Background Report Reference

AP-42 Section Number: 9.12.1

Background Chapter: 4

Reference Number: 13

Title: Report on Diagnostic Testing Performed for Coors Brewing Company

Clean Air Engineering

Clean Air Engineering

November 1992

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Stack Test Report # 3

Clean Air Engineering

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AP-42 Section 9.12.1
Reference —
Report Sect. 4
Reference 13

REPORT ON DIAGNOSTIC TESTING

Performed for:
COORS BREWING COMPANY
GOLDEN, COLORADO

CAE Project No: 6265-3
November 25, 1992

CONTENTS

SUMMARY

INTRODUCTION

Clean Air Engineering was contracted by Coors Brewing Company to determine the levels of total hydrocarbons emissions at their facility located in Golden, Colorado for diagnostic purposes.

The testing took place at the Cellar 13 Lysed Yeast Surge tank and the Cellar 13 Yeast Roof Vent on June 10, 1992. Coordinating the field testing were:

F. Varani - Coors Brewing Company
M. Hynes - Clean Air Engineering

SUMMARY OF TEST RESULTS

The test conditions and results of analysis are presented in Table 1 on page 1-2.

To the best of our knowledge, the data presented in this report are accurate and complete.

Respectfully submitted,

CLEAN AIR ENGINEERING

Michael Pierce
Manager, Denver Region

David Perkins
Manager, Technical Communications

TABLE 1 - Summary of Test Results

EPA Method 25A
Cellar 13 Floor

Run No.	7	8	Average
Date (1992)	June 10	June 10	
Start Time (approx.)	6:26 AM	3:44 PM	
Stop Time (approx.)	10:35 AM	6:37 PM	
Lysed Yeast Surge Tank			
Gas Conditions			
Temperature (° F)	89	89	89
Moisture (volume %)	1.1	1.1	1.1
O_2 (dry volume %)	19.4	19.4	19.4
CO_2 (dry volume %)	1.9	1.9	1.9
Volumetric Flow Rate			
acfm	1,174	1,174	1,174
dscfm	906	906	906
For Solvent Corrected:			
Total Hydrocarbons			
lb/hr (as ethanol)	4.43	4.17	4.30
ton/yr (as ethanol)	19.4	18.3	18.8
For Non-Solvent Corrected:			
Total Hydrocarbons			
ppm, dry (as propane)	302	284	293
lb/hr (as propane)	1.88	1.77	1.83
ton/yr (as propane)	8.21	7.73	7.97
Yeast Roof Vent			
Gas Conditions			
Temperature (° F)	78	78	78
Moisture (volume %)	1.1	1.1	1.1
O_2 (dry volume %)	20.1	20.1	20.1
CO_2 (dry volume %)	0.0	0.0	0.0
Volumetric Flow Rate			
acfm	7,225	7,225	7,225
dscfm	5,732	5,732	5,732
For Solvent Corrected:			
Total Hydrocarbons			
lb/hr (as ethanol)	4.66	4.63	4.65
ton/yr (as ethanol)	20.4	20.3	20.4
For Non-Solvent Corrected:			
Total Hydrocarbons			
ppm, dry (as propane)	50	50	50
lb/hr (as propane)	1.98	1.96	1.97
ton/yr (as propane)	8.65	8.60	8.63

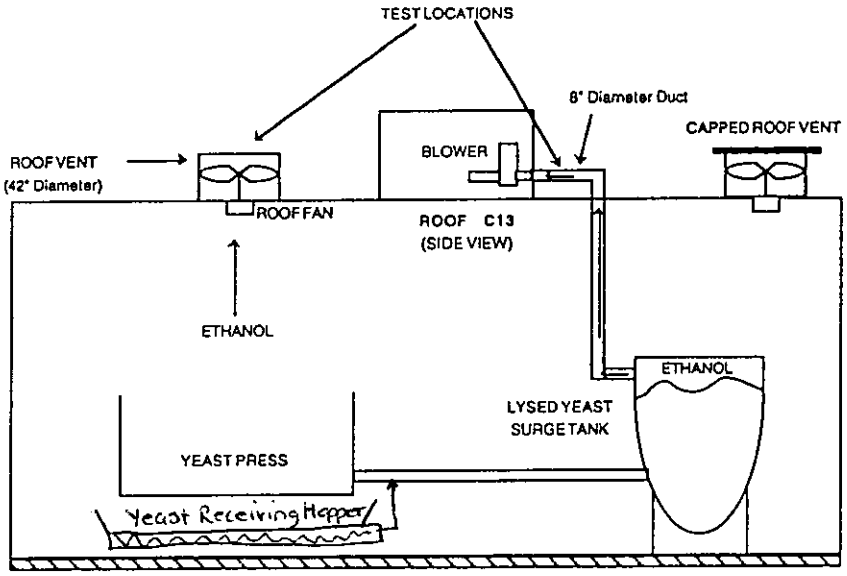
DESCRIPTION OF INSTALLATION

At the Coors Brewing Company, located in Golden, Colorado, the Yeast Beer Separation process is comprised of two yeast presses and surge tanks. The yeast presses separate beer from yeast by pushing the solution through filters. During the process ethanol is released and vented via roof fans simaltaneous to the release of ethanol from the surge tank.

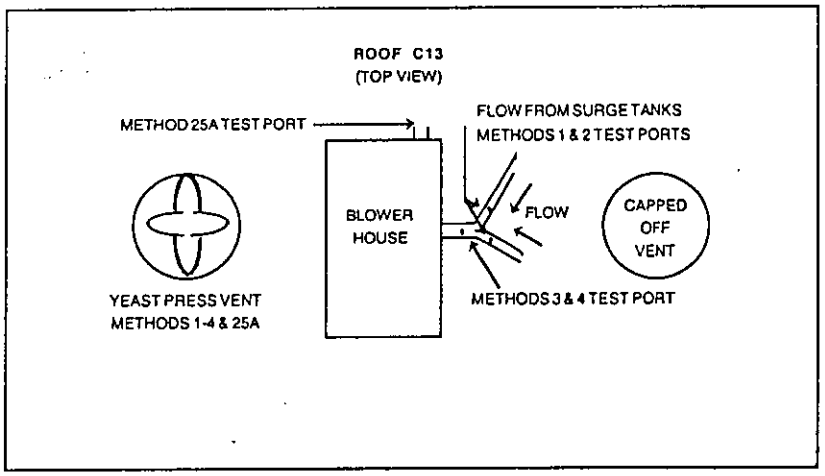
The testing reported in this document was performed at the Cellar 13 Lysed Yeast Surge tank and the Cellar 13 Yeast Roof Vent.

DESCRIPTION OF INSTALLATION (Continued)

A schematic of the side view is shown below.



A schematic of the top view is shown below.



SUMMARY OF PROCEDURES

SAMPLING PROCEDURES

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3, 4 and 25A. These methods are titled:

- Method 1 — "Sample and Velocity Traverses for Stationary Sources;"
- Method 2 — "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube);"
- Method 3 — "Gas Analysis for the Determination of Dry Molecular Weight;"
- Method 4 — "Determination of Moisture Content in Stack Gases;"
- Method 25A - "Determination of Total Gaseous Organic Concentrations using a Flame Ionization Analyzer (FIA)."

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR), Part 60, Appendix A.

The sampling apparatus is shown in Figure 1 on page 3-2. All equipment was calibrated at the Clean Air Engineering laboratory prior to shipment to the job site.

Sampling Locations

The Lysed Yeast Surge Tank has two ports. For velocity testing, six points were sampled per port. The sampling locations are shown in Figure 2 on page 3-3. For moisture determination and total hydrocarbons testing, a single point was sampled at the center of the duct for various time intervals.

The Yeast Roof Vent has no ports. For velocity testing, six points were sampled per row. The sampling locations are shown in Figure 3 on page 3-4. For moisture determination and total hydrocarbons testing, a single point was sampled at the center of the vent for various time intervals.

FIGURE 1

The EPA Method 25A sampling apparatus is shown.

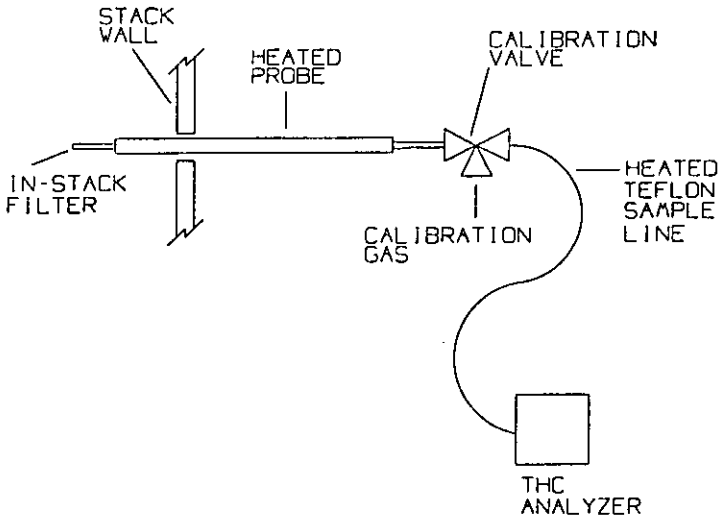
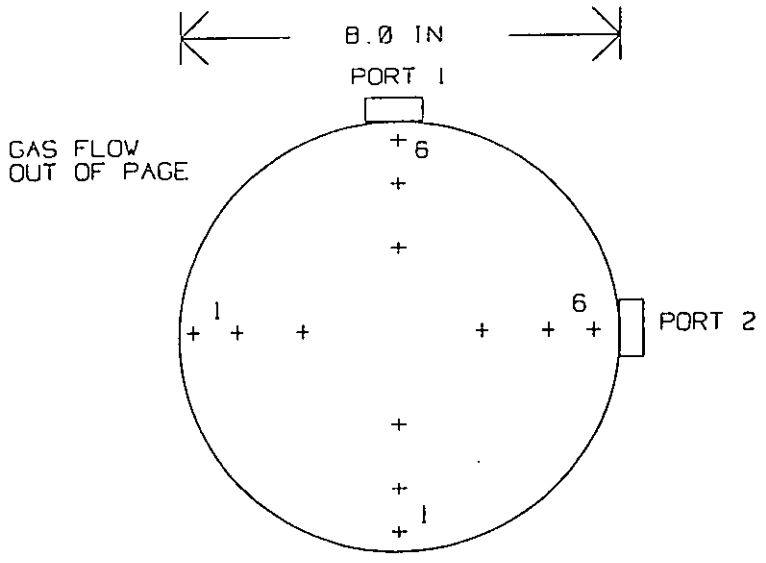


FIGURE 2

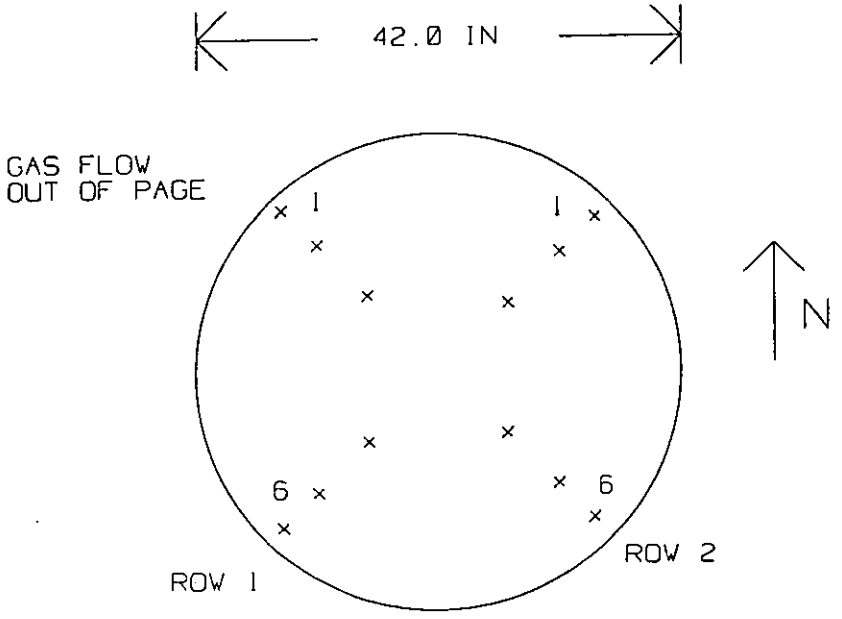
The cross section of the Lysed Yeast Surge Tank shows traverse point locations.



TRAVERSE POINT	PORT TO POINT DISTANCE (IN)
1	7.5
2	6.8
3	5.6
4	2.4
5	1.2
6	0.5

FIGURE 3

The cross section of the Yeast Roof Vent shows traverse point locations.



TRAVERSE POINT	PORT TO POINT DISTANCE (IN)
1	40.2
2	35.8
3	29.6
4	12.4
5	6.2
6	1.8

SUMMARY OF PROCEDURES (Continued)

ANALYTICAL PROCEDURES

Continuous Emissions Monitoring

Total Hydrocarbons

The total hydrocarbons emission rate was determined using procedures detailed in EPA Method 25A. A sample was extracted continuously from the flue gas stream, and a portion was conveyed to a flame ionization analyzer.

Before and after each run, the monitor was zeroed and calibrated with a certified calibration gas. These calibrations were used to correct the raw data for zero and calibration drift occurring during the test runs.

Solvent Calibration

Referenced were EPA Method 18 "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography"; Section 6.2, "Calibration Standards"; Subsection 6.2.2, "Preparation of Standards from Volatile Materials"; Subsection 6.2.2.2, "Liquid Injection Technique."

Apparatus

The apparatus consisted of a 50 liter Tedlar bag connected to the outlet of a midget impinger where the solvent was volatilized. The inlet of the impinger was connected to the outlet of a dry gas meter which received nitrogen gas from a gas cylinder. On the top of the midget impinger was a septum for introducing the solvent with the use of a syringe.

System Preparation

Before each solvent run, the Tedlar bag was evacuated and purged with zero air to remove any contaminates. This was repeated until no VOC's were detected. The Tedlar bag was then evacuated and attached to the outlet of the midget impinger.

[redacted]

Sampling

The hot bath was brought to a boil and the initial dry gas meter reading was taken. The flow rate from the nitrogen take was adjusted to completely fill the Tedlar bag in approximately 15 minutes. The meter pressure and temperature was recorded along with the barometric pressure.

A 10, 100 and 1,000 microliter syringe was used to inject the solvent sample into the midget impinger. The solvent will be injected into the impinger below the inlet air stream.

When the bag was completely filled the pump was stopped, the bag removed and the final volume recorded. The bag was set aside for one hour or massaged to insure adequate mixing of the gas.

The solvent density was found by accurately measuring a known volume on an analytical balance to the nearest 1.0 milligram. The results were calculated in terms of g/ml.

Analysis

The Tedlar bag was analyzed using the same hydrocarbon analyzer as was used in the field. The response of the analyzer was read as ppm propane.

QUALITY CONTROL PROCEDURES

Quality control procedures for all aspects of field sampling; sample preservation and holding time; reagent quality; analytical method; analyst training and safety; and instrument cleaning, calibration and safety were followed. These procedures are generally consistent with EPA guidelines documented in "Quality Assurance Manuals for Air Pollution Measurement Systems," Vol 3, "Stationary Source Specific Methods" (EPA-600/4-77-027b).

COMMENTS

The velocity at the Yeast Roof Vent was measured with a hot wire anamometer.

No deviations from standard U.S. EPA testing procedures were noted.

APPENDIX

NOMENCLATURE

Nomenclature

A	-	absorbance
A_n	-	cross sectional area of nozzle (ft^2)
A_s	-	cross sectional area of stack (ft^2)
B_{wo}	-	proportion of water vapor in the gas stream by volume
B_{ws}	-	proportion of water vapor in the gas stream by volume at saturated conditions
C_p	-	pitot tube coefficient (dimensionless)
D_f	-	dilution factor
F_d	-	ratio of dry gas generated to gross calories (dscf/MBtu)
F_c	-	ratio of gas generated
GCV	-	gross calorific value of fuel (Btu/lb)
$\overline{DH}$	-	average pressure drop across meter box orifice (in. H_2O)
$\overline{\sqrt{DP}}$	-	average square roots of velocity heads of stack gas ($\sqrt{\text{in. } H_2O}$)
DH@	-	meter orifice calibration coefficient (in. H_2O)
%I	-	percent of isokinetic sampling (acceptable: $90 \leq \%I \leq 110\%$)
K_p	-	pitot tube constant: 85.49 (ft/sec) $\frac{\sqrt{(lb/lb\text{-}mole)(in.\ Hg)}}{\sqrt{(^\circ R)(in.\ H_2O)}}$
K_c	-	spectrophotometer calibration factor
M_d	-	dry molecular weight of stack gas (lb/lb-mole)
M_s	-	molecular weight of stack gas, wet basis (lb/lb-mole)
M_n	-	total amount of particulate matter collected (gm)
N	-	normality of titrant (meq/ml)
P_b	-	barometric pressure (in. Hg)
P_f	-	final absolute pressure of flask (in. Hg)
P_i	-	initial absolute pressure of flask (in. Hg)
P_s	-	absolute stack gas pressure (in. Hg)
Q_a	-	volumetric flow rate, actual conditions
Q_{std}	-	volumetric flow rate, standard conditions, dry basis
std	-	standard conditions, 29.92 in. Hg, 68 ° F
T_f	-	final absolute temperature of flask (° R)
T_i	-	initial temperature of flask (° R)
T_m	-	average dry gas meter temperature (° F)

T_s	-	average stack temperature (° F)
T_{std}	-	absolute temperature, standard conditions (528 ° R)
Θ	-	total sampling time (min)
V_a	-	volume of aliquot (ml)
V_f	-	volume of flask (ml)
V_{lc}	-	total volume of liquid collected in impingers and silica gel (ml)
V_m	-	volume of gas sample through the dry gas meter at meter conditions (ft^3)
V_{mstd}	-	volume of gas sample through the dry gas meter, standard conditions (ft^3)
V_{sc}	-	volume of flask sample, standard conditions (ml)
V_{soln}	-	total volume of solution (ml)
V_t	-	volume of titrant used to titrate aliquot (ml)
V_{tb}	-	volume of titrant used to titrate blank (ml)
V_{wstd}	-	volume of water collected, standard conditions (ft^3)
V_s	-	stack gas velocity (ft/sec)
Y_d	-	gas meter correction factor (dimensionless)

Nomenclature

CAL GAS	actual concentration of the upscale calibration gas
CAL I	initial system calibration bias check response for the upscale calibration gas, ppm
CAL F	final system calibration bias check response for the upscale calibration gas, ppm
ZERO I	initial system calibration bias check response for the zero gas, ppm
ZERO F	final system calibration bias check response for the zero gas, ppm
ppm	measured concentration as parts per million in the gas stream
ppm (drift calibrated)	concentration calibrated for drift as per Eq. 6C-1 of EPA Method 6C

SAMPLE CALCULATIONS

COORS BREWING COMPANY
CAE Project No : 6265 - 3

SAMPLE CALCULATIONS - C13 LYSED YEAST SURGE TANK (EAST)

(Note : results are taken from computer analysis)

1. Volume of water collected

$$V_{wstd} = (0.04707\ ft^3/ml)\ (V_{lc})$$
$$= (0.04707)\ (7.0)$$
$$= 0.33\ wscf$$

2. Volume of gas metered, standard conditions

$$V_{mstd} = \frac{(17.64\ ^\circ R/in.\ Hg)\ (V_m)\left[P_b + \frac{DH}{13.6}\right]}{(460 + T_m)}(Y_d)$$
$$= \frac{(17.64)\ (39.14)\left[24.42 + \frac{1.0}{13.6}\right]}{(460 + 103)}(1.0078)$$
$$= 30.27\ dscf$$

3. Moisture content (actual)

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$
$$= \frac{0.33}{30.27 + 0.33}$$
$$= 0.0108$$
$$= 1.1\ \%$$

4. Molecular weight of dry gas stream

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$$
$$= 0.44(1.9) + 0.32(19.4) + 0.28(78.7)$$
$$= 29.08$$

5. Molecular weight of stack gas

$$M_s = M_d\ (1 - B_{wo}) + 18(B_{wo})$$
$$= 29.08(1 - 0.0108) + 18(0.0108)$$
$$= 28.96$$

6. Stack pressure (in. Hg)

$$P_s = P_b + \left(\frac{STATIC\ P}{13.6}\right)$$
$$= 24.42 + \left(\frac{-1.3}{13.6}\right)$$
$$= 24.32$$

SAMPLE CALCULATIONS (Continued)

7. Velocity of stack gas

$$V_s = K_p C_p \overline{(DP)}^{\frac{1}{2}} \frac{[\overline{T_s} + 460]^{\frac{1}{2}}}{[(M_s)(P_s)]^{\frac{1}{2}}}$$

$$= 85.49\ (1.0)\ (0.173)\ \frac{[87 + 460]^{\frac{1}{2}}}{[(28.96)\ (24.32)]^{\frac{1}{2}}}$$

$$= 13.05\ \text{ft/sec}$$

8. Total flow of stack gas

$$Q_a = (60)\ (A_s)\ (V_s)$$
$$= (60)\ (0.35)\ (13.05)$$
$$= 274\ \text{acfm}$$

$$Q_{std} = \frac{Q_a\ P_s\ (17.64\ ^\circ\text{R/in. Hg})\ (1 - B_{wo})}{\overline{T_s} + 460}$$

$$= \frac{(274)\ (24.32)\ (17.64)\ (1 - 0.0108)}{87 + 460}$$

$$= 213\ \text{dscfm}$$

SAMPLE CALCULATIONS (Continued)

9. Total Hydrocarbons (as propane)

$$ppm_{wet,\ drift\ calibrated} = \left(C_{avg} - C_o\right)\frac{C_{ma}}{(C_m - C_o)}$$
$$= (299 - (-2))\frac{547.8}{(549 - (-2))}$$
$$= 299$$

C_{avg} = Average gas concentration indicated by gas analyzer, wet basis, ppm.
C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm.
C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm.
C_{ma} = Actual concentration of the upscale calibration gas, ppm.

$$ppm_{dry} = \frac{ppm_{wet,\ drift\ calibrated}}{1 - B_{wo}}$$
$$= \frac{299}{1 - 0.0108}$$
$$= 302$$

$$lb/dscf = \frac{(ppm_{dry})(MW)}{385.3x10^{-6}}$$
$$= \frac{(302)(44)}{385.3x10^{-6}}$$
$$= 3.45x10^{-5}$$

$$lb/hr = (lb/dscf)(dscfm)(60)$$
$$= (3.45x10^{-5})(906)(60)$$
$$= 1.88$$

$$lb/hr,\ Ethanol = (lb/hr)(Ethanol\ Correction\ Factor)$$
$$= (1.88)(2.36)$$
$$= 4.43$$

$$ton/yr,\ Ethanol = \frac{(lb/hr,\ Ethanol)(24\frac{hr}{day})(365\frac{days}{yr})}{2,000\frac{lb}{ton}}$$
$$= \frac{(4.43)(24)(365)}{2,000}$$
$$= 19.4$$

SAMPLE CALCULATIONS (Continued)

10. Solvent Calibration (trial 1)

$$lb/dscf_{Ethanol} = \frac{(grams_{Ethanol})(28.31 \frac{liters}{ft3})}{(liters)(453.59 \frac{g}{lb})}$$

$$= \frac{(0.0013)(28.31)}{(15)(453.59)}$$

$$= 5.41 \times 10^{-6}$$

$$RF(1) = \frac{(lb/dscf_{Ethanol})(385.3 \times 10^{6})}{(ppm_{FID})(MW)}$$

$$= \frac{(5.41 \times 10^{-6})(385.3 \times 10^{6})}{(20.5)(44)}$$

$$= 2.31$$

PARAMETERS

COORS BREWING COMPANY
Project No. 6265-3
Cellar 13 Vents

Moisture and Velocity Parameters

Location	Lysed Yeast Surge Tank (East)	Lysed Yeast Surge Tank (West)	Yeast Roof Vent
Date (1992)	June 10	June 10	June 10
Start Time (approx.)	11:42 AM	11:42 AM	9:47 AM
Stop Time (approx.)	12:51 PM	12:51 PM	10:52 AM
%CO2	1.9	1.9	0.0
%O2	19.4	19.4	20.1
Pb	24.42	24.42	24.46
STATIC P	-1.3	-1.3	0.0
Cp	1.0	1.0	N/A
As	0.35	0.35	9.62
Vlc	7.0	7.0	7.0
Vm	39.14	39.14	37.77
DH	1.0	1.0	1.0
Yd	1.0078	1.0078	1.0078
Tm	103	103	96
CALCULATED RESULTS			
Vwstd	0.33	0.33	0.33
Vmstd	30.27	30.27	29.63
Bwo	0.0108	0.0108	0.0110
AVG VEL ROOT	0.173	0.567	N/A
AVG TEMP	87	91	78
Md	29.08	29.08	28.80
Ms	28.96	28.96	28.69
Ps	24.32	24.32	24.46
Vs*	13.05	42.87	12.52
Qa (acfm)	274	900	7,225
Qstd (dscfm)**	213	693	5,732

Combined Lysed Yeast Surge Tank East and West

AVG TEMP	89
Qa (acfm)	1,174
Qstd (dscfm)	906

* The velocity at the Yeast Roof Vent was obtained using a hot wire anomometer.
** dscfm at the Lysed Yeast Surge Tank is the sum of the converging ducts.

CALIBRATION DATA

METER BOX FULL TEST CALIBRATION

$\overline{Yd}$: 1.0070 $\overline{dH@}$: 1.6764

Qp	Q	dH	dP	Vds	WET TEST VOLUME INITIAL	WET TEST VOLUME FINAL	METER Vds	DRY GAS VOLUME INITIAL	DRY GAS VOLUME FINAL	METER NET Yd	WET TEST TEMPERATURES IN	WET TEST TEMPERATURES OUT	WET TEST TEMPERATURES $\overline{Tds}$	DRY GAS METER TEMPERATURES IN	DRY GAS METER TEMPERATURES OUT	DRY GAS METER TEMPERATURES $\overline{Td}$	TIME	Yd	dH@
.24.000	0.9017	3.00	-12.9	1.00	0.000	10.000	10.000	323.640000	333.250	9.602	74.0	74.0	74.0	90.5	01	05.5	9.10	1.0142	1.657
.24.000	0.8996	3.00	-12.9	1.00	0.000	10.000	10.009	333.250000	342.009	9.639	74.0	74.0	74.0	92.0	02	06.0	9.13	1.0136	1.661
.24.000	0.6200	1.50	-7.1	1.00	0.000	10.000	10.000	352.94300	362.070	9.935	74.0	74.0	74.0	00.5	04	06.0	13.05	1.0051	1.703
.24.000	0.6317	1.50	-7.1	1.00	0.000	10.000	10.000	362.07000	372.000	9.930	74.0	74.0	74.0	90.0	04	07.0	12.99	1.0054	1.681
.24.000	0.3003	0.50	-3.1	1.00	0.000	5.000	5.000	342.00300	347.907	5.010	74.0	74.0	74.0	07.0	03	05.0	11.20	1.0061	1.675
.24.000	0.3057	0.50	-3.1	1.00	0.000	5.000	5.000	347.90700	352.943	5.036	74.0	74.0	74.0	00.0	04	06.0	11.32	1.0044	1.673

VACUUM GAUGE CALIBRATION

STD (Hg)	VAC GAUGE
5.0	5.000
10.0	10.000
15.0	15.000
20.0	20.000
22.0	23.000

THERMOMETER CALIBRATION

STANDARD	INLET	OUTLET
00	00.000	00.000
100	100	100
120	119	120
140	140	138
160	160	159
100		

DATE: 15 May 92 OPERATOR:Jonathan Dellinger METER BOX NO.:D-5 CLIENT/OWNER Colorado Incineration JOB#:6191

DATE: 8/25/92 METER BOX Yd: 0.9921

METER BOX NUMBER: 0-5 OPERATOR:JEFFERY MOLINARO CLIENT/OWNER: COORS BREWING JOB#: 4264

METER BOX VACUUM: 15

Bp	Q	dH	dP	Yds	NET TEST VOLUME INITIAL	NET TEST VOLUME FINAL	METER VOLUME Vds	DRY GAS VOLUME INITIAL	DRY GAS VOLUME FINAL	METER NET Vd	NET TEST TEMPERATURES IN	NET TEST TEMPERATURES OUT	METER Tds	DRY GAS METER TEMPERATURES IN	DRY GAS METER TEMPERATURES OUT	METER Td	TIME	Vd	dH@
25.090	0.5100	1.00	-4.9	1.00	0.000	10.009	10.009	578.900	589.025	10.125	72.0	72.0	72.0	85.0	81.00	83.0	16.30	0.9910	1.747
25.090	0.5118	1.00	-4.9	1.00	0.000	10.008	10.008	603.500	613.622	10.122	72.0	72.0	72.0	85.0	81.50	83.5	16.27	0.9931	1.743
25.090	0.4989	1.00	-4.9	1.00	0.000	10.000	10.000	595.200	605.315	10.115	72.0	72.0	72.0	85.0	81.00	83.0	16.60	0.9917	1.831

FILE: PTC6255 METHOD 5 AT SPENT GRAIN OUTLET

ANALYTICAL REPORT – cont'd

C A E INSTRUMENT RENTAL

Date: 6/2/92
Our Project No.: 0537496
Your P.O. No.: 5446-71500

Cyl. No. _____ Analytical Accuracy ±1% AMG

Component	Concentration
PROPANE	848.0PPM
NITROGEN	BALANCE

K013320,K003637

ACUBLEND MASTER GAS

Cyl. No. _____ Analytical Accuracy ±1%AMG

Component	Concentration
PROPANE	84.49PPM
NITROGEN	BALANCE

ALM023663,ALM008666,ALM005045

ACUBLEND MASTER GAS

Cyl. No. _____ Analytical Accuracy ±1%AMG

Component	Concentration
PROPANE	547.8PPM
NITROGEN	BALANCE

ALM023210,ALM010029,ALM008898

ACUBLEND MASTER GAS

Cyl. No. _____ Analytical Accuracy ±1%AMG

Component	Concentration
PROPANE	848.0PPM
NITROGEN	BALANCE

AAL2517,AAL12337,ALM010242

ACUBLEND MASTER GAS

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Cyl. No. _____ Analytical Accuracy _____

Component	Concentration

Analyst T. Rue

Approved By J. Shapiro

SCOTT ENVIRONMENTAL TECHNOLOGY, INC.

COORS BREWING COMPANY
CAE Project No: 6265-3
Solvent Calibration Data
September 30, 1992

Trial	Ethanol in grams	lb/dscf Ethanol	FID ppm	RF(1)
1	0.0013	5.41E-06	20.5	2.31
2	0.0045	1.87E-05	72	2.28
3	0.0115	4.78E-05	173	2.42
4	0.0116	4.83E-05	172.5	2.45
5	0.0203	8.45E-05	298.5	2.48
6	0.0452	1.88E-04	728	2.26
7	0.1146	4.77E-04	1839	2.27
8	0.1234	5.13E-04	1,989.6	2.26
9	0.1951	8.12E-04	2969	2.39
10	0.7986	3.32E-03	11,613.0	2.51
Average				2.36

Note: RF(1) is a response factor based on lb/dscf

All samples are for 15 minutes with a flow rate of 1 liter/minute

COORS BREWING COMPANY
CAE Project No: 6265-3
Cellar 13 Vents

Total Hydrocarbons Concentration
(ppm as propane)

Location	Lysed Yeast Surge Tank	Yeast Roof Vent	Lysed Yeast Surge Tank	Yeast Roof Vent
Run No.	7	7	8	8
Date (1992)	June 10	June 10	June 10	June 10
Start Time (approx)	6:26 AM	6:26 AM	3:44 PM	3:44 PM
Stop Time (approx)	10:35 AM	10:35 AM	6:37 PM	6:37 PM
dscfm*	906	5,732	906	5,732
Bwo	0.0108	0.0110	0.0108	0.0110
Ethanol Correction Factor	2.36	2.36	2.36	2.36
ZERO I	-2	2	-2	2
CAL I	549	556	549	556
ZERO F	-2	2	-2	2
CAL F	549	556	549	556
ppm	299	52	281	52
CAL GAS	547.8	547.8	547.8	547.8
ppm, wet (drift calibrated)	299	50	281	49
ppm, dry	302	50	284	50
lb/dscf	3.45E-05	5.74E-06	3.25E-05	5.71E-06
lb/hr	1.88	1.98	1.77	1.96
ton/yr	8.21	8.65	7.73	8.60
lb/hr, as ethanol	4.43	4.66	4.17	4.63
ton/yr, as ethanol	19.4	20.4	18.3	20.3

* dscfm at the Lysed Yeast Surge Tank is the sum of the converging ducts (East and West).

FIELD DATA

Location: Four Ducts on R-1 Run: 1

Moisture Determination Field Data Sheet

Page 1 of 1

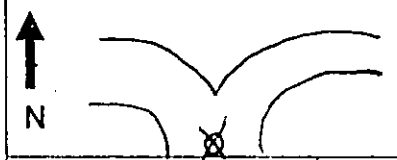
Client	Coors Brewing	Project Number	6265
Plant	Golden Co.	Unit	Surge Tank
Date	6-12-92	Inlet/outlet/stack	Duct
Meter Operator	Doug Gibbons		
Probe Operator			

Ambient Temp. (°F)	87	Bar. Press. (in. Hg)	24.42
Assumed Moisture (%)			

Sample Box Number	NA		
Pyrometer Number	NA		
Meter Box Number	D-5		
Meter ΔH@	1.676	Meter Y_d	1.0078

Leak Rate Before:	0	cc/m cf/m @	13	"Hg
Leak Rate After:	0	cc/m cf/m @	10	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .35	Port Len. (in.)	Gas Flow IN OUT
Filter Material		

Heater Box Setting	NA	Probe Heater Setting	NA
Probe Length	NA	Probe Number	NA
Probe Material	Rubber		

IGS Bag ID Number	R-1 Surge Tank		
% O_2	19.4	% CO_2	1.9
H_2O (ml)	4	Silica Gel (gm)	3
Total V_{lc}	7		

Start Time:	11:51 (AM) / PM	Stop Time:	12:51 AM (PM)

Traverse Point Number	Min/pt / Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 419.07 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp, T_P (°F)			Notes
1	5	5		51	1.0	422.38	102	99				B_{ws} = 1.1%
	10	5		52		425.72	104	100				
	15	5		52		429.11	106	100				
	20	5		53		432.28	107	101				
	25	5		53		435.58	107	101				
	30	5		54		438.87	107	101				
	35	5		54		442.17	107	101				
	40	5		54		445.51	106	101				
	45	5		54		448.48	105	100				
	50	5		54		451.75	105	100				
	55	5		55		455.00	103	99				
▼	60	5		55	▼	458.21	102	98				
Average						39.14	102.58					
Total												

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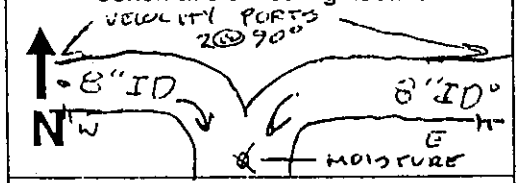
Location: Ducts on Roof Co. [illegible] Run: 1

Velocity Determination Field Data Sheet

Page 1 of 1

Client: Coors Brewing	Project Number 6265
Plant Golden Co.	Unit Surge Tank
Date 6-10-92	Inlet/Outlet/Stack Ducts
Data Recorder Doug Gribbons	
Probe Operator	

Schematic of Testing Location



First point all the way	IN	OUT
Area (ft^2) .35	Port Len (in) 1/8"	Gas Flow IN OUT Thru

Ambient Temp. (°F)	86°	Bar. Press. (in. Hg)	24.42
IGS Bag ID Number	R-1	Surge Tank	
% O_2	19.4	% CO_2	1.9
% Moisture:	1.1%		Assumed/Measured
Start Time	11:42 AM/PM	Stop Time	11:52 AM/PM

Pyrometer Number	Velocicalc D.4	Pitot Cp	Velocicalc 1.0
Pitot Leak Check:	✓ NA Velocicalc	Before ✓	After
Static Pressure (inches H_2O) (+/-)	NA -1.3		

Duct East

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)
1-1	.03	87
2	.03	87
3	.03	87
4	.03	88
5	.03	87
6	.03	87
2-1	.03	87
2	.03	88
3	.03	88
4	.03	87
5	.03	87
6	.03	87
Total		
Average	0.1732	87

Duct West

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)
1-1	.35	90
2	.36	91
3	.32	91
4	.32	91
5	.34	92
6	.33	91
2-1	.26	91
2	.28	91
3	.28	91
4	.29	91
5	.37	91
6	.37	91
Total	6.804	
Average	0.567	91

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)

Notes: Total DSCFM = ~~1075~~ 906

D:\vpforms\velocity ~~255~~ DSCFM + ~~[illegible]~~ DSCFM

212.6 693.5

Location: JEAS. Roof Vent Run: 1

Moisture Determination Field Data Sheet

Page 1 of 1

Client	Coors Brewing	Project Number	6265
Plant	Golden Co	Unit	Roof Vent
Date	6-10-92	Inlet/outlet/stack	VENT
Meter Operator	Doug Gribbons		
Probe Operator			

Sample Box Number	KNOCK OUTS		
Pyrometer Number	Velocicalc		
Meter Box Number	D-5		
Meter ΔH@	1.676	Meter Y_d	1.0078

Leak Rate Before:	0	cc/m cf/m @	15	"Hg
Leak Rate After:	0	cc/m cf/m @	5	"Hg

Schematic of Testing Location

First point all the way IN OUT	Method 4	
Area (ft^2) 9.62	Port Len. (in.) NA	Gas Flow IN (OUT)
Filter Material		

Ambient Temp. (°F)	82	Bar. Press. (in. Hg)	24.46
Assumed Moisture (%)			

Heater Box Setting	N.A	Probe Heater Setting	NA
Probe Length	NA	Probe Number	NA
Probe Material	Rubber		

IGS Bag ID Number	R-1 VENT		
% O_2	20.1	% CO_2	0
H_2O (ml)	~~40~~ - 60	Silica Gel (gm)	67
Total V_{lc}	17		

Start Time: 9:52 (AM) / PM		Stop Time: 10:52 (AM) / PM	

Traverse Point Number	Min/pt Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 373.02 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Gas Sample Temperature at Dry Gas Meter: Outlet $T_{m\,out}$ (°F)	Probe Temp, T_p (°F)			Notes
1	5	1.0	78	52	1.0	376.20	92	88				B_{wo} = 1.1%
	10	1.0		52		379.11	95	88				
	15	1.0		52		382.00	94	89				
	20	1.0		52		384.85	96	90				
	25	1.0		53		388.10	97	91				
	30	1.0		54		391.28	99	91				
	35	1.0		54		394.54	100	92				
	40	1.0		55		397.78	102	93				
	45	1.0		55		401.04	103	94				
	50	1.0		57		404.28	104	95				
	55	1.0		59		407.54	104	96				
▼	60	1.0	▼	61	▼	410.79	105	97				
Average		1.0				37.77	95.6					
Total												

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Location: South Run: 1

Velocity Determination Field Data Sheet

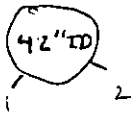
Page 1 of 1

Client COORS	Project Number 6265
Plant Golden	Unit Roof Vent
Date 6-10-92	Inlet/Outlet/Stack
Data Recorder RH	
Probe Operator G	

Pyrometer Number Vel	+5F Calculated	Pitot Cp	NA
Pitot Leak Check: OK	Before ✓	NA	After
Static Pressure (inches H_2O) (+/-)	0		

Schematic of Testing Location

HOT WIRE ANEMOMETER



First point all the way (IN) OUT

Area (ft^2)	Port Len (in)	Gas Flow
9.42 9.62	0	IN (OUT)

Ambient Temp. (°F)	72	Bar. Press. (in. Hg)	24.48
IGS Bag ID Number	R-1 Vent		
% O_2	20.1	% CO_2	0.0
% Moisture:	1.1%		Assumed/(Measured)
Start Time	9:47 (AM/PM)	Stop Time	AM/PM

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes
1-1	850 FPM	79			824	79										AVG ~~ACFM~~ FPM
2	830	78			831	79										= 753
3	580	78			820	79										= 12 55 Ft/sec
4	460	78			457	79										
5	580	78			418	79										DSCFM =
6	870	78			829	79										5736
2-1	846	77			696	79										
2	814	77			898	79										
3	840	77			545	79										
4	644	77			831	79										
5	890	77			932	79										
6	875	77			866	79										
Total	757	77.6			746	79										
Average																

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Orsat Readings

Client Coors Brewing	Project Number 6265
Plant Golden Co	Unit CELLAR 13
Date 6-10-92	Fuel Type
Orsat ID	Leak Check? ✓

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

F_o = 1.083 to 1.230 (for bituminous coal)

Run Number	Location	Bag ID	Trial	Percent CO_2	Percent $CO_2 + O_2$	Percent O_2	F_o	Sample Time	Analysis Time	Analyst
1	Roof Vent South	RVS	1	0.0	20.1	20.1		1000	1100	RM
			2	0.0	20.0	20.0				
			3	0.0	20.1	20.1				
			Avg.	0.0		20.1	KW			
1	East West Vents	EWV	1	1.9	21.3	19.4		11:54	11:54	RM
	SURGE TANK		2	1.9	21.4	19.5				
			3	1.9	21.3	19.4				
			Avg.	1.9		19.4	KW			
			1							
			2							
			3							
			Avg.							
			1							
			2							
			3							
			Avg.							
			1							
			2							
			3							
			Avg.							
			1							
			2							
			3							
			Avg.							
			1							
			2							
			3							
			Avg.							
			1							
			2							
			3							
			Avg.							

"COORS BREWING C13"
" "
"16:55:58.39"
" 6-11-1992"
"TIME" "THC1" "THC2"
"SEC" "PPM" "PPM"
00:00:00:00.000 0 0
00:00:00:14.999 748 1031
00:00:00:29.999 1034 1033
"COORS BREWING C13"
" "
"16:57:22.92"
" 6-11-1992"
"TIME" "THC1" "THC2"
"SEC" "PPM" "PPM"

YRV LYST

RECAL TO 0-1000 RANGE

LOST FILE

Calibration Run 7

00:00:00:00.000	0	0
00:00:00:14.999	864	860
00:00:00:29.999	857	851
00:00:00:44.999	850	850
00:00:00:59.998	854	851
00:00:01:14.998	857	849
00:00:01:29.998	860	848
00:00:01:44.998	862	845
00:00:01:59.997	859	844
00:00:02:14.997	858	847
00:00:02:29.997	859	851
00:00:02:44.997	858	850
00:00:02:59.996	853	848
00:00:03:14.996	850	847
00:00:03:29.996	825	845
00:00:03:44.995	-31	560
00:00:03:59.995	-38	22
00:00:04:14.995	-41	-3
00:00:04:29.995	-44	-12
00:00:04:44.994	-34	-15
00:00:04:59.994	-5	-17
00:00:05:14.994	-2	-18
00:00:05:29.994	-0	-9
00:00:05:44.993	-1	-0
00:00:05:59.993	1	2
00:00:06:14.993	3	3
00:00:06:29.992	4	2
00:00:06:44.992	14	0
00:00:06:59.992	504	10
00:00:07:14.992	938	537
00:00:07:29.991	859	832
00:00:07:44.991	851	851
00:00:07:59.991	851	857
00:00:08:14.991	852	858
00:00:08:29.990	853	850
00:00:08:44.990	855	848
00:00:08:59.990	850	847
00:00:09:14.989	848	847
00:00:09:29.989	850	846
00:00:09:44.989	5	290
00:00:09:59.989	5	24
00:00:10:14.988	5	11
00:00:10:29.988	6	6
00:00:10:44.988	2	1
00:00:10:59.988	-1	-0
00:00:11:14.987	-1	0
00:00:11:29.987	2	3
00:00:11:44.987	5	1
00:00:11:59.986	3	-1

851.3 CAL

00:00:12:29.986	-2	-1
00:00:12:44.986	1	1
00:00:12:59.985	5	1
00:00:13:14.985	2	-2
00:00:13:29.985	855	180
00:00:13:44.985	572	891
00:00:13:59.984	556	530
00:00:14:14.984	562	558
00:00:14:29.984	557	551
00:00:14:44.983	551	549
00:00:14:59.983	551	550
00:00:15:14.983	555	551
00:00:15:29.983	562	551
00:00:15:44.982	560	544
00:00:15:59.982 ..	219	543
00:00:16:14.982	-0	162
00:00:16:29.982	6	32

LOST FILE

547.8 CAL

"COORS BREWING C13"
" "
"17:14:12.57"
" 6-11-1992"
"TIME" "THC1" "THC2"
"SEC" "PPM" "PPM"
00:00:00:00.000 0 0
"COORS BREWING C13"
"RUN"
" 6-11-1992"
"17:17:17.33"
"SUR" "THC1 VEN" "THC2 SUR"
" sec" " ppm" " ppm"
00:00:00:00.000 2 17

[illegible]		293
[illegible]		285
[illegible]		285
[illegible]	1[illegible]	296
[illegible]	2[illegible]	320
[illegible]	29	346
[illegible]	33	374
[illegible]	39	400
[illegible]	44	411

"[illegible]ORE BEEFINE [illegible]13"
"[illegible]"
"6-[illegible]-1992"
"16:25:23.12"

YRV LYST

"SUR" "THC1 VEN" "THC2 SUR"

START RUN 7

" sec" "	ppm" "	ppm"
00:00:03:00.000	60	444
00:00:04:59.999	67	457
00:00:09:59.999	93	464
00:00:14:59.998	93	463
00:00:19:59.998	87	437
00:00:24:59.997	92	415
00:00:29:59.997	91	398
00:00:34:59.997	83	367
00:00:39:59.996	72	330
00:00:44:59.996	61	300
00:00:49:59.995	56	292
00:00:54:59.995	44	294
00:00:59:59.995	36	301
00:01:04:59.994	39	314
00:01:09:59.994	42	326
00:01:14:59.994	47	341
00:01:19:59.993	54	358
00:01:24:59.993	62	374
00:01:29:59.992	70	392
00:01:34:59.992	79	414
00:01:39:59.991	87	444
00:01:44:59.991	95	470
00:01:49:59.991	101	494
00:01:54:59.990	106	515
00:01:59:59.990	108	531
00:02:04:59.989	116	542
00:02:09:59.989	117	529
00:02:14:59.989	108	496
00:02:19:59.988	96	448
00:02:24:59.988	81	389
00:02:29:59.988	69	325
00:02:34:59.987	47	258
00:02:39:59.987	35	207
00:02:44:59.986	30	170
00:02:49:59.986	27	140
00:02:54:59.985	26	143
00:02:59:59.985	26	160
00:03:04:59.985	30	188
00:03:09:59.984	37	226
00:03:14:59.984	44	280
00:03:19:59.983	51	342
00:03:24:59.983	61	398
00:03:29:59.983	70	430
00:03:34:59.982	75	461
00:03:39:59.982	76	471
00:03:44:59.981	83	466
00:03:49:59.981	87	451
00:03:54:59.980	86	425
00:03:59:59.980	82	386
00:04:04:59.980	78	351
00:04:09:59.979	73	332

00:04:14:59.979	53	310
00:04:19:59.978	55	284
00:04:24:59.978	50	259
00:04:29:59.978	46	247
00:04:34:59.978	49	254
00:04:39:59.976	53	281
00:04:44:59.976	59	279
00:04:49:59.976	65	308
00:04:54:59.976	72	343
00:04:59:59.976	79	377
00:05:04:59.974	84	398
00:05:09:59.974	88	423
00:05:14:59.974	90	445
00:05:19:59.974	92	466
00:05:24:59.974	94	469
00:05:29:59.972	103	500
00:05:34:59.972	108	498
00:05:39:59.972	106	477
00:05:44:59.972	100	442
00:05:49:59.970	94	396
00:05:54:59.970	87	350
00:05:59:59.970	73	319
00:06:04:59.970	65	295
00:06:09:59.970	62	284
00:06:14:59.968	62	285
00:06:19:59.968	62	294
00:06:24:59.968	64	301
00:06:29:59.968	67	304
00:06:34:59.968	70	315
00:06:39:59.966	73	332
00:06:44:59.966	72	342
00:06:49:59.968	69	342
00:06:54:59.966	64	336
00:06:59:59.966	58	320
00:07:04:59.964	49	295
00:07:09:59.964	42	262
00:07:14:59.964	38	235
00:07:19:59.964	35	215
00:07:24:59.964	32	199
00:07:29:59.962	30	187
00:07:34:59.962	27	176
00:07:39:59.962	26	172
00:07:44:59.962	24	168
00:07:49:59.960	23	166
00:07:54:59.960	22	165
00:07:59:59.960	21	166
00:08:04:59.960	21	167
00:08:09:59.960	20	169
00:08:14:59.958	19	170
00:08:19:59.958	19	172
00:08:24:59.958	25	176
00:08:29:59.958	32	189
00:08:34:59.958	36	201
00:08:39:59.957	39	210
00:08:44:59.957	41	223
00:08:49:59.957	44	233
00:08:54:59.957	40	233
00:08:59:59.957	35	221
00:09:04:59.955	32	208
00:09:09:59.957	31	205
00:09:14:59.955	33	215
00:09:19:59.955	37	236
00:09:24:59.955	42	259
00:09:29:59.953	49	284
00:09:34:59.953	57	315
00:09:39:59.953	65	343

00:09:49:59.953	35	337
00:09:54:59.953	34	326
00:09:59:59.953	59	309
00:10:04:59.949	32	285
00:10:09:59.949	31	258
00:10:14:59.949	51	247
00:10:19:59.949	51	240
00:10:24:59.949	49	243
00:10:29:59.949	50	258
00:10:34:59.949	52	275
00:10:39:59.949	48	282
00:10:44:59.949	46	280
00:10:49:59.949	44	274
00:10:54:59.945	45	271
00:10:59:59.945	47	268
00:11:04:59.945	47	267
00:11:09:59.945	50	281
00:11:14:59.945	51	300
00:11:19:59.945	50	310
00:11:24:59.945	47	308
00:11:29:59.945	42	297
00:11:34:59.945	37	278
00:11:39:59.941	30	251
00:11:44:59.941	25	222
00:11:49:59.941	22	201
00:11:54:59.941	20	187
00:11:59:59.941	19	179
00:12:04:59.941	18	175
00:12:09:59.941	17	174
00:12:14:59.941	17	173
00:12:19:59.941	16	173
00:12:24:59.941	16	171
00:12:29:59.937	15	169
00:12:34:59.937	14	166
00:12:39:59.937	12	163
00:12:44:59.937	11	161
00:12:49:59.937	11	158
00:12:54:59.937	10	156
00:12:59:59.937	9	158
00:13:04:59.937	8	158
00:13:09:59.937	7	159
00:13:14:59.937	6	160
00:13:19:59.933	6	161
00:13:24:59.933	5	164
00:13:29:59.933	5	165
00:13:34:59.933	5	166
00:13:39:59.933	5	167
00:13:44:59.933	5	169
00:13:49:59.933	5	171
00:13:54:59.933	6	172
00:13:59:59.933	6	174
00:14:04:59.929	6	176
00:14:09:59.929	6	177
00:14:14:59.929	6	179
00:14:19:59.929	6	181
00:14:24:59.929	6	183
00:14:29:59.929	14	191
00:14:34:59.929	19	199
00:14:39:59.929	22	205
00:14:44:59.929	27	210
00:14:49:59.929	31	216
00:14:54:59.925	36	233
00:14:59:59.925	33	248
00:15:04:59.925	33	268
00:15:09:59.925	37	292

00:15:[illegible]	43	348
00:15:24:59.[illegible]	47	374
00:15:29:59.[illegible]	52	394
00:15:34:59.[illegible]	58	415
00:15:39:59.[illegible]	63	434
00:15:44:59.921	69	453
00:15:49:59.921	73	471
00:15:54:59.921	78	459
00:15:59:59.921	82	506
00:16:04:59.921	86	521
00:16:09:59.921	92	532
00:16:14:59.921	100	530
00:16:19:59.921	101	516
00:16:24:59.921	98	490
00:16:29:59.917	92	459
00:16:34:59.917	86	422
00:16:39:59.917	74	365
00:16:44:59.917	69	367
00:16:49:59.917	55	364
00:16:54:59.917	65	376
00:16:59:59.917	68	395
00:17:04:59.917	63	422
00:17:09:59.917	71	456
00:17:14:[illegible]	80	484
00:17:19:59.[illegible]	83	490
00:17:24:59.[illegible]	83	476
00:17:29:59.[illegible]	80	455
00:17:34:59.[illegible]	74	422
00:17:39:59.[illegible]	66	382
00:17:44:59.[illegible]	56	337
00:17:49:59.[illegible]	61	314
00:17:54:59.[illegible]	65	305
00:17:59:59.[illegible]	64	300
00:18:04:59.[illegible]	65	295
00:18:09:59.[illegible]	67	292
00:18:14:59.914	69	290
00:18:19:59.914	56	285
00:18:24:59.914	50	280
00:18:29:59.906	49	292
00:18:34:59.906	50	307
00:18:39:59.906	49	316
00:18:44:59.906	49	322
[illegible]	53	
[illegible]	55	
[illegible]	55	
[illegible]	[illegible]	
[illegible]		[illegible]
[illegible]		59
[illegible]		[illegible]
[illegible]		[illegible]
00:[illegible]		[illegible]
00:[illegible]		[illegible]
00:[illegible]		57
00:[illegible]		45
00:[illegible]		4[illegible]
00:[illegible]		[illegible]
[illegible]		
[illegible]		
00:20		
00:20		
[illegible]		

6265.2

C13

STOP RUN 7.

FIELD DATA PRINTOUTS

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
6:26 PM	80	444
6:27 PM	87	457
6:28 PM	93	464
6:29 PM	93	463
6:30 PM	87	437
6:31 PM	92	415
6:32 PM	91	398
6:33 PM	83	367
6:34 PM	72	330
6:35 PM	61	300
6:36 PM	56	292
6:37 PM	44	294
6:38 PM	38	301
6:39 PM	39	314
6:40 PM	42	326
6:41 PM	47	341
6:42 PM	54	358
6:43 PM	62	374
6:44 PM	70	392
6:45 PM	79	414
6:46 PM	87	444
6:47 PM	95	470
6:48 PM	101	494
6:49 PM	106	515
6:50 PM	108	531
6:51 PM	118	542
6:52 PM	117	529
6:53 PM	108	496
6:54 PM	96	448
6:55 PM	81	389
6:56 PM	69	325
6:57 PM	47	258
6:58 PM	35	207
6:59 PM	30	170
7:00 PM	27	140
7:01 PM	26	143
7:02 PM	26	160
7:03 PM	30	188
7:04 PM	37	228
7:05 PM	44	280
7:06 PM	51	342
7:07 PM	61	388
7:08 PM	70	430
7:09 PM	75	461
7:10 PM	76	471
7:11 PM	83	466
7:12 PM	87	451
7:13 PM	86	425
7:14 PM	82	386

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
7:15 PM	78	351
7:16 PM	73	332
7:17 PM	63	310
7:18 PM	55	284
7:19 PM	50	259
7:20 PM	48	247
7:21 PM	49	254
7:22 PM	53	261
7:23 PM	59	279
7:24 PM	65	308
7:25 PM	72	343
7:26 PM	79	377
7:27 PM	84	398
7:28 PM	88	423
7:29 PM	90	445
7:30 PM	92	468
7:31 PM	94	489
7:32 PM	103	500
7:33 PM	108	498
7:34 PM	106	477
7:35 PM	100	442
7:36 PM	94	396
7:37 PM	87	350
7:38 PM	73	319
7:39 PM	65	295
7:40 PM	62	284
7:41 PM	62	285
7:42 PM	62	294
7:43 PM	64	301
7:44 PM	67	304
7:45 PM	70	315
7:46 PM	73	332
7:47 PM	72	342
7:48 PM	69	342
7:49 PM	64	336
7:50 PM	58	320
7:51 PM	49	295
7:52 PM	42	262
7:53 PM	38	235
7:54 PM	35	215
7:55 PM	32	199
7:56 PM	30	187
7:57 PM	27	178
7:58 PM	26	172
7:59 PM	24	168
8:00 PM	23	166
8:01 PM	22	165
8:02 PM	21	166
8:03 PM	21	167

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
8:04 PM	20	169
8:05 PM	19	170
8:06 PM	19	172
8:07 PM	25	176
8:08 PM	32	189
8:09 PM	36	201
8:10 PM	39	210
8:11 PM	41	223
8:12 PM	44	233
8:13 PM	40	233
8:14 PM	35	221
8:15 PM	32	208
8:16 PM	31	205
8:17 PM	33	215
8:18 PM	37	236
8:19 PM	42	259
8:20 PM	49	284
8:21 PM	57	315
8:22 PM	65	343
8:23 PM	66	345
8:24 PM	66	337
8:25 PM	64	326
8:26 PM	59	309
8:27 PM	52	285
8:28 PM	51	258
8:29 PM	51	247
8:30 PM	51	240
8:31 PM	49	243
8:32 PM	50	258
8:33 PM	52	275
8:34 PM	48	282
8:35 PM	46	280
8:36 PM	44	274
8:37 PM	45	271
8:38 PM	47	268
8:39 PM	47	267
8:40 PM	50	281
8:41 PM	51	300
8:42 PM	50	310
8:43 PM	47	308
8:44 PM	42	297
8:45 PM	37	278
8:46 PM	30	251
8:47 PM	25	222
8:48 PM	22	201
8:49 PM	20	187
8:50 PM	19	179
8:51 PM	18	175
8:52 PM	17	174

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
8:53 PM	17	173
8:54 PM	16	173
8:55 PM	16	171
8:56 PM	15	169
8:57 PM	14	166
8:58 PM	12	163
8:59 PM	11	161
9:00 PM	11	158
9:01 PM	10	156
9:02 PM	9	156
9:03 PM	8	158
9:04 PM	7	159
9:05 PM	6	160
9:06 PM	6	161
9:07 PM	5	164
9:08 PM	5	165
9:09 PM	5	166
9:10 PM	5	167
9:11 PM	5	169
9:12 PM	5	171
9:13 PM	6	172
9:14 PM	6	174
9:15 PM	6	176
9:16 PM	6	177
9:17 PM	6	179
9:18 PM	6	181
9:19 PM	6	183
9:20 PM	14	191
9:21 PM	19	199
9:22 PM	22	205
9:23 PM	27	210
9:24 PM	31	218
9:25 PM	36	233
9:26 PM	33	248
9:27 PM	33	268
9:28 PM	37	292
9:29 PM	39	320
9:30 PM	43	348
9:31 PM	47	374
9:32 PM	52	394
9:33 PM	58	415
9:34 PM	63	434
9:35 PM	69	453
9:36 PM	73	471
9:37 PM	78	489
9:38 PM	82	506
9:39 PM	86	521
9:40 PM	92	532
9:41 PM	100	530

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
9:42 PM	101	516
9:43 PM	98	490
9:44 PM	92	459
9:45 PM	86	422
9:46 PM	74	385
9:47 PM	59	367
9:48 PM	55	364
9:49 PM	55	376
9:50 PM	58	395
9:51 PM	63	422
9:52 PM	71	456
9:53 PM	80	484
9:54 PM	83	490
9:55 PM	83	478
9:56 PM	80	455
9:57 PM	74	422
9:58 PM	66	382
9:59 PM	56	337
10:00 PM	61	314
10:01 PM	65	305
10:02 PM	64	300
10:03 PM	65	295
10:04 PM	67	292
10:05 PM	69	290
10:06 PM	58	285
10:07 PM	50	280
10:08 PM	49	292
10:09 PM	50	307
10:10 PM	49	316
10:11 PM	49	321
10:12 PM	53	330
10:13 PM	56	326
10:14 PM	56	304
10:15 PM	55	280
10:16 PM	53	259
10:17 PM	51	240
10:18 PM	45	213
10:19 PM	41	191
10:20 PM	36	173
10:21 PM	32	157
10:22 PM	31	145
10:23 PM	36	142
10:24 PM	38	141
10:25 PM	39	141
10:26 PM	42	145
10:27 PM	45	152
10:28 PM	47	159
10:29 PM	47	178
10:30 PM	50	203

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 7
June 13, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
10:31 PM	57	234
10:32 PM	64	269
10:33 PM	72	308
10:34 PM	83	345
10:35 PM	86	360
Average	52	299

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 8
June 14, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
3:44 PM	24	180
3:45 PM	23	175
3:46 PM	23	175
3:47 PM	23	179
3:48 PM	23	182
3:49 PM	23	185
3:50 PM	24	187
3:51 PM	24	192
3:52 PM	24	197
3:53 PM	24	198
3:54 PM	23	200
3:55 PM	23	202
3:56 PM	23	203
3:57 PM	22	205
3:58 PM	22	207
3:59 PM	22	211
4:00 PM	22	215
4:01 PM	22	217
4:02 PM	22	219
4:03 PM	21	220
4:04 PM	21	222
4:05 PM	20	222
4:06 PM	19	221
4:07 PM	18	219
4:08 PM	17	217
4:09 PM	16	215
4:10 PM	16	214
4:11 PM	16	214
4:12 PM	15	215
4:13 PM	15	218
4:14 PM	15	221
4:15 PM	16	225
4:16 PM	17	228
4:17 PM	17	229
4:18 PM	16	230
4:19 PM	17	229
4:20 PM	17	230
4:21 PM	18	232
4:22 PM	18	233
4:23 PM	19	235
4:24 PM	20	237
4:25 PM	20	240
4:26 PM	21	242
4:27 PM	20	243
4:28 PM	21	245
4:29 PM	23	246
4:30 PM	23	249
4:31 PM	25	250
4:32 PM	26	252

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 8
June 14, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
4:33 PM	26	253
4:34 PM	26	255
4:35 PM	24	257
4:36 PM	25	258
4:37 PM	23	259
4:38 PM	22	260
4:39 PM	23	262
4:40 PM	22	264
4:41 PM	21	265
4:42 PM	20	267
4:43 PM	19	269
4:44 PM	19	271
4:45 PM	18	272
4:46 PM	18	274
4:47 PM	29	279
4:48 PM	44	300
4:49 PM	52	320
4:50 PM	57	334
4:51 PM	62	346
4:52 PM	66	359
4:53 PM	60	368
4:54 PM	54	361
4:55 PM	57	356
4:56 PM	64	362
4:57 PM	73	367
4:58 PM	80	372
4:59 PM	84	367
5:00 PM	81	350
5:01 PM	74	327
5:02 PM	65	299
5:03 PM	52	268
5:04 PM	39	232
5:05 PM	30	203
5:06 PM	24	183
5:07 PM	21	165
5:08 PM	17	147
5:09 PM	18	131
5:10 PM	29	125
5:11 PM	35	119
5:12 PM	36	111
5:13 PM	37	104
5:14 PM	38	102
5:15 PM	38	110
5:16 PM	30	122
5:17 PM	26	145
5:18 PM	29	178
5:19 PM	32	217
5:20 PM	40	262
5:21 PM	51	304

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 8
June 14, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
5:22 PM	64	341
5:23 PM	75	373
5:24 PM	84	401
5:25 PM	89	412
5:26 PM	86	403
5:27 PM	78	379
5:28 PM	66	347
5:29 PM	69	310
5:30 PM	65	274
5:31 PM	58	249
5:32 PM	53	234
5:33 PM	53	230
5:34 PM	55	235
5:35 PM	43	246
5:36 PM	40	259
5:37 PM	45	276
5:38 PM	50	300
5:39 PM	57	330
5:40 PM	67	362
5:41 PM	77	395
5:42 PM	87	427
5:43 PM	98	462
5:44 PM	108	493
5:45 PM	118	519
5:46 PM	125	531
5:47 PM	129	528
5:48 PM	135	521
5:49 PM	145	499
5:50 PM	143	455
5:51 PM	132	398
5:52 PM	116	351
5:53 PM	103	318
5:54 PM	86	292
5:55 PM	67	280
5:56 PM	57	290
5:57 PM	58	320
5:58 PM	64	350
5:59 PM	69	387
6:00 PM	77	425
6:01 PM	86	463
6:02 PM	94	499
6:03 PM	97	518
6:04 PM	97	515
6:05 PM	91	485
6:06 PM	82	437
6:07 PM	68	376
6:08 PM	74	312
6:09 PM	71	255
6:10 PM	67	206

COORS BREWING COMPANY
CAE Project No. 6265-3
Cellar 13 Vents
Run 8
June 14, 1992
Total Hydrocarbons (ppm, dry as propane)

Time	Yeast Roof Vent ppm	Lysed Yeast Surge Tank ppm
6:11 PM	63	176
6:12 PM	63	154
6:13 PM	65	137
6:14 PM	48	127
6:15 PM	41	138
6:16 PM	41	161
6:17 PM	45	187
6:18 PM	49	224
6:19 PM	56	273
6:20 PM	67	327
6:21 PM	80	366
6:22 PM	97	408
6:23 PM	114	451
6:24 PM	128	490
6:25 PM	140	524
6:26 PM	148	553
6:27 PM	149	557
6:28 PM	138	528
6:29 PM	121	475
6:30 PM	103	407
6:31 PM	83	326
6:32 PM	64	239
6:33 PM	47	166
6:34 PM	37	118
6:35 PM	31	80
6:36 PM	26	51
6:37 PM	24	27
Average	52	281

THESE DATA ARE NOT SUITABLE FOR USE IN DEVELOPING EMISSION FACTORS.
NO PROCESS DATA, HIGHEST EMISSIONS IN RUNS 7 & 8
FAN DID NOT CAPTURE ALL OF THE AIR IN THE ROOM, AND A CAPTURE EFFICIENCY WAS NOT MEASURED.

COORS3.WQ1

Test ID	Parameter	Units	Values reported			
			Run 7	Run 8	Run 3	Run 4
1	Stack temperature	Deg F	89	89		
LYSED YEAST SURGE TANK	Moisture	%	1.1	1.1		
	Oxygen	%	19.4	19.4		
	Volumetric flow, actual	acfm	1174	1174		
	Volumetric flow, standard	dscfm	906	906		
	Isokinetic variation	%	NA	NA		
Circle: Production or feed rate Capacity:		bbl/hr**	897	897		
	Pollutant concentrations:					
	THC as propane	ppmdv	302	284		
	CO2	%	1.9	1.9		
	Pollutant mass flux rates:					
	THC as propane	lb/hr	1.87	1.76		
	THC as ethanol	lb/hr	4.42	4.16		
	CO2	lb/hr	119	119		
	Emission factors:					
	THC as propane	lb/bbl				
	THC as ethanol	lb/bbl				
	CO2	lb/bbl				

Test ID	Parameter	Units	Values reported			
			Run 7	Run 8	Run 3	Run 4
2	Stack temperature	Deg F	78	78		
YEAST ROOF VENT	Moisture	%	1.1	1.1		
	Oxygen	%	20.1	20.1		
	Volumetric flow, actual	acfm	7225	7225		
	Volumetric flow, standard	dscfm	5732	5732		
	Isokinetic variation	%	NA	NA		
Circle: Production or feed rate Capacity:		bbl/hr**	897	897		
	Pollutant concentrations:					
	THC as propane	ppmdv	50	50		
	CO2	%	0	0		
	Pollutant mass flux rates:					
	THC as propane	lb/hr	1.96	1.96		
	THC as ethanol	lb/hr	4.63	4.63		
	CO2	lb/hr	0	0		
	Emission factors:					
	THC as propane	lb/bbl				
	THC as ethanol	lb/bbl				
	CO2	lb/bbl				