vacuum	Time Cnst.	Span Set
O2:	2	4	Teledyne 320AX			
CO2:	8	6	ACS 3300			
Recorders:	1	5	Soltec / 6 Cont.-pens	10	cm/hr	

** Calibration Information **

	Units	Zero	Span	Range	Gas Cyl.#	Gas Flow
Outlet O2:	%	2.5	3.94	25	CC93021	0.8
CO2:	%	2	14.2	20	CC93021	0.8

** Recorder Information **

		Chanl.	Pen Type	Color
Outlet O2:	%	6	Cont.	Brown
CO2:	%	3	Cont.	Purple

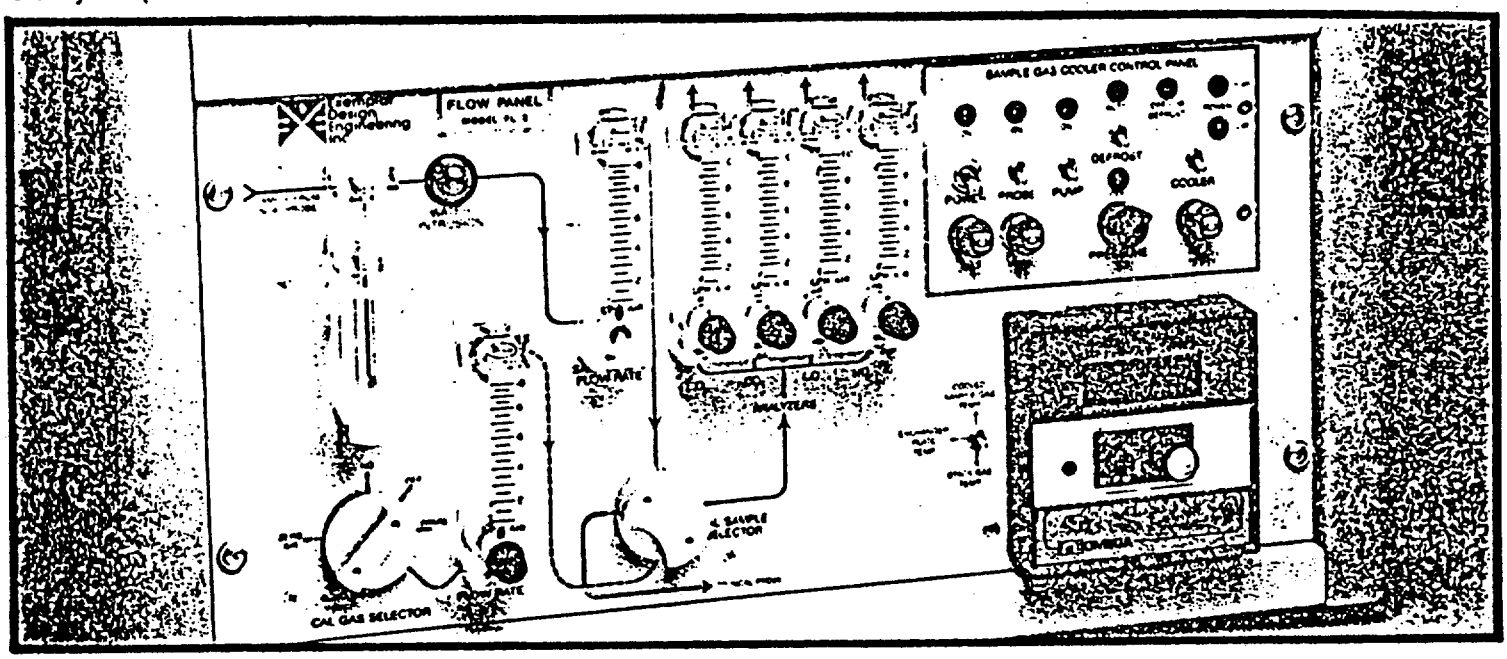


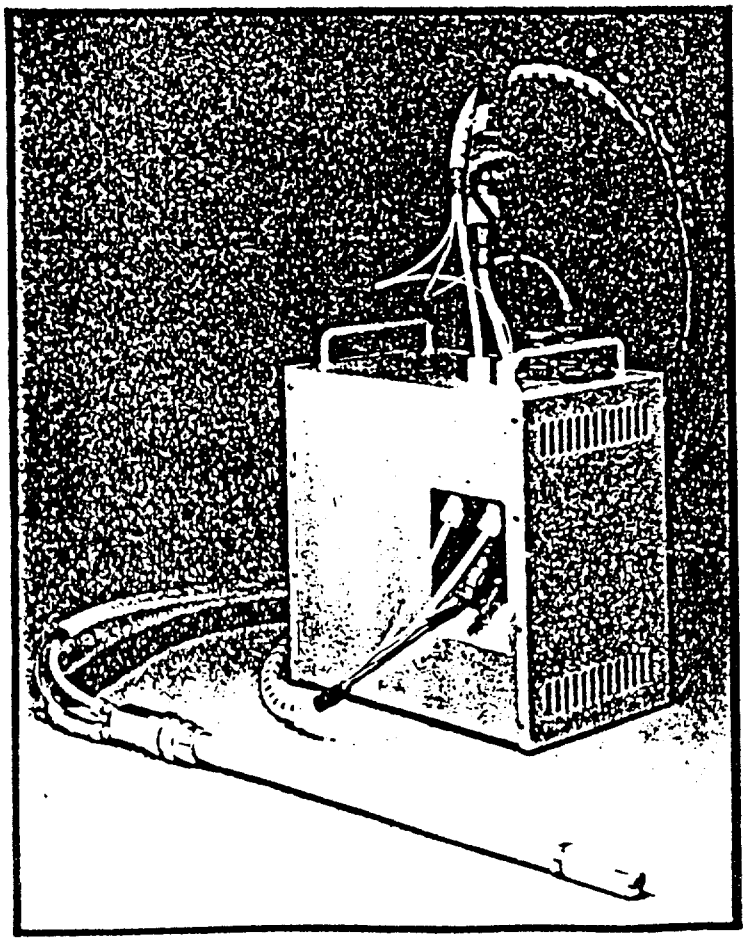
O_2 3.99
CO_2 14.2
End Cal
Run 1 Willamette.
CO_2 2 Hole
LAUMANN
CO_2 2 Hole
O_2 3.99
0-25
CO_2 0-20
14.2

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.





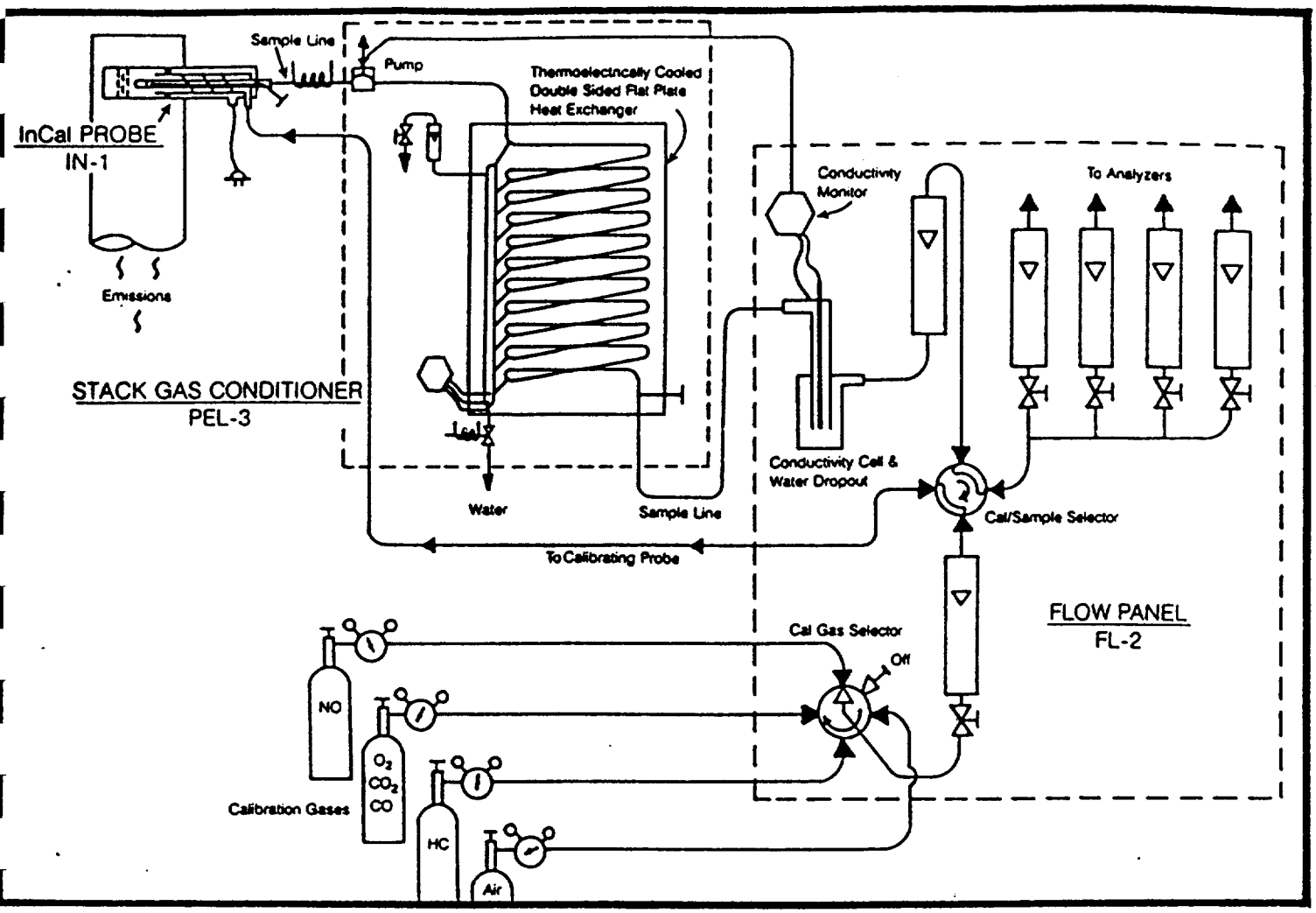
SPECIAL FEATURES

- 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.

ESG-1 4/84



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.

V. LABORATORY ANALYSIS

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Prepared For: **Air Lab** November 12, 1991

Attention: Tom Porter

Laboratory No: 912037 Job No: 291-168
Date Received: 21-OCT-91 Sampled By: Dan
Sample ID: See Below Project: Willamette

RESULTS

On October 21, 1991, three (3) samples were received for analysis by BTC Environmental, Inc. The samples were identified and assigned the lab numbers listed below.

SAMPLE IDENTIFICATION	BTCE LAB NUMBERS
Run 1 - Bag	91203701
Run 2 - Bag	91203702
Run 3 - Bag	91203703

Dan Farah

Dan A. Farah, Ph.D.
Director - Analytical Operations

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Airlab (Willamette)
Lab No: 91203701
Sample ID: Run 1-Bag

VOLATILE AROMATIC COMPOUNDS
by ADDL004

COMPOUND	RESULT	PQL	UNITS	DIL.FACTOR	ANALYZED
Benzene	0.17	0.01	ppm(V)	1	24-OCT-91

VOID

PQL: Practical Quantitation Limit
BQL: Below Practical Quantitation Limit

GC Analyst

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Airlab (Willamette)
Lab No: 91203702
Sample ID: Run 2-Bag

VOLATILE AROMATIC COMPOUNDS
by ADDL004

COMPOUND	RESULT	PQL	UNITS	DIL.FACTOR	ANALYZED
Benzene	0.24	0.01	ppm(V)	1	24-OCT-91

VOID

PQL: Practical Quantitation Limit
BQL: Below Practical Quantitation Limit

GC Analyst

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Airlab (Willamette)
Lab No: 91203703
Sample ID: Run 3-Bag

VOLATILE AROMATIC COMPOUNDS
by ADDL004

COMPOUND	RESULT	PQL	UNITS	DIL.FACTOR	ANALYZED
Benzene	BQL	0.01	ppm(V)	1	24-OCT-91

VOID

PQL: Practical Quantitation Limit
BQL: Below Practical Quantitation Limit

GC Analyst

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Air Lab (Willamette)
Lab No.: 912037
Sample ID: Method Blank

Date Analyzed: 22-OCT-91
Dilution Factor: 1
Matrix: Air

VOLATILE ORGANIC COMPOUNDS
EPA 624/8240

COMPOUND	Concentration ppm(V)	PQL ppm(V)
Propylene	BQL	.1

BQL: Below Practical Quantitation Limit
PQL: Practical Quantitation Limit

Russell Teague
Russell Teague
Department Supervisor

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Air Lab (Willamette)
Lab No.: 91203701
Sample ID: Run 1 - Bag

Date Analyzed: 22-OCT-91
Dilution Factor: 1
Matrix: Air

VOLATILE ORGANIC COMPOUNDS
EPA 624/8240

COMPOUND	Concentration ppm(V)	PQL ppm(V)
Propylene	BQL	.1

BQL: Below Practical Quantitation Limit
PQL: Practical Quantitation Limit

Russell Teague
Department Supervisor

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Air Lab (Willamette)
Lab No.: 91203702
Sample ID: Run 2 - Bag

Date Analyzed: 22-OCT-91
Dilution Factor: 1
Matrix: Air

VOLATILE ORGANIC COMPOUNDS
EPA 624/8240

COMPOUND	Concentration ppm(V)	PQL ppm(V)
Propylene	BQL	.1

BQL: Below Practical Quantitation Limit
PQL: Practical Quantitation Limit

Russell Teague
Russell Teague
Department Supervisor

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

Client: Air Lab (Willamette)
Lab No.: 91203703
Sample ID: Run 3 - Bag

Date Analyzed: 22-OCT-91
Dilution Factor: 1
Matrix: Air

VOLATILE ORGANIC COMPOUNDS
EPA 624/8240

COMPOUND	Concentration ppm(V)	PQL ppm(V)
Propylene	BQL	.1

BQL: Below Practical Quantitation Limit
PQL: Practical Quantitation Limit

Russell Teague
Russell Teague
Department Supervisor

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

October 29, 1991

LTR/459/91
3900

Tom Porter
BTC Environmental
1536 Eastman Ave.
Ventura, CA 93003

re: 291-168

Dear Tom:

Please find enclosed the laboratory analysis report four DNPH cartridge samples received on October 21, 1991.

The samples were analyzed for formaldehyde by high performance liquid chromatography (HPLC).

Spike recoveries for two 5 ug (as HCHO) spiked DNPH solutions were 4.99 and 4.94 ug respectively.

Sincerely,

AtmAA, Inc.

Dr. Kochy Fung
Air Programs Director

KF/kp
Encl.

AtmAA Inc.
21354 Nordhoff St., Suite 113, Chatsworth, CA 91311 (818) 718-6070 • FAX (818) 718-9779
environmental consultants
laboratory services

LABORATORY ANALYSIS REPORT

DNPH impinger solutions were analyzed for formaldehyde by high performance liquid chromatography (HPLC).

Report Date : October 28, 1991
Date Received : October 21, 1991
Date Analyzed : October 22, 1991
P.O. No.: Verbal
Client Proj. No.: 291-168

AtmAA Lab. No.	Sample ID	ug/impinger HCHO	ug/impinger Vol,ml
92941-33	Run #1 Formaldehyde	1.62	44.0
92941-34	Run #2 Formaldehyde	2.61	43.0
92941-35	Run #3 Formaldehyde	1.60	43.5
92941-36	Run #4 Formaldehyde	1.53	43.0 ← Travel Blank = 1.53/43 = 0.036 ug/ml
92941-33 R	Run #1 Formaldehyde	1.74	44.0

Ave of Run #1 = (1.62 + 1.74)/2 = 1.68

(Samp/Blank)Run #2 = 1.273/65.19 = 1.705 Since ≤5

Dr. Kochy Fung
Air Programs Director

Run Set Up Sheet

Client : Willamette
Site :
Unit:

Date :
Job #:
Lab #:

Method: H2O

Cold Box:

Run No.

Hot Box:

Impinger Wt's.

Imp. #1:	gross	602.7
	tare	578.2
	final	24.5
Imp. #2:	gross	616.9
	tare	611.9
	final	5.0
Imp. #3:	gross	466.0
	tare	464.5
	final	1.5
Imp. #4:	gross	631.6
	tare	629.3
	final	2.3
	Total	33.3

PM-10 Filter's

Type	No.	Tare Wt.

Large Filter

No.	
Tare Wt.	

Sample Vol Imp#1	start		ml
	finsh		ml
	final		ml
Sample Vol Imp #2	start		ml
	finsh		ml
	final		ml

Set up by:

Comments:

27A

VI. METHODOLOGY

SOURCE EMISSION INSTRUMENTATION LIST
7/3/91

OXYGEN:

Unit No. - 1

Manufacturer:	Taylor/Servomex
Model No.:	OA580
Serial No.:	508/702/497
Method:	Paramagnetic
Range (%):	0-10, 25 & 100

Unit No. - 2

Manufacturer:	Taylor/Servomex
Model No.:	68771/B
Serial No.:	68771/B
Method:	Paramagnetic
Range (%):	0-100

Unit No. - 3

Manufacturer:	Taylor/Servomex
Model No.:	570A
Serial No.:	4212B
Method:	Paramagnetic
Range (%):	0-100

Unit No. - 4

Manufacturer:	Teledyne
Model No.:	320-AX
Serial No.:	107294
Method:	Electrochemical
Range (%):	0-5, 10 & 25

Unit No. - 5

Manufacturer:	Teledyne
Model No.:	320-AX
Serial No.:	108743
Method:	Electrochemical
Range (%):	0-5, 10 & 25

Unit No. - 6

Manufacturer:	Teledyne
Model No.:	320-AX
Serial No.:	110649
Method:	Electrochemical
Range (%):	0-5, 10 & 25

SOURCE EMISSION INSTRUMENTATION LIST
7/3/91

OXYGEN:

Unit No. - 7

Manufacturer:	Teledyne
Model No.:	320-AX
Serial No.:	108742
Method:	Electrochemical
Range (%):	0-5, 10 & 25

Unit No. - 8

Manufacturer:	Teledyne
Model No.:	320-AX
Serial No.:	110647
Method:	Electrochemical
Range (%):	0-5, 10 & 25

SOURCE EMISSION INSTRUMENTATION LIST
7/3/91

CARBON DIOXIDE:

Unit No. - 1

Manufacturer:	Horiba
Model No.:	MEXA - 221
Serial No.:	4726203
Method:	NDIR
Range (%):	0-5 & 20

Unit No. - 2

Manufacturer:	Horiba
Model No.:	MEXA - 211E
Serial No.:	E70019
Method:	NDIR
Range (%):	0-5 & 20

Unit No. - 3

Manufacturer:	ACS (Fuji)
Model No.:	3300
Serial No.:	N8M6611T
Method:	NDIR
Range (%):	0-5 & 20

Unit No. - 4

Manufacturer:	ACS (Fuji)
Model No.:	3300
Serial No.:	N9C5479T
Method:	NDIR
Range (%):	0-5 & 20

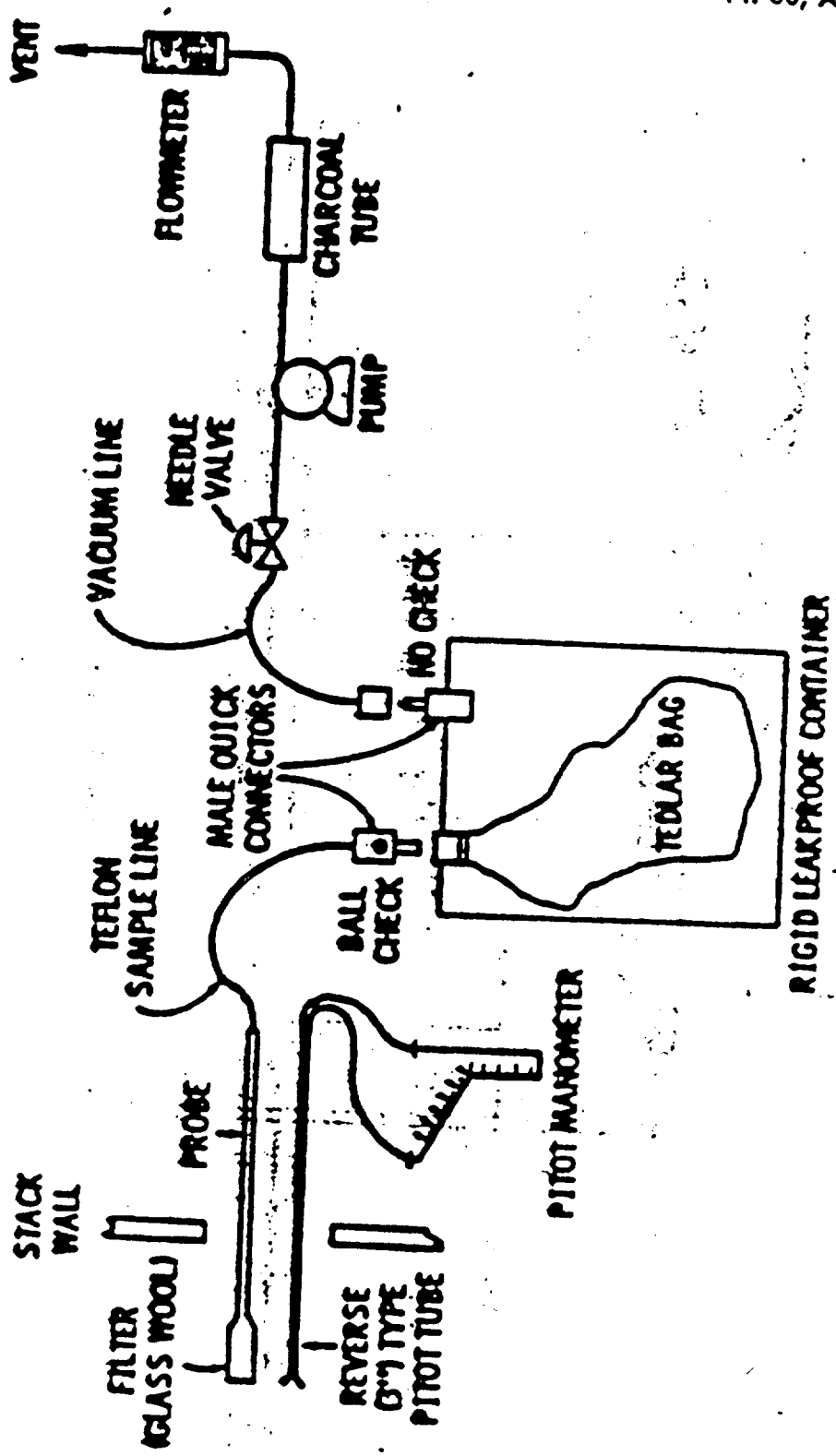
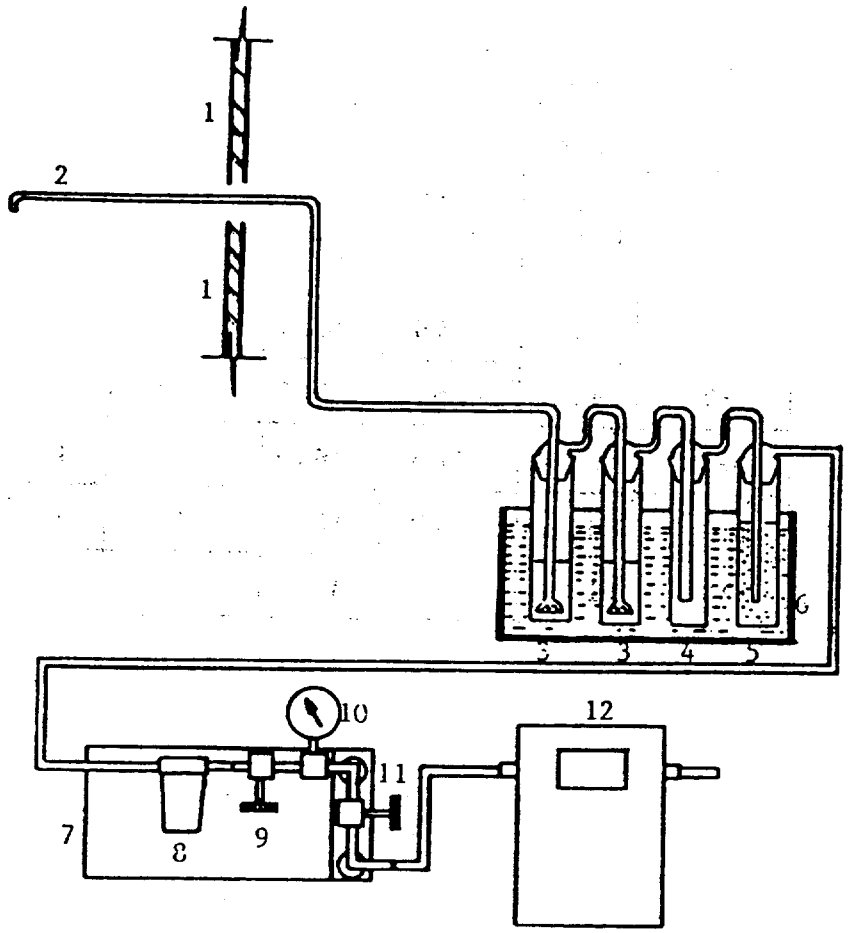


Figure 18-9. Integrated bag sampling train.



1. Stack Wall
2. Probe
3. Impinger with 100 ml of H_2O
4. Empty Bubbler
5. Bubbler with Silica Gel
6. Ice Bath
7. Sealed Pump (Leak Free)
8. Filter for Pump
9. Metering Valve
10. Vacuum Gauge
11. By-pass Valve
12. Temperature Compensated Dry Gas Meter

Impingement Train For Moisture

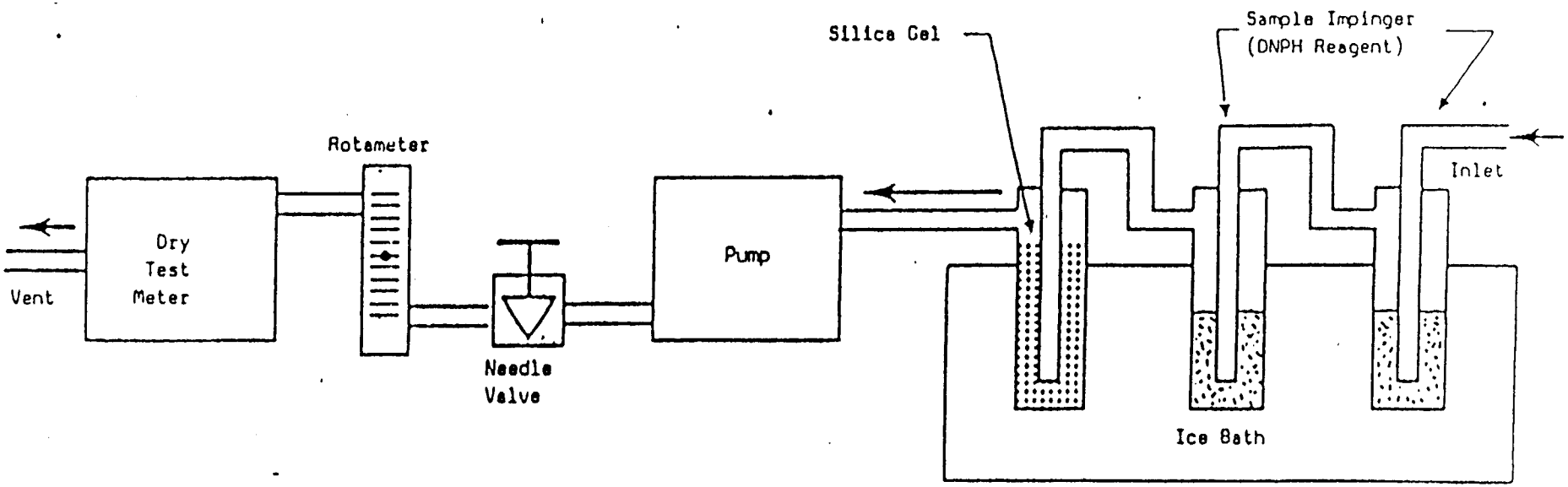


FIGURE 1. TYPICAL SAMPLING SYSTEM (13.2)
FORMALDEHYDE CARB METHOD 430

VII. RAW DATA

BTC Environmental, Incorporated
1536 Eastman Avenue, Suite B
Ventura, CA. 93003
(805) 644-1095

645-1444

DATE: 10/20/92

TIME: 9:50

TO: ~~Terri Thomas~~ TT

COMPANY NAME: VCAPCD

FROM: Mark Patrick, Air Test

Terri, Enclosed are ΔP readings from Willamette Toxics Test per request from Reese Martin. I'm not sure how they got left out. If you have any questions, please call.

Thanks

TOTAL NO. PAGES: 3
(INCLUDING COVER SHEET)

VELOCITY TRAVERSE DATA

Client : Willamette
Site :
Unit :

Date :
Job #:
Lab #:

Time:
Stack Diameter: in
Baro. Press.: in Hg
Static Press.: +.54 in H2O
Pitot Type:
Pitot Coefficent: #7
Stack Gas MW:

Stack X-Section:

Traverse Point NO.	Distance	Angle °	Δ P	SQRT Δ P	Stack Temp. °F	
1 - 1			.31			
1 - 2			.71			
3			1.3			
4			1.4			
2 - 1			.31			
2			.56			
3			1.3			
4			1.4			
3 - 1			.25			
2			.58			
3			1.2			
4			1.3			
4 - 1			.27			
2			.68			
3			1.3			
4			1.2			
5 - 1			.34			
2			.65			
3			1.2			
4			1.1			
6 - 1			.31			
2			.65			
3			1.3			
4			.9025			
AVERAGE						

Notes:

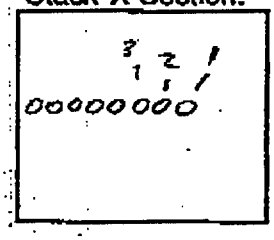
VELOCITY TRAVERSE DATA

Client : Willamette
Site :
Unit :

Date :
Job #:
Lab #:

Time:
Stack Diameter: in
Baro. Press.: in Hg
Static Press.: in H2O
Pitot Type:
Pitot Coefficent:
Stack Gas MW:

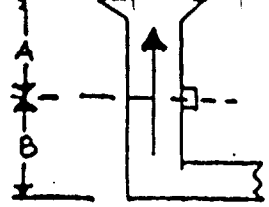
Stack X-Section:

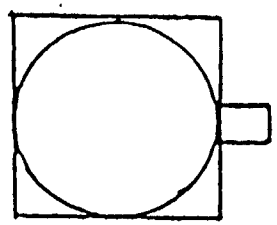


Traverse Point NO.	Distance	Angle °	Δ P	SQRT Δ P	Stack Temp. °F	
7- 1			.28			
2			.74			
-3			1.3			
4			1.2			
8- 1			.5			
2			.86			
3			1.2			
4			1.0			
AVERAGE						

Notes:

PLANT: Wilmett Inc
LOCATION: Port H
COUNTY: Ventura
UNIT: Co-Gen
DATE:
RUN NO./METHOD: 4-1
COLD BOX NO.:
METER BOX NO.: E
METER FACTOR: .9973
PITOT #/ FACTOR: #7 0.846
PYROMETER #: T7
MAGNEHELIC FACTOR: ΔP ΔH





FILTER NO.
AMBIENT TEMP.: 65
BARAMETRIC PRESS.,IN.HG.: 30.14
ASSUMED MOISTURE:
HEATER BOX SETTING:
PROBE LENGTH,FT.
NOZZLE DIAMETER,IN.:
PROBE HEATER SETTING:
APPROX.WIND VEL.,MPH:
SAMPLE BOX TEMP.,(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)
		14.5	3.5	10	337+			1.75	907.105	69	68	12	
		14.5	3.5	5					910.5	71	70		
		14.5	3.5	10					913.5	73	82		
		14.5	3.5	15					916.7	85	77		
		14.5	3.5	20					920.0	88	76		
									923.370				
	ZERO	0.0	0.0										
	SPAN	0.0	0.0										
AVERAGE													

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

SAMPLE TRAIN LEAK:
BEFORE= 0.001 CFM@ 20 IN. HG.
AFTER= 0.001 CFM@ 15 IN. HG.

COMMENTS: PURGE

```
ëëëëëëëëëëëëëëëëëë Southern California Gas Company ëëëëëëëëCOM1:ëCSëRSëCDëëëëRD£
RTU=>Willamette                    LIVE DATA       Time> 9:12:06  Date>10/21/91¤
[F1 - Meter Set, Meter Run, & G.C. Data]
Time:                                                          Date:
{Meter Set}                                  {Meter Run}
        Incr        Flow      Energy          Incr        Flow      Energy
       Volume       Rate       Rate          Volume       Rate       Rate
 #     (MCF)      (MCF/H)    (MMBTU)   #     (MCF)      (MCF/H)    (MMBTU)
 1                                      1
 2                                      2
                                        3
        Incr                            4
       Energy                           5
 #     (MMBTU)                          6
 1                                      7
 2                                      8
{G.C.}
 C6+    Prop   I-But  N-But  Neo-C5 I-Pen  N-Pen   N»   Methane  CO»  Ethan

 B.T.U.                        Sp.Gr.
 Time:                         Date:
[press: |F2 = Screen 2|  |F3 = Scan Rate|  |F9 = Exit|  |Scroll Lock = Hold ]
```

```
ëëëëëëëëëëëëëëëëëë Southern California Gas Company ëëëëëëëëCOM1:ëCSëRSëCDëëëëRD£
RTU=>Willamette                    LIVE DATA       Time> 9:12:23  Date>10/21/91¤
[F1 - Meter Set, Meter Run, & G.C. Data]
Time: 8:18:18                    [Reading]                     Date:10/21/91
{Meter Set}                  Pass #1                {Meter Run}
        Incr        Flow      Enà                          Incr        Flow      Energy
       Volume       Rate       Rate                         Volume       Rate       Rate
 #     (MCF)      (MCF/H)    (MMBTU)   #                   (MCF)      (MCF/H)    (MMBTU)
 1      515.3      204.70     223.00   1                     17.6        8.63       9.40
 2         .0         .00        .00   2                    497.7      196.07     213.60
                                       3                       .0         .00        .00
        Incr                           4                       .0         .00        .00
       Energy                          5                       .0         .00        .00
 #     (MMBTU)                         6                       .0         .00        .00
 1      562.8                          7                       .0         .00        .00
 2         .0                          8                       .0         .00        .00
{G.C.}
 C6+    Prop   I-But  N-But  Neo-C5 I-Pen  N-Pen   N»   Methane  CO»  Ethan
 .2010 1.8000  .4010  .7140  .0000  .2470  .1580  .6120 92.637  .9390 2.2910

 B.T.U.        1089.4          Sp.Gr.          .6248
 Time:          8:19           Date:         10/21/91
[press: |F2 = Screen 2|  |F3 = Scan Rate|  |F9 = Exit|  |Scroll Lock = Hold ]
```

```
ëëëëëëëëëëëëëëëëëë Southern California Gas Company ëëëëëëëëCOM1:ëCSëRSëCDëëëëRD£
RTU=>Willamette                    LIVE DATA       Time> 9:13:06  Date>10/21/91¤
[F1 - Meter Set, Meter Run, & G.C. Data]
Time: 8:18:56                    [Reading]                     Date:10/21/91
{Meter Set}                  Pass #1                {Meter Run}
```

#	Incr Volume (MCF)	Flow Rate (MCF/H)	Energy Rate (MMBTU)	#	Incr Volume (MCF)	Flow Rate (MCF/H)	Energy Rate (MMBTU)
1	517.5	204.51	222.79	1	17.7	8.62	9.40
2	.0	.00	.00	2	500.1	220.52	240.23
				3	.0	.00	.00
				4	.0	.00	.00
				5	.0	.00	.00
				6	.0	.00	.00
				7	.0	.00	.00
				8	.0	.00	.00

Incr Energy (MMBTU)

#	
1	565.2
2	.0

{G.C.}

C6+	Prop	I-But	N-But	Neo-C5	I-Pen	N-Pen	N»	Methane	CO»	Ethan
.2010	1.8000	.4010	.7140	.0000	.2470	.1580	.6120	92.637	.9390	2.2910

B.T.U. 1089.4 Sp.Gr. .6248

Time: 8:19 Date: 10/21/91

[press: |F2 = Screen 2| |F3 = Scan Rate| |F9 = Exit| |Scroll Lock = Hold]

Southern California Gas Company COM1: CS RS CD RD

RTU=>Willamette LIVE DATA Time> 9:15:38 Date>10/21/91

[F1 - Meter Set, Meter Run, & G.C. Data]

Time: 8:21:25 [Reading] Date:10/21/91

{Meter Set} Pass #1 {Meter Run}

#	Incr Volume (MCF)	Flow Rate (MCF/H)	Energy Rate (MMBTU)	#	Incr Volume (MCF)	Flow Rate (MCF/H)	Energy Rate (MMBTU)
1	527.0	253.98	276.28	1	18.0	8.64	9.40
2	.0	.00	.00	2	509.3	220.92	240.32
				3	.0	.00	.00
				4	.0	.00	.00
				5	.0	.00	.00
				6	.0	.00	.00
				7	.0	.00	.00
				8	.0	.00	.00

Incr Energy (MMBTU)

#	
1	575.5
2	.0

{G.C.}

C6+	Prop	I-But	N-But	Neo-C5	I-Pen	N-Pen	N»	Methane	CO»	Ethan
.2020	1.7530	.3920	.6980	.0000	.2430	.1570	.6200	92.728	.9360	2.2710

B.T.U. 1087.8 Sp.Gr. .6238

Time: 8:25 Date: 10/21/91

[press: |F2 = Screen 2| |F3 = Scan Rate| |F9 = Exit| |Scroll Lock = Hold]

WILLAMETTE INDUSTRIES, INC.
HUENEME PAPER MILL
SUPPLIER RECAP REPORT FOR 10/20/91
10/21/91
09:15:44

SUPPLIER	#BALES	GROSS WT	ADJ WT	TONS	AVBWT	MTOD AVBWT	MTOD TONS
AB	0	0	0	0.00	0.00	0.00	2,330.33
ABCO	120	78500	78500	39.25	654.17	652.62	514.92

RTUID	Willamette		8:00							3000
Date/Time	10/21/91	7:00								5000
Meter IDs	NC08-R	NC08-T30								10000
Meter IDs										
SET1&2	55.84	0	60.95	0						
GCData	0.22	1.81	0.44	0.79	0	0.29	0.19	0.41	92.87	0.98
Volume	1.76	54.08	0	0	0	0	0	0		-3000
%Flow	100	100	0	0	0	0	0	0		-1000
Temp	72.4	74.7	0	0	0	0	0	0		0
Pres	249.5	249.2	0	0	0	0	0	0		1000
DP	0	0	0	0	0	0	0	0		3000
Freq	0.6	1.8	0	0	0	0	0	0		5000
Date/Time	10/21/91	7:15	8:15							10000
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	55.79	0	61.05	0						
GCData	0.24	1.81	0.44	0.8	0	0.3	0.19	0.42	92.85	0.98
Volume	1.76	54.03	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	72.4	74.7	0	0	0	0	0	0		
Pres	249.8	249.5	0	0	0	0	0	0		

39

8 AM → 9 AM = 216.16 MCF/H

9 AM → 10 AM = 217.44 MCF/H

10 AM → 10:30 AM = 215.66 MCF/H

Time + 1 HR = PST

2.8	8	
2	10.7	
2.2	11.5	
1.99	1094.7	0.6267
	2	
	2	
	2.1	
	3.6	
	4.9	
	7.2	
	9.7	
1.96	1095.5	0.6274

HHV BTU/CFT

S.P.G.

Pres	249.8	249.5	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.6	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	7:30	8:30							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	55.95	0	61.17	0						
GCData	0.23	1.72	0.43	0.76	0	0.29	0.18	0.44	93.05	0.98
Volume	1.89	54.06	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	72.5	74.7	0	0	0	0	0	0		
Pres	250.5	250.3	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.6	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	7:45	8:45							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	55.98	0	61.08	0						
GCData	0.22	1.72	0.43	0.77	0	0.29	0.18	0.47	92.91	1
Volume	1.99	53.99	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		

	HHV BTU/ft^3	SP.G
1.93	1091.7	0.625
2	1091.6	0.6257

%Flow	100	100		0	0	0	0	0	0	
Temp	72.7	74.8		0	0	0	0	0	0	
Pres	250.4	250.2		0	0	0	0	0	0	
DP	0	0		0	0	0	0	0	0	
Freq	0.6	1.8	9:00	0	0	0	0	0	0	
Date/Time	10/21/91	8:00								
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.19	0	61.24	0						
GCData	0.22	1.66	0.41	0.73	0	0.27	0.18	0.52	93.04	0.97
Volume	2.15	54.04		0	0	0	0	0		
%Flow	100	100		0	0	0	0	0		
Temp	72.8	74.7		0	0	0	0	0		
Pres	249.8	249.5		0	0	0	0	0		
DP	0	0		0	0	0	0	0		
Freq	0.7	1.8		0	0	0	0	0		
Date/Time	10/21/91	8:15	9:15							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.43	0	61.39	0						
GCData	0.2	1.8	0.4	0.71	0	0.25	0.16	0.61	92.64	0.94

	HHV BTU/CFT	SP.G
1.99	1088.5	0.6237
2.29	1089.4	0.6248

GCData	0.2	1.8	0.4	0.71	0	0.25	0.16	0.61	92.64	0.94
Volume	2.14	54.29	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	73	74.8	0	0	0	0	0	0		
Pres	250.2	249.8	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.7	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	8:30 9:30								
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.93	0	61.96	0						
GCData	0.2	1.72	0.39	0.7	0	0.24	0.16	0.59	92.84	0.96
Volume	2.22	54.72	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	73.1	74.8	0	0	0	0	0	0		
Pres	249.4	248.8	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.7	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	8:45 9:45								
Meter IDs	NC08-R	NC08-T30								
Meter IDs										

45

	HHV BTU/CFT	SP.G.
2.29	1089.4	0.6248
2.2	1086.8	0.6232

Meter IDs										
SET1&2	57.09	0	61.88	0						
GCData	0.2	1.62	0.38	0.68	0	0.24	0.16	0.6	93.11	0.94
Volume	2.7	54.39	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	73.4	74.9	0	0	0	0	0	0		
Pres	249.3	248.7	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.9	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	9:00	10:00							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.94	0	61.73	0						
GCData	0.21	1.58	0.39	0.69	0	0.25	0.16	0.59	93.21	0.92
Volume	2.77	54.17	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	73.7	74.9	0	0	0	0	0	0		
Pres	248.6	247.8	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.9	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	9:15	10:15							

4h

	HHV BTU/CFT	SP.G.
2.08	1083.6	0.6209
2	1083.9	0.6207

Date/Time	10/21/91	9:15	10:15							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.9	0	61.71	0	0	0.25	0.16	0.6	92.83	0.97
GCData	0.2	1.67	0.38	0.68	0	0	0	0		
Volume	2.81	54.08	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	74	75	0	0	0	0	0	0		
Pres	248.5	247.6	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.9	1.8	0	0	0	0	0	0		
Date/Time	10/21/91	9:30	10:30							
Meter IDs	NC08-R	NC08-T30								
Meter IDs										
SET1&2	56.32	0	61.16	0	0	0.25	0.16	0.6	92.8	0.96
GCData	0.2	1.7	0.38	0.69	0	0	0	0		
Volume	2.57	53.75	0	0	0	0	0	0		
%Flow	100	100	0	0	0	0	0	0		
Temp	74.4	75	0	0	0	0	0	0		
Pres	249	248	0	0	0	0	0	0		
DP	0	0	0	0	0	0	0	0		
Freq	0.8	1.8	0	0	0	0	0	0		

	HHV BTU/CFT	SP.G.
2.26	1085.6	0.6227
2.25	1086.9	0.6233

VIII. QUALITY ASSURANCE

DRY GAS METER CALIBRATION

Date: 7/2/91

Unit: E

Ambient Conditions

Temp: 72 F/C

Baro: 28.91 in.Hg

ORIFICE MANOMETER SETTING D,H	GAS VOL WET TEST METER V,w	GAS VOL DRY GAS METER Vb,	wet test tw	Temperature Dry IN TD, IN	Dry Out Tdo,	Ave f Td,	Time e min	Y	DH@Y
0.5	5	203.701	75	96	84	88.50	15.19	0.7640	2.6405
		197.000	75	87	87				
1.0	5	208.686	75	100	85	91.50	10.64	1.1210	2.5770
		204.100	75	96	85				
1.5	5	215.221	75	101	86	93.00	8.61	1.1630	2.5244
		210.794	75	100	85				
2.0	5	223.436	75	105	86	94.50	7.52	0.9411	2.5606
		217.957	75	102	85				
								0.997	2.575625

Calibration by: STU

Reviewed by: _____

Meter Factor: **0.9973**

Delta H: **2.5756**

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)

SKC AIR PUMP'S

FLOW CALIBRATION DATA

Pump#: Speedaire 1 Date : 10/21/91

Trial (#)	Volume (ml)	Time (sec)	Flow (L/min)
1	500	51.69	0.58038
2	500	51.56	0.58185
3	500	51.57	0.58173
4	500	52.41	0.57241
5	500	52.06	0.57626
6	500	52.14	0.57537
7	500	51.79	0.57926
8	500	52.08	0.57604
9	500	51.81	0.57904
10	500	51.87	0.57837

Average Flow Rate: 0.5781

$\frac{578.1}{50} = 1.15$

Initials : KK

Formulae:
Flow(L/min)=[Vol(ml)/Time(sec)] * [(60sec/1min)/(1000ml/1L)]

Apparatus:
HP 0101-0113 Soap Film Flowmeter

THERMO COUPLE CALIBRATION

Date: 7/23/91 Unit: T-7

Point	* Standard Temperature *Tstd*	Pyrometer Temperature *Tpyr*	Error % ** *(Tstd-Tpyr)/Tstd*
	deg. F	deg. F	
1 Ambient	69.8	72.6	0.53%
2 Ice	32.0	33.0	0.20%
3 Boil	212.0	211.4	0.09%
4 Oil			0.00%

Std. Corr. Factor 0.978

Calibration by: SW

Reviewed by: RTR

* Standard ID: ASTM #86429 -5+300C

* * in deg. K

PITOT TUBE CALIBRATION

Ambient Conditions

DATE: 2/20/91

TEMPERATURE 70 F

RH: _____ %

UNIT NUMBER: 7/C-5'

BAROMETER: 29.87 in. hg.

Run #	Velocity fpm	ΔP (std) in. H2O	ΔP (s) in. H2O		Cp(s)	| Dev |	Cp(s)	| Dev |
			A	B	A	A	B	B
1	3992	*1.00*	*1.40*	*1.40*	0.837	0.001	0.837	0.003
2		*0.99*	*1.39*	*1.40*	0.835	0.000	0.833	0.001
3		*0.99*	*1.39*	*1.40*	0.835	0.000	0.833	0.001
Avg		0.99	1.39	1.40	~0.836	0.001*	~0.834	0.002*

AVERAGE: (Cp(s)A+Cp(s)B)/2 0.835

| ~Cp(s)A-~Cp(s)B | = 0.002 *

1	4448	*1.24*	*1.66*	*1.66*	0.856	0.001	0.856	0.001
2		*1.23*	*1.65*	*1.66*	0.855	0.000	0.855	0.000
3		*1.23*	*1.65*	*1.66*	0.855	0.000	0.855	0.000
Avg		1.23	1.65	1.66	~0.855	0.000*	~0.855	0.000*

AVERAGE: (Cp(s)A+Cp(s)B)/2 0.855

| ~Cp(s)A-~Cp(s)B | = 0.000 *

1	4596	*1.31*	*1.79*	*1.79*	0.847	0.002	0.847	0.002
2		*1.32*	*1.79*	*1.79*	0.850	0.001	0.850	0.001
3		*1.32*	*1.79*	*1.80*	0.850	0.001	0.850	0.001
Avg		1.32	1.79	1.79	~0.849	0.001*	~0.849	0.001*

AVERAGE: (Cp(s)A+Cp(s)B)/2 0.849

|~Cp(s)A-~Cp(s)B | = 0.000 *

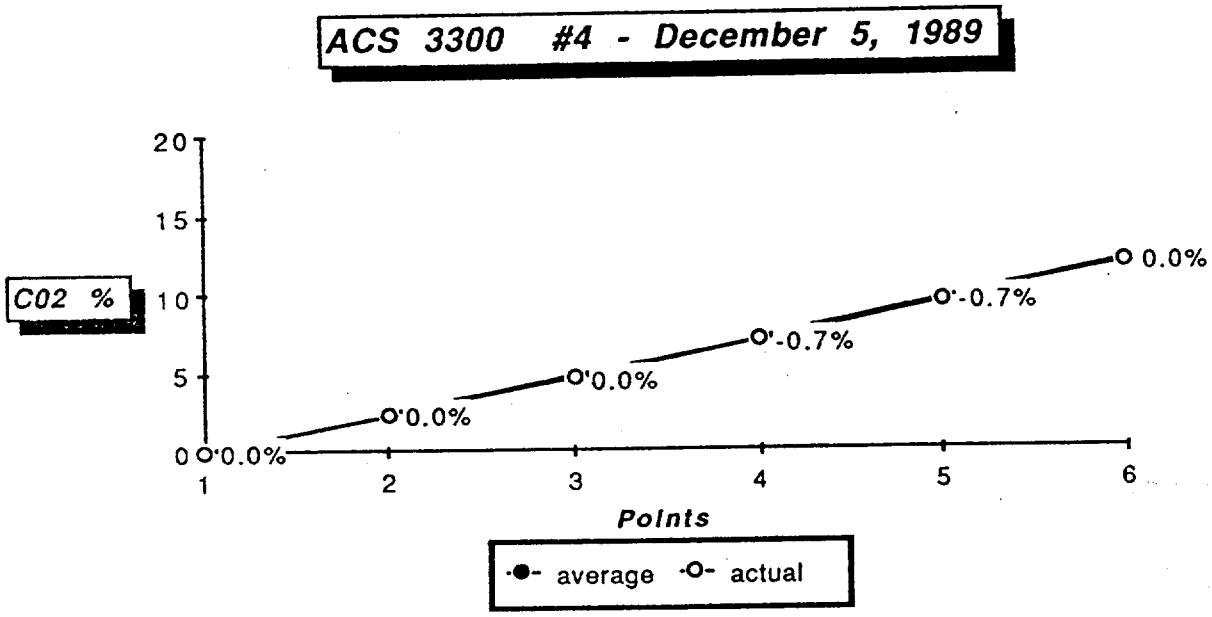
PITOT CALIBRATION VALUE: 0.846

~ Denotes average value

* Denotes values which must be ≤ to 0.01 for calibration to be valid.

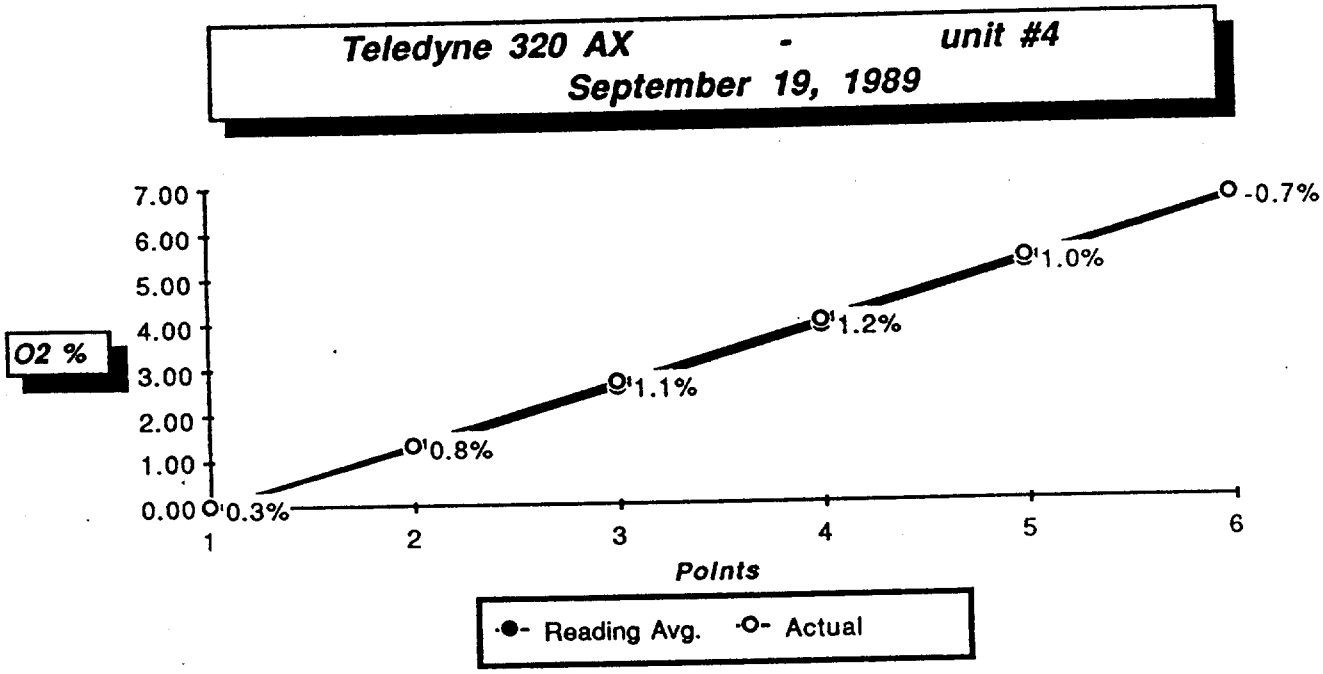
Calibrated by: SALLY *Reviewed by:* _____

BTC Environmental, Inc. - 1989



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

BTC ENVIRONMENTAL INCORPORATED



57

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

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

REPORT OF ANALYSIS
CALIBRATION GAS MIXTURES

BTCEØ1

DATE : Ø7/16/91

TO:

TOM PORTER
BTC ENVIRONMENTAL
1536 EASTMAN AVENUE
VENTURA, CA 93ØØ3

PAGE 1

CUSTOMER ORDER NUMBER: 4822

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CYLINDER NO.: CC93Ø21

COMPONENT	CONCENTRATION(v/v)
Oxygen	3.94 ± Ø.Ø4 %
Carbon Dioxide	14.19 ± Ø.14 %
Carbon Monoxide	4Ø7 ± 4 ppm
Nitrogen	Balance

CYLINDER NO.:

COMPONENT	CONCENTRATION(v/v)

---

ppm = umole/mole   % = mole-%

Analyst: M.S. Calhoun

Approved: J.T. Marrin

The 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.

58

BILL TO Company: 912037

Address:

Phone #: ( ) Contact:

BTC ENVIRONMENTAL INCORPORATED

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

CHAIN OF CUSTODY RECORD

PROJ. NO.: 291-68

PROJECT NAME: Willamette

SAMPLERS: (Signature)

NO.	DATE	TIME	COMP	GRAB	SAMPLE I.D.	NO. OF CONTAINERS	ANALYSIS: Benzene &	Propylene *					REMARKS	CHECK IF RUSH
1	10-21	8:30			RUN 1 - BAG	1	X	X					*GC by PID	
2	10-21	9:15			RUN 2 - BAG	1	X	X						
3	10-21	9:45			RUN 3 - BAG	1	X	X					*GG by MS	

The undersigned hereby acknowledges having received a copy of the Fee Schedule/General Information and Conditions, the provisions of which are a part of this agreement.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	10-21 12:50				
Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	NAME	
				ADDRESS	
				PHONE NO.	

WHITE COPY _____ CANARY COPY _____ PINK COPY _____

BIC ENVIRONMENTAL INCORPORATED

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

CHAIN OF CUSTODY RECORD

BILL TO Company: BIC ENV. HIRDEPT.
Address: 1536 EASTMAN AVE
VENTURA, CA 93003
Phone #: (805) 644-1095 Contact: Tom Porter

PROJ. NO.: 291-168
PROJECT NAME: Willamette
SAMPLERS: (Signature)

NO.	DATE	TIME	COMP	GRAB	SAMPLE I.D.	NO. OF CONTAINERS	ANALYSIS: CHOH						REMARKS	CHECK IF RUSH
													AtmAA Lab#	
1	10-21				RUN 1 - Formaldehyde	1	X			92941			-33	
2	10-21				RUN 2 - Formaldehyde	1	X						-34	
3	10-21				RUN 3 - Formaldehyde	1	X						-35	
4	10-21				TRAVEL BLANK - Formaldehyde	1	X						-36	

The undersigned hereby acknowledges having received a copy of the Fee Schedule/General Information and Conditions, the provisions of which are a part of this agreement.

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
	10/21/91 1507				

Relinquished by: (Signature)	Date/Time	Received for Laboratory by: (Signature)	Date/Time	NAME / ADDRESS
				PHONE NO.

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