

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

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## **Background Report Reference**

**AP-42 Section Number:** 9.6.1

**Background Chapter:** 4

**Reference Number:** 1

**Title:** Air Emission Test Report: Results of Source Emission Test Performed on Parmesan Cheese Dryer, Kraft Foods, Inc.

Twin City Testing Corporation

May 1993

REF 1

AP-42 Section	9.6.1
Reference	●
Report Sect.	4
Reference	1

# Kraft Foods

Report Number: 4232-93-2251

Report Issued: May 7, 1993

# Wausau, WI Fluidized Bed Cheese Dryer

## AIR EMISSION TEST REPORT

RESULTS OF SOURCE  
EMISSION TEST  
PERFORMED ON ~~PARMESAN CHEESE DRYER~~  
KRAFT FOODS, INC.  
WAUSAU, WISCONSIN  
MARCH 30, 1993

# March 30, 1993

Submitted to:

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Submitted by:

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# Accepted: 9/10/93

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## TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Test Results	2
Process Data	3
Test Procedures	3

Appendix A: Calculations

Appendix B: Field Data Forms

Appendix C: Laboratory Reports

Appendix D: Calibration Data

Appendix E: Process Data

Appendix F: Test Plan

*\*Didn't use  
cond. PM b/c  
scrubber outlet >  
inlet*



## INTRODUCTION

Twin City Testing Corporation (TCT) was contracted by Kraft Foods, Inc. to perform a source emission test on the parmesan cheese dryer at the Kraft Foods facility located in Wausau, Wisconsin. The inlet and outlet exhaust gases from the air scrubber for this process was tested for particulate emissions on March 30, 1993. This report presents the results of the test program along with all substantiating documentation.

The TCT sampling team consisted of Messrs. Al Trowbridge, Jim Tryba, Jerry Wallerius and Brad Lavold. The test proceedings were witnessed by Rhonda O'Leary, Environmental Engineer for the Wisconsin Department of Natural Resources.

## TEST RESULTS

The results of the particulate emission tests are summarized in Table 1. The data indicates an average particulate emission rate for the inlet gases of 2.46 pounds per hour and a rate of 2.04 pounds per hour for the outlet gases.

Opacity observations could not be made due to adverse meteorological conditions. There were no problems encountered during the test proceedings.

**Table 1**  
 Summary of emission test results  
 Kraft Foods, Inc., Wausau Wisconsin  
 Air Scrubber for Parmesan Cheese Dryer  
 March 30, 1993

<u>Parameter</u>	<u>INLET</u> <u>Average</u>	<u>OUTLET</u> <u>Average</u>
Effluent Temperature, °F	79	76
Effluent Moisture Content, % v/v	3.50	2.95
Effluent Composition, % v/v dry;		
Carbon Dioxide	0.23	0.23
Oxygen	20.30	20.30
Effluent Volumetric Flow Rate;		
Actual Conditions, acfm	13950	14457
Dry Standard Conditions, dscfm	12441	13293
Isokinetic Variation, %	101.8	99.2
Effluent Particulate Concentration;		
Pounds/Hour	2.46	2.04
Pounds/1000 pounds stack gas	0.0423	0.0331

Standard Conditions: 68°F, 29.92 in. Hg. Particulate concentration and emission rates are based on analysis of the sampling train front and back catches.

**PROCESS DATA**

Kraft Foods utilizes an air scrubber to control the particulate emissions for their parmesan cheese drying process. The production records indicated an average production rate of ~~6,600~~ <sup>5300</sup> pounds per hour. Please refer to Appendix E for process data details. *Rated at 6,250 lb dry product/hr.*

**TEST PROCEDURES**

The EPA Methods referenced below are described in Appendix A of the Code of Federal Regulations, Title 40, Part 60 (40 CFR 60).

The number of sampling points and their location with in the source stack/duct was determined per EPA Method 1 which is entitled "Sample and velocity traverses for stationary sources". In this method the number of sampling points is based on the length of straight, undisturbed flow both before and after the sampling port location. The following data is specific to the source tested:

	Inlet	Outlet
Stack diameter, inches:	36.0	33.75
Required number of sampling points:	24	24
Number of sampling points used:	24	24
Sampling point distribution;		
Number of sampling ports:	2	2
Number of sampling points per port:	12	12
Particulate test sampling time;		
Time at each point, minutes:	2.5	2.5
Test run total time, minutes:	60.0	60.0

Effluent flow measurements were made per EPA Method 2 which is entitled "Determination of stack gas velocity and volumetric flow rate (Type S pitot tube)". Gas velocity pressure (head) and temperature data were obtained during each EPA Method 5 particulate test run by traversing each of the sampling points defined by EPA Method 1. This data along with gas density (EPA Method 3) and moisture content (EPA Method 4) data was used to calculate the gas velocity at each sampling point. The source volumetric flow rate was calculated by multiplying the average gas velocity by the stack/duct cross-sectional area at the point of measurement. Velocity pressure (head) measurements were made using a Type S pitot tube constructed to the design specifications detailed in EPA Method 2. Such pitot tubes have a base line coefficient of 0.84.

The density of the effluent was determined per EPA Method 3 which is entitled "Gas analysis for the determination of dry molecular weight". A multi-point, integrated gas sample was collected simultaneously with each EPA Method 5 particulate test run. The gas sample was analyzed for carbon dioxide and oxygen concentrations with a standard Orsat analyzer using commercially prepared solutions. For calculations of gas density the balance of the gas was assumed to be nitrogen and carbon monoxide.

The effluent moisture content was determined per EPA Method 4 which is entitled "Determination of moisture content in stack gases". Data for making a gas moisture content determination was collected simultaneously with each EPA Method 5 particulate test run. The gas moisture content was calculated from the mass and/or volume of liquid collected in the Method 5 sampling train cold box impingers and the volume of gas sampled.

The effluent particulate concentration was determined per EPA Method 5 which is entitled "Determination of particulate emissions from stationary sources". For each test run, particulate matter was with drawn from the gas stream at each of the EPA Method 1 defined sampling points and collected on a glass fiber filter which was maintained at  $248 \pm 25^{\circ}\text{F}$ . Water vapor, organic vapors and other matter in vapor form which passed through the filter was collected in an ice-cooled impinger trap who's exit temperature was maintained at less than  $68^{\circ}\text{F}$ . Sampling was performed using a Grasby-Nutech Model 2010 Method 5 stack sampling system which employed an inconel lined probe and nozzle. Particulate emissions included analyses of both the front and back (condensable organics) catches.

**APPENDIX A**  
**CALCULATIONS**

**APPENDIX A - 1**  
**AIR SCRUBBER INLET**

\* SUMMARY OF TEST DATA \*

SAMPLING TRAIN DATA		Run 1-1	Run 1-2	Run 1-3
Sampling time, minutes		60	60	60
Sampling nozzle diameter, inches	Dn	0.281	0.281	0.281
Sampling nozzle area, sq.ft.	An	0.000431	0.000431	0.000431
Isokinetic variation, %	I	101.5	101.5	102.5
Sample gas volume, cubic feet	Vm	46.768	49.774	48.249
Avg. meter temperature, deg R	Tm	534.0	541.0	542.0
Avg. orifice pressure drop, in. H <sub>2</sub> O	dH	2.34	2.55	2.35
Total particulate collected, mg	Mn	60.45	74.38	71.02

VELOCITY TRAVERSE DATA

Stack Area, sq.ft.	A	7.0686	7.0686	7.0686
Abs. stack gas pressure, in. Hg.	Ps	29.33	29.31	29.34
Barometric pressure, in. Hg.	Pbar	29.18	29.16	29.18
Avg. stack temperature, deg R	Ts	560.00	560.00	560.00
Avg. sq. rt. velocity head (Cp=.84)		0.5500	0.5800	0.5600
Avg. stack gas velocity, ft./sec.	Vs	32.070	33.860	32.749

STACK MOISTURE CONTENT

Total water collected, ml	Vic	27	34	43
Moisture in stack gas, %	Bws	2.82	3.28	4.40

EMISSIONS DATA

Stack gas flow rate, dscf/hr.	Qsd	733007	769732	736608
Particulate concentration, gr/dscf	Cs	0.0207	0.0243	0.0240
Particulate concentration, lb./hr.	E	2.17	2.67	2.53
Particulate concentration, lb./1000lb. stack gas		0.0383	0.0447	0.0440

ORSAT DATA

Percent CO <sub>2</sub> by volume	CO <sub>2</sub>	0.20	0.30	0.20
Percent O <sub>2</sub> by volume	O <sub>2</sub>	20.30	20.20	20.40
Percent CO by volume	CO	0.00	0.00	0.00
Percent N <sub>2</sub> by volume	N <sub>2</sub>	79.50	79.50	79.40

Plant # & Location	=	Kraft Foods, Wausau, WI.		
Date of Test	=	March 30, 1993		
Process Tested	=	Parmesan Drying System		
Number of Sampling Points	=	24		
Pitot Tube Coefficient	=	0.84		
Stack Area, sq.ft.	=	7.0686		
Y Factor	=	0.9895		
		Run 1-1	Run 1-2	Run 1-3
Dry Gas Meter Volume, cfd.	=	46.768	49.774	48.249
Barometric Pressure, in.Hg.	=	29.18	29.16	29.18
Stack Pressure, in.Hg.	=	29.33	29.31	29.34
Total Water Collected, ml.	=	27.3	33.8	43
% Carbon Dioxide	=	0.20	0.30	0.20
% Oxygen	=	20.30	20.20	20.40
% Carbon Monoxide	=	0.00	0.00	0.00
% Nitrogen	=	79.50	79.50	79.40
Total Particulate, gr. (see Lab Data)	=	0.06045	0.07438	0.07102
Total Sampling Time, min.	=	60	60	60
Nozzle Diameter, inches	=	0.281	0.281	0.281
Nozzle Area, sq.ft.	=	0.0004307	0.0004307	0.0004307

Laboratory Data:

		✓	✓	✓
Front Catch :		Run 1-1	Run 1-2	Run 1-3
Front Wash =		0.04330	0.06051	0.03341
Filter Catch =		0.00069	0.00059	0.00141

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Front Half Total =		0.04399	0.06110	0.03482
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Back Catch :

** Impinger Catch =		0.00332	0.00440	0.00176
Impinger Wash =		0.00257	0.00105	0.00262
Impinger Water =		0.01057	0.00783	0.03182

---

Back Half Total =		0.01646	0.01328	0.03620
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TOTAL PARTICULATE COLLECTED =		0.06045	0.07438	0.07102
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\*\* Chloroform/Ethyl Ether Extraction .

Run 1-1

Ts = 560 dH = 2.34 Impinger Water = 10 ml  
 Tm = 534 SR dP = 0.55 Silica Gel = 17.3 gr

Run 1-1 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	98	0.1	0.75	70	69	0.31623
2	98	0.14	1.1	69	69	0.37417
3	98	0.22	1.7	68	69	0.46904
4	99	0.26	1.9	69	68	0.50990
5	99	0.26	1.9	70	68	0.50990
6	99	0.3	2.2	71	68	0.54772
7	100	0.3	2.2	72	68	0.54772
8	101	0.3	2.2	74	69	0.54772
9	102	0.31	2.3	75	69	0.55678
10	101	0.34	2.5	76	70	0.58310
11	102	0.35	2.6	77	70	0.59161
12	102	0.34	2.5	79	70	0.58310
B1	99	0.08	0.6	74	71	0.28284
2	99	0.36	2.7	76	71	0.60000
3	100	0.45	3.4	77	72	0.67082
4	100	0.38	2.9	79	72	0.61644
5	101	0.37	2.8	80	72	0.60828
6	101	0.37	2.8	81	72	0.60828
7	100	0.4	3	82	73	0.63246
8	100	0.4	3	83	73	0.63246
9	99	0.38	2.9	84	74	0.61644
10	99	0.38	2.9	84	74	0.61644
11	99	0.36	2.7	84	74	0.60000
12	99	0.36	2.7	85	75	0.60000

Run 1-2

Ts = 560      dH = 2.55 Impinger Water = 16 ml  
 Tm = 541      SR dP = 0.58 Silica Gel = 17.8 gr

Run 1-2 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	97	0.22	1.6	76	75	0.46904
2	97	0.26	1.9	76	75	0.50990
3	97	0.3	2.2	77	75	0.54772
4	97	0.34	2.6	79	75	0.58310
5	97	0.35	2.6	80	75	0.59161
6	97	0.38	2.9	82	76	0.61644
7	99	0.38	2.9	83	76	0.61644
8	99	0.4	3	85	77	0.63246
9	100	0.35	2.6	85	76	0.59161
10	100	0.37	2.8	86	77	0.60828
11	100	0.36	2.7	86	77	0.60000
12	99	0.36	2.7	87	77	0.60000
B1	100	0.27	2	84	78	0.51962
2	101	0.27	2	84	78	0.51962
3	102	0.28	2.1	85	78	0.52915
4	102	0.29	2.1	85	78	0.53852
5	103	0.3	2.2	86	79	0.54772
6	102	0.34	2.6	87	79	0.58310
7	102	0.38	2.9	88	79	0.61644
8	101	0.45	3.3	89	79	0.67082
9	101	0.36	2.7	89	80	0.60000
10	101	0.38	2.9	89	80	0.61644
11	101	0.39	2.9	89	80	0.62450
12	102	0.39	2.9	90	80	0.62450

Run 1-3

Ts = 560 dH = 2.35 Impinger Water = 29 ml  
 Tm = 542 SR dP = 0.56 Silica Gel = 14 gr

Run 1-3 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	98	0.26	1.9	79	79	0.50990
2	99	0.29	2.2	80	79	0.53852
3	99	0.3	2.2	81	79	0.54772
4	98	0.34	2.6	82	79	0.58310
5	99	0.32	2.4	84	79	0.56569
6	99	0.34	2.6	84	79	0.58310
7	100	0.35	2.6	85	79	0.59161
8	101	0.36	2.7	86	79	0.60000
9	101	0.34	2.6	86	79	0.58310
10	101	0.38	2.8	86	79	0.61644
11	101	0.32	2.4	87	79	0.56569
12	101	0.32	2.4	86	79	0.56569
B1	100	0.24	1.8	81	78	0.48990
2	100	0.28	2.1	82	79	0.52915
3	100	0.25	1.9	83	79	0.50000
4	100	0.26	1.9	83	79	0.50990
5	101	0.28	2.1	84	79	0.52915
6	101	0.3	2.2	85	79	0.54772
7	100	0.36	2.7	85	79	0.60000
8	99	0.32	2.4	86	79	0.56569
9	100	0.33	2.5	86	79	0.57446
10	100	0.32	2.4	87	79	0.56569
11	101	0.32	2.4	87	79	0.56569
12	100	0.34	2.6	88	79	0.58310

\* DRY GAS VOLUME \*

$$Vm(std) = Vm [T(std) / Tm] [(Pbar + (dH/13.6)) / P(std)]$$
$$= 17.64 \times [degR / in.Hg.] \times Y \times Vm [(Pbar + (dH/13.6))/Tm]$$

Where:

Vm(std) = Dry Gas Volume through meter at standard conditions

Vm = Dry Gas Volume measured by meter

Pbar = Barometric pressure at orifice meter

Pstd = Standard absolute pressure

Tm = Absolute temperature at meter degR.

Tstd = Standard absolute temperature (528 degR).

dH = Average pressure drop across orifice meter

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

Run 1-1

$$Vm(std) = 17.64 \times 0.9895 \times 46.768 [( 29.18 + ( 2.34 / 13.6 )) / 534 ] = \underline{\underline{44.870 \text{ dscf}}}$$

Run 1-2

$$Vm(std) = 17.64 \times 0.9895 \times 49.774 [( 29.16 + ( 2.55 / 13.6 )) / 541 ] = \underline{\underline{47.129 \text{ dscf}}}$$

Run 1-3

$$Vm(std) = 17.64 \times 0.9895 \times 48.249 [( 29.18 + ( 2.35 / 13.6 )) / 542 ] = \underline{\underline{45.609 \text{ dscf}}}$$

• TOTAL CONTAMINANTS by WEIGHT: GRAIN LOADING \*

$$C's = [0.0154 \text{ gr/mg}] [Mn/Vm(\text{std})]$$

Where:

C's = Concentration of particulate matter in stack gas  
corrected to standard conditions

Mn = Total amount of particulate matter collected

Vm(std) = Dry gas volume through meter at standard conditions

Run 1-1

$$C's = 0.0154 \times [ 0.0605 \times 1000 ] / 44.870 = 0.0207 \text{ gr/dscf}$$

=====

Run 1-2

$$C's = 0.0154 \times [ 0.0744 \times 1000 ] / 47.129 = 0.0243 \text{ gr/dscf}$$

=====

Run 1-3

$$C's = 0.0154 \times [ 0.0710 \times 1000 ] / 45.609 = 0.0240 \text{ gr/dscf}$$

=====

• DRY MOLECULAR WEIGHT •

$$Md = 0.44 (\% \text{ CO}_2) + 0.32 (\% \text{ O}_2) + 0.28 (\% \text{ CO} + \% \text{ N}_2)$$

Where:

Md = Dry molecular weight

% CO<sub>2</sub> = Percent carbon dioxide by volume (dry basis).

% O<sub>2</sub> = Percent oxygen by volume (dry basis).

% N<sub>2</sub> = Percent nitrogen by volume (dry basis).

% CO = Percent carbon monoxide by volume (dry basis).

0.264 = Ratio of O<sub>2</sub> to N<sub>2</sub> in air

0.28 = Molecular weight of N<sub>2</sub> or CO

0.32 = Molecular weight of O<sub>2</sub> divided by 100.

0.44 = Molecular weight of CO<sub>2</sub> divided by 100.

Run 1-1

$$Md = 0.44 ( 0.20 ) + 0.32 ( 20.30 ) + 0.28 ( 79.50 ) = \underline{\underline{28.844 \text{ lb/lb-mole}}}$$

Run 1-2

$$Md = 0.44 ( 0.30 ) + 0.32 ( 20.20 ) + 0.28 ( 79.50 ) = \underline{\underline{28.856 \text{ lb/lb-mole}}}$$

Run 1-3

$$Md = 0.44 ( 0.20 ) + 0.32 ( 20.40 ) + 0.28 ( 79.40 ) = \underline{\underline{28.848 \text{ lb/lb-mole}}}$$

\* WATER VAPOR CONDENSED \*

$$V_{wc}(std) = (V_f - V_i) [P_w R T(std) / M_w P(std)] = 0.04707 (V_f - V_i)$$

$$V_{wsg}(std) = (W_f - W_i) [R T(std) / M_w P(std)] = 0.04715 (W_f - W_i)$$

Where:

0.04707 = Conversion factor

0.04715 = Conversion factor

$V_{wc}(std)$  = Volume of water vapor condensed (standard conditions)

$V_{wsg}(std)$  = Volume of water vapor collected in silica gel (standard conditions)

$V_f - V_i$  = Final volume of impinger contents less initial volume

$W_f - W_i$  = Final weight of silica gel less initial weight

$P_w$  = Density of water

$R$  = Ideal gas constant

$M_w$  = Molecular weight of water vapor

$T(std)$  = Absolute temperature at standard conditions

$P(std)$  = Absolute pressure at standard conditions

Run 1-1

$$V_{wc}(std) = 0.04707 \times 10 \text{ ml} = 0.5 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 17.3 \text{ gr} = 0.8 \text{ cu.ft.}$$

=====

Run 1-2

$$V_{wc}(std) = 0.04707 \times 16 \text{ ml} = 0.8 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 17.8 \text{ gr} = 0.8 \text{ cu.ft.}$$

=====

Run 1-3

$$V_{wc}(std) = 0.04707 \times 29 \text{ ml} = 1.4 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 14 \text{ gr} = 0.7 \text{ cu.ft.}$$

=====

\* MOISTURE CONTENT OF STACK GASES \*

$$Bws = [Vwc(std) + Vwsg(std)] / [Vwc(std) + Vwsg(std) + Vm(std)] \times 100$$

Where:

Bws = Proportion of water vapor

Vm = Dry gas volume measured by dry gas meter

Vwc(std) = Volume of water vapor condensed corrected to standard conditions

Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions

Run 1-1

$$Bws = ( 0.5 + 0.8 ) / ( 0.5 + 0.8 + 44.870 ) \times 100 = \underline{\underline{2.82 \%}}$$

Run 1-2

$$Bws = ( 0.8 + 0.8 ) / ( 0.8 + 0.8 + 47.129 ) \times 100 = \underline{\underline{3.28 \%}}$$

Run 1-3

$$Bws = ( 1.4 + 0.7 ) / ( 1.4 + 0.7 + 45.609 ) \times 100 = \underline{\underline{4.40 \%}}$$

\* MOLECULAR WEIGHT of STACK GASES \*

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

$M_s$  = Molecular weight of stack gas

$M_d$  = Molecular weight of stack gas

$B_{ws}$  = Proportion of water vapor

Run 1-1

$$M_s = 29.28 (1 - 2.82\%) + 18 (2.82\%) = \underline{\underline{28.96 \text{ lb/lb-mole}}}$$

Run 1-2

$$M_s = 29.28 (1 - 3.28\%) + 18 (3.28\%) = \underline{\underline{28.91 \text{ lb/lb-mole}}}$$

Run 1-3

$$M_s = 29.28 (1 - 4.4\%) + 18 (4.4\%) = \underline{\underline{28.78 \text{ lb/lb-mole}}}$$

• STACK GAS VELOCITY \*

$$V_s = K_p C_p [\text{sq.rt.dP}] \times \text{avg.} [\text{sq.rt.}(T_s(\text{avg.})/P_s M_s)]$$

Where :

$V_s$  = Average velocity of gas stream in stack

$K_p$  = 85.49 ft/sec [(g/g-mole) - (mm Hg) / (degK) (mm H<sub>2</sub>O)]<sup>1/2</sup>

$C_p$  = Pitot tube coefficient

$dP$  = Velocity head of stack gas

$P_{bar}$  = Barometric pressure at measurement site

$P_g$  = Stack static pressure

$P_s$  = Absolute stack gas pressure

$P_{std}$  = Standard absolute pressure

$t_s$  = stack temperature

$T_s$  = Absolute stack temperature

$M_s$  = Molecular weight of stack gas

Run 1-1

$$V_s = 85.49 \times 0.84 \times 0.550 \times \text{Sq.Rt.} [ 560 / ( 29.33 \times 28.96 ) ] = \underline{\underline{32.070 \text{ ft/sec.}}}$$

Run 1-2

$$V_s = 85.49 \times 0.84 \times 0.580 \times \text{Sq.Rt.} [ 560 / ( 29.31 \times 28.91 ) ] = \underline{\underline{33.860 \text{ ft/sec.}}}$$

Run 1-3

$$V_s = 85.49 \times 0.84 \times 0.560 \times \text{Sq.Rt.} [ 560 / ( 29.34 \times 28.78 ) ] = \underline{\underline{32.749 \text{ ft/sec.}}}$$

\* STACK GAS FLOW RATE \*

$$Q_{std} = 3600 (1 - Bws) V_s A (T_{std} / T_s) (P_s / P_{std})$$

Where :

Q<sub>std</sub> = Dry volumetric stack gas flow rate corrected to std.conditions.

A = Cross sectional area of stack

3600 = Conversion factor

t<sub>s</sub> = Stack temperature

T<sub>s</sub> = Absolute stack temperature

T<sub>std</sub> = Standard absolute temperature

P<sub>bar</sub> = Barometric pressure at measurement site

P<sub>g</sub> = Stack static pressure

P<sub>s</sub> = Absolute stack gas pressure

P<sub>std</sub> = Standard absolute pressure

Run 1-1

$$Q (std) = 3600(1 - 0.0282)(32.07)(7.0686)(528/560)(29.33/29.92)$$

$$Q (std) = 733,007 \text{ dscf/hr}$$

=====

Run 1-2

$$Q(std) = 3600(1 - 0.0328)(33.86)(7.0686)(528/560)(29.31/29.92)$$

$$Q (std) = 769,732 \text{ dscf/hr}$$

=====

Run 1-3

$$Q(std) = 3600(1 - 0.044)(32.749)(7.0686)(528/560)(29.34/29.92)$$

$$Q (std) = 736,608 \text{ dscf/hr}$$

=====

• EMISSIONS RATE FROM STACK \*

$$E = [Cs \text{ Qstd}] / 7000 \text{ gr./lb.} = \text{lb. / hr.}$$

Where :

E = Emissions rate

Cs = Concentration of particulate matter corrected to std.conditions.

Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.

Run 1-1

$$E = [ 0.0207 \times 733,007 ] / 7000 = 2.17 \text{ lb./hr.}$$

=====

Run 1-2

$$E = [ 0.0243 \times 769,732 ] / 7000 = 2.67 \text{ lb./hr.}$$

=====

Run 1-3

$$E = [ 0.024 \times 736,608 ] / 7000 = 2.53 \text{ lb./hr.}$$

=====

\* ALLOWABLE EMISSIONS: LBS./1000 LBS. GAS \*

$$\text{Lbs./Mlbs.Gas} = \frac{E \times 1000}{\frac{Q_{std} \times M_s \times 29.92}{M_d \times 528 dF \times 21.85}}$$

Where:

Ms = Wet molecular weight

Mdry = Dry molecular weight of stack gas = 1 - % moisture/100.

Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.

E = Emissions in pounds per hour.

528 dF = Standard Temperature

29.92 = Standard Pressure

21.85 = Unit Conversion

Run 1-1

$$\text{Lb./Mlb.} = \frac{2.17 \times 1000}{\frac{733,007 \times 28.96 \times 29.92}{(1 - 0.0282) \times 528 \times 21.85}}$$

= 0.0383 lbs./ 1000 lbs. of stack gas

Run 1-2

$$\text{Lb./Mlb.} = \frac{2.67 \times 1000}{\frac{769,732 \times 28.91 \times 29.92}{(1 - 0.0328) \times 528 \times 21.85}}$$

= 0.0447 lbs./ 1000 lbs. of stack gas

Run 1-3

$$\text{Lb./Mlb.} = \frac{2.53 \times 1000}{\frac{736,608 \times 28.78 \times 29.92}{(1 - 0.044) \times 528 \times 21.85}}$$

= 0.0440 lbs./ 1000 lbs. of stack gas

\* ISOKINETIC VARIATION \*

$$I = 100 Ts [0.002669 Vic + (Vm / Tm) (Pbar + dH / 13.6)] / 60 e Vs Ps An$$

Where :

- I = Percent isokinetic sampling.
- 100 = Conversion to percent.
- Ts = Absolute average stack gas temperature
- 0.002669 = Conversion factor
- Vic = Total volume of liquid collected in impingers and silica gel
- Tm = Absolute average dry gas meter temperature
- Pbar = Barometric pressure at sampling site
- dH = Average pressure differential across the orifice meter
- 13.6 = Specific gravity of mercury.
- 60 = Conversion seconds to minutes.
- e = Total sampling time
- Vs = Stack gas velocity
- Ps = Absolute stack gas pressure
- An = Cross sectional area of nozzle

Run 1-1

$$I = 100 \times \frac{560}{60 \times 60 \times 32.070 \times 29.33 \times 0.000431} \left[ \left( 0.002669 \times 27.3 \right) + \left( \frac{46.768}{534} \right) \right] \left[ 29.18 + \left( \frac{2.34}{13.6} \right) \right]$$

I = 101.5 %  
=====

Run 1-2

$$I = 100 \times \frac{560}{60 \times 60 \times 33.860 \times 29.31 \times 0.000431} \left[ \left( 0.002669 \times 33.8 \right) + \left( \frac{49.774}{541} \right) \right] \left[ 29.16 + \left( \frac{2.55}{13.6} \right) \right]$$

I = 101.5 %  
=====

Run 1-3

$$I = 100 \times \frac{560}{60 \times 60 \times 32.749 \times 29.34 \times 0.000431} \left[ \left( 0.002669 \times 43 \right) + \left( \frac{48.249}{542} \right) \right] \left[ 29.18 + \left( \frac{2.35}{13.6} \right) \right]$$

I = 102.5 %  
=====

APPENDIX A - 2  
AIR SCRUBBER OUTLET

• SUMMARY OF TEST DATA \*

SAMPLING TRAIN DATA		Run 2-1	Run 2-2	Run 2-3
Sampling time, minutes		60	60	60
Sampling nozzle diameter, inches	Dn	0.250	0.250	0.250
Sampling nozzle area, sq.ft.	An	0.000341	0.000341	0.000341
Isokinetic variation, %	I	100.4	99.9	97.4
Sample gas volume, cubic feet	Vm	46.817	44.243	43.926
Avg. meter temperature, deg R	Tm	533.0	538.0	538.0
Avg. orifice pressure drop, in. H <sub>2</sub> O	dH	2.19	1.93	1.92
Total particulate collected, mg	Mn	48.81	53.73	48.84

VELOCITY TRAVERSE DATA

Stack Area, sq. ft.	A	6.2126	6.2126	6.2126
Abs. stack gas pressure, in. Hg.	Ps	29.02	29.00	29.02
Barometric pressure, in. Hg.	Pbar	29.18	29.16	29.18
Avg. stack temperature, deg R	Ts	539.00	541.00	541.00
Avg. sq. rt. velocity head (Cp = .84)		0.7000	0.6600	0.6600
Avg. stack gas velocity, ft./sec.	Vs	40.319	38.099	37.935

STACK MOISTURE CONTENT

Total water collected, ml	Vic	37	35	15
Moisture in stack gas, %	Bws	3.60	3.63	1.63

EMISSIONS DATA

Stack gas flow rate, dscf/hr.	Qsd	825931	776791	790044
Particulate concentration, gr/dscf	Cs	0.0165	0.0195	0.0178
Particulate concentration, lb./hr.	E	1.95	2.16	2.01
Particulate concentration, lb./1000 lb. stack gas		0.0304	0.0358	0.0332

ORSAT DATA

Percent CO <sub>2</sub> by volume	CO <sub>2</sub>	0.20	0.30	0.20
Percent O <sub>2</sub> by volume	O <sub>2</sub>	20.30	20.20	20.40
Percent CO by volume	CO	0.00	0.00	0.00
Percent N <sub>2</sub> by volume	N <sub>2</sub>	79.50	79.50	79.40

Plant # & Location	=	Kraft Foods, Wausau, WI.		
Date of Test	=	March 30, 1993		
Process Tested	=	Parmesan Drying System		
Number of Sampling Points	=	24		
Pitot Tube Coefficient	=	0.84		
Stack Area, sq.ft.	=	6.2126		
Y Factor	=	1.0001		
		Run 2-1	Run 2-2	Run 2-3
Dry Gas Meter Volume, cfd.	=	46.817	44.243	43.926
Barometric Pressure, in.Hg.	=	29.18	29.16	29.18
Stack Pressure, in.Hg.	=	29.02	29.00	29.02
Total Water Collected, ml.	=	36.7	35.4	14.8
% Carbon Dioxide	=	0.20	0.30	0.20
% Oxygen	=	20.30	20.20	20.40
% Carbon Monoxide	=	0.00	0.00	0.00
% Nitrogen	=	79.50	79.50	79.40
Total Particulate, gr.(see Lab Data)	=	0.04881	0.05373	0.04884
Total Sampling Time, min.	=	60	60	60
Nozzle Diameter, inches	=	0.250	0.250	0.250
Nozzle Area, sq.ft.	=	0.0003409	0.0003409	0.0003409

Laboratory Data:

/                      /                      /

Front Catch :		Run 2-1	Run 2-2	Run 2-3
Front Wash =		0.02785	0.01496	0.00893
Filter Catch =		0.00059	0.00027	0.00113

---

Front Half Total =		0.02844	0.01523	0.01006
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Back Catch :

** Impinger Catch =		0.00316	0.00200	0.00136
Impinger Wash =		0.00193	0.00191	0.00183
Impinger Water =		0.01528	0.03459	0.03559

---

Back Half Total =		0.02037	0.03850	0.03878
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TOTAL PARTICULATE COLLECTED =		0.04881	0.05373	0.04884
-------------------------------	--	---------	---------	---------

=====  
\*\* Chloroform/Ethyl Ether Extraction

Run 2-1

Ts = 539      dH = 2.19 Impinger Water = 22 ml  
 Tm = 533      SR dP = 0.70 Silica Gel = 14.7 gr

Run 2-1 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	74	0.34	1.4	68	68	0.58310
2	76	0.3	1.3	68	68	0.54772
3	77	0.4	1.8	69	68	0.63246
4	77	0.44	1.9	69	68	0.66332
5	78	0.51	2.3	70	69	0.71414
6	78	0.55	2.4	71	69	0.74162
7	78	0.6	2.6	72	69	0.77460
8	79	0.6	2.6	74	69	0.77460
9	79	0.55	2.4	74	70	0.74162
10	80	0.5	2.2	75	70	0.70711
11	80	0.46	2	76	70	0.67823
12	80	0.42	1.9	76	71	0.64807
B1	79	0.4	1.8	73	71	0.63246
2	80	0.38	1.7	74	71	0.61644
3	80	0.44	1.9	75	72	0.66332
4	80	0.49	2.1	76	72	0.70000
5	81	0.53	2.4	77	72	0.72801
6	81	0.55	2.4	78	73	0.74162
7	80	0.58	2.6	79	73	0.76158
8	81	0.62	2.8	79	73	0.78740
9	81	0.62	2.8	80	74	0.78740
10	81	0.58	2.6	80	74	0.76158
11	81	0.52	2.3	81	75	0.72111
12	81	0.52	2.3	81	75	0.72111

Run 2-2

Ts = 541 dH = 1.93 Impinger Water = 26 ml  
 Tm = 538 SR dP = 0.66 Silica Gel = 9.4 gr

Run 2-2 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
B1	80	0.33	1.4	74	74	0.57446
2	80	0.37	1.6	75	74	0.60828
3	80	0.42	1.9	76	75	0.64807
4	81	0.46	2	77	75	0.67823
5	81	0.5	2.2	78	75	0.70711
6	81	0.5	2.2	79	75	0.70711
7	81	0.51	2.3	80	76	0.71414
8	81	0.54	2.4	81	76	0.73485
9	81	0.54	2.4	82	76	0.73485
10	82	0.5	2.2	82	76	0.70711
11	81	0.46	2	83	77	0.67823
12	82	0.43	1.9	83	77	0.65574
A1	72	0.24	1	77	77	0.48990
2	80	0.32	1.4	78	78	0.56569
3	81	0.36	1.6	78	78	0.60000
4	82	0.42	1.9	78	78	0.64807
5	82	0.45	2	78	78	0.67082
6	82	0.49	2.1	78	78	0.70000
7	82	0.52	2.3	78	78	0.72111
8	82	0.52	2.3	78	78	0.72111
9	82	0.48	2.1	79	79	0.69282
10	82	0.4	1.8	79	79	0.63246
11	82	0.38	1.7	79	79	0.61644
12	82	0.36	1.6	79	79	0.60000

Run 2-3

Ts = 541 dH = 1.92 Impinger Water = 3 ml  
 Tm = 538 SR dP = 0.66 Silica Gel = 11.8 gr

Run 2-3 Point #	Stack Temp.	Velocity Pressure	Orifice Pressure	Meter Temperature Inlet	Outlet	Sq.Root Velocity Pressure
A1	81	0.34	1.5	76	76	0.58310
2	81	0.32	1.4	76	76	0.56569
3	81	0.34	1.5	77	77	0.58310
4	81	0.42	1.9	78	76	0.64807
5	82	0.45	2	79	76	0.67082
6	81	0.49	2.1	79	77	0.70000
7	81	0.52	2.3	80	77	0.72111
8	81	0.53	2.4	81	77	0.72801
9	81	0.49	2.1	81	77	0.70000
10	81	0.41	1.8	81	77	0.64031
11	81	0.38	1.7	81	77	0.61644
12	81	0.35	1.5	81	77	0.59161
B1	81	0.38	1.7	78	77	0.61644
2	81	0.36	1.6	78	77	0.60000
3	81	0.4	1.8	79	77	0.63246
4	81	0.45	2	79	77	0.67082
5	81	0.48	2.1	80	77	0.69282
6	81	0.49	2.1	81	77	0.70000
7	82	0.49	2.1	81	77	0.70000
8	82	0.52	2.3	82	77	0.72111
9	82	0.5	2.2	82	78	0.70711
10	81	0.48	2.1	83	78	0.69282
11	81	0.45	2	83	77	0.67082
12	82	0.42	1.9	83	78	0.64807

\* DRY GAS VOLUME \*

$$Vm(std) = Vm [T(std) / Tm] [(Pbar + (dH/13.6)) / P(std)]$$
$$= 17.64 \times [degR / in.Hg.] \times Y \times Vm [(Pbar + (dH/13.6))/Tm]$$

Where:

Vm(std) = Dry Gas Volume through meter at standard conditions

Vm = Dry Gas Volume measured by meter

Pbar = Barometric pressure at orifice meter

Pstd = Standard absolute pressure

Tm = Absolute temperature at meter degR.

Tstd = Standard absolute temperature (528 degR).

dH = Average pressure drop across orifice meter

Y = Dry gas meter calibration factor.

13.6 = Inches water per inches Hg.

Run 2-1

$$Vm(std) = 17.64 \times 1.0001 \times 46.817 [( 29.18 + ( 2.19 / 13.6 )) / 533 ] = \underline{\underline{45.467 \text{ dscf}}}$$

Run 2-2

$$Vm(std) = 17.64 \times 1.0001 \times 44.243 [( 29.16 + ( 1.93 / 13.6 )) / 538 ] = \underline{\underline{42.511 \text{ dscf}}}$$

Run 2-3

$$Vm(std) = 17.64 \times 1.0001 \times 43.926 [( 29.18 + ( 1.92 / 13.6 )) / 538 ] = \underline{\underline{42.234 \text{ dscf}}}$$

\* TOTAL CONTAMINANTS by WEIGHT: GRAIN LOADING \*

$$C's = [0.0154 \text{ gr/mg}] [Mn/Vm(\text{std})]$$

Where:

C's = Concentration of particulate matter in stack gas  
corrected to standard conditions

Mn = Total amount of particulate matter collected

Vm(std) = Dry gas volume through meter at standard conditions

Run 2-1

$$C's = 0.0154 \times [ 0.0488 \times 1000 ] / 45.467 = 0.0165 \text{ gr/dscf}$$

=====

Run 2-2

$$C's = 0.0154 \times [ 0.0537 \times 1000 ] / 42.511 = 0.0195 \text{ gr/dscf}$$

=====

Run 2-3

$$C's = 0.0154 \times [ 0.0488 \times 1000 ] / 42.234 = 0.0178 \text{ gr/dscf}$$

=====

\* DRY MOLECULAR WEIGHT \*

$$Md = 0.44 (\% \text{ CO}_2) + 0.32 (\% \text{ O}_2) + 0.28 (\% \text{ CO} + \% \text{ N}_2)$$

Where:

- Md = Dry molecular weight
- % CO<sub>2</sub> = Percent carbon dioxide by volume (dry basis).
- % O<sub>2</sub> = Percent oxygen by volume (dry basis).
- % N<sub>2</sub> = Percent nitrogen by volume (dry basis).
- % CO = Percent carbon monoxide by volume (dry basis).
- 0.264 = Ratio of O<sub>2</sub> to N<sub>2</sub> in air
- 0.28 = Molecular weight of N<sub>2</sub> or CO
- 0.32 = Molecular weight of O<sub>2</sub> divided by 100.
- 0.44 = Molecular weight of CO<sub>2</sub> divided by 100.

Run 2-1

$$Md = 0.44 ( 0.20 ) + 0.32 ( 20.30 ) + 0.28 ( 79.50 ) = \underline{\underline{28.844 \text{ lb/lb-mole}}}$$

Run 2-2

$$Md = 0.44 ( 0.30 ) + 0.32 ( 20.20 ) + 0.28 ( 79.50 ) = \underline{\underline{28.856 \text{ lb/lb-mole}}}$$

Run 2-3

$$Md = 0.44 ( 0.20 ) + 0.32 ( 20.40 ) + 0.28 ( 79.40 ) = \underline{\underline{28.848 \text{ lb/lb-mole}}}$$

• WATER VAPOR CONDENSED \*

$$V_{wc}(std) = (V_f - V_i) [P_w R T(std) / M_w P(std)] = 0.04707 (V_f - V_i)$$

$$V_{wsg}(std) = (W_f - W_i) [R T(std) / M_w P(std)] = 0.04715 (W_f - W_i)$$

Where:

0.04707 = Conversion factor

0.04715 = Conversion factor

$V_{wc}(std)$  = Volume of water vapor condensed (standard conditions)

$V_{wsg}(std)$  = Volume of water vapor collected in silica gel (standard conditions)

$V_f - V_i$  = Final volume of impinger contents less initial volume

$W_f - W_i$  = Final weight of silica gel less initial weight

$P_w$  = Density of water

$R$  = Ideal gas constant

$M_w$  = Molecular weight of water vapor

$T(std)$  = Absolute temperature at standard conditions

$P(std)$  = Absolute pressure at standard conditions

Run 2-1

$$V_{wc}(std) = 0.04707 \times 22 \text{ ml} = 1 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 14.7 \text{ gr} = 0.7 \text{ cu.ft.}$$

=====

Run 2-2

$$V_{wc}(std) = 0.04707 \times 26 \text{ ml} = 1.2 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 9.4 \text{ gr} = 0.4 \text{ cu.ft.}$$

=====

Run 2-3

$$V_{wc}(std) = 0.04707 \times 3 \text{ ml} = 0.1 \text{ cu.ft.}$$

=====

$$V_{wsg}(std) = 0.04715 \times 11.8 \text{ gr} = 0.6 \text{ cu.ft.}$$

=====

• MOISTURE CONTENT OF STACK GASES \*

$$Bws = [Vwc(std) + Vwsg(std)] / [Vwc(std) + Vwsg(std) + Vm(std)] \times 100$$

Where:

Bws = Proportion of water vapor

Vm = Dry gas volume measured by dry gas meter

Vwc(std) = Volume of water vapor condensed corrected to standard conditions

Vwsg(std) = Volume of water vapor collected in silica gel corrected to standard conditions

Run 2-1

$$Bws = ( 1 + 0.7 ) / ( 1 + 0.7 + 45.467 ) \times 100 = \underline{\underline{3.60 \%}}$$

Run 2-2

$$Bws = ( 1.2 + 0.4 ) / ( 1.2 + 0.4 + 42.511 ) \times 100 = \underline{\underline{3.63 \%}}$$

Run 2-3

$$Bws = ( 0.1 + 0.6 ) / ( 0.1 + 0.6 + 42.234 ) \times 100 = \underline{\underline{1.63 \%}}$$

• MOLECULAR WEIGHT of STACK GASES \*

$$M_s = M_d (1 - B_{ws}) + 18 (B_{ws})$$

Where:

$M_s$  = Molecular weight of stack gas

$M_d$  = Molecular weight of stack gas

$B_{ws}$  = Proportion of water vapor

Run 2-1

$$M_s = 29.28 (1 - 3.6 \%) + 18 (3.6 \%) = \underline{\underline{28.87 \text{ lb/lb-mole}}}$$

Run 2-2

$$M_s = 29.28 (1 - 3.63 \%) + 18 (3.63 \%) = \underline{\underline{28.87 \text{ lb/lb-mole}}}$$

Run 2-3

$$M_s = 29.28 (1 - 1.63 \%) + 18 (1.63 \%) = \underline{\underline{29.10 \text{ lb/lb-mole}}}$$

\* STACK GAS VELOCITY \*

$$V_s = K_p C_p [\text{sq.rt.dP}] \times \text{avg.} [\text{sq.rt.}(T_s(\text{avg.})/P_s M_s)]$$

Where :

$V_s$  = Average velocity of gas stream in stack

$K_p$  = 85.49 ft/sec [(g/g-mole) - (mm Hg) / (degK) (mm H<sub>2</sub>O)]<sup>1/2</sup>

$C_p$  = Pitot tube coefficient

$dP$  = Velocity head of stack gas

$P_{bar}$  = Barometric pressure at measurement site

$P_g$  = Stack static pressure

$P_s$  = Absolute stack gas pressure

$P_{std}$  = Standard absolute pressure

$t_s$  = stack temperature

$T_s$  = Absolute stack temperature

$M_s$  = Molecular weight of stack gas

Run 2-1

$$V_s = 85.49 \times 0.84 \times 0.700 \times \text{Sq.Rt.} [ 539 / ( 29.02 \times 28.87 ) ] = \underline{\underline{40.319 \text{ ft/sec.}}}$$

Run 2-2

$$V_s = 85.49 \times 0.84 \times 0.660 \times \text{Sq.Rt.} [ 541 / ( 29 \times 28.87 ) ] = \underline{\underline{38.099 \text{ ft/sec.}}}$$

Run 2-3

$$V_s = 85.49 \times 0.84 \times 0.660 \times \text{Sq.Rt.} [ 541 / ( 29.02 \times 29.1 ) ] = \underline{\underline{37.935 \text{ ft/sec.}}}$$

• STACK GAS FLOW RATE \*

$$Q_{std} = 3600 (1 - Bws) V_s A (T_{std} / T_s) (P_s / P_{std})$$

Where :

$Q_{std}$  = Dry volumetric stack gas flow rate corrected to std.conditions.

A = Cross sectional area of stack

3600 = Conversion factor

$t_s$  = Stack temperature

$T_s$  = Absolute stack temperature

$T_{std}$  = Standard absolute temperature

$P_{bar}$  = Barometric pressure at measurement site

$P_g$  = Stack static pressure

$P_s$  = Absolute stack gas pressure

$P_{std}$  = Standard absolute pressure

Run 2-1

$$Q (std) = 3600(1 - 0.036)(40.319)(6.2126)(528/539)(29.02/29.92)$$

$$Q (std) = 825,931 \text{ dscf/hr}$$

=====

Run 2-2

$$Q(std) = 3600(1 - 0.0363)(38.099)(6.2126)(528/541)(29/29.92)$$

$$Q (std) = 776,791 \text{ dscf/hr}$$

=====

Run 2-3

$$Q(std) = 3600(1 - 0.0163)(37.935)(6.2126)(528/541)(29.02/29.92)$$

$$Q (std) = 790,044 \text{ dscf/hr}$$

=====

• EMISSIONS RATE FROM STACK \*

$$E = [C_s Q_{std}] / 7000 \text{ gr./lb.} = \text{lb. / hr.}$$

Where :

E = Emissions rate

C<sub>s</sub> = Concentration of particulate matter corrected to std.conditions.

Q<sub>std</sub> = Dry volumetric stack gas flow rate corrected to std.conditions.

Run 2-1

$$E = [ 0.0165 \times 825,931 ] / 7000 = 1.95 \text{ lb./hr.}$$

=====

Run 2-2

$$E = [ 0.0195 \times 776,791 ] / 7000 = 2.16 \text{ lb./hr.}$$

=====

Run 2-3

$$E = [ 0.0178 \times 790,044 ] / 7000 = 2.01 \text{ lb./hr.}$$

=====

\* ALLOWABLE EMISSIONS: LBS./1000 LBS. GAS \*

$$\text{Lbs./Mlbs.Gas} = \frac{E \times 1000}{\frac{Q_{\text{std}} \times M_{\text{s}} \times 29.92}{M_{\text{d}} \times 528 \text{dF} \times 21.85}}$$

Where:

Ms = Wet molecular weight

Mdry = Dry molecular weight of stack gas = 1 - % moisture/100.

Qstd = Dry volumetric stack gas flow rate corrected to std.conditions.

E = Emissions in pounds per hour.

528 dF= Standard Temperature

29.92 = Standard Pressure

21.85 = Unit COnterconversion

Run 2-1

$$\text{Lb./Mlb.} = \frac{1.95 \times 1000}{\frac{825,931 \times 28.87 \times 29.92}{(1 - 0.036) \times 528 \times 21.85}}$$

= 0.0304 lbs./ 1000 lbs. of stack gas

Run 2-2

$$\text{Lb./Mlb.} = \frac{2.16 \times 1000}{\frac{776,791 \times 28.87 \times 29.92}{(1 - 0.0363) \times 528 \times 21.85}}$$

= 0.0358 lbs./ 1000 lbs. of stack gas

Run 2-3

$$\text{Lb./Mlb.} = \frac{2.01 \times 1000}{\frac{790,044 \times 29.1 \times 29.92}{(1 - 0.0163) \times 528 \times 21.85}}$$

= 0.0332 lbs./ 1000 lbs. of stack gas

• ISOKINETIC VARIATION •

$$I = 100 T_s [0.002669 V_{ic} + (V_m / T_m) (P_{bar} + dH / 13.6)] / 60 e V_s P_s A_n$$

Where :

I = Percent isokinetic sampling.

100 = Conversion to percent.

T<sub>s</sub> = Absolute average stack gas temperature

0.002669 = Conversion factor

V<sub>ic</sub> = Total volume of liquid collected in impingers and silica gel

T<sub>m</sub> = Absolute average dry gas meter temperature

P<sub>bar</sub> = Barometric pressure at sampling site

dH = Average pressure differential across the orifice meter

13.6 = Specific gravity of mercury.

60 = Conversion seconds to minutes.

e = Total sampling time

V<sub>s</sub> = Stack gas velocity

P<sub>s</sub> = Absolute stack gas pressure

A<sub>n</sub> = Cross sectional area of nozzle

Run 2-1

$$I = 100 \times 539 \frac{[(0.002669 \times 36.7) + (46.817 / 533)] [29.18 + (2.19 / 13.6)]}{60 \times 60 \times 40.319 \times 29.02 \times 0.000341}$$

$$I = 100.4 \%$$

=====

Run 2-2

$$I = 100 \times 541 \frac{[(0.002669 \times 35.4) + (44.243 / 538)] [29.16 + (1.93 / 13.6)]}{60 \times 60 \times 38.099 \times 29 \times 0.000341}$$

$$I = 99.9 \%$$

=====

Run 2-3

$$I = 100 \times 541 \frac{[(0.002669 \times 14.8) + (43.926 / 538)] [29.18 + (1.92 / 13.6)]}{60 \times 60 \times 37.935 \times 29.02 \times 0.000341}$$

$$I = 97.4 \%$$

=====

**APPENDIX B**  
**FIELD DATA FORMS**



SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 1 RUN: 1

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: <u>4231-93-2511</u>		Control Unit Number: <u>1</u>		ohd <u>2.0945</u>	
Date: <u>3/30/93</u>		Gas Meter Coefficient: <u>0.9895</u>		Tm <u>65</u>	
Company: <u>KRAFT GENERAL FOODS</u>		Sample Box Number: <u>1</u>		MC <u>10</u>	
Source: <u>#2 FARMER DRYING SYSTEM</u>		Probe No: <u>3</u> Length: <u>3'</u>		Ps/Pm <u>1.00</u>	
Source Dimensions: <u>36" Ø</u>		Pitot No: <u>3</u> Coefficient: <u>0.84</u>		C <u>1.25</u>	
Test Team: <u>AT/JT/GW/BL</u>		Nozzle No: <u>49</u> Diameter: <u>0.281</u>		Ts <u>100</u>	
Test Procedures: <u>EPA 1-5</u>		Filter No: <u>76</u>		R <u>-</u>	
Ambient Temp., °F: <u>62</u>		Barometric Pressure, in.Hg: <u>29.18</u>		Static Pressure, in.WC: <u>4.21</u>	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE		PUMP VAC. inHG	TEMPERATURE, °F					GAS METER	
					ØH, in.WC REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	IN	OUT
11:53	A 1	0	472.185	0.10	0.75	0.75	2.0	98	251	249	66	171	70	69
	2	2.5	473.3	0.14	1.1	1.1	2.0	98	253	247	61	170	69	69
	3	5.0	474.7	0.22	1.7	1.7	2.5	98	236	249	57	171	68	69
	4	7.5	476.4	0.26	1.9	1.9	2.5	99	221	248	55	170	69	68
	5	10.0	478.2	0.26	1.9	1.9	2.5	99	207	248	56	169	70	68
	6	12.5	480.0	0.30	2.2	2.2	3.0	99	214	250	59	168	71	68
	7	15.0	482.0	0.30	2.2	2.2	3.0	100	210	248	61	165	72	68
	8	17.5	483.9	0.30	2.2	2.2	3.0	101	204	250	63	164	74	69
	9	20.0	485.2	0.31	2.3	2.3	3.0	102	202	250	64	164	75	69
	10	22.5	487.7	0.34	2.5	2.5	3.0	101	200	252	65	162	76	70
	11	25.0	489.9	0.35	2.6	2.6	3.0	102	200	252	66	161	77	70
	12	27.5	492.1	0.34	2.5	2.5	3.0	102	201	251	66	160	79	70
	END A	30.0	494.1	X	X	X	X	X	X	X	X	X	X	X
12:30	B 1	0	494.1	0.08	0.6	0.6	2.0	99	249	255	69	125	74	71
	2	2.5	495.1	0.36	2.7	2.7	3.5	99	254	249	67	194	76	71
	3	5.0	497.2	0.45	3.4	3.4	4.0	100	249	247	63	196	77	72
	4	7.5	499.5	0.38	2.9	2.9	3.5	100	242	250	62	192	77	72
	5	10.0	501.7	0.37	2.8	2.8	3.5	101	239	250	65	190	80	72
	6	12.5	504.0	0.37	2.8	2.8	3.5	101	232	251	67	188	81	72
	7	15.0	506.1	0.40	3.0	3.0	3.5	100	238	253	68	196	82	73
	8	17.5	508.4	0.40	3.0	3.0	3.5	100	235	253	69	199	83	73
	9	20.0	510.6	0.38	2.9	2.9	3.5	99	226	252	70	205	84	74
	10	22.5	512.9	0.38	2.9	2.9	3.5	99	221	253	71	202	84	74
	11	25.0	515.1	0.36	2.7	2.7	3.5	99	224	254	72	198	84	74
	12	27.5	516.9	0.36	2.7	2.7	4.0	99	224	252	72	203	85	75
	END B	30.0	518.953	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION					EPA METHOD 5 LEAK CHECK			Total Volume of Gas Sampled, DCF: <u>46.768</u>	
IMPINGER	1	2	3	4	5	Time	Rate, dcfm	Vac, in.Hg	Total Sampling Time, Min: <u>6.0</u>
Final	104	105	1	697.3		10:05	0.000	15	
Initial	100	100	0	680.0		13:04	0.000	7	
Net	4	5	1	17.3					
Total Moisture Collected: <u>27.3</u>								Filter Catch Description: <u>CLEAR</u>	
Impinger Catch Description: <u>CLEAR</u>									

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS									
Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
Initial Reading									
Carbon Dioxide									
Oxygen									
Carbon Monoxide									

Signature of Sampling Team Leader: [Signature]

SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 1 RUN: 2

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: <u>4232-93-2511</u>		Control Unit Number: <u>          </u>		ohd <u>2.0945</u>	
Date: <u>3/30/93</u>		Gas Meter Coefficient: <u>0.9895</u>		Tm <u>75</u>	
Company: <u>KRAFT GENERAL FOODS</u>		Sample Box Number: <u>3</u>		MC <u>176</u>	
Source: <u>#2 PARTIAL DRYING SYSTEM</u>		Probe No: <u>3</u> Length: <u>3'</u>		Ps/Pm <u>1.00</u>	
Source Dimensions: <u>36"Ø</u>		Pitot No: <u>3</u> Coefficient: <u>0.84</u>		C <u>1.25</u>	
Test Team: <u>AT/NT/GW/BL</u>		Nozzle No: <u>H9</u> Diameter: <u>0.281</u>		Ts <u>95</u>	
Test Procedures: <u>47.9 1-5</u>		Filter No: <u>75</u>		R <u>-</u>	
Ambient Temp., °F: <u>75°</u>		Barometric Pressure, in.Hg: <u>29.16</u>		Static Pressure, in.WC: <u>72.1</u>	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu. ft.	VELOCITY HEAD in.WC	ORIFICE		PUMP VAC. inHG	TEMPERATURE, °F						
					øH, in.WC REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	GAS METER IN OUT	
13.57	A/1	0	519.129	0.22	1.6	1.6	3.0	97	232	253	74	169	76	75
	2	2.5	520.7	0.26	1.9	1.9	3.0	97	239	250	71	176	76	75
	3	5.0	522.5	0.30	2.2	2.2	3.5	97	241	248	68	179	77	75
	4	7.5	524.0	0.34	2.6	2.6	4.0	97	238	248	68	181	79	75
	5	10.0	526.5	0.35	2.6	2.6	4.0	97	236	249	71	183	80	75
	6	12.5	528.7	0.38	2.9	2.9	4.5	97	222	250	74	185	82	76
	7	15.0	531.0	0.38	2.9	2.9	4.5	99	206	251	75	181	83	76
	8	17.5	533.2	0.40	3.0	3.0	4.5	99	195	252	76	180	85	77
	9	20.0	535.6	0.35	2.6	2.6	4.5	100	188	253	77	181	85	76
	10	22.5	537.6	0.37	2.8	2.8	5.0	100	187	253	77	174	86	77
	11	25.0	539.7	0.36	2.7	2.7	5.0	100	186	253	77	172	86	77
	12	27.5	541.6	0.36	2.7	2.7	5.0	99	186	252	77	171	87	77
	END A	30.0	543.6	X	X	X	X	X	X	X	X	X	X	X
14.12	B/1	0	543.6	0.47	2.0	2.0	4.0	100	233	257	76	182	87	78
	2	2.5	545.4	0.27	2.0	2.0	4.0	101	240	253	75	180	87	78
	3	5.0	547.4	0.28	2.1	2.1	4.0	102	244	250	71	182	85	78
	4	7.5	549.3	0.29	2.1	2.1	4.0	102	237	249	69	181	85	78
	5	10.0	551.1	0.30	2.2	2.2	4.0	103	235	252	70	183	86	79
	6	12.5	553.1	0.34	2.6	2.6	4.0	102	233	252	69	180	87	79
	7	15.0	555.2	0.38	2.9	2.9	5.0	102	229	253	69	184	88	79
	8	17.5	557.5	0.45	3.3	3.3	5.0	101	217	251	69	180	89	79
	9	20.0	559.9	0.36	2.7	2.7	4.0	101	206	252	70	180	89	80
	10	22.5	562.1	0.38	2.9	2.9	4.5	101	199	253	70	180	89	80
	11	25.0	564.4	0.39	2.9	2.9	4.5	101	196	252	70	180	89	80
	12	27.5	566.6	0.39	2.9	2.9	4.5	102	195	252	71	180	90	80
14.42	END B	30.0	568.903	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

EPA METHOD 5 LEAK CHECK

IMPINGER	1	2	3	4	5	Time	Rate, dcfm	Vac, in.Hg	Total Volume of Gas Sampled, DCF: <u>49.774</u>
Final	<u>106</u>	<u>108</u>	<u>2</u>	<u>708.2</u>		<u>13:30</u>	<u>0.000</u>	<u>15</u>	Total Sampling Time, Min: <u>60</u>
Initial	<u>100</u>	<u>100</u>	<u>0</u>	<u>690.4</u>		<u>14:46</u>	<u>0.000</u>	<u>6</u>	Filter Catch Description: <u>CLU912</u>
Net	<u>6</u>	<u>8</u>	<u>2</u>	<u>17.8</u>					
Total Moisture Collected: <u>33.8</u>									
Impinger Catch Description: <u>CLU912</u>									

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
Initial Reading									
Carbon Dioxide	X		X		X		X		X
Oxygen	X		X		X		X		X
Carbon Monoxide	X		X		X		X		X

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [Signature]



SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 1 RUN: 3

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: <u>4232-93-2511</u>		Control Unit Number: <u>1</u>		ohd <u>2.0445</u>	
Date: <u>3/30/93</u>		Gas Meter Coefficient: <u>0.9895</u>		Tm <u>PC</u>	
Company: <u>KRAFT GENERAL FOODS</u>		Sample Box Number:		MC <u>1%</u>	
Source: <u>#2 PARMEZAN DRYING SYSTEM</u>		Probe No: <u>3</u>	Length: <u>3'</u>	Ps/Pm <u>1.00</u>	
Source Dimensions: <u>36" Ø</u>		Pitot No: <u>3</u>	Coefficient: <u>0.84</u>	C <u>1.25</u>	
Test Team: <u>AT/NT/CLW/BL</u>		Nozzle No: <u>#9</u>	Diameter: <u>0.281</u>	Ts <u>95</u>	
Test Procedures: <u>CPA 1-5</u>		Filter No: <u>78</u>		R <u>-</u>	
Ambient Temp., °F:		Barometric Pressure, in.Hg: <u>29.18</u>		Static Pressure, in.WC: <u>~2.2</u>	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC		PUMP VAC. inHG	TEMPERATURE, °F					GAS METER	
					REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	IN	OUT
15:03	A1	0	569.043	0.26	1.9	1.9	3.0	98	220	253	74	177	79	79
	2	2.5	570.8	0.27	2.2	2.2	3.0	99	225	252	65	177	80	79
	3	5.0	572.7	0.30	2.2	2.2	3.0	99	229	249	61	179	81	79
	4	7.5	574.7	0.34	2.6	2.6	3.5	98	233	249	60	180	82	79
	5	10.0	576.9	0.32	2.4	2.4	3.5	99	235	250	59	180	84	79
	6	12.5	578.9	0.34	2.6	2.6	3.5	99	226	250	57	180	81	79
	7	15.0	581.0	0.35	2.6	2.6	3.5	100	230	253	55	180	85	79
	8	17.5	583.0	0.36	2.1	2.1	3.5	101	228	252	54	180	86	79
	9	20.0	585.3	0.34	2.6	2.6	3.5	101	228	252	54	182	86	79
	10	22.5	587.4	0.34	2.8	2.8	3.5	101	226	253	53	180	86	79
	11	25.0	589.6	0.32	2.4	2.4	3.5	101	221	252	53	180	81	79
	12	27.5	591.7	0.32	2.4	2.4	3.5	101	218	252	52	181	86	79
	END A	30.0	593.7	X	X	X	X	X	X	X	X	X	X	X
15:03	B1	0	593.7	0.24	1.8	1.8	3.0	100	234	254	59	194	87	79
	2	2.5	595.5	0.28	2.1	2.1	3.0	100	244	251	49	190	82	79
	3	5.0	597.3	0.25	1.9	1.9	3.0	100	232	249	47	186	83	79
	4	7.5	599.1	0.26	1.9	1.9	3.0	100	225	250	48	184	83	79
	5	10.0	600.9	0.28	2.1	2.1	3.0	101	221	250	48	180	84	79
	6	12.5	602.9	0.30	2.2	2.2	3.0	101	218	252	49	181	85	79
	7	15.0	604.7	0.36	2.7	2.7	3.0	100	220	251	49	180	85	79
	8	17.5	606.4	0.32	2.4	2.4	3.0	99	224	252	50	186	86	79
	9	20.0	608.9	0.32	2.5	2.5	3.0	100	222	252	50	184	86	79
	10	22.5	611.1	0.32	2.4	2.4	3.0	100	216	253	51	182	87	79
	11	25.0	613.1	0.32	2.4	2.4	3.0	101	213	252	51	180	87	79
	12	27.5	614.9	0.34	2.6	2.6	3.0	100	212	252	51	180	87	79
	END B	30.0	617.292	X	X	X	X	X	X	X	X	X	X	X

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	122	107	0	711.3	
Initial	100	100	0	697.3	
Net	22	7	0	14.0	
Total Moisture Collected: <u>43.0</u>					

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
15:22	0.004	15
16:11	0.000	7

Total Volume of Gas Sampled, DCF: 42.240  
 Total Sampling Time, Min: 60  
 Filter Catch Description: CLEAR

Impinger Catch Description: CLEAR

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
Initial Reading									
Carbon Dioxide									
Oxygen	X		X		X		X		X
Carbon Monoxide									

Signature of Sampling Team Leader: [Signature]

SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 2 RUN: 1

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: <u>4232-93-2511</u>		Control Unit Number: <u>2</u>		ohm <u>2.0005</u>	
Date: <u>3/30/93</u>		Gas Meter Coefficient: <u>1.0001</u>		Tm <u>68</u>	
Company: <u>KRAFT GENERAL FOODS</u>		Sample Box Number: <u>2</u>		MC <u>2.5 0/0</u>	
Source: <u>23 PARAMITAN DRYING SYSTEM</u>		Probe No: <u>5</u> Length: <u>3'</u>		Ps/Pm <u>1.00</u>	
Source Dimensions: <u>3 3/4" Ø</u>		Pitot No: <u>5</u> Coefficient: <u>0.84</u>		C <u>1.1</u>	
Test Team: <u>AT/NT/GW/BL</u>		Nozzle No: <u>H8</u> Diameter: <u>0.250</u>		Ts <u>80</u>	
Test Procedures: <u>LRA 1-5</u>		Filter No: <u>73</u>		R	
Ambient Temp., °F: <u>62</u>		Barometric Pressure, in.Hg: <u>27.10</u>		Static Pressure, in.WC: <u>1 - 2.20</u>	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC		PUMP VAC. in.HG	TEMPERATURE, °F					GAS METER	
					REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	IN	OUT
11:54	A1	0	872.906	0.341	1.4	1.41	3.0	74	741	233	63	-	68	68
	2	2.5	874.5	0.30	1.3	1.3	3.0	76	735	234	63	-	68	68
	3	5.0	876.0	0.40	1.8	1.8	4.0	77	729	233	62	-	69	68
	4	7.5	877.7	0.44	1.9	1.9	4.0	77	725	234	64	-	69	68
	5	10.0	877.5	0.51	2.3	2.3	4.5	78	726	234	72	-	70	69
	6	12.5	881.5	0.55	2.4	2.4	4.5	78	721	233	80	-	71	69
	7	15.0	883.5	0.60	2.6	2.6	5.0	78	723	232	82	-	72	69
	8	17.5	885.7	0.60	2.6	2.6	5.0	79	717	229	76	-	74	69
	9	20.0	887.8	0.55	2.4	2.4	4.5	79	715	230	69	-	74	70
	10	22.5	889.9	0.50	2.2	2.2	4.5	80	716	229	63	-	75	70
	11	25.0	891.9	0.46	2.0	2.0	4.0	80	714	228	58	-	76	70
	12	27.5	893.7	0.42	1.9	1.9	4.0	80	714	227	56	-	76	71
	END A	30.0	895.6	x	x	x	x	x	x	x	x	x	x	x
12:33	B1	0	895.6	0.40	1.8	1.8	3.5	79	730	223	56	-	73	71
	2	2.5	897.3	0.38	1.7	1.7	3.5	80	721	222	47	-	74	71
	3	5.0	899.1	0.41	1.9	1.9	3.5	80	709	221	46	-	75	72
	4	7.5	900.9	0.49	2.1	2.1	4.0	80	703	221	46	-	76	72
	5	10.0	902.7	0.53	2.4	2.4	4.5	81	702	220	46	-	77	72
	6	12.5	904.8	0.55	2.4	2.4	4.5	81	703	220	47	-	77	73
	7	15.0	906.9	0.58	2.6	2.6	4.5	80	705	220	47	-	77	73
	8	17.5	908.9	0.62	2.8	2.8	4.5	81	704	218	48	-	77	73
	9	20.0	911.2	0.62	2.8	2.8	4.5	81	704	218	48	-	80	74
	10	22.5	913.5	0.58	2.6	2.6	4.5	81	703	216	48	-	80	74
	11	25.0	915.7	0.52	2.3	2.3	4.0	81	704	216	49	-	81	75
	12	27.5	917.7	0.52	2.3	2.3	4.0	81	707	216	49	-	81	75
	END B	30.0	919.73	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION					EPA METHOD 5 LEAK CHECK			Total Volume of Gas Sampled, DCF: <u>416.817</u>
IMPINGER	1	2	3	4	5	Time	Rate, dcfm	
Final	116	105	1	690.1		10:00	0.000	15
Initial	100	100	0	615.4		13:05	0.000	8
Net	16	5	1	14.7				
Total Moisture Collected: <u>36.7</u>								Total Sampling Time, Min: <u>60</u>
Impinger Catch Description: <u>CLEAR</u>								Filter Catch Description: <u>CLEAR</u>

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS									
Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
BAG #1									
Initial Reading	0.0		0.0		0.0				
Carbon Dioxide	0.2	0.2	0.2	0.2	0.2	0.2			0.2
Oxygen	20.6	20.4	20.4	20.2	20.6	20.4			20.3
Carbon Monoxide	0.0	0.0	0.0	0.0	0.0	0.0			0.0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [Signature]

SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 2 RUN: 2

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: 4230-93-2511		Control Unit Number: 2		ohd 2.0005	
Date: 3/30/92		Gas Meter Coefficient: 1.0001		Tm 75	
Company: KRAFT General Foods		Sample Box Number: 4		MC 2.5%	
Source: EL HABITAN AIRTIGHT SYSTEM		Probe No: 5 Length: 5		Ps/Pm 1.00	
Source Dimensions: 33 1/4" φ		Pitot No: 5 Coefficient: 0.84		C 1.2	
Test Team: AT/IT/GW/KL		Nozzle No: #8 Diameter: 0.250		Ts 20	
Test Procedures: EPA 1-5		Filter No: 72		R -	
Ambient Temp., °F: 75.0		Barometric Pressure, in.Hg: 29.16		Static Pressure, in.WC: -2.20	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE ΔH, in.WC		PUMP VAC. inHG	TEMPERATURE, °F					GAS METER	
					REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	IN	OUT
13:38	1	0	919.95	0.33	1.4	1.4	3.0	80	193	190	55	-	74	74
	2	2.5	911.5	0.37	1.6	1.6	3.5	80	190	194	43	-	75	74
	3	5.0	923.1	0.42	1.9	1.9	3.5	80	192	197	46	-	76	76
	4	7.5	915.0	0.46	2.0	2.0	4.0	81	193	200	40	-	77	75
	5	10.0	926.8	0.50	2.2	2.2	4.0	81	190	200	41	-	78	75
	6	12.5	928.8	0.50	2.2	2.2	4.0	81	192	203	42	-	78	75
	7	15.0	930.7	0.51	2.3	2.3	4.0	81	198	205	43	-	80	76
	8	17.5	932.6	0.54	2.4	2.4	4.5	81	204	209	43	-	81	76
	9	20.0	934.8	0.54	2.4	2.4	4.5	81	205	210	44	-	82	76
	10	22.5	936.8	0.50	2.2	2.2	4.5	82	210	213	44	-	82	76
	11	25.0	938.8	0.46	2.0	2.0	4.0	81	208	216	44	-	83	77
	12	27.5	941.0	0.43	1.9	1.9	3.5	82	208	216	44	-	83	77
	END	30.0	941.8	x	x	x	x	x	x	x	x	x	x	x
	A1	0	947.8	0.29	1.0	1.0	3.0	72	221	220	52	-	80	77
	2	2.5	944.2	0.32	1.4	1.4	3.0	80	221	224	47	-	81	78
	3	5.0	945.7	0.36	1.6	1.6	3.5	81	221	225	45	-	81	78
	4	7.5	947.4	0.42	1.9	1.9	4.0	82	216	226	44	-	81	78
	5	10.0	949.2	0.45	2.0	2.0	4.0	82	213	228	44	-	82	78
	6	12.5	951.0	0.49	2.1	2.1	4.0	82	216	229	45	-	83	78
	7	15.0	952.9	0.52	2.3	2.3	4.5	82	217	230	45	-	83	78
	8	17.5	955.0	0.52	2.3	2.3	4.5	82	219	230	45	-	84	78
	9	20.0	956.9	0.48	2.1	2.1	4.0	82	217	229	46	-	84	79
	10	22.5	958.9	0.40	1.8	1.8	3.5	82	216	229	46	-	84	79
	11	25.0	960.7	0.38	1.7	1.7	3.5	82	215	230	46	-	84	79
	12	27.5	962.5	0.36	1.6	1.6		82	218	231	46	-	85	79
	END	30.0	964.178	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION

IMPINGER	1	2	3	4	5
Final	124	102	0	697.1	
Initial	100	100	0	687.7	
Net	24	2	0	9.4	
Total Moisture Collected: 35.4					
Impinger Catch Description: CLEAR					

EPA METHOD 5 LEAK CHECK

Time	Rate, dcfm	Vac, in.Hg
13:31	0.000	15
14:15	0.000	6

Total Volume of Gas Sampled, DCF: 44,243  
 Total Sampling Time, Min: 60  
 Filter Catch Description: CLEAR

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS

Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
Bag #2									
Initial Reading	0.0		0.0		0.0				
Carbon Dioxide	0.4	0.4	0.2	0.2	0.3	0.3			0.3
Oxygen	20.6	20.2	20.5	20.3	20.4	20.1			20.2
Carbon Monoxide	0.0	0.0	0.0	0.0	0.0	0.0			0.0

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader:



SOURCE EMISSION TEST FIELD DATA SHEET

TEST: 2 RUN: 3

PAGE: 1 of 1

TEST IDENTIFICATION		EQUIPMENT IDENTIFICATION		NOMOGRAPH SETTINGS	
TCT Project Number: <u>4232-93-2511</u>		Control Unit Number: <u>2</u>		ohm <u>3000</u>	
Date: <u>3/30/93</u>		Gas Meter Coefficient: <u>1.0001</u>		Tm <u>75</u>	
Company: <u>KRAFT GENERAL FOOD</u>		Sample Box Number: <u>2</u>		MC <u>2.5%</u>	
Source: <u>#2 PARMESAN DRIVING SYSTEM</u>		Probe No: <u>5</u> Length: <u>5'</u>		Ps/Pm <u>1.0L</u>	
Source Dimensions: <u>33 3/4" Ø</u>		Pitot No: <u>5</u> Coefficient: <u>0.84</u>		C <u>1.2</u>	
Test Team: <u>AT/NT/LGW/BL</u>		Nozzle No: <u>48</u> Diameter: <u>0.350</u>		Ts <u>20</u>	
Test Procedures: <u>GPA 1-5</u>		Filter No: <u>77</u>		R <u>-</u>	
Ambient Temp., °F: <u>75</u>		Barometric Pressure, in.Hg: <u>29.18</u>		Static Pressure, in.WC: <u>2.20</u>	

EPA METHOD 5 TRAVERSE DATA

CLOCK TIME hours	TRAVERSE POINT NUMBER	SAMPLE TIME minute	SAMPLE VOLUME cu.ft.	VELOCITY HEAD in.WC	ORIFICE in.WC		PUMP VAC. inHG	TEMPERATURE, °F					GAS METER	
					REQ.	ACT.		STACK GAS	PROBE LINER	FILTER OVEN	IMPINGER EXIT	AUXILIARY	IN	OUT
15:24	A1	0	964.430	0.34	1.5	1.5	3.0	81	180	197	57	-	76	76
	2	2.5	966.1	0.32	1.4	1.4	3.0	81	183	201	46	-	76	76
	3	5.0	967.6	0.34	1.5	1.5	3.0	81	199	205	45	-	77	77
	4	7.5	969.3	0.42	1.9	1.9	3.5	81	195	208	46	-	78	76
	5	10.0	971.1	0.45	2.0	2.0	4.0	82	198	210	47	-	79	76
	6	12.5	972.9	0.49	2.1	2.1	4.0	81	201	212	48	-	79	77
	7	15.0	974.7	0.52	2.3	2.3	4.0	81	203	214	49	-	80	77
	8	17.5	976.8	0.53	2.4	2.4	4.0	81	202	216	50	-	81	77
	9	20.0	978.8	0.49	2.1	2.1	4.0	81	204	218	50	-	81	77
	10	22.5	980.7	0.41	1.8	1.8	3.5	81	204	220	50	-	81	77
	11	25.0	982.5	0.38	1.7	1.7	3.5	81	205	220	50	-	81	77
	12	27.5	984.3	0.35	1.5	1.5	3.5	81	202	222	50	-	81	77
16:04	END A	30.0	986.0	x	x	x	x	x	x	x	x	x	x	x
	B1	0	986.0	0.32	1.7	1.7	3.0	81	203	218	55	-	78	77
	2	2.5	987.7	0.36	1.6	1.6	3.0	81	207	219	48	-	78	77
	3	5.0	989.4	0.40	1.8	1.8	3.5	81	199	218	48	-	79	77
	4	7.5	991.2	0.45	2.0	2.0	3.5	81	195	218	48	-	79	77
	5	10.0	993.0	0.48	2.1	2.1	4.0	81	192	219	49	-	80	77
	6	12.5	994.9	0.49	2.1	2.1	4.0	81	194	220	49	-	81	77
	7	15.0	996.8	0.49	2.1	2.1	4.0	82	191	218	50	-	81	77
	8	17.5	998.7	0.52	2.3	2.3	4.0	82	188	217	50	-	82	77
	9	20.0	1000.7	0.50	2.2	2.2	4.0	82	190	218	50	-	82	78
	10	22.5	2.8	0.48	2.1	2.1	4.0	81	190	217	50	-	83	78
	11	25.0	4.6	0.45	2.0	2.0	4.0	81	194	219	50	-	83	77
	12	27.5	6.5	0.42	1.9	1.9	4.0	82	191	216	50	-	83	78
	END B	30.0	1008.358	x	x	x	x	x	x	x	x	x	x	x

EPA METHOD 4: MOISTURE DETERMINATION					EPA METHOD 5 LEAK CHECK			Total Volume of Gas Sampled, DCF: <u>43,926</u>	
IMPINGER	1	2	3	4	5	Time	Rate, dcfm	Vac, in.Hg	Total Sampling Time, Min: <u>6.0</u>
Final	<u>95</u>	<u>108</u>	<u>0</u>	<u>701.9</u>		<u>15:10</u>	<u>.004</u>	<u>15</u>	Filter Catch Description: <u>CLEAR</u>
Initial	<u>100</u>	<u>100</u>	<u>0</u>	<u>690.1</u>		<u>16:31</u>	<u>.000</u>	<u>7</u>	
Net	<u>-5</u>	<u>8</u>	<u>0</u>	<u>11.8</u>					
Total Moisture Collected: <u>14.8</u>									
Impinger Catch Description: <u>CLEAR</u>									

EPA METHOD 3: GAS COMPOSITION BY ORSAT ANALYSIS									
Sample Identification	Replicate 1		Replicate 2		Replicate 3		Replicate 4		Compound Average Percent Volume
	Buret Reading	Percent Volume							
Initial Reading	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>			
Carbon Dioxide	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>0.3</u>	<u>0.3</u>			<u>0.2</u>
Oxygen	<u>20.6</u>	<u>20.4</u>	<u>20.6</u>	<u>20.4</u>	<u>20.6</u>	<u>20.3</u>			<u>20.4</u>
Carbon Monoxide	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>	<u>0.0</u>			<u>0.0</u>

Form SST5, Revised 12/28/92

Signature of Sampling Team Leader: [Signature]



Date: 2/29/93

Project: KAMAT

Technician: JT

Client: \_\_\_\_\_

Source/Process: INLET

POINT	%	DISTANCE	INLET	LP WC		
1	2.1	1"	2.8"	0.15		
2	6.7	2.4"	4.1"	0.18		
3	11.8	4.2"	5.9"	0.20		
4	17.7	6.4"	8.1"	0.21		
5	25.0	9.0"	10.7"	0.22		
6	35.6	12.8"	14.5"	0.24		
7	64.4	25.2"	24.9"	0.24		
8	75.0	27"	28.7"	0.24		
9	82.3	29.6"	31.3"	0.25		
10	88.2	31.8"	33.5"	0.25		
11	93.3	33.6"	35.3"	0.24		
12	97.9	35"	36.7"	0.22		

Comments:

Diameter = 36" ID

NIFLE = 1 3/4"

unit = 1  
 Static 2.1 in WC     Site 2.67  
 Avg. wind 12.4  
 wind speed 65 ft  
 #9 0.281 in WC  
 #10 0.295

Date: 2/27/92 Project: KRANT  
 Technician: J.T. Client: \_\_\_\_\_  
 Source/Process: 3.000

Point	%	Length	T <sub>u</sub> inches	ΔP		
1	2.1	1"	4.5"	0.29		
2	6.7	2.3"	5.8"	0.33		
3	11.8	4.0"	7.5"	0.38		
4	17.7	6.0"	9.5"	0.44		
5	25.0	8.4"	11.9"	0.49		
6	35.6	12.0"	15.5"	0.53		
7	64.4	21.7"	25.2"	0.56		
8	75.0	25.3"	28.8"	0.58		
9	82.3	27.8"	30.3"	0.54		
10	88.2	29.8"	33.3"	0.48		
11	93.3	31.5"	35.0"	0.45		
12	97.9	32.8"	36.3"	0.40		

Comments: diam -  $33\frac{3}{4}$ " ID  
 Nitro -  $3\frac{1}{2}$ "  
 dry bulb - 68°F ΔH@ 2.0005  
 wet bulb - 65°F saturated  
 2.47% Humid.  
 Nozzle #8 0.250 nominal  
 Discharge: 0.41



**APPENDIX C**  
**LABORATORY REPORTS**

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-93-2511	TEST	RUN
Client: <i>Leah Wangan</i>	1	1

FILTER CATCH				
Sample Number:	Filter Number:			
314217	76			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:00	MKC	0.34666
Weight #1	4/15/93	4:05	MKC	0.34649
Filter Tare Weight				0.39597
Net Sample Weight				0.00069

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 253
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314223	194			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-21-93	4:40	MKC	2.85751
Weight #1	4-19-93	4:55	MKC	2.85730
Dish Tare	4/13/93	1630	ptc	2.81295
Weight of collected matter				0.04456
Water Blank based on 97 ml				0.00020
Acetone Blank based on 97 ml				0.00106
Net Sample Weight				0.04230

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number:	314225			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-22-93	9:00	MKC	2.62672
Weight #1	4-21-93	5:10	MKC	2.62087
Dish Tare	4/15/93	1645	ptc	2.61220
Weight of collected matter				0.00352
Less Solvent Blanks				
Ethyl Ether based on 75 ml				ND
Chloroform based on 75 ml				0.00020
				based on ml
Net Sample Weight				0.00332

IMPINGER ACETONE RINSE				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314224	70			
	Date	Time	By	grams
Weight #3				
Weight #2	4-20-93	7:45	MKC	2.59986
Weight #1	4-19-93	4:20	MKC	2.59994
Dish Tare	4/13/93	1630	ptc	2.59653
Weight of collected matter				0.00333
Acetone Blank based on 30 ml				0.00076
Net Sample Weight				0.00257

IMPINGER CATCH MASS RESIDUE				
Sample Number:	314283 SV:270			
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2	4-30-93	9:35	MKC	2.65189
Weight #1	4/29/93	7:45	ptc	2.65198
Dish Tare	4/13/93	1650	ptc	2.64890
Weight of collected matter				0.01099
Water Blank based on 200 ml				0.00042
Net Sample Weight				0.01057

Form: SST-LAB52C

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-93-2511	TEST	RUN
Client: <i>K. Robert Lawson</i>	1	2

FILTER CATCH				
Sample Number:		Filter Number:		
314218		75		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:00	MKL	0.34861
Weight #1	4/15/93	4:05	MKL	0.34871
Filter Tare Weight				0.34902
Net Sample Weight				0.00059

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 268
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number:		Measured Sample Volume, ml		Estimated Volume Lost, ml
314226		150		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-16-93	4:20	MKL	2.67027
Weight #1	4-15-93	4:25	MKL	2.67020
Dish Tare	4/13/93	1650	pkc	2.60878
Weight of collected matter				0.06149
Water Blank based on 75 ml				0.00016
Acetone Blank based on 75 ml				0.00080
Net Sample Weight				0.06051

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number:		314228		
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-22-93	9:00	MKL	2.59532
Weight #1	4-21-93	5:10	MKL	2.59532
Dish Tare	4/13/93	1655	pkc	2.59022
Weight of collected matter				0.00460
Less Solvent Blanks				
Ethyl Ether based on 75 ml				ND
Chloroform based on 75 ml				0.00020
based on ml				
Net Sample Weight				0.00440

IMPINGER ACETONE RINSE				
Sample Number:		Measured Sample Volume, ml		Estimated Volume Lost, ml
314227		93		
	Date	Time	By	grams
Weight #3				
Weight #2	4-20-93	7:45	MKL	2.62697
Weight #1	4-19-93	4:20	MKL	2.62694
Dish Tare	4/13/93	1655	pkc	2.62491
Weight of collected matter				0.00206
Acetone Blank based on 93 ml				0.00101
Net Sample Weight				0.00105

IMPINGER CATCH MASS RESIDUE				
Sample Number:		314224 SV 297		
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2	4-20-93	9:35	MKL	2.60525
Weight #1	4/20/93	7:45	pkc	2.60533
Dish Tare	4/13/93	1700	pkc	2.59703
Weight of collected matter				0.00825
Water Blank based on 200 ml				0.00040
Net Sample Weight				0.00783

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-43-2511	TEST 1	RUN 3
Client: Robert Lawson		

FILTER CATCH				
Sample Number:	Filter Number:			
314219	78			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:00	MKC	0.35415
Weight #1	4/15/93	4:10	MKC	0.35399
Filter Tare Weight				0.35274
Net Sample Weight				0.00141

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 422
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314229	205			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:25	MKC	2.67427
Weight #1	4-15-93	4:25	MKC	2.67431
Dish Tare	4/13/93	1700	afc	2.63953
Weight of collected matter				0.03474
Water Blank based on 103 ml				0.00022
Acetone Blank based on 102 ml				0.00111
Net Sample Weight				0.03341

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number:	314231			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-22-93	9:00	MKC	2.62360
Weight #1	4-21-93	5:10	MKC	2.62354
Dish Tare	4/15/93	1700	afc	2.62164
Weight of collected matter				0.00196
Less Solvent Blanks				
Ethyl Ether based on 75 ml				ND
Chloroform based on 75 ml				0.00020
	based on ml			
Net Sample Weight				0.00176

IMPINGER ACETONE RINSE				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314230	80			
	Date	Time	By	grams
Weight #3				
Weight #2	4-20-93	7:45	MKC	2.61890
Weight #1	4-19-93	4:25	MKC	2.61898
Dish Tare	4/13/93	1700	afc	2.61541
Weight of collected matter				0.00349
Acetone Blank based on 80 ml				0.00087
Net Sample Weight				0.00262

IMPINGER CATCH MASS RESIDUE				
Sample Number:	314285 SV: 451			
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3	5/3/93	8:05	afc	2.64311
Weight #2	4-30-93	9:35	MKC	2.64290
Weight #1	4/29/93	7:40	afc	2.64348
Dish Tare	4/13/93	1700	afc	2.11057
Weight of collected matter				0.03224
Water Blank based on 200 ml				0.00042
Net Sample Weight				0.03182

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-43-2511	TEST 2	RUN 1
Client: Kraft Wausau		

FILTER CATCH				
Sample Number: 314220		Filter Number: 73		
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-19-93	4:00	MKC	0.35281
Weight #1	4/15/93	4:10	MKC	0.35291
Filter Tare Weight				0.35222
Net Sample Weight				0.00059

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 265
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number: 314232		Measured Sample Volume, ml 156	Estimated Volume Lost, ml	
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-19-93	4:25	MKC	2.67390
Weight #1	4-15-93	4:25	MKC	2.67373
Dish Tare	4/13/93	1705	pkc	2.64504
Weight of collected matter				0.02886
Water Blank based on 78 ml				0.00016
Acetone Blank based on 78 ml				0.00085
Net Sample Weight				0.02785

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number: 314234				
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-22-93	9:00	MKC	2.63312
Weight #1	4-21-93	5:10	MKC	2.63296
Dish Tare	4/13/93	1705	pkc	2.62946
Weight of collected matter				0.00366
Less Solvent Blanks				
Ethyl Ether	based on 75 ml		ND	
Chloroform	based on 75 ml		0.00020	
	based on ml			
Net Sample Weight				0.00316

IMPINGER ACETONE RINSE				
Sample Number: 314233		Measured Sample Volume, ml 78	Estimated Volume Lost, ml	
Date	Time	By	grams	
Weight #3				
Weight #2	4-20-93	7:45	MKC	2.63506
Weight #1	4-19-93	4:30	MKC	2.63516
Dish Tare	4/13/93	1705	pkc	2.63228
Weight of collected matter				0.00278
Acetone Blank based on 78 ml				0.00085
Net Sample Weight				0.00193

IMPINGER CATCH MASS RESIDUE				
Sample Number: 314286		SV: 282		
Date	Time	By	grams	
Weight #5				
Weight #4				
Weight #3				
Weight #2	4-30-93	9:30	MKC	2.61390
Weight #1	4/29/93	7:45	pkc	2.61398
Dish Tare	4/13/93	1705	pkc	2.59820
Weight of collected matter				0.01570
Water Blank based on 200 ml				0.00040
Net Sample Weight				0.01528

Form: SST-LAB52C

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-93-2511	TEST	RUN
Client: Kraft Wamson	2	2

FILTER CATCH				
Sample Number:	Filter Number:			
314221	72			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:00	MKC	0.35695
Weight #1	4/15/93	4:10	MKC	0.35713
Filter Tare Weight	0.3568			
Net Sample Weight	0.00027			

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 271
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314235	88			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:30	MKC	2.63610
Weight #1	4-15-93	4:20	MKC	2.63590
Dish Tare	4/13/93	17:10	pkc	2.62057
Weight of collected matter	0.01553			
Water Blank based on 44 ml	0.00009			
Acetone Blank based on 44 ml	0.00048			
Net Sample Weight	0.01496			

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number:	314237			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-22-93	9:05	MKC	2.61135
Weight #1	4-21-93	5:05	MKC	2.61149
Dish Tare	4/13/93	17:10	pkc	2.60915
Weight of collected matter	0.00220			
Less Solvent Blanks				
Ethyl Ether based on 75 ml	ND			
Chloroform based on 75 ml	0.00020			
	based on ml			
Net Sample Weight	0.00200			

IMPINGER ACETONE RINSE				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314236	85			
	Date	Time	By	grams
Weight #3				
Weight #2	4-20-93	7:50	MKC	2.62659
Weight #1	4-19-93	4:30	MKC	2.62669
Dish Tare	4/13/93	17:10	pkc	2.62375
Weight of collected matter	0.00284			
Acetone Blank based on 85 ml	0.00093			
Net Sample Weight	0.00191			

IMPINGER CATCH MASS RESIDUE				
Sample Number:	314287 SV:298			
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3				
Weight #2	4-30-93	9:30	MKC	2.67030
Weight #1	4/29/93	7:40	pkc	2.67069
Dish Tare	4/13/93	17:15	pkc	2.63529
Weight of collected matter	0.03501			
Water Blank based on 200 ml	0.00042			
Net Sample Weight	0.03459			

Form: SST-LAB52C

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE ANALYSIS**

Project Number: 4232-93-2511	TEST	RUN
Client: <i>Kraft Wauson</i>	2	3

FILTER CATCH				
Sample Number:	Filter Number:			
314222	77			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:05	MKC	0.35201
Weight #1	4/15/93	4:10	MKC	0.35192
Filter Tare Weight	0.35088			
Net Sample Weight	0.00113			

WEIGHING PROCEDURE
Weighings shall be to the nearest 0.1 mg. Weighings shall be to "constant weight" which means a difference of no more than 0.5 mg between two consecutive weighings, with no less than six hours of desiccation time between weighings.

IMPINGER CATCH VOLUME
Measured Sample Volume, ml: 341
Estimated Volume Lost, ml:

FRONT WASH				
Sample Number:	Measured Sample Volume, ml		Estimated Volume Lost, ml	
314238	88			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-19-93	4:30	MKC	2.64199
Weight #1	4-15-93	4:20	MKC	2.64198
Dish Tare	4/13/93	17:15	plc	2.63249
Weight of collected matter	0.00950			
Water Blank based on 44 ml	0.00009			
Acetone Blank based on 44 ml	0.00048			
Net Sample Weight	0.00893			

IMPINGER CATCH ORGANIC EXTRACTION				
Sample Number:	314240			
	Date	Time	By	grams
Weight #4				
Weight #3				
Weight #2	4-22-93	9:05	MKC	2.65868
Weight #1	4-21-93	5:05	MKC	2.65880
Dish Tare	4/15/93	17:15	plc	2.65712
Weight of collected matter	0.00156			
Less Solvent Blanks				
Ethyl Ether based on 75 ml	ND			
Chloroform based on 75 ml	0.00020			
	based on ml			
Net Sample Weight	0.00136			

IMPINGER ACETONE RINSE				
Sample Number:	Measured Sample Volume, ml		Estimated Volume Lost, ml	
314239	77			
	Date	Time	By	grams
Weight #3				
Weight #2	4-20-93	7:50	MKC	2.62613
Weight #1	4-19-93	4:35	MKC	2.62625
Dish Tare	4/13/93	17:15	plc	2.62346
Weight of collected matter	0.00267			
Acetone Blank based on 79 ml	0.00084			
Net Sample Weight	0.00183			

IMPINGER CATCH MASS RESIDUE				
Sample Number:	314288 SV:366			
	Date	Time	By	grams
Weight #5				
Weight #4				
Weight #3	5/13/93	8:05	plc	2.69022
Weight #2	4-30-93	9:30	MKC	2.68991
Weight #1	4/29/93	7:45	plc	2.69095
Dish Tare	4/13/93	17:15	plc	2.65421
Weight of collected matter	0.03601			
Water Blank based on 200 ml	0.00042			
Net Sample Weight	0.03559			

Form: SST-LAB52C

**LABORATORY REPORT: EPA METHOD 5 PARTICULATE TEST SOLVENT BLANKS**

Project Number: 4232-93-2511	TEST
Client: <i>Kraft-Wausau</i>	1/2

DISTILLED, DEIONIZED WATER				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314241	100			
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-19-93	4:35	MKC	2.65907
Weight #1	4-15-93	4:20	MKC	2.65899
Dish Tare	4/13/93	17:15	<i>af</i>	2.65886
Weight of residual matter				0.00021
Mass Concentration:				<i>0.0</i> 2.1 <sup>-6</sup> mg/ml

ACETONE				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314242	98			
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-19-93	4:35	MKC	2.66752
Weight #1	4-15-93	4:20	MKC	2.66755
Dish Tare	4/13/93	17:20	<i>af</i>	2.6645
Weight of residual matter				0.00107
Mass Concentration:				1.09 <sup>-5</sup> mg/ml

CHLOROFORM				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314244	75			
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-22-93	9:05	MKC	2.61958
Weight #1	4-21-93	5:05	MKC	2.61957
Dish Tare	4/13/93	17:20	<i>af</i>	2.61938
Weight of residual matter				0.00020
Mass Concentration:				<del>0.0</del> 2.6 <sup>-6</sup> mg/ml

ETHYL ETHER				
Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
314243	75			
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2	4-22-93	9:05	MKC	2.62530
Weight #1	4-21-93	5:05	MKC	2.62515
Dish Tare	4/13/93	17:20	<i>af</i>	2.62536
Weight of residual matter				ND
Mass Concentration:				ND mg/ml

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

Sample Number:	Measured Sample Volume, ml	Estimated Volume Lost, ml		
Date	Time	By	grams	
Weight #4				
Weight #3				
Weight #2				
Weight #1				
Dish Tare				
Weight of residual matter				
Mass Concentration:				mg/ml

Form: SST-LAB53C

APPENDIX D  
CALIBRATION DATA

## **GAS METER AND ORIFICE CALIBRATION**

Pretest calibration of TCT control unit #1 generated a gas meter coefficient of 0.9895. Post test calibration yielded a coefficient of 0.9949. Both sets of calibration data are included on the following pages. All calculations for tests performed using unit #1 were made using the lower (0.9895) calibration factor which produces worst case emission data.

Pretest calibration of TCT control unit #2 generated a gas meter coefficient of 1.0001. Post test calibration yielded a coefficient of 1.0065. Both sets of calibration data are included on the following pages. All calculations for tests performed using unit #2 were made using the lower (1.0001) calibration factor which produces worst case emission data.

## **PITOT TUBE CALIBRATION DATA**

Pitot tubes used are a Type S pitot tube which meets the design specifications described in EPA Method 2 and the base line coefficient of 0.84 was assigned.

ORIFICE and DRY GAS METER CALIBRATION FORM

Date: Mar 26, 1993		Meter # 1		Barometric Pressure, Pb: 29.83			
Orifice manometer setting dH, in.H2O	Gas Wet test meter Vw, ft3	Volume Dry gas meter Vd, ft3	Wet test meter tw, dF	Temperature Dry gas meter			Time e, min.
				Inlet tdi, dF	Outlet tdo, dF	Average td, dF	
0.5	5.000	5.105	65	69	66	67.5	13.68
1.0	5.000	5.097	65	71	67	69.0	9.65
2.0	10.000	10.151	65	74	68	71.0	13.13
4.0	10.000	10.129	65	78	68	73.0	9.78
6.0	10.000	10.140	65	82	70	76.0	8.15
8.0	10.000	10.132	65	85	71	78.0	7.02

Y	dH@
$\frac{Vw Pb (td + 460)}{Vd [Pb + (dH/13.6)] (tw + 460)}$	$\frac{0.0317 dH}{Pb (to + 460)} \left[ \frac{(tw + 460) e}{Vw} \right]^2$
Yi 1 = 0.9829	dH@i 1 = 2.0842
Yi 2 = 0.9860	dH@i 2 = 2.0703
Yi 3 = 0.9915	dH@i 3 = 1.9127
Yi 4 = 0.9925	dH@i 4 = 2.1224
Yi 5 = 0.9922	dH@i 5 = 2.2025
Yi 6 = 0.9919	dH@i 6 = 2.1747
Y = 0.9895	dH@ = 2.0945

Definitions:

- Vw = Gas volume passing through the wet test meter, ft3.
- Vd = Gas volume passing through the dry gas meter, ft3.
- tw = Temperature of the gas in the wet test meter, dF.
- tdi = Temperature of the inlet gas of the dry gas meter, dF.
- tdo = Temperature of the outlet gas of the dry gas meter, dF.
- td = Average temperature of the gas in the dry gas meter, dF.
- dH = Pressure differential across orifice, in. H2O.
- Yi = Ratio of accuracy of wet test meter to dry gas meter for each run.
- Y = Average of Yi. Tolerance = +/- 0.02
- Pb = Barometric pressure, in Hg.
- e = Time of calibration run, min.
- dH@i = Orifice pressure differential for each run.
- dH@ = Average orifice pressure differential. Tolerance = +/- 0.20

  
 Calibrator - James Tryba

Mar 26, 1993

Date

ORIFICE and DRY GAS METER POST TEST FORM

Client: KRAFT FOODS, INC., Wausau, Wisconsin  
 Date: Apr 2, 1993      Meter # 1      Barometric Pressure, Pb: 29.59  
 Max. Vacuum Achieved (in.Hg.): 5.0      Intermediate Orifice Setting: 2.50  
 dH@ Factor Used: 2.0945      Y Factor Used: .9895

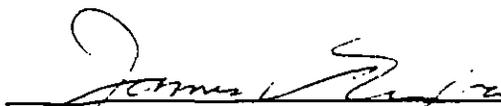
Orifice manometer setting dH, in.H2O	Gas Wet test meter Vw, ft3	Volume Dry gas meter Vd, ft3	Wet test meter tw, dF	Temperature Dry gas meter			Time e, min.
				Inlet tdi, dF	Outlet tdo, dF	Average td, dF	
2.50	10.000	9.938	69	73	67	70.0	12.22
2.50	10.000	10.062	69	77	69	73.0	12.27
2.50	10.000	10.206	68	80	71	75.5	12.32

Y	dH@
$\frac{Vw \text{ Pb } (td + 460)}{Vd [Pb + (dH/13.6)] (tw + 460)}$	$\frac{0.0317 \text{ dH}}{Pb (to + 460)} \left[ \frac{(tw + 460) e}{Vw} \right]^2$
Yi 1 = 1.0019	dH@i 1 = 2.1237
Yi 2 = 0.9952	dH@i 2 = 2.1330
Yi 3 = 0.9876	dH@i 3 = 2.1343
Y = 0.9949	dH@ = 2.1303
Difference = 0.55 % *	Difference = 1.71 % *

\* Tolerance must be within +/- 5% of calibrated factors.

Definitions:

- Vw = Gas volume passing through the wet test meter, ft3.
- Vd = Gas volume passing through the dry gas meter, ft3.
- tw = Temperature of the gas in the wet test meter, dF.
- tdi = Temperature of the inlet gas of the dry gas meter, dF.
- tdo = Temperature of the outlet gas of the dry gas meter, dF.
- td = Average temperature of the gas in the dry gas meter, dF.
- dH = Pressure differential across orifice, in. H2O.
- Yi = Ratio of accuracy of wet test meter to dry gas meter for each run.
- Y = Average of Yi.
- Pb = Barometric pressure, in Hg.
- e = Time of calibration run, min.
- dH@i = Orifice pressure differential for each run.
- dH@ = Average orifice pressure differential.

  
 \_\_\_\_\_  
 Calibrator - James Tryba

Apr 2, 1993

\_\_\_\_\_ Date

ORIFICE and DRY GAS METER CALIBRATION FORM

Date: Mar 24, 1993      Meter # 2      Barometric Pressure, Pb: 29.76

Orifice manometer setting dH, in. H2O	Gas Wet test meter Vw, ft3	Volume Dry gas meter Vd, ft3	Wet test meter tw, dF	Temperature			Time e, min.
				Inlet tdi, dF	Outlet tdo, dF	Average td, dF	
0.5	5.000	5.060	67	74	71	72.5	12.82
1.0	5.000	5.028	68	77	74	75.5	9.22
2.0	10.000	10.100	68	78	72	75.0	13.68
4.0	10.000	10.115	67	81	74	77.5	9.50
6.0	10.000	10.113	67	88	78	83.0	7.90
8.0	10.000	10.110	67	86	77	81.5	6.95

Y	dH@
$\frac{Vw Pb (td + 460)}{Vd [Pb + (dH/13.6)] (tw + 460)}$	$\frac{0.0317 dH}{Pb (to + 460)} \left[ \frac{(tw + 460) e}{Vw} \right]^2$
Yi 1 = 0.9972	dH@i 1 = 1.8313
Yi 2 = 1.0061	dH@i 2 = 1.8909
Yi 3 = 0.9983	dH@i 3 = 2.0892
Yi 4 = 0.9985	dH@i 4 = 1.9999
Yi 5 = 1.0040	dH@i 5 = 2.0630
Yi 6 = 0.9966	dH@i 6 = 2.1288
Y = 1.0001	dH@ = 2.0005

Definitions:

- Vw = Gas volume passing through the wet test meter, ft3.
- Vd = Gas volume passing through the dry gas meter, ft3.
- tw = Temperature of the gas in the wet test meter, dF.
- tdi = Temperature of the inlet gas of the dry gas meter, dF.
- tdo = Temperature of the outlet gas of the dry gas meter, dF.
- td = Average temperature of the gas in the dry gas meter, dF.
- dH = Pressure differential across orifice, in. H2O.
- Y = Ratio of accuracy of wet test meter to dry gas meter for each run.
- Yi = Average of Yi. Tolerance = +/- 0.02
- Pb = Barometric pressure, in Hg.
- e = Time of calibration run, min.
- dH@i = Orifice pressure differential for each run.
- dH@ = Average orifice pressure differential. Tolerance = +/- 0.20

Mar 24, 1993

James Tryba

Date

ORIFICE and DRY GAS METER POST TEST FORM

Client: KRAFT FOODS, INC., Wausau, Wisconsin  
 Date: Apr 2, 1993      Meter # 2      Barometric Pressure, Pb: 29.59  
 Max. Vacuum Achieved (in.Hg.): 5.0      Intermediate Orifice Setting: 2.00  
 dH@ Factor Used: 2.0005      Y Factor Used: 1.0001

Orifice manometer setting dH, in.H2O	Gas Wet test meter Vw, ft3	Volume Dry gas meter Vd, ft3	Wet test meter tw, dF	Temperature Dry gas meter			Time e, min.
				Inlet tdi, dF	Outlet tdo, dF	Average td, dF	
2.00	10.000	9.998	69	74	70	72.0	13.30
2.00	10.000	10.002	68	78	72	75.0	13.35
2.00	10.000	10.015	68.5	81	74	77.5	13.30

Y	dH@
$\frac{Vw Pb (td + 460)}{Vd [Pb + (dH/13.6)] (tw + 460)}$	$\frac{0.0317 dH}{Pb (to + 460)} \left[ \frac{(tw + 460) e}{Vw} \right]^2$
Yi 1 = 1.0009	dH@i 1 = 2.0012
Yi 2 = 1.0080	dH@i 2 = 2.0011
Yi 3 = 1.0105	dH@i 3 = 1.9824
Y = 1.0065	dH@ = 1.9949
Difference = 0.64 % *	Difference = -0.28 % *

\* Tolerance must be within +/- 5% of calibrated factors.

Definitions:

- Vw = Gas volume passing through the wet test meter, ft3.
- Vd = Gas volume passing through the dry gas meter, ft3.
- tw = Temperature of the gas in the wet test meter, dF.
- tdi = Temperature of the inlet gas of the dry gas meter, dF.
- tdo = Temperature of the outlet gas of the dry gas meter, dF.
- td = Average temperature of the gas in the dry gas meter, dF.
- dH = Pressure differential across orifice, in. H2O.
- Yi = Ratio of accuracy of wet test meter to dry gas meter for each run.
- Y = Average of Yi.
- Pb = Barometric pressure, in Hg.
- e = Time of calibration run, min.
- dH@i = Orifice pressure differential for each run.
- dH@ = Average orifice pressure differential.

  
 \_\_\_\_\_  
 Calibrator -

Apr 2, 1993  
 \_\_\_\_\_  
 Date

APPENDIX E  
PROCESS DATA

# KRAFT GENERAL FOODS

KRAFT USA

April 15, 1993

Mr. Alan L. Trowbridge  
Twin City Testing  
662 Cromwell Avenue  
St. Paul, MN 55114

Dear Alan:

Enclosed you will find the production tally sheets for the air emissions test completed on 3/30/93. As noted, the production start time for the test period was 11:26 a.m. along with the weight of each barrel and corresponding time interval it entered the process. This should be sufficient data to determine an average thruput per hour.

Also enclosed are sheets for lot number 5028 and random barrel numbers with corresponding moisture samples. The moistures can be used to compute an average entering cheese moisture.

If you have any questions regarding the above data sheets, please advise.

Sincerely,



John W. Franke

JWF:crg  
Enclosure

CC: Rhonda O'Leary  
State of Wisconsin - D.N.R.  
5301 Rib Mountain Drive  
Wausau, WI 54401  
Chuck Phillips - Kraft - Wausau  
Chris Fuss - Kraft - Wausau

**BARREL EVALUATION**

PAGE 4 SYSTEM NO: 2  
✓ ROMANO ✓ PARMESAN ✓ ITALIAN (Blended) 67/33

Barrel Dump Operator Name: Wayne Date: 3/30/93  
 Shift: 1

\* Source = (B) Blackfoot, (M) Melrose, (R) Rupert

	DATE	VAT NO.	TIME USED	COLOR	KNIT	*SOURCE	MOIST.	FAT	WEIGHT	LOT NO.
1	9-7-92	1425	1425	1	T	M			516.8	5028
2	9-7	1430	1430	1	T	M			523.2	5028
3	9-7		1436	1	T	M			523.6	5028
4	9-7		1441	1	T	M			518.7	5028
5	9-7		1446	1	T	M			521.6	5028
6	9-7		1452	1	T	M			515	5028
7	9-7		1459	1	T	M			523.6	5028
8	9-7		1504	1	T	M			517.3	5028
9	9-7		1507	1	T	M			513.7	5028
10	9-7		1513	1	T	M			525.3	5028
11	9-7		1514	1	Loop	M			522	5028
12	9-7		1526	1	Loop	M			518.8	5028
13	9-7		1530	1	T	M			528.7	5028
14	9-7		1535	1	T	M			518.3	5028
15	9-7		1540	1	T	M			522.8	5028
16	9-7		1545	1	T	M			521.1	5028
17	9-7		1550	1	T	M			521.3	5028
18	9-7		1555	1	T	M			518.0	5028
19	9-7		1606	1	T	M			517.2	5028
20	9-7		1609	1	T	M			521.4	5028
21	9-7		1611	1	T	M			519.1	5028
22	9-7		1615	1	T	M			519.5	5028
23	9-7		1620	1	T	M			525.6	5028
24	9-7		1625	1	Loop	M			524	5028
25	9-7		1630	1	Loop	M			518.6	5028
26	9-7		1634	1	T	M			511	5028
27	9-7		1646	1	T	M			518.7	5028
28	9-7		1644	1	T	M			515.8	5028
29	9-7		1647	1	T	M			524	5028
30	9-7		1653	1	T	M			521.4	5028

689044 Wet = 5300 lb/hr Dry -  
 Moistures on Back Page

**BARREL EVALUATION**

PAGE 2 SYSTEM NO: 7  
✓ ROMANO        PARMESAN        ITALIAN (Blended) 67/33

Barrel Dump Operator Name: Wayne Date: 3/30/93  
 Shift: 1

\* Source = (B) Blackfoot, (M) Melrose, (R) Rupert

DATE	VAT NO.	TIME USED	COLOR	KNIT	*SOURCE	MOIST.	FAT	WEIGHT	LOT NO.
9-6-92	0	0922	1	T	M			521.4	5026
9-6		0925	1	T	M			521.9	5026
9-6		0930	1	T	M			520.4	5026
9-6		0935	1	T	M			520.9	5026
9-6		0938	1	T	M			516.9	5026
9-6		0947	1	T	M			520	5026
9-6		0948	1	T	M			-	5026
9-6		0951	1	T	M			521.5	5026
9-6		0954	1	T	M			519.5	5026
9-6		0957	1	T	M			521.2	5026
9-6		1004	1	T	M			516.4	5026
9-6		1008	1	T	M			525.3	5026
9-6		1011	1	T	M			522.2	5026
9-6		1014	1	T	M			523.2	5026
9-6		1017	1	T	M			524.5	5026
9-6		1020	1	T	M			525.2	5026
9-6		1023	1	T	M			515	5026
9-6		1028	1	T	M			516.8	5026
9-6		1031	1	T	M			522.7	5026
9-6		1035	1	T	M			-	5026
9-6		1057	1	T	M			-	5026
9-6		1100	1	T	M			521.7	5026
9-7	0	1126	1	T	M			525.3	5028
9-7		1129	1	T	M			517.5	5028
9-7		1132	1	T	M			518.9	5028
9-7		1135	1	T	M			518.0	5028
9-7		1138	1	T	M			517.7	5028
9-7		1142	1	T	M			524.7	5028
9-7		1149	1	T	M			519.6	5028
9-7		1152	1	T	M			517.7	5028

**BARREL EVALUATION**

PAGE 3 SYSTEM NO: 2  
✓ ROMANO     PARMESAN     ITALIAN (Blended) 67/33

Barrel Dump Operator Name: Wayne Date: 3-30-93  
 Shift: 1

\* Source = (B) Blackfoot, (M) Melrose, (R) Rupert

DATE	VAT NO.	TIME USED	COLOR	KNIT	*SOURCE	MOIST.	FAT	WEIGHT	LOT NO.
9-7-92	0	1155	1	Tight	M			521.1	5028
9-7		1200	1	T	M			511.4	5028
9-7		1205	1	T	M			524.6	5028
9-7		1210	1	T	M			523.4	5028
9-7		1215	1	T	M			521.4	5028
9-7		1221	1	T	M			524.8	5028
9-7		1226	1	T	M			527.6	5028
9-7		1230	1	T	M			530.5	5028
9-7		1236	1	T	M			523.1	5028
9-7		1242	1	T	M			-	5028
9-7		1248	1	T	M			516.9	5028
9-7		1253	1	T	M			519.4	5028
9-7		1257	1	T	M			516.3	5028
9-7		1302	1	T	M			517.2	5028
9-7		1307	1	T	M			516.5	5028
9-7		1311	1	T	M			522.7	5028
9-7		1316	1	T	M			519.4	5028
9-7		1323	1	T	M			519.1	5028
4-1	2	1328	1	T	M	Cherry	Reject	526.3	Reject
4-1	6	1331	1	T	M	Cherry	Reject	504.6	Reject
9-7		1336	1	T	M			518.8	5028
9-7		1345	1	T	M			519.2	5028
4-1	3	1350	1	T	M	Cherry	Reject	506.9	Reject
4-1	U	1353	1	T	M	Cherry	Reject	511.4	Reject
9-7		1357	1	T	M			518.2	5028
9-7		1400	1	T	M			523.1	5028
9-7		1405	1	T	M			521.5	5028
9-7		1410	1	T	M			521.4	5028
9-7		1415	1	T	M			521.5	5028
9-7		1420	1	T	M			522.8	5028

per	Make Fact	Storage Location	Vat Date	Bar. No.	Moist	FDB	Salt	Temp	Time Used	Date Used
26	Mel Romano	Northland	9-6-92	141	30.3					
				147	30.8					
				153	30.5					
				159	30.0					
27	Mel	Northland	9-6-92	162	30.0					
				165	30.5					
				171	30.3					
				177	31.3					
				183	32.5					
				189	31.1					
				195	30.6					
				201	31.8					
			9-7-92	3	30.5					
				9	29.9					
				15	30.3					
				21	30.9					
				27	30.4					
				31	31.3					
28	Mel Romano	Northland	9-7-92	33	31.3					
				39	31.0					
				45	29.9					
				51	29.4					
				57	29.5					
				63	29.9					
				69	29.7					
				75	29.8					



