AP-42 Section Number: 9.9.4

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Title: Source Emissions Report For Morrison and Quirk, Inc., Alfalfa Dehydrating Facility, Lyons, NE

AirSource Technologies

AirSource Technologies

October 1993

PLANT #3

SOURCE EMISSIONS REPORT
for
MORRISON & QUIRK, INC.
Alfalfa Dehydration Facility
Lyons, Nebraska

prepared by
AirSource Technologies

11635 W. 83rd Terrace
Lenexa, Kansas 66214

AirSource Project No. 411922

PREFACE

This report was prepared by AirSource Technologies in response to a test that was conducted at the Morrison & Quirk, Inc. in Lyons, Nebraska on September 8, 1993. Any questions concerning this report should be directed to Mr. Blane Wood, Project Manager, or to Mr. George Cobb, General Manager.

AirSource Technologies

Blane Wood
Project Manager

Approved

George R. Cobb
General Manager

Date: October 15, 1993

SECTION 1

INTRODUCTION

A stack test was conducted by AirSource Technologies on the Morrison & Quirk, Inc. alfalfa dehydration plant in Lyons, Nebraska on September 8, 1993.

The AirSource Technologies personnel who conducted the test were: Mr. Blane Wood, Project Manager and Mr. Tom McLean, Technician.

The results of the test were used to evaluate the process' performance with regards to the particulate emission rate.

The appendices contain the following:

Appendix A:	Example Calculations
Appendix B:	Computer Forms
Appendix C:	Particulate Field Data Forms
Appendix D:	Laboratory and Analysis Forms
Appendix E:	Pretest Calibrations
Appendix F:	Posttest Calibrations
Appendix G:	Process Data

SECTION 2

SUMMARY OF RESULTS

The results of the particulate emissions are: 3.93 lb.hr, 4.92 lb/hr, and 6.56 lb/hr for Runs 1, 2 and 3 respectively.

The sampling, and particulate results are shown in Table 1.

Table 1
SUMMARY OF SAMPLING AND PARTICULATE RESULTS
Morrison & Quirk, Inc.
Lyons, Nebraska

Parameters	Unit of Measure	Run 1	Run 2	Run 3
Particulate Emissions				
Front Half	gr/dscf	0.0449	0.0557	0.0800
Uncorrected	gr/dscf	0.1048	0.1558	0.2801
Corrected to 7% O_2	gr/dscf	0.3593	0.6679	0.9603
Emission Rate	lb/hr	3.93	4.92	6.56
Weight	grams	0.0931	0.1187	0.1651
Isokinetics	%	97.7	99.4	103.8
Stack Flow Rate				
Actual	acfm	14,874	15,447	15,286
Standard Conditions	dscfm	10,215	10,321	9,563
Velocity	ft/min.	2,504	2,601	2,574
Sampling Results				
Sampling Volume	dscf	31.925	32.841	31.776
Avg. Stack Temperature	°F	184	187	192
Avg. ΔP	inches H_2O	0.416	0.442	0.423
Avg. ΔH	inches H_2O	0.93	1.00	0.97
Avg. Meter Temperature	°F	65	75	89
Oxygen, Orsat	%	15.0	16.0	17.0
Carbon Dioxide, Orsat	%	1.5	1.0	1.0
Static Pressure	inches H_2O	0.25	0.25	0.25
Moisture Collected	ml	101.6	122.9	166.8
Moisture	% H_2O	13.0	15.0	19.8
Sampling Time	min.	60	60	60

SECTION 3

PROCESS OPERATION

The alfalfa dehydration plant is a 10 x 36 single pass with an 8 foot inlet cone. The control equipment used to control emissions is a 10 foot diameter cyclone. The condition for each of the test runs were the same.

Table 2 summarizes the results of the process operations and Table 3 provides process data collected during the tests.

Table 2 SUMMARY OF RESULTS Process Data	
Maximum Continuous Process Weight (Manufacturers Rating)	7 T/hr
Historical Average Process Weight	5 T/hr
Historical Maximum Process Weight	7 T/hr
Type of Fuel Normally Burned	Natural Gas
Approximate Quantity of Fuel Burned	20,000 MCF
Process Data During Test	
Process Weight (Dry)	10,000 lb/hr alfalfa
Percent Moisture	27%
Process Weight (Wet)	1,700 lb/hr water
How Process Weight Determined	Moisture Balance
Recycling in Progress	50% to 75%
Cyclone - negative - 10 ft.	
ΔP	4 in. H_2O
Fan Rated H.P.	100 H.P.
Operating Volts	440 Volts
Operating Amps	75 amps

Table 3 PROCESS DATA					
	Drum Tail **°F**	**Furnace** **°F**	**TPH**	**Pellet Moisture** **%**	**Drumtail Vac** **in. H_2O**
10:00	220	850	5	7.8	4
10:30	220	850	5	7.8	4
11:00	220	850	4 3/4	7.8	4
11:30	220	800	5	7.7	4
12:00	220	850	5	7.8	4
12:30	220	850	5	7.9	4
13:00	220	850	4 3/4	7.8	4
13:30	230	1000	5	7.8	4
14:00	230	1100	5	7.7	4
14:30	230	1050	6	7.9	4
15:00	235	1150	6	7.5	4
15:20	235	1150	6	7.4	4

SECTION 4

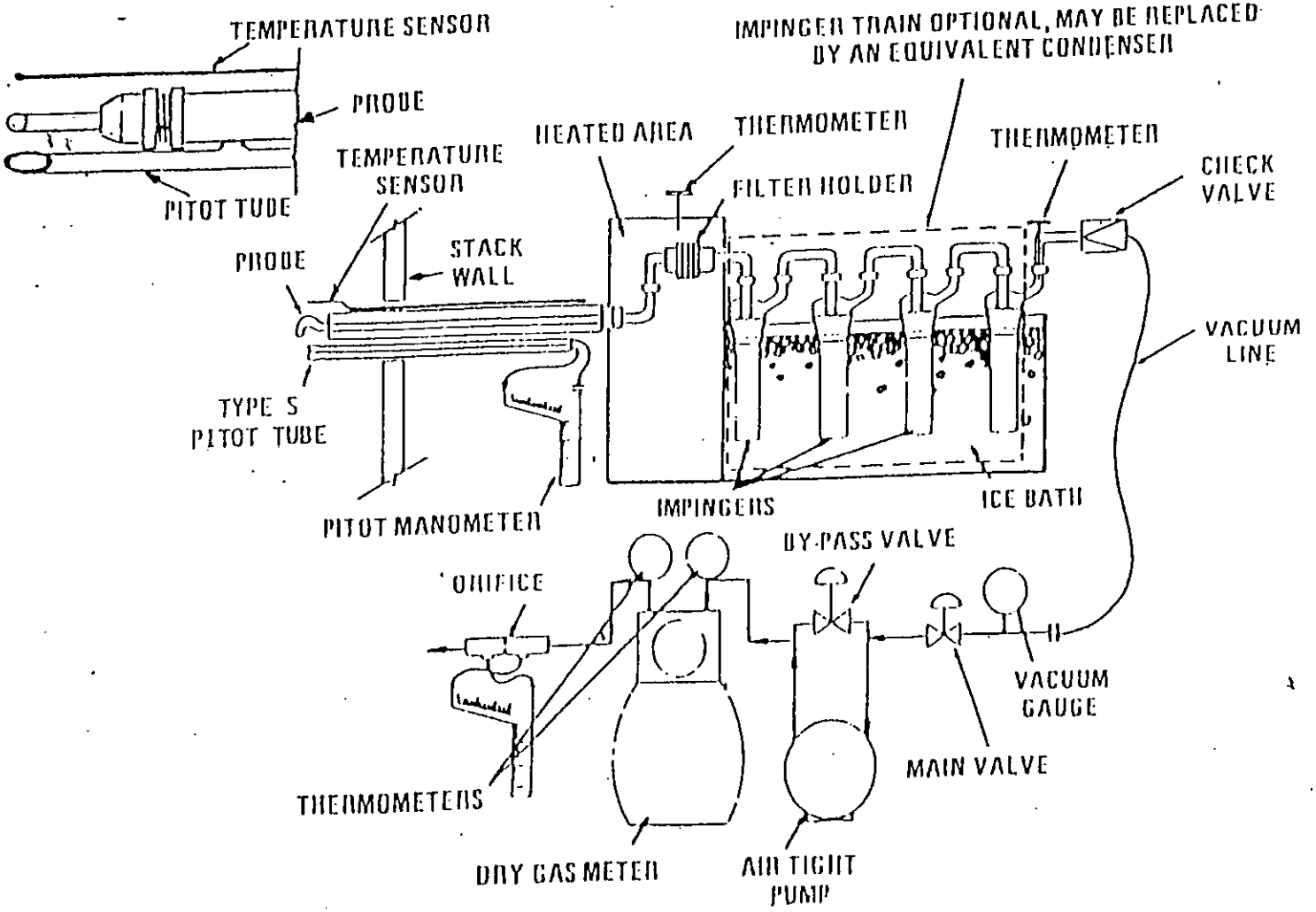
SAMPLING AND ANALYTICAL PROCEDURES

Particulates

EPA Methods 1-4 were used for the determination of traverse point locations, velocities and flows of stack gas, oxygen, carbon dioxide, and moisture. The particulate sampling and recovery of the samples were done according to EPA Method 17 recovery procedures.

Figure 1 shows a schematic of the sampling train.

Figure 2 shows a schematic of the stack and traverse locations.



Schematic of Method 5 sampling train.

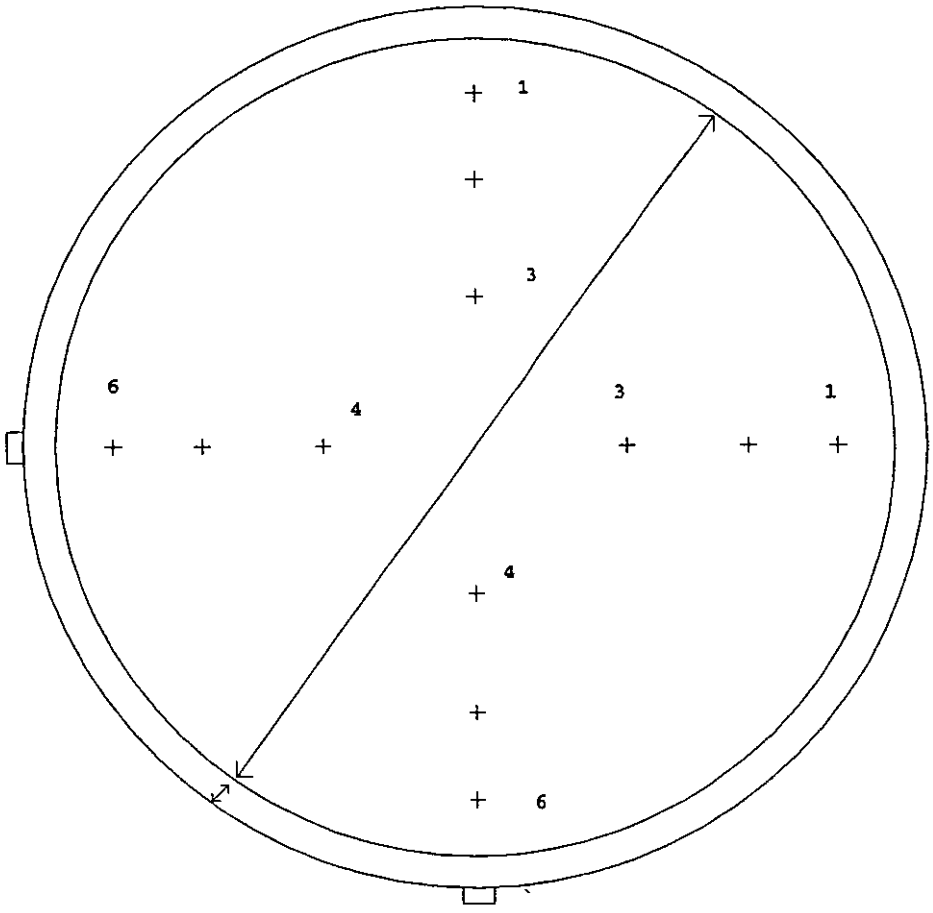
Figure 1

Stack dimensions - Morrison & Quirk Inc.

Inside diameter 33"
Port length 3"

Sampling Port Location

8 Diameters upstream from disturbance
2 Diameters downstream from disturbance



Traverse Point Locations
(Excluding Port Length)

1.	1.5"	4.	23.2"
2.	4.8"	5.	28.2"
3.	9.8"	6.	31.5"

Figure 2

APPENDIX A

EXAMPLE CALCULATIONS

NOMENCLATURE

Equation No.	Symbol	Description	Units
1	Vi	Initial meter reading	dcf
	Vf	Final meter reading	dcf
	Vm	Volume meter, actual	dcf
2	Pb	Barometric pressure	in. Hg
	ΔH_{avg}	Average orifice pressure drop	in. H_2O
	Tm_{avg}	Average meter temperature	°F
	Vm_{std}	Volume meter, standard conditions	dscf
3	Vlc	Total moisture collected	grams
	Vw_{std}	Volume of water vapor collected, standard conditions	ft^3
	% H_2O	Percent moisture by volume	-
4	Mf	Mole fraction of dry gas	-
5	% CO_2	Percent carbon dioxide by volume, dry	-
	% O_2	Percent oxygen by volume, dry	-
	% CO	Percent carbon monoxide by volume, dry	-
	% N_2	Percent nitrogen by volume, dry	-
6	Md	Molecular weight, dry stack gas	lb/lb-mole
7	Ms	Molecular weight, stack gas	lb/lb-mole
8	Θi	Sampling time interval	minutes
	Dn	Diameter of nozzle	inches
	ΔPs	Velocity head of S pitot	in. H_2O
	Ts	Temperature of stack gas	°F
	Vm_i	Volume of meter per sampling interval	ft^3
9	Ps	Stack pressure, absolute	in. Hg
	Pg	Stack gas pressure	in. H_20
10	ΔPs_{avg}	Average velocity head of S pitot	in. H_2O
	Ts_{avg}	Average temperature of stack gas	°F
	Vs	Average stack gas velocity	fpm
11	Θ	Total time of test	minutes
	% I	Percent isokinetic	-
12	ID	Inside diameter of stack	inches
	As	Area of stack	in^2
13	Qs	Stack flow rate, dry standard conditions	dscfm
14	m_n	Total particulate matter collected	mg
	Cs_{std}	Concentration of particulate collected, dry basis, standard conditions	gr/dscf
15	Cs_{std}(corr 7% O_2)	Concentration of particulate collected, dry basis standard conditions	gr/dscf (corr to 7% O_2)
16	Cs_{std}(corr 12% CO_2)	Concentration of particulate collected, dry basis standard condition	gr/dscf (corr to 12% CO_2)

PARTICULATE CALCULATION EQUATIONS

1. $V_m = V_f - V_i$

2. $$V_{m(std)} = \frac{17.64\ (V_m)\ Y \left(P_b + \frac{\Delta H_{avg}}{13.6}\right)}{T_{m(avg)} + 460}$$

3. $V_{wc(std)} = 0.0471(V_{lc})$

$$\%\ H_2O = \frac{100(V_{wc(std)})}{V_{m(std)} + V_{wc(std)}}$$

4. $$M_f = \frac{100 - \%H_2O}{100}$$

5. $\%\ N_2 = 100 - (\%CO_2 + \%O_2 + \%CO)$

6. $M_d = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + (\%N_2 + \%CO \times 0.28)$

7. $M_s = (M_d \times M_f) + 18(1 - M_f)$

8. $$V_{mi} = \frac{5.168(T_m + 460)(C_p)(\theta_i)(M_f)(D_n^2)}{\sqrt{P_b}} \times \sqrt{\frac{\Delta P_s}{T_S + 460}}$$

9. $$P_s = P_b + \frac{P_g}{13.6}$$

10. $$V_s = 5128.8 \times C_P \times \left(\sqrt{\Delta P_{s(avg)}}\right) \times \sqrt{\frac{T_{s(avg)} + 460}{P_s \times M_s}}$$

11. $$\%\ I = \frac{1039(T_{s(avg)} + 460)(V_{m(std)})}{V_s(\theta)(P_s)(M_f)(D_n^2)}$$

12. $A_s = \pi \left(\frac{ID}{2}\right)^2$

13. $Q_s = \frac{0.122(V_S)(A_s)(M_p)(P_s)}{T_{s(avg)} + 460}$

14. $C_{s(std)} = 0.0154\left(\frac{M_n}{V_{m(std)}}\right)$

15. $C_{s(act)} = \frac{17.64(C_{s(std)})(P_s)(M_p)}{T_{s(avg)} + 460}$

16. $E_p = 0.00857(C_{S(std)})(Q_s)$

APPENDIX B

COMPUTER FORMS

FILE NAME - LYONS.R1 PROG.=VER 06/27/89
RUN # - LYONS RUN 1 09-29-1993 15:03:46
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Feet)=	123.200	
Final Meter Volume (Cubic Feet)=	157.120	
Meter Factor=	0.970	
Final Leak Rate (cu ft/min)=	0.000	
Net Meter Volume (Cubic Feet)=	32.902	
Gas Volume (Dry Standard Cubic Feet)=	31.925	
Barometric Pressure (in Hg)=	28.80	
Static Pressure (Inches H20)=	0.25	
Percent Oxygen=	15.0	
Percent Carbon Dioxide=	1.5	
Moisture Collected (ml)=	101.6	
Percent Water=	13.0	
Average Meter Temperature (F)=	65	
Average Delta H (in H20)=	0.93	
Average Delta P (in H20)=	0.416	
Average Stack Temperature (F)=	184	
Dry Molecular Weight=	28.84	
Wet Molecular Weight=	27.43	
Average Square Root of Delta P (in H20)=	0.6439	
% Isokinetic=	97.7	
Pitot Coefficient=	0.84	
Sampling Time (Minutes)=	60.0	
Nozzle Diameter (Inches)=	0.241	
Stack Axis #1 (Inches)=	33.0	
Stack Axis #2 (Inches)=	33.0	
Circular Stack		
Stack Area (Square Feet)=	5.94	
Stack Velocity (Actual, Feet/min)=	2,504	
Flow Rate (Actual, Cubic ft/min)=	14,874	
Flow rate (Standard, Wet, Cubic ft/min)=	11,746	
Flow Rate (Standard, Dry, Cubic ft/min)=	10,215	

Particulate Loading - Front Half

Particulate Weight (g)=	0.0931	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0449	0.1048	0.3593
Particulate Loading, Actual (gr/cu ft)=	0.0308		
Emission Rate (lb/hr)=	3.93		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.1098		
Particulate Loading, Dry Std. (gr/scf)=	0.0530	0.1236	0.4238
Particulate Loading, Actual (gr/cu ft)=	0.0364		
Emission Rate (lb/hr)=	4.64		
Percent Impinger Catch=	15.2		

* * METRIC UNITS * *

FILE NAME - LYONS.R1 PROG.=VER 06/27/89
RUN # - LYONS RUN 1 09-29-1993 15:03:47
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Meters)=	3.489		
Final Meter Volume (Cubic Meters)=	4.449		
Meter Factor=	0.970		
Final Leak Rate (cu m/min)=	0.0000		
Net Meter Volume (Cubic Meters)=	0.932		
Gas Volume (Dry Standard Cubic Meters)=	0.904		
Barometric Pressure (mm Hg)=	732		
Static Pressure (mm H20)=	6		
Percent Oxygen=	15.0		
Percent Carbon Dioxide=	1.5		
Moisture Collected (ml)=	101.6		
Percent Water=	13.0		
Average Meter Temperature (C)=	18		
Average Delta H (mm H20)=	23.7		
Average Delta P (mm H20)=	10.6		
Average Stack Temperature (C)=	84		
Dry Molecular Weight=	28.84		
Wet Molecular Weight=	27.43		
Average Square Root of Delta P (mm H20)=	3.2454		
% Isokinetic=	97.7		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	60.0		
Nozzle Diameter (mm)=	6.12		
Stack Axis #1 (Meters)=	0.838		
Stack Axis #2 (Meters)=	0.838		
Circular Stack			
Stack Area (Square Meters)=	0.552		
Stack Velocity (Actual, m/min)=	763		
Flow rate (Actual, Cubic m/min)=	421		
Flow rate (Standard, Wet, Cubic m/min)=	333		
Flow rate (Standard, Dry, Cubic m/min)=	289		

Particulate Loading - Front Half

Particulate Weight (g)=	0.0931	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (mg/cu m)=	103.0	240.4	824.1
Particulate Loading, Actual (mg/cu m)=	70.7		
Emission Rate (kg/hr)=	1.79		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.1		
Particulate Loading, Dry Std. (mg/cu m)=	121.5	283.5	971.9
Particulate Loading, Actual (mg/cu m)=	83.4		
Emission Rate (kg/hr)=	2.11		
Percent Impinger Catch=	15.2		

FILE NAME - LYONS.R1
RUN # - LYONS RUN 1
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

PROG.=VER 06/27/89
09-29-1993 15:03:47

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.300	0.66	182	59	58
2	0.390	0.85	184	59	58
3	0.410	0.90	186	62	60
4	0.450	1.00	184	65	61
5	0.460	1.10	186	68	63
6	0.420	0.93	183	69	63
7	0.410	0.91	183	67	64
8	0.470	1.10	184	68	65
9	0.440	0.98	184	69	67
10	0.430	0.96	185	70	66
11	0.410	0.91	183	70	67
12	0.400	0.90	184	70	68

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	31.4254	31.3612	-0.0006	0.0648

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	68.2304	68.2022	60.0	0.0283
IMPINGERS	217.7694	217.7508	200.0	0.0167

Probe Rinse Blank (mg/ml)= -0.0020
Impinger Blank (mg/ml)= 0.0095

FILE NAME - LYONS.R2 PROG.=VER 06/27/89
RUN # - LYONS RUN 2 09-28-1993 16:14:28
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Feet)=	157.260		
Final Meter Volume (Cubic Feet)=	192.845		
Meter Factor=	0.970		
Final Leak Rate (cu ft/min)=	0.003		
Net Meter Volume (Cubic Feet)=	34.517		
Gas Volume (Dry Standard Cubic Feet)=	32.841		
Barometric Pressure (in Hg)=	28.80		
Static Pressure (Inches H20)=	0.25		
Percent Oxygen=	16.0		
Percent Carbon Dioxide=	1.0		
Moisture Collected (ml)=	122.9		
Percent Water=	15.0		
Average Meter Temperature (F)=	75		
Average Delta H (in H20)=	1.00		
Average Delta P (in H20)=	0.442		
Average Stack Temperature (F)=	187		
Dry Molecular Weight=	28.80		
Wet Molecular Weight=	27.18		
Average Square Root of Delta P (in H20)=	0.6642		
% Isokinetic=	99.4		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	60.0		
Nozzle Diameter (Inches)=	0.241		
Stack Axis #1 (Inches)=	33.0		
Stack Axis #2 (Inches)=	33.0		
Circular Stack			
Stack Area (Square Feet)=	5.94		
Stack Velocity (Actual, Feet/min)=	2,601		
Flow Rate (Actual, Cubic ft/min)=	15,447		
Flow rate (Standard, Wet, Cubic ft/min)=	12,140		
Flow Rate (Standard, Dry, Cubic ft/min)=	10,321		

Particulate Loading - Front Half

Particulate Weight (g)=	0.1187	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0557	0.1558	0.6679
Particulate Loading, Actual (gr/cu ft)=	0.0372		
Emission Rate (lb/hr)=	4.92		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.1432		
Particulate Loading, Dry Std. (gr/scf)=	0.0671	0.1880	0.8058
Particulate Loading, Actual (gr/cu ft)=	0.0448		
Emission Rate (lb/hr)=	5.94		
Percent Impinger Catch=	17.1		

* * METRIC UNITS * *

FILE NAME - LYONS.R2 PROG.=VER 06/27/89
RUN # - LYONS RUN 2 09-28-1993 16:14:29
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Meters)=	4.453		
Final Meter Volume (Cubic Meters)=	5.461		
Meter Factor=	0.970		
Final Leak Rate (cu m/min)=	0.0001		
Net Meter Volume (Cubic Meters)=	0.977		
Gas Volume (Dry Standard Cubic Meters)=	0.930		
Barometric Pressure (mm Hg)=	732		
Static Pressure (mm H20)=	6		
Percent Oxygen=	16.0		
Percent Carbon Dioxide=	1.0		
Moisture Collected (ml)=	122.9		
Percent Water=	15.0		
Average Meter Temperature (C)=	24		
Average Delta H (mm H20)=	25.5		
Average Delta P (mm H20)=	11.2		
Average Stack Temperature (C)=	86		
Dry Molecular Weight=	28.80		
Wet Molecular Weight=	27.18		
Average Square Root of Delta P (mm H20)=	3.3474		
% Isokinetic=	99.4		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	60.0		
Nozzle Diameter (mm)=	6.12		
Stack Axis #1 (Meters)=	0.838		
Stack Axis #2 (Meters)=	0.838		
Circular Stack			
Stack Area (Square Meters)=	0.552		
Stack Velocity (Actual, m/min)=	793		
Flow rate (Actual, Cubic m/min)=	437		
Flow rate (Standard, Wet, Cubic m/min)=	344		
Flow rate (Standard, Dry, Cubic m/min)=	292		

Particulate Loading - Front Half

Particulate Weight (g)=	0.1187	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (mg/cu m)=	127.6	357.4	1531.7
Particulate Loading, Actual (mg/cu m)=	85.2		
Emission Rate (kg/hr)=	2.24		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.1		
Particulate Loading, Dry Std. (mg/cu m)=	154.0	431.2	1847.8
Particulate Loading, Actual (mg/cu m)=	102.8		
Emission Rate (kg/hr)=	2.70		
Percent Impinger Catch=	17.1		

FILE NAME - LYONS.R3 PROG.=VER 06/27/89
RUN # - LYONS RUN 3 09-28-1993 16:16:27
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Feet)=	193.080		
Final Meter Volume (Cubic Feet)=	228.380		
Meter Factor=	0.970		
Final Leak Rate (cu ft/min)=	0.005		
Net Meter Volume (Cubic Feet)=	34.241		
Gas Volume (Dry Standard Cubic Feet)=	31.776		
Barometric Pressure (in Hg)=	28.80		
Static Pressure (Inches H20)=	0.25		
Percent Oxygen=	17.0		
Percent Carbon Dioxide=	1.0		
Moisture Collected (ml)=	166.8		
Percent Water=	19.8		
Average Meter Temperature (F)=	89		
Average Delta H (in H20)=	0.97		
Average Delta P (in H20)=	0.423		
Average Stack Temperature (F)=	192		
Dry Molecular Weight=	28.84		
Wet Molecular Weight=	26.69		
Average Square Root of Delta P (in H20)=	0.6490		
% Isokinetic=	103.8		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	60.0		
Nozzle Diameter (Inches)=	0.241		
Stack Axis #1 (Inches)=	33.0		
Stack Axis #2 (Inches)=	33.0		
Circular Stack			
Stack Area (Square Feet)=	5.94		
Stack Velocity (Actual, Feet/min)=	2,574		
Flow Rate (Actual, Cubic ft/min)=	15,286		
Flow rate (Standard, Wet, Cubic ft/min)=	11,928		
Flow Rate (Standard, Dry, Cubic ft/min)=	9,563		

Particulate Loading - Front Half

Particulate Weight (g)=	0.1651	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (gr/scf)=	0.0800	0.2801	0.9603
Particulate Loading, Actual (gr/cu ft)=	0.0500		
Emission Rate (lb/hr)=	6.56		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.2089		
Particulate Loading, Dry Std. (gr/scf)=	0.1012	0.3544	1.2149
Particulate Loading, Actual (gr/cu ft)=	0.0633		
Emission Rate (lb/hr)=	8.30		
Percent Impinger Catch=	21.0		

* * METRIC UNITS * *

FILE NAME - LYONS.R3 PROG.=VER 06/27/89
RUN # - LYONS RUN 3 09-28-1993 16:16:28
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

Initial Meter Volume (Cubic Meters)=	5.467		
Final Meter Volume (Cubic Meters)=	6.467		
Meter Factor=	0.970		
Final Leak Rate (cu m/min)=	0.0001		
Net Meter Volume (Cubic Meters)=	0.970		
Gas Volume (Dry Standard Cubic Meters)=	0.900		
Barometric Pressure (mm Hg)=	732		
Static Pressure (mm H20)=	6		
Percent Oxygen=	17.0		
Percent Carbon Dioxide=	1.0		
Moisture Collected (ml)=	166.8		
Percent Water=	19.8		
Average Meter Temperature (C)=	32		
Average Delta H (mm H20)=	24.6		
Average Delta P (mm H20)=	10.8		
Average Stack Temperature (C)=	89		
Dry Molecular Weight=	28.84		
Wet Molecular Weight=	26.69		
Average Square Root of Delta P (mm H20)=	3.2707		
% Isokinetic=	103.8		
Pitot Coefficient=	0.84		
Sampling Time (Minutes)=	60.0		
Nozzle Diameter (mm)=	6.12		
Stack Axis #1 (Meters)=	0.838		
Stack Axis #2 (Meters)=	0.838		
Circular Stack			
Stack Area (Square Meters)=	0.552		
Stack Velocity (Actual, m/min)=	784		
Flow rate (Actual, Cubic m/min)=	433		
Flow rate (Standard, Wet, Cubic m/min)=	338		
Flow rate (Standard, Dry, Cubic m/min)=	271		

Particulate Loading - Front Half

Particulate Weight (g)=	0.1651	Corr. to 7% O2 & 12% CO2	
Particulate Loading, Dry Std. (mg/cu m)=	183.5	642.3	2202.2
Particulate Loading, Actual (mg/cu m)=	114.8		
Emission Rate (kg/hr)=	2.98		

Particulate Loading - Total Catch Including Impingers

Particulate Weight (g)=	0.2		
Particulate Loading, Dry Std. (mg/cu m)=	232.2	812.6	2786.1
Particulate Loading, Actual (mg/cu m)=	145.2		
Emission Rate (kg/hr)=	3.77		
Percent Impinger Catch=	21.0		

FILE NAME - LYONS.R3
RUN # - LYONS RUN 3
LOCATION - DRYER STACK
DATE - SEPTEMBER 8, 1993
PROJECT # - 411922

PROG.=VER 06/27/89
09-28-1993 16:16:28

Point #	Delta P (in. H20)	Delta H (in. H20)	Stack T (F)	Meter T In(F)	Meter T Out(F)
1	0.390	0.82	190	82	81
2	0.390	0.88	195	84	83
3	0.470	1.10	192	88	85
4	0.470	1.10	191	89	86
5	0.490	1.10	193	90	86
6	0.320	0.74	183	92	87
7	0.400	0.92	189	90	88
8	0.470	1.10	194	92	90
9	0.470	1.10	194	93	90
10	0.490	1.10	193	93	91
11	0.400	0.92	193	93	90
12	0.320	0.73	194	95	93

Fraction	Final Wt. (g)	Tare Wt. (g)	Blank Wt. (g)	Net Wt. (g)
DRY CATCH	0.0000	0.0000	0.0000	0.0000
FILTER	33.1930	33.0693	-0.0006	0.1243

Fraction	Final Wt. (g)	Tare Wt. (g)	Vol. (ml)	Net Wt. (g)
PROBE RINSE	70.4746	70.4340	110.0	0.0408
IMPINGERS	267.6662	267.6205	200.0	0.0438

Probe Rinse Blank (mg/ml)= -0.0020
Impinger Blank (mg/ml)= 0.0095

APPENDIX C

PARTICULATE FIELD DATA FORMS

TRAVERSE POINT LOCATIONS

PROJECT NO. 4/1922

PLANT Lyons ~~Atlanta~~

DATE 9-8-93

SAMPLING LOCATION Dryer Stack

INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE (Distance A) 36

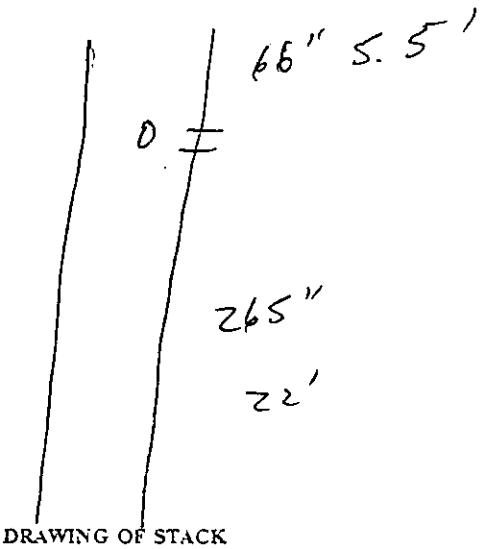
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE (Distance B) 3

STACK I.D. (Distance A - Distance B) 33

NEAREST UPSTREAM DISTURBANCE (in.) 8

NEAREST DOWNSTREAM DISTURBANCE (in.) 2

OPERATOR B. Wood



DRAWING OF STACK

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)	
					~~Decimal~~ ΔP	~~Fraction to nearest 1/8 in.~~ Tenths
1	4.4	33	1.5		.40	163
2	14.6		4.8		.40	168
3	29.6		9.8		.40	172
4	70.4		23.2		.48	162
5	85.4		28.2		.49	160
6	95.6		31.5		.46	160
7						
8					.25 static	
9						
10						
11						
12						

Comments:

Reviewed by: _____ Date: _____

PRELIMINARY VELOCITY TRAVERSE

PROJECT NO. 411922

PLANT Lyons Falls

DATE 9-8-93

LOCATION Dryer Stack

STACK I.D. 33

BAROMETER PRESSURE IN. Hg 28.80

SITE TO BARO. ELEVATION (ft.) 0

CORRECTED BARO. PRESSURE 28.80

TEMPERATURE METER NO. 2

THERMOCOUPLE I.D. NO. T. Pitot

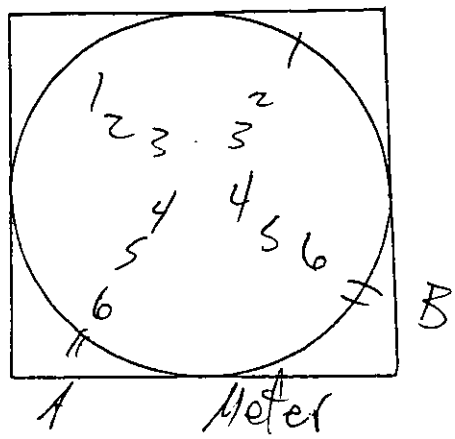
PITOT (Cp) .84

OPERATORS B. Wood

T. McLean

STACK GAUGE PRESSURE (In. H_2O) .25

FINAL PITOT LEAK CK. AT ≥3" H_2O (P) F



SCHEMATIC OF TRAVERSE POINT LAYOUT

TRAVERSE POINT NUMBER	VELOCITY HEAD ΔP, IN. H_2O	STACK TEMP. °F	CYCLONIC FLOW DETERMINATION		TRAVERSE POINT NUMBER	VELOCITY HEAD ΔP, IN. H_2O	STACK TEMP. °F	CYCLONIC FLOW DETERMINATION	
			ΔP, AT 0° REFERENCE	ANGLE (±) WHICH YIELDS A NULL ΔP				ΔP, AT 0° REFERENCE	ANGLE (±) WHICH YIELDS A NULL ΔP
B 1	.41	184	.3	5					
2	.48	186	.3	5					
3	.45	184	.2	5					
4	.45	184	0	0					
5	.40	183	0	0					
6	.39	180	.2	3					

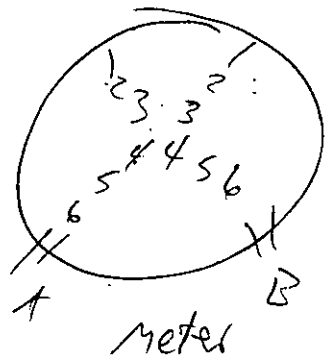
Comments:

Reviewed by: _____ Date: _____

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 41922 | PROJECT LEADER B. Wood
RUN NO. 1 | CONSOLE OPERATOR B. Wood
DATE 9-8-93 | LAB PERSON B. Wood
SAMPLE TYPE Particulate | SUPPORT PERSONNEL: T. McLean
PLANT Lyons Alfalfa
SAMPLING LOCATION Dryer Stack
TOTAL SAMPLING TIME 60
METER NO. 2 | ASSUMED MOISTURE 15 %
UMBILICAL CORD I.D. NO. 50' | METER CORRECTION FACTOR .970
UMBILICAL/SAMPLER HOOKUP 1 | METER ΔH @ 1.707
OVEN BOX NO. — | BAROMETRIC PRESSURE 28.80 in Hg
PROBE NO. 3-1 | STATIC PRESSURE .125 in H_2O
PROBE LENGTH & TYPE 3' SS | RECORD DATA EVERY 5 MIN
PITOT NO. 17" | PITOT COEFFICIENT .84
THERMOCOUPLE I.D. NO. T1 | NOZZLE DIAMETER .241 in
NOZZLE NO. .241 | STACK AXIS #1 33
NOZZLE TYPE SS/G/O | STACK AXIS #2 33



SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	1113	1243
VACUUM, in. Hg	≥15	1"
CFM	.004	.000
PITOT LEAK CHECK ≥3" H_2O	Pass	Pass

INITIAL METER VOLUME	123.200
FINAL METER VOLUME	157.120

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	1.5		15.0
2	1.5		15.0
3			
AVG	1.5		15.0

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	189	100	89
IMP. 2	105	100	5
IMP. 3	3	0	3
IMP. 4	524.6	520.0	4.6
TOTAL:			(101.6)

COMMENTS:

FILTER NO: 4-3-1 | % BLUE 80

REVIEWED BY: _____

Run No. 1 Project No. 41/922 Location Lyons - Dryer Stack Date 9-8-93 Operator R Wood Page 1 of 1

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 123.200 Desired	Dry Gas Meter ft³ Initial 123.200 Actual	Velocity Head Δp in. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
		1136													
A 1	5	1141	125.57	125.52	.30	.66	.66	182	59	58	1	—	—	61	
2	10	1146	128.28	128.21	.39	.85	.85	184	59	58	1			51	
3	15	1151	131.07	130.98	.41	.90	.90	186	62	60	1			49	
4	20	1156	134.00	133.93	.45	.99	1.0	184	65	61	1			51	
5	25	1201	136.98	137.01	.46	1.02	1.1	186	68	63	1			53	
6	30	1206	139.83	139.829	.42	.93	.93	183	69	63	1			54	
		1210													
B 1	5	1215	142.65	142.62	.41	.91	.91	183	67	64	1			60	
2	10	1220	145.67	145.68	.47	1.04	1.1	184	68	65	1			52	
3	15	1225	148.60	148.57	.44	.98	.98	184	69	67	1			52	
4	20	1230	151.49	151.40	.43	.96	.96	185	70	66	1			53	
5	25	1235	154.32	154.25	.41	.91	.91	183	70	67	1			54	
6	30	1240	157.12	157.120	.40	.89	.90	184	70	68	1			54	

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 4/1922 — PROJECT LEADER B. Wood

RUN NO. 2 — CONSOLE OPERATOR B. Wood

DATE 9-8-93 — LAB PERSON B. Wood

SAMPLE TYPE Particulate — SUPPORT PERSONNEL: T. McCoa

PLANT Lyons Alfalfa

SAMPLING LOCATION Dryer Stack

TOTAL SAMPLING TIME 60

METER NO. 2 — ASSUMED MOISTURE 15 %

UMBILICAL CORD I.D. NO. 50' — METER CORRECTION FACTOR .970

UMBILICAL/SAMPLER HOOKUP 2 — METER ΔH @ 1.707

OVEN BOX NO. — — BAROMETRIC PRESSURE 28.80 in Hg

PROBE NO. 3-1 — STATIC PRESSURE .25 in H_2O

PROBE LENGTH & TYPE 3' SS — RECORD DATA EVERY 5 MIN

PITOT NO. 17" — PITOT COEFFICIENT .84

THERMOCOUPLE I.D. NO. T1 — NOZZLE DIAMETER .241 in

NOZZLE NO. .241 — STACK AXIS #1 33

NOZZLE TYPE SS/G/O — STACK AXIS #2 33

See Run 1

SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	1252	1406
VACUUM, In. Hg	≥15	1"
CFM	.006	.003
PITOT LEAK CHECK ≥3" H_2O	Pass	Pass

INITIAL METER VOLUME	157.260
FINAL METER VOLUME	192.845

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	1.0		16.0
2	1.0		16.0
3			
AVG	1.0		16.0

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	200	100	100
IMP. 2	113	100	13
IMP. 3	4	0	4
IMP. 4	546.6	540.7	5.9
TOTAL:			122.9

COMMENTS:

FILTER NO. 9-3-2 — % BLUE 80

REVIEWED BY: _____

Run No. 2 Project No. 4/1922 Location Dryer Stack - Lyons Date 9-8-93 Operator B. Wood Page 1 of 1

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 157.260 Desired	Dry Gas Meter ft³ Actual	Velocity Head Δp in. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
		1257										N/A	N/A		
B 1	5	1302	160.22	160.22	.45	1.00	1.0	182	68	68	1			64	
2	10	1307	163.26	163.24	.47	1.05	1.1	183	70	70	1			50	
3	15	1312	166.32	166.27	.47	1.06	1.1	184	73	72	1			48	
4	20	1317	169.34	169.40	.46	1.03	1.1	187	76	74	1			49	
5	25	1322	172.35	172.35	.45	1.02	1.0	185	77	75	1			50	
6	30	1327	175.23	175.210	.41	.93	.93	184	79	77	1			52	
		1332													
A 1	5	1337	178.00	177.90	.38	.86	.86	182	77	77	1			54	
2	10	1342	180.88	180.75	.41	.92	.92	191	79	80	1			51	
3	15	1347	183.85	183.83	.44	.99	1.0	190	77	78	1			50	
4	20	1352	186.84	186.91	.45	1.00	1.0	193	76	77	1			50	
5	25	1357	189.96	189.95	.49	1.10	1.1	189	75	75	1			51	
6	30	1402	192.85	192.845	.42	.94	.94	195	80	78	1			52	

AIRSOURCE TECHNOLOGIES

11635 W 83RD TERRACE
Lenexa, Kansas 66215
(913) 492-1613
FAX: (913) 492-1012

PROJECT NO. 4/1922 — PROJECT LEADER B. Wood
RUN NO. 3 — CONSOLE OPERATOR B. Wood
DATE 9-8-93 — LAB PERSON B. Wood
SAMPLE TYPE Particulate — SUPPORT PERSONNEL: T. McLean
PLANT Lyons Alfalfa
SAMPLING LOCATION Dryer Stack
TOTAL SAMPLING TIME 60

METER NO. 2 — ASSUMED MOISTURE 15 %
UMBILICAL CORD I.D. NO. 50' — METER CORRECTION FACTOR .970
UMBILICAL/SAMPLER HOOKUP 3 — METER ΔH @ 1.707
OVEN BOX NO. — — BAROMETRIC PRESSURE 28.80 in Hg
PROBE NO. 3-1 — STATIC PRESSURE .25 in H_2O
PROBE LENGTH & TYPE 3' SS/Q — RECORD DATA EVERY 5 MIN
PITOT NO. 17" — PITOT COEFFICIENT .84
THERMOCOUPLE I.D. NO. T1 — NOZZLE DIAMETER .241 in
NOZZLE NO. .241 — STACK AXIS #1 33
NOZZLE TYPE (S)/G/O — STACK AXIS #2 33

See Run 1

SCHEMATIC OF TRAVERSE POINT LAYOUT

SAMPLE TRAIN LEAK CHECKS	INITIAL	FINAL
TIME (24 HRS.)	1414	1525
VACUUM, in. Hg	≥15	1"
CFM	.011	.005
PITOT LEAK CHECK ≥3" H_2O	Pass	Pass

INITIAL METER VOLUME	193.080
FINAL METER VOLUME	228.380

ORSAT/FYRITE

TRIAL	PERCENT CO_2	PERCENT CO_2 + O_2	PERCENT O_2
1	1.0		17.0
2	1.0		17.0
3			
AVG	1.0		17.0

RECOVERY DATA

	FINAL	INITIAL	DIFFERENCE
IMP. 1	242	100	142
IMP. 2	113	100	13
IMP. 3	3	0	3
IMP. 4	564.8	556.0	8.8
TOTAL:			(166.8)

COMMENTS:

FILTER NO. 9-3-3 — % BLUE 70

REVIEWED BY: _____

Run No. 3 Project No. 41922 Location Dryer Stack Lyons Date 9-8-93 Operator B. Wood Page 1 of 1

Traverse Point Number	Sample Time (min)	Clock Time (24-hr)	Dry Gas Meter ft³ Initial 193,080 Desired	Dry Gas Meter ft³ Actual	Velocity Head Δp in. H_2O	Orifice ΔH in. H_2O Desired	Orifice ΔH in. H_2O Actual	Stack Temp. °F	Dry Gas Meter Temperature °F Inlet	Dry Gas Meter Temperature °F Outlet	Pump VAC. in. Hg	Probe Temp. °F	Filter Temp. °F	Impinger Temp. °F	
		1418										N/A	N/A		
A 1	5	1423	195.68	195.77	.39	.82	.82	190	82	81	1			66	
2	10	1428	198.49	198.49	.39	.88	.88	195	84	83	1			52	
3	15	1433	201.61	201.57	.47	1.07	1.1	192	88	85	1			48	
4	20	1438	204.73	204.75	.47	1.07	1.1	191	89	86	1			47	
5	25	1443	207.92	207.94	.49	1.12	1.1	193	90	86	1			49	
6	30	1448	210.52	210.520	.32	.74	.74	183	92	87	1			51	
		1451													
B 1	5	1456	213.41	213.39	.40	.92	.92	189	90	88	1			55	
2	10	1501	216.55	216.52	.47	1.09	1.1	194	92	90	1			54	
3	15	1506	219.69	219.65	.47	1.08	1.1	194	93	90	1			54	
4	20	1511	222.89	222.83	.49	1.13	1.1	193	93	91	1			54	
5	25	1516	225.79	225.71	.40	.92	.92	193	93	90	1			54	
6	30	1521	228.39	228.380	.32	.73	.73	194	95	93	1			56	

APPENDIX D

LABORATORY AND ANALYSIS FORMS

AIRSOURCE TECHNOLOGIES
11635 WEST 83RD TERRACE
LENEXA KS 66214
(913) 492-1613
FAX: (913) 492-1613

			PROBE RINSE BLANK — 0.002 mg/ml			FILTER BLANK - 0.0006g	
STACK ID	RUN NO.		FIL/BEAKER NO.	FINAL WEIGHT	TARE WEIGHT	ml	COMMENTS
Inlet	1	F	9-3-1	31.4254	31.3612		
		PR	8-23-31	68.2303	68.2022	60	
	2	F	9-3-2	29.5469	29.4658		
		PR	8-23-34	69.0549	69.0181	95	
	3	F	9-3-3	33.1930	33.0693		
		PR	8-26-1	70.4746	70.4340	110	
Dam	1	F	9-3-4	30.4202	30.0511		
		PR	8-26-2	70.0155	69.8159	110	
	2	F	9-3-5	33.8369	33.6858		
		PR	8-26-3	70.7191	70.6048	145	
	3	F	9-3-6	31.5464	31.4608		
	~~RE~~	PR	8-26-4	74.2020	74.0792	120	
	BL	F	9-3-7	35.6281	35.6283		
	BL	PR	8-26-5	72.6654	72.6660	100	
		F					
		PR					
		F					
		PR					
		F					
		PR					
		F					
		PR					
		F					
		PR					
		F					
		PR					
		F					
		PR					
		F		33.8369			

FINAL FILTER WEIGHING

Project No.:	**Analyst:** Caleb
Filter Type and Size: ~~85 mm~~ Teflon	**Weight Unit:** grams

Filter Treatment:

- X Desiccate 24 hours/6 hours between weighings
- ____ Oven Treated
- ____ Other

Balance Check:				
Weight Value(g)	30	30	30	
Initial Check(g)	30.0002	30.0000	30.0003	
Final Check(g)	30.0002	30.0000	30.0002	
Date:	9-15-93	9-17-93	9-24-93	
Time (24 hr):	1635	1115	1300	
Filter No.	**Weigh No. 1**	**Weigh No. 2**	**Weigh No. 3**	**Average**
9-3-1	31.4261	31.4251	31.4256	31.4254
-2	29.5501	29.5493	29.5498	29.5496
-3	33.1936	33.1923	33.1931	
9-3-4	30.4199	30.4180	30.4199	
-5	33.8370	33.8367		33.8369
-6	31.5865	31.5862		31.5864
9-3-7	35.6282	35.6279		35.6281

FINAL FILTER WEIGHING

Project No.:	Analyst:
Filter Type and Size:	Weight Unit: grams

Filter Treatment:

- X Desiccate 24 hours/6 hours between weighings
- ____ Oven Treated
- ____ Other

Balance Check:				
Weight Value(g)	30			
Initial Check(g)	30.0002			
Final Check(g)	30.0001			
Date:	9-25-93			
Time (24 hr):	1005			
Filter No.	Weigh No. 4	Weigh No.____	Weigh No.____	Average
9-3-3	33.1929			33.1930
9-3-4	30.4204			30.4202

INITIAL FILTER WEIGHING

Analyst: GBB	bottom only
Filter Type and Size: flat pack	**Weight Unit:** grams

Filter Treatment:

X Desiccate 24 hours/6 hours between weighings
____ Oven Treated
____ Other

Balance Check:				
Weight Value(g)	30	30		
Initial Check(g)	30.0003	30.0002		
Final Check(g)	30.0002	30.0003		
Date:	9-4-93	9-6-93		
Time (24 hr):	~~0S~~ 1730	1330		
Filter No.	**Weigh No. 1**	**Weigh No. 2**	**Weigh No. 3**	**Average**
9-3-1	31.3612	31.3612		31.3612
-2	29.4657	29.4659		29.4658
-3	33.0695	33.0690		33.0693
-4	30.0512	30.0510		30.0511
-5	~~29.4657~~ a 33.6856	33.6860		33.6858
9-3-6	31.4609	31.4606		31.4608
-7	35.6284	35.6281		35.6283
-8	31.1033	31.1031		31.1032
-9	31.8227	31.8227		31.8227
9-3-10	31.1125	31.1123		31.1124

a) 33.6856

FINAL BEAKER WEIGHING

Project No.: af	Analyst: Cobb
Beaker Size: 150 ml	Weight Unit: grams

Beaker Treatment:
X Desiccate 24 hours/6 hours between weighings
___ Other

Balance Check:					
Weight Value(g)	70	70	70		
Initial Check(g)	70.0001	69.9998 ~~70.0001~~	70.0001		
Final Check(g)	69.9999	69.9999	70.0000		
Date:	9-15-93	9-17-93	9-24-93		
Time (24 hr):	1630	1120	1300		
Beaker No.	Weigh No. 1	Weigh No. 2	Weigh No. 3	Average	ml.
8-23-31	68.2305	68.2303		68.2304	60
8-23-34	69.0552	69.0546	69.0551	69.0549	95
8-26-1	70.4741	70.4733	70.4744		110
-2	70.0162	70.0135	70.0152		110
-3	70.7195	70.7175	70.7189		145
-4	74.2022	74.2003	74.2019		120
8-26-5	72.6659	72.6654		72.6656	160

FINAL BEAKER WEIGHING

Project No.: af	Analyst: GBS
Beaker Size: 150 ml	Weight Unit: grams

Beaker Treatment:
X Desiccate 24 hours/6 hours between weighings
____ Other

Balance Check:					
Weight Value(g)	70				
Initial Check(g)	70.0000				
Final Check(g)	70.0001				
Date:	9-25-93				
Time (24 hr):	1000				
Beaker No.	Weigh No. 4	Weigh No.____	Weigh No.____	Average	ml.
8-26-1	70.4748			70.4746	
2	70.0157			70.0155	
3	70.7192			70.7191	
4	74.2020			74.2020	

INITIAL BEAKER WEIGHING

Analyst: Cbb	
Beaker Size: 150 ml	Weight Unit: grams

Beaker Treatment:
X Desiccate 24 hours/6 hours between weighings
____ Other

Balance Check:				
Weight Value(g)	70	70	70	
Initial Check(g)	69.9999	69.9998	69.9998	
Final Check(g)	69.9997	70.0000	69.9998	
Date:	8-23-93	8-24-93	8-24-93	
Time (24 hr):	1700	0820	1825	
Beaker No.	Weigh No. 1	Weigh No. 2	Weigh No. 3	Average
8-23-18	68.3417	68.3450	68.3422	→
-19	75.2457	75.2502	25.2472	→
-20	68.9971	69.0013	68.9991	→
-21	67.5494	67.5536	67.5508	→
-22	67.7590	67.7629	67.7614	→
-23	76.3139	76.3189	76.3159	→
-24	67.6512	67.6554	67.6531	→
-25	68.2014	68.2045	68.2028	→
8-23-26	76.2650	76.2688	76.2670	→
-27	69.7655	69.7691	69.7675	→
-28	63.2897	63.2934	63.2916	→
-29	65.2695	65.2725	65.2714	→
-30	70.9722	70.9754	70.9737	→
-31	68.2015	68.2052	68.2027	→
-32	65.7497	65.7540	65.7515	→
-33	74.9287	74.9315	74.9299	→
8-23-34	69.0180	69.0204	69.0195	→

INITIAL BEAKER WEIGHING

Analyst: Cobb	
Beaker Size: 150	Weight Unit: grams

Beaker Treatment:

X Desiccate 24 hours/6 hours between weighings

___ Other

Balance Check:				
Weight Value(g)	70	70	70	
Initial Check(g)	69.9997	69.9999	69.9997	
Final Check(g)	69.9996	69.9998	69.9997	
Date:	8-25-93	8-25-93	8-26-93	
Time (24 hr):	0920	1530	0930	
Beaker No.	Weigh No. 4	Weigh No. 5	Weigh No. 6	Average
8-23-18	68.3420	68.3418		68.3419
-19	75.2464	75.2461		75.2463
-20	68.9968	68.9978	68.9974	68.9976
-21	67.5497	67.5497		67.5497
-22	67.7601	67.7601		67.7601
-23	76.3148	76.3161	76.3156	76.3159
-24	67.6505	67.6523		67.6514
-25	68.2013	68.2020	68.2016	68.2018
8-23-26	76.2655	76.2663	76.2659	76.2661
-27	69.7662	69.7666		69.7664
-28	63.2900	63.2907	63.2907	63.2907
-29	65.2700	65.2707	65.2705	65.2706
-30	70.9722	70.9725		70.9724
-31	68.2022	68.2021		68.2022
-32	65.7503	65.7501		65.7502
-33	74.9288	74.9289		74.9289
8-23-34	69.0190	69.0181		69.0181

INITIAL BEAKER WEIGHING

Analyst: Cobb	
Beaker Size: 150 ml	Weight Unit: grams

Beaker Treatment:
X Desiccate 24 hours/6 hours between weighings
___ Other

Balance Check:				
Weight Value(g)	70	70	70	
Initial Check(g)	69.9998	69.9998	69.9999	
Final Check(g)	69.9997	69.9998	69.9999	
Date:	8-27-93	8-27-93	8-30-93	
Time (24 hr):	0950	0916 55	1110	
Beaker No.	Weigh No. 1	Weigh No. 2	Weigh No. 3	Average
8-26-1	70.4332	70.4345	70.4353	
-2	69.8150	69.8161	69.8178	
-3	70.6040	70.6050	70.6062	
-4	74.0781	74.0793	74.0815	
-5	72.6656	72.6666	72.6678	
-6	67.8960	67.8971	67.8987	
-7	66.7755	66.7766	66.7782	
-8	67.6740	67.6752	67.6768	
8-26-9	68.2764	68.2773	68.2784	
-10	67.1959	67.1969	67.1989	
-11	70.2046	70.2058	70.2075	
-12	67.7773	67.7785	67.7804	
-13	75.4094	75.4105	75.4126	
-14	~~75.4094~~ a	68.5545	68.5564	
-15	73.1443	73.1450	73.1474	
-16	68.1527	68.1538	68.1555	
8-26-17	75.1544	75.1554	75.1575	

a) 68.5536

INITIAL BEAKER WEIGHING

Analyst: Gbb	
Beaker Size: 150ml	Weight Unit: grams

Beaker Treatment:
- X Desiccate 24 hours/6 hours between weighings
- ___ Other

Balance Check:				
Weight Value(g)	70	70	70	
Initial Check(g)	69.9998	70.0000	69.9999	
Final Check(g)	69.9999	70 69.9998	69.9998	
Date:	~~8-30-93~~ 9-1-93	9-1-93	9-3-93	
Time (24 hr):	~~1710~~ 0855	1000	1700	
Beaker No.	Weigh No. 4	Weigh No. 5	Weigh No. 6	Average
8-26-1	70.4342	70.4337		70.4340
-2	69.8160	69.8157		69.8159
-3	70.6050	70.6046		70.6048
-4	74.0793	74.0791		74.0792
-5	72.6662	72.6657		72.6660
-6	67.8971	67.8964	67.8967	67.8969
-7	66.7763	66.7758		66.7761
-8	67.6749	67.6737	67.6742	67.6740
8-26-9	68.2774	68.2765	68.2770	68.2768
-10	67.1965	67.1962		67.1964
-11	70.2056	70.2051		70.2054
-12	67.7783	67.7779		67.7781
-13	75.4102	75.4097		75.4100
-14	68.5544	68.5537	68.5542	68.5540
-15	73.1448	73.1444		73.1446
-16	68.1537	68.1534		68.1536
8-26-17	75.1554	75.1546	75.1551	75.1549

of 8-31-93

APPENDIX E

PRETEST CALIBRATIONS

BAROMETER CALIBRATION SHEET

Date	8-15-93
Barometer Number	#1
Ambient Temperature	74°
Calibrator	Ryder

Barometer Reading	28.85
Reference Barometer Reading	28.80
Difference	.05

Acceptance Criteria: Difference ≤ 0.1 inch

CONSOLE WORKSHEET

NAME Rigden K FACTOR 5312 PROJECT #_____

DATE 8/30/93 TRAIN ID #2 PREVIOUS Y FACTOR .990

ORIFICE # 2 PYROMETER # _____

	RUN NUMBER 1	2
DGM		
FINAL READING	110.36	114.07
INITIAL READING	106.8	110.50
INLET & OUTLET TEMPERATURES		
INITIAL	69 / 67	71 / 68
FINAL	71 / 68	74 / 69
TIME Sec	300	300
ORIFICE RDG. ^E	1.50	1.50
BAR. PRESSURE	28.85	28.85
ROOM TEMP.	68 / 68	68 / 68
PUMP VACUUM Hg"	16	16

CONSOLE CALIBRATION

Project	411775	Orifice number	2
Date	AUG 31 93	Orifice K factor	.5312
Operator	RIGDON	Previous Y factor	.990
Console Number	2		

	Run 1	Run 2
Final DGM Volume	110.360	114.070
Inital DGM Volume	106.800	110.500
Net DGM Volume (Vm)	3.560	3.570
In/Out DGM Temp.		
Inlet Deg. F		
initial	69.0	71.0
final	71.0	74.0
Outlet Deg. F		
initial	67.0	68.0
final	68.0	69.0
Avg. DGM Temp Deg. F	68.8	70.5
Time, sec.	300.0	300.0
Orifice DH, in. H2O	1.50	1.50
Baro. Press., in. Hg	28.85	28.85
Room temp., Deg. F		
initial	68.0	68.0
final	68.0	68.0
Avg.Room Temp.	68.0	68.0
Pump Vacuum, in. Hg	16	16
Vcr (std)	3.335	3.335
Vm (std)	3.440	3.438
Y Factor	.970	.970
Delta H@	1.714	1.699

Average Y	.970
Average Delta H@	1.707

+/- 2% criteria	
Percent of Avg Y	.02
	PASS
+/- 5% criteria	
Percent of final Y	2.09
	PASS

GRC 6/8/90

CONSOLE CALIBRATION

Project	411775	Orifice number	2
Date	AUG 31 93	Orifice K factor	.5312
Operator	RIGDON	Previous Y factor	.990
Console Number	2		

	Run 1	Run 2

GRC 6/11/90

ORFICE BRACKETING

Project		962002	Bracket Orfices:	
Date		AUG 31 93	Orifice No. 1	4.
Operator		RIGDON	Orifice N0.1 K factor	.
Orfice Number		2	Orifice No. 2	7.
Orfice Y factor		.97	Orifice N0.2 K factor	.
		Orfice #1	Orfice #2	
Final DGM Volume		116.780	121.490	
Inital DGM Volume		114.600	117.200	
Net DGM Volume (Vm)		2.180	4.290	
In/Out DGM Temp.				
Inlet				
	initial	74.0	77.0	
	final	74.0	74.0	
Outlet			74.0	
	initial	69.0	69.0	
	final	69.0	69.0	
Avg. DGM Temp		71.5	72.3	
Time, sec.		300.0	300.0	
Orifice DH, in. H2O		.58	2.25	
Baro. Press., in. Hg		28.85	28.85	
Room temp., Deg. F				
	initial	72.0	72.0	
	final	72.0	72.0	
Avg. Room Temp.		72.0	72.0	
Pump Vacuum, in. Hg		15	15	
Vcr (std)		2.001	4.006	
Vm (std)		2.090	4.125	
Y Factor (brackets)		.957	.971	
+/- 2% criteria				
Percent of Y		1.33	.10	
		PASS	PASS	

BRACKETING WORKSHEET

NAME Rigdon K.FACTOR 1. ~~1.3199~~ 2. ~~1.6405~~

PROJECT # _____ DATE 8/30/93 TRAIN I.D. #2

ORIFICE # 1. 4 2. 7

DGM	1	2
Final Reading	116.78	121.49
Initial reading	114.60	117.2
Difference		

INLET & OUTLET TEMP.

Initial	74/69	74/69
Final	74/69	74/69
Avg. Temp.		
Time	300	300
Orifice rdg. ^E	.58	2.25
Bar. Pressure	28.85	28.85
Room Temp.	72/72	72/72
Pump Vacuum	15	15

DRY GAS METER THERMOCOUPLE CALIBRATION SHEET

Date	8/30/93	Thermocouple Number	#2
Calibrator	Rydon	Reference Mercury-in-glass	ASTM
		Other	

Thermocouple	Source	Reference Thermometer Temperature (°F)	Thermocouple Potentiometer Temperature (°F)	Temperature Difference* (°F)
Inlet	Ambient Air	73°	74	+1
	Hot Water Bath	131	131	0°
Outlet	Ambient Air	73°	74°	+1
	Hot Water Bath	131	132°	+1

* Reference Temperature -- Thermocouple Temperature ≤ ± 5.4 °F

TYPE S PITOT TUBE CALIBRATION

PITOT # [redacted] extension for M17

Calibrator: B Wood	Project no.:
Date: 8-15-93	Probe no.: 3-1

Pitot Tube Assembly Level? (Y) / N

Pitot Tube Openings Damaged? Y / (N) (If yes explain below)

α^1 1 ° (<10°) β^1 0 ° (<5°)

α^2 1 ° (<10°) β^2 1 ° (<5°)

Y = 1 O = 1 A = .940 in.

Z = A sin Y .016 in. (<1/8 in.)

W = A sin O .016 in. (<1/32 in.)

P^{α} .470 in. P^{β} .470 in.

DT = .385 in.

Calibration Required? Y / (N) (If yes explain below)

Comments:

STACK THERMOCOUPLE CALIBRATION SHEET

Date 8-22-93 Thermocouple Number 3-1

Ambient Temp. _____ F Barometric Pressure _____ in. Hg

Calibrator B. Wood Reference: mercury-in-glass ASTM

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[c] %
1	Ambient	91°	93°	.003%
2	Tube Oven	248	252	.005%

[a] Every 50°F for each reference point

[b] Type of calibration system used

[c] $\frac{\text{(ref temp, °F + 460) - (test thermom temp, °F + 460)}}{\text{ref temp, °F + 460}} \times 100 \leq 1.5\%$.

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 8-22-93	Thermocouple Number	1
Calibrator B. Wood	Reference:mercury-in-glass	
	Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	90	91	1
Ice Bath	38	39	1

[a] Reference Temperature - Thermocouple Temperature ≤ ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 8-22-93	Thermocouple Number	2
Calibrator B. Wood	Reference:mercury-in-glass	
	Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	90	91	1
Ice Bath	39	39	0

[a]ReferenceTemperature - Thermocouple Temperature ≤ ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 8-22-93	Thermocouple Number	3
Calibrator B. Wood	Reference:mercury-in-glass	
	Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	91	91	0
Ice Bath	40	40	0

[a]ReferenceTemperature - Thermocouple Temperature ≤ ± 2°F

APPENDIX F

POSTTEST CALIBRATIONS

BAROMETER CALIBRATION SHEET

Date	9-15-93
Barometer Number	~~#7~~
Ambient Temperature	72°
Calibrator	Bigelow

Barometer Reading	29.00
Reference Barometer Reading	29.05
Difference	.05

Acceptance Criteria: Difference ≤ 0.1 inch

CONSOLE WORKSHEET

NAME Ryder K FACTOR 5312 PROJECT # _____

DATE 9/16/93 TRAIN ID #2 PREVIOUS Y FACTOR .970

ORIFICE # 2 PYROMETER # _____

	RUN NUMBER 1	2
DGM		
FINAL READING	354.38	358.10
INITIAL READING	350.80	354.50
INLET & OUTLET TEMPERATURES		
INITIAL	78 / 78	79 / 78
FINAL	79 / 78	79 / 78
TIME Sec	300	300
ORIFICE RDG. "E	1.50	1.50
BAR. PRESSURE	29.15	29.15
ROOM TEMP.	78 / 78	78 / 78
PUMP VACUUM Hg"	15"	15"

CONSOLE CALIBRATION

Project	411775	Orifice number	2
Date	SEPT 16 93	Orifice K factor	.5312
Operator	RIGDON	Previous Y factor	.970
Console Number	2		

	RUN 1	RUN 2
Final DGM Volume	354.380	358.100
Inital DGM Volume	350.800	354.500
Net DGM Volume (Vm)	3.580	3.600
In/Out DGM Temp.		
Inlet Deg. F		
initial	78.0	79.0
final	79.0	79.0
Outlet Deg. F		
initial	78.0	78.0
final	78.0	78.0
Avg. DGM Temp Deg. F	78.3	78.5
Time, sec.	300.0	300.0
Orifice DH, in. H2O	1.50	1.50
Baro. Press., in. Hg	29.15	29.15
Room temp., Deg. F		
initial	78.0	78.0
final	78.0	78.0
Avg.Room Temp.	78.0	78.0
Pump Vacuum, in. Hg	15	15
Vcr (std)	3.338	3.338
Vm (std)	3.433	3.451
Y Factor	.972	.967
Delta H@	1.711	1.691
Average Y	.970	
Average Delta H@	1.701	

+/- 2% criteria
Percent of Avg Y .26
PASS

+/- 5% criteria
Percent of final Y .02
PASS

GRC 6/8/90

CONSOLE CALIBRATION

Project	411775	Orifice number	2
Date	SEPT 16 93	Orifice K factor	.5312
Operator	RIGDON	Previous Y factor	.970
Console Number	2		

	RUN 1	RUN 2

BRACKETING WORKSHEET

NAME Rigdon K.FACTOR 1. 3199 2. .6405

PROJECT # _____ DATE 9/16/93 TRAIN I.D. #2

ORIFICE # 1. 4 2. 7

DGM	1	2
Final Reading	361.40	346.63
Initial reading	359.20	342.3
Difference	_____	_____
INLET & OUTLET TEMP.		
Initial	79/78	80/79
Final	80/79	80/79
Avg. Temp.	_____	_____
Time	300	300
Orifice rdg. ^E	.58	2.25
Bar. Pressure	29.15	29.15
Room Temp.	78/78	78/78
Pump Vacuum	16	15

ORFICE BRACKETING

Project	962002	Bracket Orfices:	
Date	SEPT 16 93	Orifice No. 1	4.0000
Operator	RIGDON	Orifice N0.1 K factor	.3199
Orfice Number	2	Orifice No. 2	7.0000
Orfice Y factor	.97	Orifice N0.2 K factor	.6405

	ORFICE #1	ORFICE #2
Final DGM Volume	361.400	366.630
Inital DGM Volume	359.200	362.300
Net DGM Volume (Vm)	2.200	4.330
In/Out DGM Temp.		
Inlet		
initial	79.0	80.0
final	80.0	80.0
Outlet		
initial	78.0	79.0
final	79.0	79.0
Avg. DGM Temp	79.0	79.5
Time, sec.	300.0	300.0
Orifice DH, in. H2O	.58	2.25
Baro. Press., in. Hg	29.15	29.15
Room temp., Deg. F		
initial	78.0	78.0
final	78.0	78.0
Avg. Room Temp.	78.0	78.0
Pump Vacuum, in. Hg	16	15
		0
Vcr (std)	2.010	4.025
Vm (std)	2.102	4.150
Y Factor (brackets)	.956	.970
+/- 2% criteria		
Percent of Y	1.41	.03
	PASS	PASS

GRC 9/13/93

ORFICE BRACKETING

Project	962002	Bracket Orfices:	
Date	SEPT 16 93	Orifice No. 1	4.0000
Operator	RIGDON	Orifice N0.1 K factor	.3199
Orfice Number	2	Orifice No. 2	7.0000
Orfice Y factor	.97	Orifice N0.2 K factor	.6405

	ORFICE #1	ORFICE #2
Final DGM Volume	361.400	366.630
Inital DGM Volume	359.200	362.300

DRY GAS METER THERMOCOUPLE CALIBRATION SHEET

Date 9/16/93	Thermocouple Number	2
Calibrator Bigalow	Reference Mercury-in-glass	ASTM
	Other	

Thermocouple	Source	Reference Thermometer Temperature (°F)	Thermocouple Potentiometer Temperature (°F)	Temperature Difference* (°F)
Inlet	Ambient Air	78°	76°	-2°
	Hot Water Bath	131°	130	-1°
Outlet	Ambient Air	78°	77°	
	Hot Water Bath	131°	132°	+1

* Reference Temperature -- Thermocouple Temperature ≤ ± 5.4 °F

TYPE S PITOT TUBE CALIBRATION

PITOT # M17

Calibrator: Riggan	Project no.:
Date: 10-1-93	Probe no.: M17

Pitot Tube Assembly Level? (Y) / N

Pitot Tube Openings Damaged? Y / (N) (If yes explain below)

α^1 1 ° (<10°) β^1 0 ° (<5°)

α^2 1 ° (<10°) β^2 1 ° (<5°)

Y = 1 O = 1 A = .940 in.

Z = A sin Y .016 in. (<1/8 in.)

W = A sin O .016 in. (<1/32 in.)

P^{α} .470 in. P^{β} .470 in.

DT = .385 in.

Calibration Required? Y / (N) (If yes explain below)

Comments:

STACK THERMOCOUPLE CALIBRATION SHEET

Date 9-15-93 Thermocouple Number 3-1

Ambient Temp. _____ F Barometric Pressure 28.05 in. Hg

Calibrator Rigdon Reference: mercury-in-glass Astm

Other _____

Reference Point Number[a]	Source[b] (Specify)	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[c] %
Ambient 1	Ambient	72°	74°	+2°
Tube Oven	248°	248°	250°	+2°

[a] Every 50°F for each reference point

[b] Type of calibration system used

[c] $\frac{\text{(ref temp, °F + 460) - (test thermom temp, °F + 460)}}{\text{ref temp, °F + 460}} \times 100 \leq 1.5\%$.

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 9/15/93	Thermocouple Number	1
Calibrator Rigdon	Reference:mercury-in-glass	Astro
	Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	73°	+1°
Ice Bath	33°	34°	+1°

[a]ReferenceTemperature - Thermocouple Temperature ≤ ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date 9/15/93	Thermocouple Number	2
Calibrator Rigdon	Reference:mercury-in-glass	Astro
	Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	72°	0°
Ice Bath	33°	33°	0°

[a]ReferenceTemperature - Thermocouple Temperature ≤ ± 2°F

UMBILICAL HOOKUP THERMOCOUPLE CALIBRATION SHEET

Date	9/15/93	Thermocouple Number	3
Calibrator	Rigdon	Reference:mercury-in-glass	Astm
		Other	

Source	Reference Thermometer Temperature F	Thermocouple Potentiometer Temperature F	Temperature Difference[a] F
Ambient Air	72°	72°	0°
Ice Bath	33°	32°	-1°

[a]ReferenceTemperature - Thermocouple Temperature ≤ ± 2°F

APPENDIX G

PROCESS DATA

M&Q Inc. Fact Sheet

Morrison & Quirk Inc.
Box 117
Lyons NE 68038

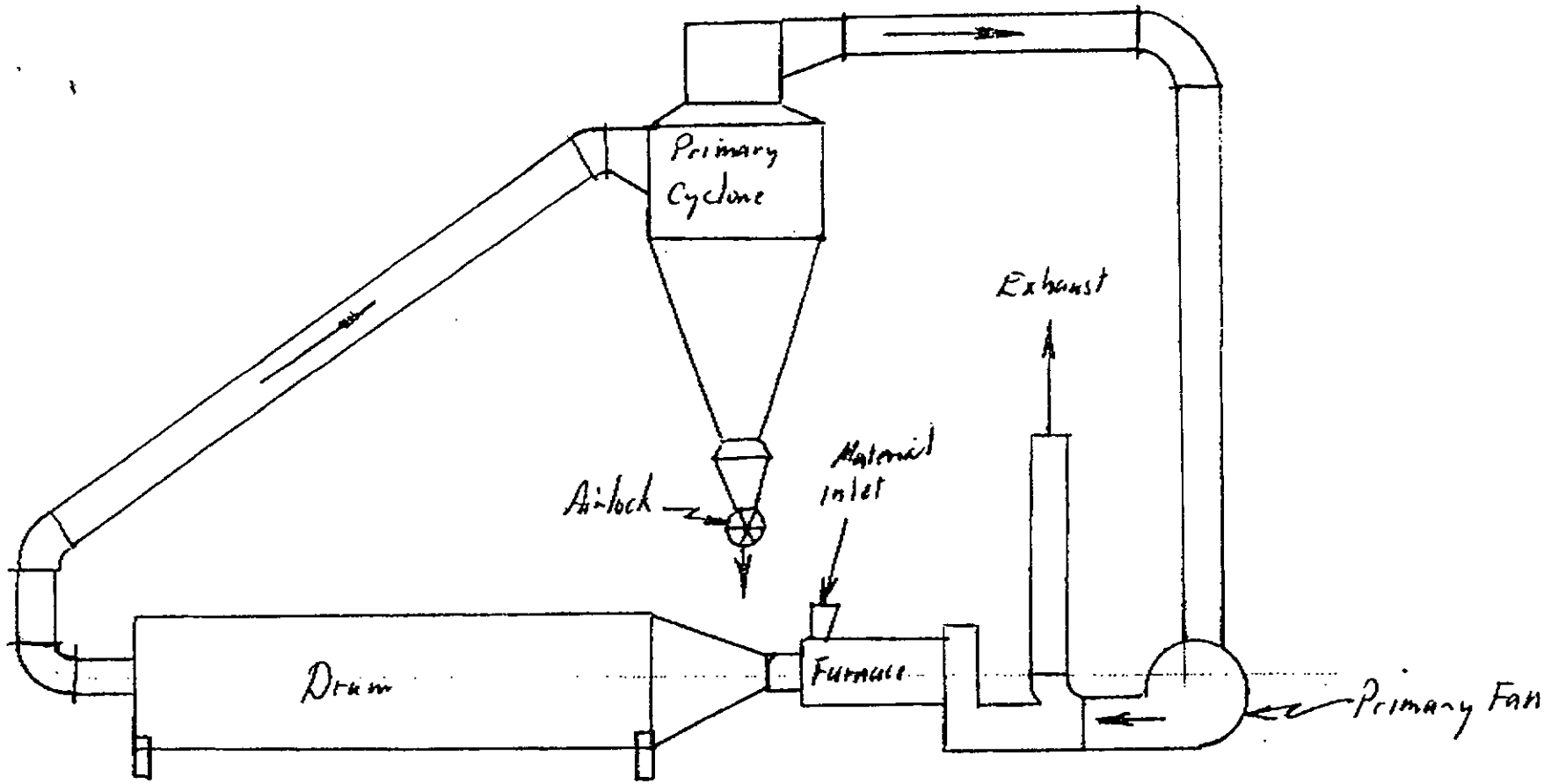
Mike Olson, Mgr.

Phone: 402-687-2444 FAX: Same

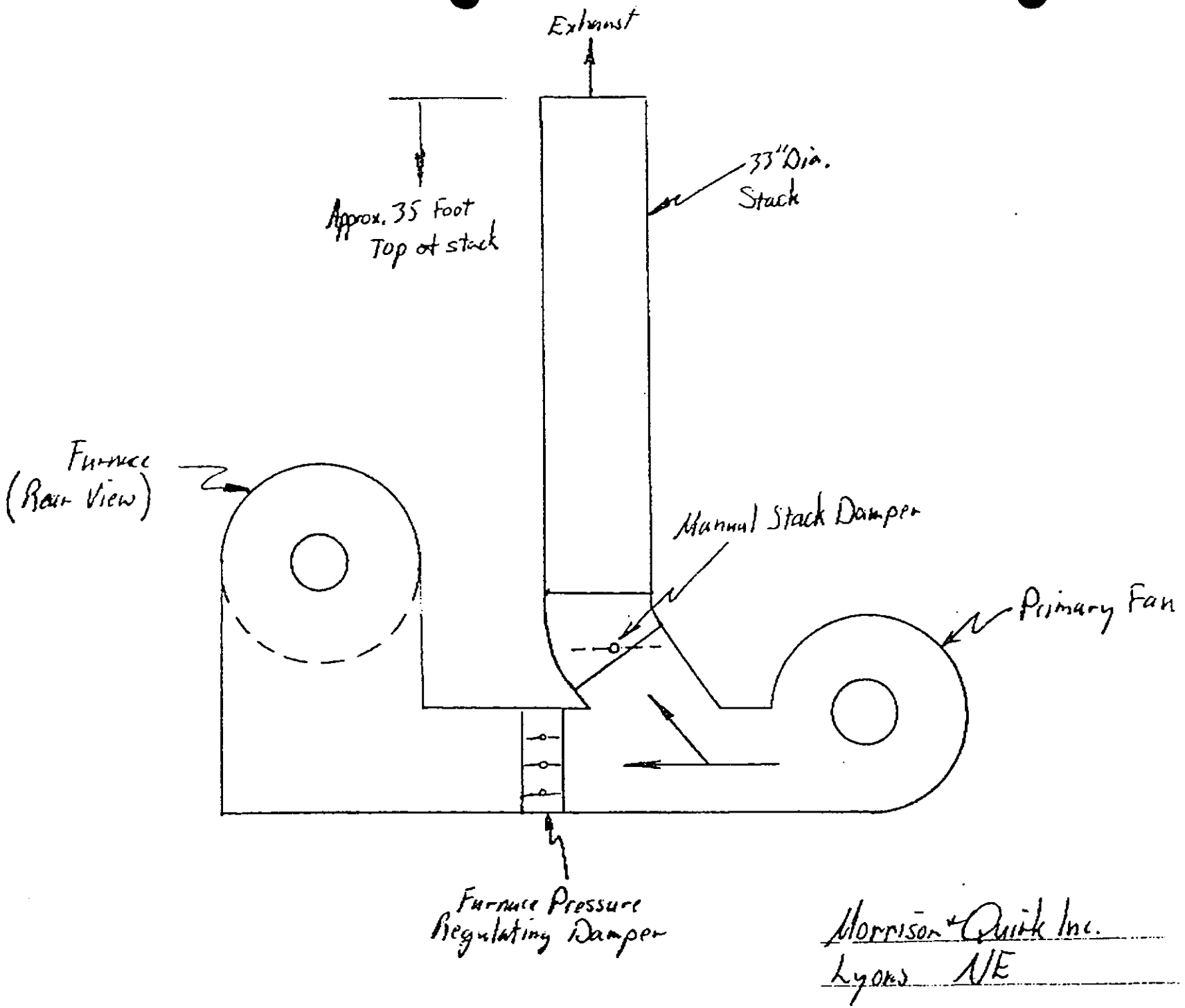
Dryer Specs:

Furnace Temp,	400° to 2000°	Ave. 1000°
Drum Outlet Temp,	150° to 350°	Ave. 200°
Product Moisture-Out	10 to 12%	

Dryer: 10 x 36 Single Pass w/ 8' Inlet Cone
Primary Cyclone: 10' Dia
Furnace: 14 Mct/hr Natural Gas



Morrison & Quirk Inc.
Lyons NE



Morrison & Quirk Inc.
Lyons NE

PARTICULATE EMISSION TEST
Alfalfa Pellets OPERATING DATA
(Type of Source)

Owner	Morrison + Quirk Inc.	Run No.	
Source I.D.	Lyons NE	Date	9/8/93

	lbs/hr
Maximum Continuous Process Weight (Manufacturer's Rating)	3500 lb/hr water (10000 lb/hr Alfalfa)
Historical Average Process Weight	1700 lb/hr water
Historical Maximum Process Weight	3500 lb/hr water

Type and Sources of Fuels Normally Burned	Natural Gas
Approximate Quantities of Each of Above Fuels Burned Annually	20 000 MCF

	Yes	No
Recycling Capability	X	

Process Data During Run (Averaged)			
Process Weight (dry)	Alfalfa	lbs/hr	10,000
Percent Moisture		%	27
Process Weight (wet)	Water	lbs/hr	1700
How Process Weight Determined		Moisture Balance	

Type of Fuel Burned During Run	Natural Gas

	Yes	No
Recycling in Progress 50 to 75%	X	

Person Responsible for Data: Barry M. Olson

Signature: Barry M. Olson

Title/Position: Plant Manager

• Averages of operating data taken during actual test run, unless requested otherwise.

PROCESS DATA

Plant	Morrison Quirk Inc	Location	Lyons NE
Source Type		Rated Production	
Date:	Time:	Actual Production	
Air Flow Data		Run No.	

Mechanical Collector

Tube Diameter (in.)		No. of Tubes		Design ΔP _____ in. H_2O @ Gas Temp._____ °F	
Observed ΔP _____ in. H_2O				Design cfm/tube @ Observed ΔP_____ @_____ °F	
Fan Rated H.P.		Operating Volts		Operating Amps	

Electrostatic Precipitator

Field No.	Primary Voltage (volts)	Primary Current (amps)	Secondary Voltage (kV)	Secondary Current (ma)	Spark Rate (per min.)

Scrubber

Type		ΔP (across scrubber)_____ in. H_2O			
Fan Rated H.P.		Operating Volts		Operating Amps	
Liquid Circulation Rate (gal/min)		% Make-up		Blowdown (gpm)	
Scrubbing Water Change Interval					
Settling Tank Cleaning Interval					

Baghouse

Pressure-Positive		Negative		No. Compartments	
Type Cleaning		Clean Cycle (min.)			
Average Baghouse ΔP_____ in. H_2O		ΔP Range_____ in. H_2O			
Fan Rated H.P.		Operating Volts		Operating Amps	

Cyclone

Type	Negative	ΔP _____ in. H_2O		Diameter	10'
Fan Rated H.P.	100	Operating Volts	440	Operating Amps	75

Person Responsible for Data: Barry M. Olson

Signature: Barry M. Olson

Title/Position: Plant Mgr

*Average of operating data taken during actual test run, unless requested otherwise.

Alfalfa
Sec #4
Ref. #7