EMISSION PERFORMANCE TESTING
OF
TWO FRYER LINES

SITE: Eagle Snacks, Inc.
Visalia, California

DATE: November 1989

Prepared for:

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Visalia, California 93291

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1.0 INTRODUCTION

At the request of Anheuser Busch Cos., Inc., St. Louis, Missouri, Western Environmental Services (WES) conducted a compliance test at Eagle Snacks, Visalia, California. The testing consisted of collecting particulate samples at the Continuous Fryer and Kettle Fryer #5. WES performed the testing program on October 9, 10, and 11 1989 to provide compliance test data for the Tulare County Air Pollution Control District.

The sampling program consisted of collecting particulates, carbon dioxide, oxygen, moisture, volumetric flow rate, and charge rate.

On the first and second days of testing, WES collected samples from Kettle Fryer #5 using extended 3 to 4 hour test periods. These extended test periods provided larger sample volumes and sample sizes for increasing the testing accuracy. The Kettle Fryer wet scrubber operated according to the manufacturer's settings.

On the third day of testing, WES collected samples from the continuous Potato Chip Fryer using standard one hour testing periods. During these tests, the Fryer's exhaust damper was set slightly above manufacturer's recommendation.

WES presents the following sections in this report: Summary of Results, Site Description, Sampling and Analytical Procedures, Quality Assurance, and Appendices. The appendices contain the Field and Laboratory data sheets, Gas Calibration Information, and Sample Calculations.

2.0 SUMMARY OF RESULTS

2.1 Discussion of Results

Table 2.1 and Table 2.2 present the particulate sampling results.

The test data is summarized below:

Test #	Charge Rate #/Hr	Particulates Concentration Grs/SDCF	Particulates Emission Rate #/Hr
Continuous Fryer			
Test #4	11,900	0.0759	1.93
Test #5	11,430	0.0589	1.42
Test #6	11.430	0.0732	1.66
Average	11,590	0.0693	1.67
Kettle Fryer #5			
Test #1	540	0.0040	0.33
Test #2	576	0.0024	0.19
Test #3	557	0.0024	0.19
Average	558	0.0029	0.24

2.2 Quality Assurance

WES calibrates its sampling equipment according to the Quality Assurance Handbook for Air Pollution Measurement Systems. Prior to and after each test run, WES technicians leak check the particulate sampling train.

Table 2.1 Particulate Sampling and Analysis

Site: ABI- Eagle Snacks Plant- Continuous Fryer
Date: October 11,1989

Stack Parameters	Test 4	Test 5	Test 6	Ave
Barometric Pressure "Hg	29.05	29.05	29.05	29.05
Static Pressure "H20	-0.24	-0.24	-0.24	-0.24
CO2 %	0.00	0.00	0.00	0.00
O2 %	20.94	20.94	20.94	20.94
N2 %	81.36	81.36	81.36	81.36
CO ppm	0.00	0.00	0.00	0.00
Stack Diameter "	30.00	30.00	30.00	30.00
Stack Temperature F	240.00	243.00	232.00	238
Stack Pressure "Hg	29.03	29.03	29.03	29.03
Test Conditions				
Sample Volume Ft3	27.941	26.339	24.993	26.424
Meter F	75.00	103.00	94.00	90.67
Nozzle Dia "	0.35	0.35	0.35	0.35
Time Min	60.00	60.00	60.00	60.00
Points	12.00	12.00	12.00	12.00
Pitot Tube Factor cp	0.83	0.83	0.83	0.83
Orfice Press "H2O	0.69	0.56	0.52	0.59
Condensate mls	720	720	710	717
Velocity Pressure "H2O	0.19	0.19	0.17	0.18
Meter Calibration	0.98	0.98	0.98	0.98
Test Calculations				
Water Vapor SDCF	33.890	33.890	33.420	33.734
Gas Sampled SDCF	26.220	23.480	22.639	24.113
Moisture %	56.38	59.07	59.62	58.36
Molecular Weight Dry	29.48	29.48	29.48	29.48
Molecular Weight Wet	23.01	22.70	22.64	22.78
Gas Velocity Ft/Sec	31.66	31.95	30.02	31.21
Flow Rate ACFM	9325	9409	8842	9192
Flow Rate DSCFM	2977	2806	2644	2809
Isokinetics %	107.9	102.5	104.9	105.1
Analytical Data				
Front Half				
Probe mg	34.5	16.6	34.8	28.6
Filter mg	49.1	37.5	41.8	42.8
Blanks mg	1.5	1.5	1.5	1.5
Subtotal mg	82.1	52.6	75.1	69.9
Back Half				
Impingers Inorg mg	0.2	0.6	1.2	0.7
Impingers Org mg	48.1	38.0	32.6	39.6
Blank mg	1.5	1.5	1.5	1.5
Subtotal mg	46.8	37.1	32.3	38.7
Total Weight Gain mg	128.9	89.7	107.4	108.7
Emission Data				
Front Half				
Grs/SDCF	0.0483	0.0346	0.0512	0.0447
Lbs/Hr	1.23	0.83	1.16	1.07
Back Half				
Grs/SDCF	0.0275	0.0244	0.0220	0.0246
Lbs/Hr	0.70	0.59	0.50	0.60
Total Emissions				
Grs/SDCF	0.0759	0.0589	0.0732	0.0693
Lbs/Hrs	1.93	1.42	1.66	1.67

Table 2.2 Particulate Sampling and Analysis

Site: ABI- Eagle Snacks Plant- Kettle #5
Date: October 9 and 10, 1989

Stack Parameters	Test 1	Test 2	Test 3	Ave
Barometric Pressure "Hg	29.05	29.05	29.05	29.05
Static Pressure "H20	-0.24	-0.24	-0.24	-0.24
CO2 %	0.00	0.00	0.00	0.00
O2 %	20.94	20.94	20.94	20.94
N2 %	81.36	81.36	81.36	81.36
CO ppm	0.00	0.00	0.00	0.00
Stack Area Ft^2	4.89	4.89	4.89	4.89
Stack Temperature F	73.00	73.00	73.00	73
Stack Pressure "Hg	29.03	29.03	29.03	29.03
Test Conditions				
Sample Volume Ft3	97.611	98.965	130.094	108.890
Meter F	110.00	119.00	104.00	111.00
Nozzle Dia "	0.22	0.22	0.22	0.22
Time Min	175.00	175.00	250.00	200.00
Points	25.00	25.00	25.00	25.00
Pitot Tube Factor cp	0.83	0.83	0.83	0.83
Orfice Press "H2O	0.98	0.94	0.97	0.96
Condensate mls	35	36	39	37
Velocity Pressure "H2O	0.40	0.38	0.37	0.38
Meter Calibration	0.98	0.98	0.98	0.98
Test Calculations				
Water Vapor SDCF	1.647	1.695	1.836	1.73
Gas Sampled SDCF	86.037	85.866	115.885	95.93
Moisture %	1.88	1.94	1.56	1.79
Molecular Weight Dry	29.48	29.48	29.48	29.48
Molecular Weight Wet	29.27	29.26	29.30	29.28
Gas Velocity Ft/Sec	35.54	34.65	34.16	34.79
Flow Rate ACFM	10429	10166	10024	10206
Flow Rate DSCFM	9836	9582	9485	9634
Isokinetics %	92.6	94.9	90.6	92.71
Analytical Data				
Front Half				
Probe mg	16.3	8.7	16.1	13.7
Filter mg	1.2	1.5	0.0	0.9
Blanks mg	1.5	1.5	1.5	1.5
Subtotal mg	16.0	8.7	14.6	13.1
Back Half				
Impingers Inorg mg	2.0	1.9	1.7	1.9
Impingers Org mg	5.6	4.1	3.2	4.3
Blank mg	1.5	1.5	1.5	1.5
Subtotal mg	6.1	4.5	3.4	4.7
Total Weight Gain mg	22.1	13.2	18.0	17.8
Emission Data				
Front Half				
Grs/SDCF	0.0029	0.0016	0.0019	0.0021
Lbs/Hr	0.24	0.13	0.16	0.18
Back Half				
Grs/SDCF	0.0011	0.0008	0.0005	0.0008
Lbs/Hr	0.09	0.07	0.04	0.07
Total Emissions				
Grs/SDCF	0.0040	0.0024	0.0024	0.0029
Lbs/Hrs	0.33	0.19	0.19	0.24

3.0 SITE DESCRIPTION

3.1 Kettle Fryer #5

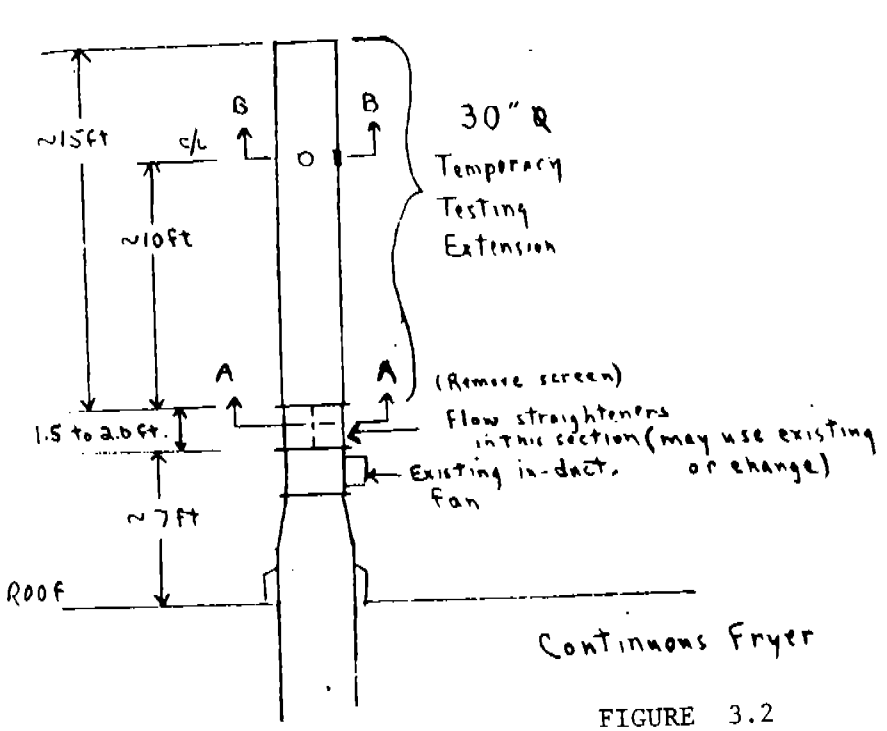
WES technicians collected samples Samples were from a 22" x 31" rectangular duct located on the roof. The sampling ports is a 3" by 18" slot which is on the 22" side. Figure 3.1 is the site diagram while Figure 3.3 shows the sampling points.

3.2 Continuous Fryer

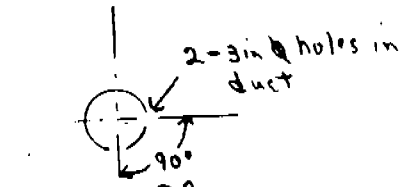
WES technicians collected the samples from a 30 inch diameter duct located above the roof. The sampling ports are two 3 inch diameter ports that are located at 90 degrees of each other on the same horizontal plane. Figure 3.2 is the site diagram while Figure 3.4 depicts the traverse points.

Eagle Snacks Inc
Visalia, CA

TEMPORARY TESTING STACKS



Continuous Fryer

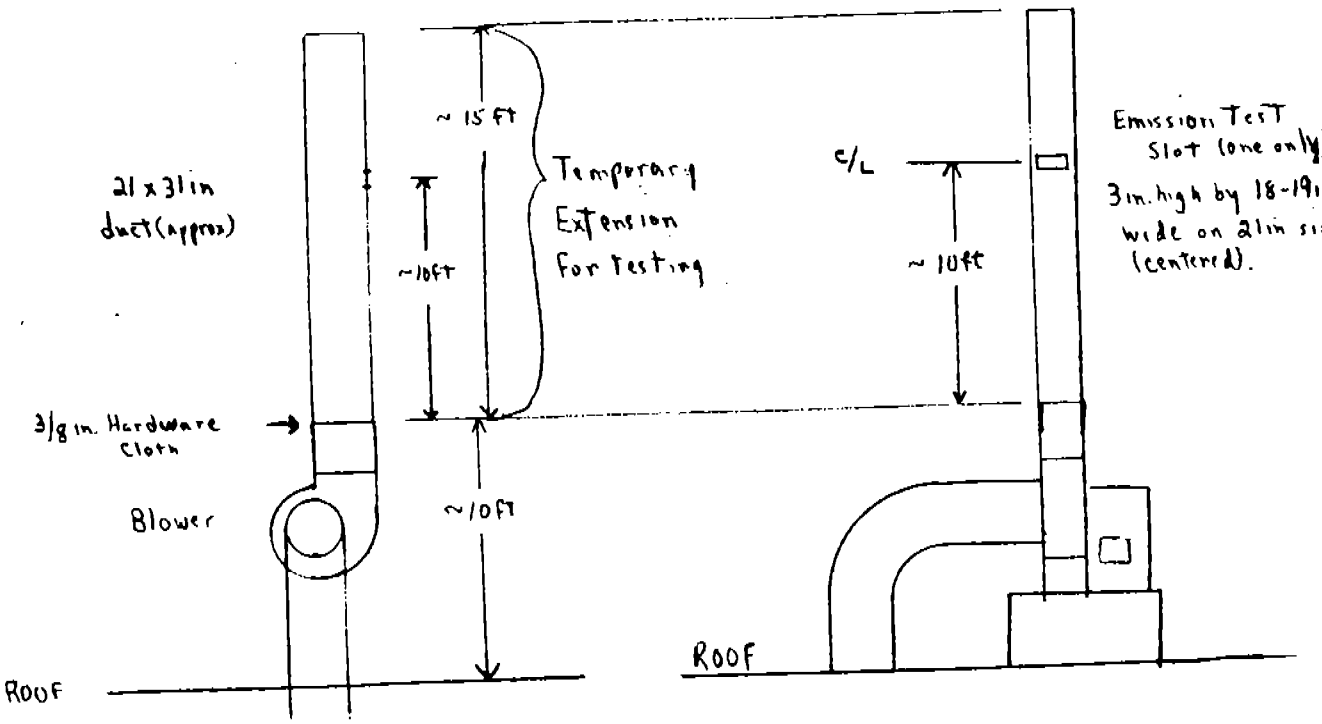


Section BB
Sample Ports
(any two accessible directions on duct w/ 90° between ports)

2 pieces hvy sheet metal crossed in duct center for entire height of 1.5 to 2.0 ft section

Section AA
Flow Straightners

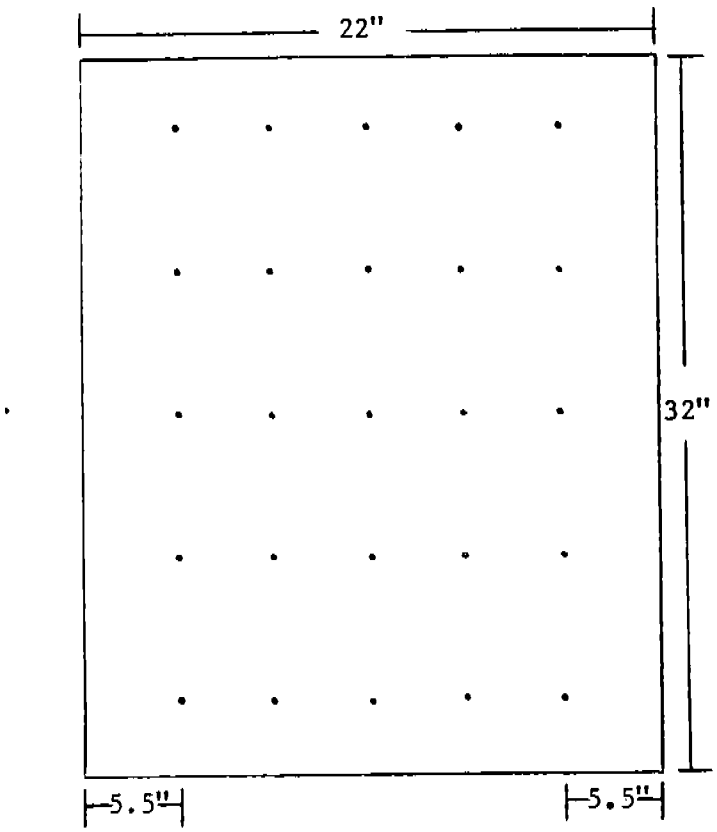
FIGURE 3.2



Kettle Fryer

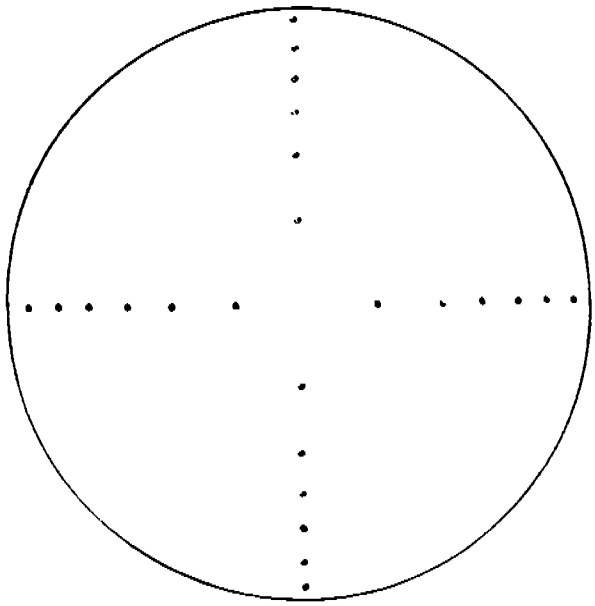
DMD
4-14-89

FIGURE 3.1



TRAVERSE POINT	DISTANCE
1.	2.15
2.	6.45
3.	11.0
4.	15.3
5.	19.7

FIGURE 3.3 KETTLE FRYER # 5



Traverse Point	Fraction	Stack ID	Traverse Point
1.	2.1	30"	.63
2.	6.7	30"	2.01
3.	11.8	30"	3.54
4.	17.7	30"	5.31
5.	25.0	30"	7.50
6.	35.6	30"	10.68
7.	64.4	30"	19.38
8.	75.0	30"	22.50
9.	82.3	30"	24.69
10.	88.2	30"	26.46
11.	93.3	30"	27.99
12.	97.9	30"	29.37

FIGURE 3.4 CONTINUOUS FRYER

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Traverse Point Location

Traverse point locations were determined by utilizing EPA Method 1, "Sample and Velocity Traverses for Stationary Sources." Twenty four sampling points were used at the continuous fryer. Due to the scaffolding placement, samples were collected from one traverse. Twenty five traverse points were used for Kettle #5.

4.2 Particulate Sampling and Analysis

Six EPA Method Five samples were collected during the testing program. Triplicate tests were performed at each location.

The sampling train consisted of a stainless steel nozzle, stainless steel probe, heated four inch filter, four glass impingers, silica gel impinger, pump, and a calibrated dry gas meter. The first and second impingers each contained 100 milliliters of distilled water. The third impinger was empty. Figure 4.1 depicts the sampling train.

After assembling the sampling train, it was leak checked and the sampling was not started until a leak rate of less than 0.02 cfm at 15 inches of mercury was achieved.

During the testing, the sampling was performed isokinetically at each traverse point. The velocity measurements were made at individual traverse points using a Type "S" pitot tube connected to an magnehlic with divisions measuring 0.05 inches of water. The stack temperature was measured by using a Type K thermocouple wire attached to a calibrated digital readout.

Five minute samples were collected at each point for the continuous fryer while 7 minute traverse points were used on the

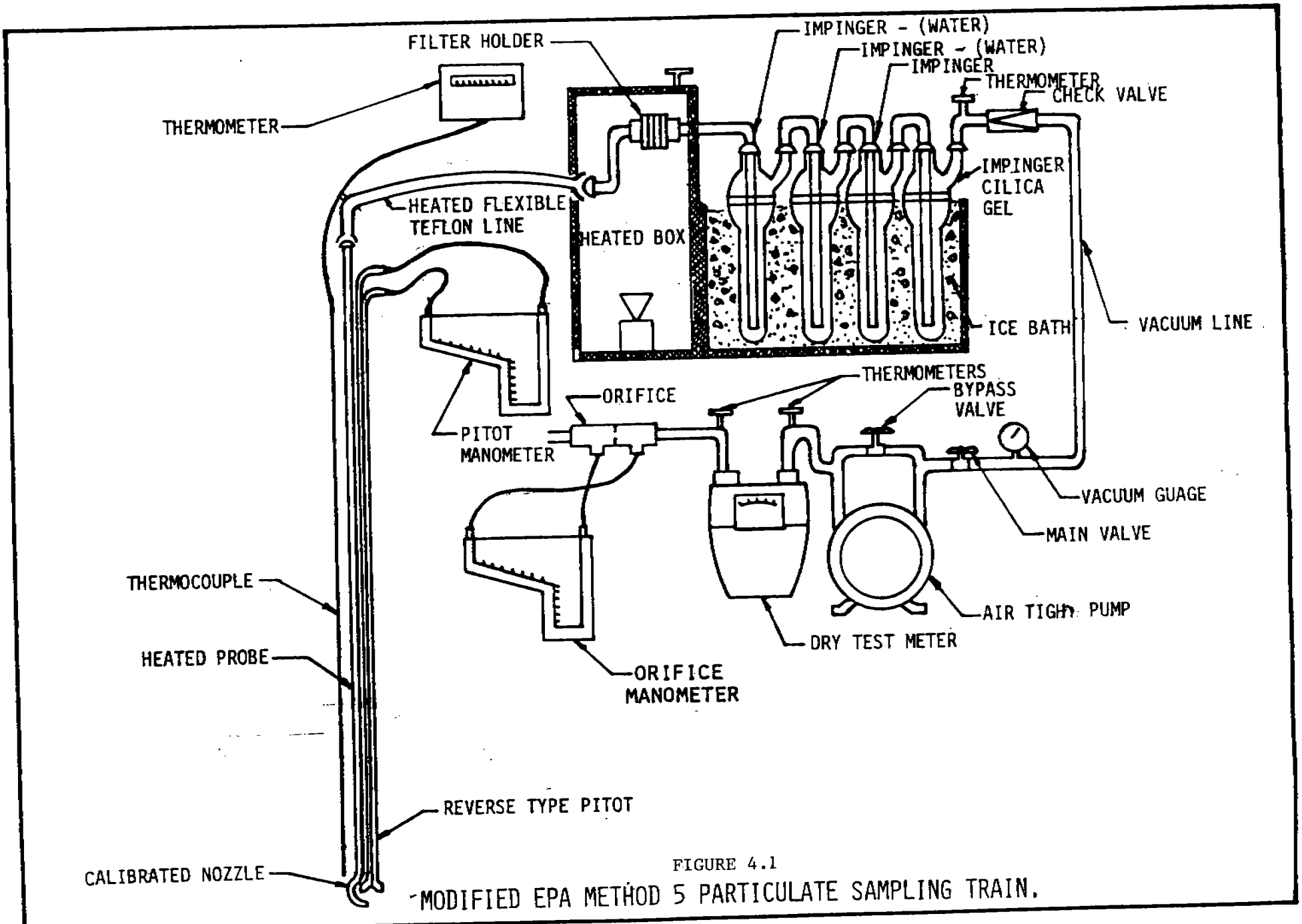


FIGURE 4.1

MODIFIED EPA METHOD 5 PARTICULATE SAMPLING TRAIN.

first and second test of Kettle #5. For Kettle #5, test #3, the sampling time was increased to 10 minutes per traverse point. The continuous fryer consisted of one hour samples while Kettle #5 sampling time varied between 175 and 250 minutes.

Upon completion of each test, the sampling train was leak checked before disassembling the sampling system. The nozzle and the probe were removed from the train. The probe was rinsed and brushed with a nylon brush on a stainless steel handle. The probe and nozzle were rinsed with acetone. The solutions were placed into a 500 milliliter amber glass bottle. The bottle was labeled and retained for analysis.

The impinger solutions were re-measured and recovered with distilled water. The solutions were placed into 950 milliliter amber glass bottles. The bottles were labeled and retained for analysis. In addition, the impingers were rinsed with acetone, and the solutions were placed into the probe rinse bottle labeled for acetone.

The glass fiber filter was removed from the filter holder and was placed into a petri dish. The front half of the filter holder was rinsed with acetone. The back-half of the filter holder was rinsed with distilled water. The distilled water rinses were placed with the impinger solutions and the acetone rinses were placed with acetone probe rinse.

The analysis was performed by evaporating the acetone probe rinses to dryness in tared beakers. The water solutions were combined and extracted with 50 milliliters of petroleum ether. The inorganic and organic fractions were evaporated in tared beakers. The beakers and filter were placed into a desiccator and were weighed to constant weights.

The data reduction was performed by using EPA Method Five calculations.

5.0 QUALITY ASSURANCE

5.1 Field Equipment Quality Assurance

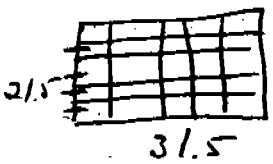
The calibration of the pitot tube, dry gas meter, digital thermometers, and manometers were performed by utilizing standard EPA Methodology, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods (EPA-600/4-77-0278).

APPENDIX A

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

4.3

PLANT ABI
DATE 10/9/89
SAMPLING LOCATION Kettle #5
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE A)
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE, (DISTANCE B)
STACK I.D., (DISTANCE A - DISTANCE B)
NEAREST UPSTREAM DISTURBANCE
NEAREST DOWNSTREAM DISTURBANCE
CALCULATOR



SCHEMATIC OF SAMPLING LOCATION

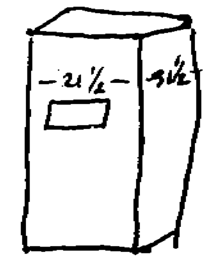
2.15
6.45 " 11.00
~~10.35~~ ~~15.90~~
~~17.85~~ ~~15.9~~
~~17~~3 17.20

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1/8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1			3.15		2.15
2			9.45		6.45
3			15.75		11.00
4			22.05		15.3
5			28.35		19.7

FIELD DATA

PLANT Eagle Snack
DATE 10/9/89
SAMPLING LOCATION Kettle #5
SAMPLE TYPE Part.
RUN NUMBER #1
OPERATOR N Muzik
AMBIENT TEMPERATURE 75
BAROMETRIC PRESSURE 29.05
STATIC PRESSURE, (P_s) -.24
FILTER NUMBER (s) 4,052

PROBE LENGTH AND TYPE #9 5' Glass
NOZZLE I.D. 0.22
ASSUMED MOISTURE, % 5%
SAMPLE BOX NUMBER
METER BOX NUMBER Green-8[illegible]
METER $\Delta H_@$ #7
C FACTOR
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp #2



SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .008 cfm @ 18"

READ AND RECORD ALL DATA EVERY 7 MINUTES

Postleak ✓ < .003 cfm at 7"

TRAVERSE POINT NUMBER	SAMPLING TIME, min	CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O DESIRED	ORIFICE PRESSURE DIFFERENTIAL ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	DRY GAS METER TEMPERATURE OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	Probe
	0	10:07	877.000										
1	7	10:14	880.150	.25	.56	.56	70	80	80	1	225	58	240
2	14	1021	883.065	.28	.63	.63	71	84	80	2	250	58	238
3	21	1028	886.770	.43	.97	.97	74	90	83	4	230	58	238
4	28	1035	890.690	.45	1.03	1.03	72	98	87	5	250	58	240
5	35	1042	894.850	.47	1.09	1.09	73	102	90	5	275	58	236
6	42	1049	898.790	.45	1.06	1.05	70	108	94	5	260	58	233
2	49	1056	902.980	.50	1.17	1.17	73	111	98	6	250	58	220
3	56	1103	907.175	.48	1.13	1.13	73	112	100	5	270	58	252
4	63	1110	910.950	.38	.90	.90	73	114	104	4	285	58	254
5	70	1117	914.475	.32	.76	.76	73	116	106	3	250	58	275
1	77	1124	917.880	.30	.72	.72	73	116	108	3	230	58	265
2	84	1131	921.850	.43	1.02	1.02	73	116	110	4	245	58	269
3	91	1138	926.125	.50	1.19	1.19	73	116	110	4	260	58	275
4	98	1145	930.460	.48	1.15	1.15	73	118	112	5	255	58	266
5	105	1152	934.520	.45	1.08	1.08	73	120	114	4	230	58	272
1	112	1159	938.580	.43	1.03	1.03	73	122	115	4	250	58	246
2	119	1206	942.875	.50	1.20	1.20	73	122	116	5	260	58	240
3	126	1213	947.075	.46	1.11	1.11	73	124	116	4	275	58	268
4	133	1220	951.180	.44	1.06	1.06	73	126	118	4	230	58	278
5	140	1227	955.160	.40	.97	.97	73	125	118	4	250	58	254
1	147	1234	959.110	.40	.97	.97	73	124	118	4	270	58	263
2	154	1241	963.065	.41	.99	.99	73	124	118	5	285	58	261
3	161	1248	966.990	.41	.97	.97	73	126	118	5	250	58	255
4	168	1255	970.975	.42	1.00	1.00	73	126	118	5	225	58	263
5	175	1302	974.611	.32	.76	.76	73	126	118	4	245	58	250
	(175)		97.611	0.41		0.98	73	116					

(√.64)

COMMENTS: Stk Temp Wavered from 65–80° 73° Average

For West

For East

EPA (Dur) 235
4/72

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Completion Dates
1. _____ 2. _____
3. _____ 4. _____
Indicate by numbers in box under Sample column.

ABF
Test #1

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

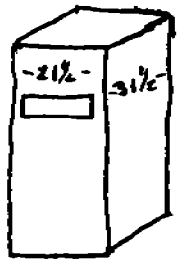
ALL WEIGHTS IN GRAMS

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. 97.8672	9.	Pure	86.6	1. 97.8847	9.
2. 97.8687	10.			2. 97.8846	10.
3. 97.8682	11.	FILTER OR CONTAINER PLUS SAMPLE	97.8847	3. 97.8847	11.
4. 97.8684	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	97.8684	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0163	7.	15.
8.	16.			8.	16.
1. 0.6407	9.	Filter	4.052	1. .6415	9.
2. 0.6408	10.			2. .6420	10.
3. 0.6407	11.	FILTER OR CONTAINER PLUS SAMPLE	0.6419	3. .6422	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	0.6407	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0012	7.	15.
8.	16.			8.	16.
1. 105.3720	9.	Imp D	12.7	1. 105.3772	9.
2. 105.3730	10.			2. 105.3783	10.
3. 105.3727	11.	FILTER OR CONTAINER PLUS SAMPLE	105.3782	3. 105.3813	11.
4.	12.			4. 105.3783	12.
5.	13.	FILTER OR CONTAINER TARE	105.3726	5. 105.3780	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0056	7.	15.
8.	16.			8.	16.
1. 95.8120	9.	Imp F	94.6	1. 95.8138	9.
2. 95.8120	10.			2. 95.8139	10.
3. 95.8120	11.	FILTER OR CONTAINER PLUS SAMPLE	95.8140	3. 95.8143	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	95.8120	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	.0020	7.	15.
8.	16.			8.	16.

FIELD DATA

PLANT Eagle Snack
DATE 10/9/99
SAMPLING LOCATION Kettle #5
SAMPLE TYPE Part
RUN NUMBER #2
OPERATOR N Musik
AMBIENT TEMPERATURE 80
BAROMETRIC PRESSURE 28.90
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 4,053

PROBE LENGTH AND TYPE #9 5' Glass
NOZZLE I.D. 0.22
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER Green
METER BOX NUMBER Green - 86
METER $\Delta H_@$ #7
C FACTOR
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp #2



SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .007 cfm @ 19"

READ AND RECORD ALL DATA EVERY 7 MINUTES

Postleak ✓ < .003 cfm @ 5"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)		GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	Probe
	0	1347	975.650		DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
1	7	1354	979.050	.41	.97	.97	73	112	112	Ø	250	84	273
2	14	1401	983.175	.42	1.00	1.00	73	114	114	Ø	270	82	240
3	21	1408	987.265	.42	1.00	1.00	73	118	114	Ø	225	80	225
4	28	1415	990.165	.37	.89	.89	73	120	114	Ø	225	82	205
5	35	1422	995.150	.39	.94	.94	73	121	115	Ø	240	80	195
1	42	1429	999.400	.45	1.08	1.08	73	121	116	Ø	250	80	246
2	49	1436	1003.735	.47	1.13	1.13	73	124	116	Ø	230	80	262
3	56	1443	1008.080	.47	1.14	1.14	73	125	118	Ø	250	80	267
4	63	1450	1012.180	.41	.99	.99	73	125	118	Ø	265	80	273
5	70	1457	1016.055	.36	.87	.87	73	126	118	Ø	245	80	275
1	77	1504	1019.730	.32	.77	.77	73	126	118	Ø	260	80	270
2	84	1511	1023.800	.41	.99	.99	73	124	119	Ø	275	80	266
3	91	1518	1028.000	.49	1.18	1.18	73	124	120	1	250	80	269
4	98	1525	1032.525	.45	1.09	1.09	73	126	120	1	230	80	269
5	105	1532	1036.800	.44	1.07	1.07	73	126	120	1	265	80	268
1	112	1539	1041.150	.46	1.11	1.11	73	125	120	1	270	80	244
2	119	1546	1045.600	.48	1.16	1.16	73	124	118	1	240	82	237
3	126	1553	1050.100	.46	1.11	1.11	73	122	118	1	255	82	266
4	133	1600	1053.710	.32	.77	.77	73	122	117	1	235	82	271
5	140	1607	1057.175	.28	.67	.67	73	120	116	Ø	270	82	269
1	147	1614	1060.270	.22	.53	.53	73	120	116	Ø	228	84	275
2	154	1621	1063.610	.27	.69	.64	73	116	114	Ø	255	84	270
3	161	1628	1067.500	.37	.88	.88	73	116	114	Ø	270	84	267
4	168	1635	1071.000	.29	.69	.69	73	116	112	Ø	245	84	274
5	175	1642	1074.615	.30	.72	.72	73	116	112	Ø	250	84	268
			98.965	1.62	.39	.94	73	119					

COMMENTS: Stk Temp Var. From 65-80° Avg 73°

EPA (Dur) 295
4 72

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Completion Dates
1. _____ 2. _____
3. _____ 4. _____
Indicate by numbers in box under Sample column.

ABF Test #2

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT			TARE + SAMPLE WEIGHT
1. 95.9388	9.		1. 95.9483 9.
2. 95.9397	10.	SAMPLE NUMBER: Pink	FILTER OR CONTAINER #: 29.7	2. 95.9479 10.
3. 95.9397	11.	FILTER OR CONTAINER PLUS SAMPLE: 95.9481	3. 95.9482 11.
4.	12.	FILTER OR CONTAINER TARE: 95.9394	4. 12.
5.	13.	SAMPLE: 0.0087	5. 13.
6.	14.		6. 14.
7.	15.		7. 15.
8.	16.		8. 16.

1. .6658	9.		1. .6698 9.
2. .6643	10.	SAMPLE NUMBER: Filter	FILTER OR CONTAINER #: 4.053	2. .6676 10.
3. .6658	11.	FILTER OR CONTAINER PLUS SAMPLE: 0.6673	3. .6717 11.
4.	12.	FILTER OR CONTAINER TARE: 0.6658	4. .6671 12.
5.	13.	SAMPLE: 0.0015	5. .6684 13.
6.	14.		6. .6688 14.
7.	15.		7. .6672 15.
8.	16.		8. 16.

1. 85.9574	9.		1. 85.9616 9.
2. 85.9572	10.	SAMPLE NUMBER: Imp D	FILTER OR CONTAINER #: 92.6	2. 85.9615 10.
3. 85.9575	11.	FILTER OR CONTAINER PLUS SAMPLE: 85.9615	3. 85.9642 11.
4.	12.	FILTER OR CONTAINER TARE: 85.9574	4. 85.9615 12.
5.	13.	SAMPLE: 0.0041	5. 13.
6.	14.		6. 14.
7.	15.		7. 15.
8.	16.		8. 16.

1. 98.1070	9.		1. 98.1106 9.
2. 98.1085	10.	SAMPLE NUMBER: Imp T	FILTER OR CONTAINER #: 81.6	2. 98.1105 10.
3. 98.1088	11.	FILTER OR CONTAINER PLUS SAMPLE: 98.1106	3. 98.1106 11.
4. 98.1087	12.	FILTER OR CONTAINER TARE: 98.1087	4. 12.
5.	13.	SAMPLE: 0.0019	5. 13.
6.	14.		6. 14.
7.	15.		7. 15.
8.	16.		8. 16.

FIELD DATA

PLANT Eagle Summit
DATE 10/10/89
SAMPLING LOCATION Kettle 5
SAMPLE TYPE Part
RUN NUMBER #3
OPERATOR N Muzik
AMBIENT TEMPERATURE 65
BAROMETRIC PRESSURE 29.00
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 4.054

PROBE LENGTH AND TYPE #9 5' Glass
NOZZLE I.D. 0.22
ASSUMED MOISTURE, % 5
SAMPLE BOX NUMBER
METER BOX NUMBER Green-86
METER $\Delta H_@$ #7
C FACTOR
PROBE HEATER SETTING 250
HEATER BOX SETTING 250
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .007 cfm @ 15"

READ AND RECORD ALL DATA EVERY 10 MINUTES

Postleak ✓ < .004 cfm @ 10"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)		GAS METER READING (V_m), ft³	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	Probe
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	0	815	076.131										
1	10	825	080.680	.35	.76	.76	73	66	64	2	250	76	285
2	20	835	085.930	.41	.91	.91	73	82	68	4	240	76	275
3	30	845	091.275	.41	.92	.92	73	86	74	4	225	72	262
4	40	855	096.710	.42	.95	.95	73	90	78	5	255	60	255
5	50	905	101.730	.35	.80	.80	73	96	84	4	275	58	250
1	60	915	107.320	.44	1.01	1.01	73	101	89	5	245	58	237
2	70	925	113.100	.46	1.07	1.07	73	106	92	5	275	58	225
3	80	935	118.980	.47	1.10	1.10	73	108	96	5	260	58	254
4	90	945	124.660	.43	1.01	1.01	73	108	99	5	225	58	248
5	100	955	130.040	.38	.89	.89	73	105	100	5	265	56	250
1	110	1005	135.240	.36	.85	.85	73	109	102	5	275	56	258
2	120	1015	140.950	.43	1.01	1.01	73	110	104	5	250	58	263
3	130	1025	147.020	.50	1.18	1.18	73	113	108	6	260	58	272
4	140	1035	153.040	.47	1.12	1.12	73	115	108	6	275	58	271
5	150	1045	158.950	.46	1.09	1.09	73	114	108	6	265	58	245
1	160	1055	165.075	.50	1.19	1.19	73	116	110	6	275	58	225
2	170	1105	171.210	.49	1.17	1.17	73	116	110	6	260	58	235
3	180	1115	177.375	.50	1.19	1.19	73	118	110	6	250	58	265
4	190	1125	182.750	.37	0.88	.88	73	120	111	5	270	58	267
5	200	1135	187.750	.32	.76	.76	73	118	112	4	265	58	278
1	210	1145	192.455	.27	.64	.64	73	118	112	4	270	58	280
2	220	1155	196.865	.27	.64	.64	73	118	112	4	250	58	280
3	230	1205	202.045	.35	.84	.84	73	114	114	4	250	58	285
COMMENTS: 5	240	1215	208.085	.48	1.15	1.15	73	118	114	6	265	58	278
	250	1225	214.225	.48	1.15	1.15	73	120	114	6	250	58	275

EPA (Dur) 235
4-72

(250) Stk Temp Var From 65°-80° (138.094) (1.64) (.41) (97) Avg 73 (104)

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Completion Dates
1. _____ 2. _____
3. _____ 4. _____
Indicate by numbers in box under Sample column.

ABT Test B

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

Probe

SAMPLE NUMBER: Probe
FILTER OR CONTAINER #: 30.7
FILTER OR CONTAINER PLUS SAMPLE: 102.1928
FILTER OR CONTAINER TARE: 102.1767
SAMPLE: 0.0161

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 102.1760	9.			1. 102.1933	9.
2. 102.1770	10.			2. 102.1925	10.
3. 102.1770	11.			3. 102.1926	11.
4.	12.			4.	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Filter

SAMPLE NUMBER: Filter
FILTER OR CONTAINER #: 4.054
FILTER OR CONTAINER PLUS SAMPLE: 0.6370
FILTER OR CONTAINER TARE: 0.6377
SAMPLE: -0-

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 0.6374	9.			1. 0.6370	9.
2. 0.6378	10.			2. 0.6371	10.
3. 0.6378	11.			3. 0.6370	11.
4.	12.			4.	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Imp D

SAMPLE NUMBER: Imp D
FILTER OR CONTAINER #: 5.7
FILTER OR CONTAINER PLUS SAMPLE: 102.9796
FILTER OR CONTAINER TARE: 102.9764
SAMPLE: 0.0032

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 102.9758	9.			1. 102.9797	9.
2. 102.9767	10.			2. 102.9801	10.
3. 102.9767	11.			3. 102.9822	11.
4.	12.			4. 102.9791	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Imp T

SAMPLE NUMBER: Imp T
FILTER OR CONTAINER #: 85.6
FILTER OR CONTAINER PLUS SAMPLE: 96.5916
FILTER OR CONTAINER TARE: 96.5899
SAMPLE: 0.0017

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 96.5883	9.			1. 96.5913	9.
2. 96.5897	10.			2. 96.5915	10.
3. 96.5898	11.			3. 96.5919	11.
4. 96.5901	12.			4.	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

FIELD DATA

PLANT Eagle Snack
DATE 10-11-89
SAMPLING LOCATION Cont. Fryer
SAMPLE TYPE Particulate
RUN NUMBER #4
OPERATOR Ty Hastinter
AMBIENT TEMPERATURE 70
BAROMETRIC PRESSURE 29.05
STATIC PRESSURE, (P_s) -.10
FILTER NUMBER (s) 4.055
@ 15 vac

PROBE LENGTH AND TYPE #9 Glass
NOZZLE I.D. .35
ASSUMED MOISTURE, % 45%
SAMPLE BOX NUMBER Green
METER BOX NUMBER #86 Green
METER $\Delta H_@$ #7
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp #9

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .008 cfm at 15" READ AND RECORD ALL DATA EVERY 5 MINUTES Postleak ✓ < .004 cfm at 6"

Flex 250°

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 900	217.920									
1	5 / 905	220.215	.20	.70	.70	226	62	62	0	250	58
2	10 / 910	222.545	.22	.75	.75	242	68	62	1	250	58
3	15 / 915	225.060	.23	.79	.79	243	72	64	2	270	55
4	20 / 920	227.650	.23	.79	.79	246	78	66	3	250	85
5	25 / 925	230.220	.24	.83	.83	245	80	68	3	220	85
6	30 / 930	232.760	.23	.79	.79	248	80	70	2	250	84
7	35 / 935	235.210	.22	.79	.79	224	82	72	2	220	68
8	40 / 940	237.485	.18	.62	.62	246	83	73	2	250	68
9	45 / 945	239.610	.17	.59	.59	242	84	74	1	225	72
10	50 / 950	241.695	.16	.56	.56	241	84	76	1	250	68
11	55 / 955	243.745	.15	.53	.53	238	85	76	1	220	68
12	60 / 1000	245.861	.16	.57	.57	236	85	78	2	250	68
	60	27.941	.20	.69		240	79	70	2	242	70
			1.44								

COMMENTS:

EPA (Dur) 235
4/72

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Completion Dates
1. _____ 2. _____
3. _____ 4. _____
Indicate by numbers in box under Sample column.

ABT Test #4

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

Duke

TARE WEIGHT		TARE + SAMPLE WEIGHT	
1. 97.8852	9.	1. 97.9196	9.
2. 97.8843	10.	2. 97.9188	10.
3. 97.8846	11.	3. 97.9192	11.
4.	12.	4.	12.
5.	13.	5.	13.
6.	14.	6.	14.
7.	15.	7.	15.
8.	16.	8.	16.

SAMPLE NUMBER: Duke
FILTER OR CONTAINER #: 7.7
FILTER OR CONTAINER PLUS SAMPLE: 97.9192
FILTER OR CONTAINER TARE: 97.8847
SAMPLE: 0.0345

Filter

TARE WEIGHT		TARE + SAMPLE WEIGHT	
1. 0.6379	9.	1. 0.6868	9.
2. 0.6381	10.	2. 0.6874	10.
3. 0.6379	11.	3. 0.6871	11.
4.	12.	4.	12.
5.	13.	5.	13.
6.	14.	6.	14.
7.	15.	7.	15.
8.	16.	8.	16.

SAMPLE NUMBER: Filter
FILTER OR CONTAINER #: 4.055
FILTER OR CONTAINER PLUS SAMPLE: 0.6871
FILTER OR CONTAINER TARE: 0.6380
SAMPLE: 0.0491

Imp O

TARE WEIGHT		TARE + SAMPLE WEIGHT	
1. 100.1314	9.	1. ✓ 100.1792	9.
2. 100.1330	10.	2. 100.1814	10.
3. 100.1332	11.	3. 100.1810	11.
4. 100.1338	12.	4. 100.1818	12.
5.	13.	5.	13.
6.	14.	6.	14.
7.	15.	7.	15.
8.	16.	8.	16.

SAMPLE NUMBER: Imp O
FILTER OR CONTAINER #: ~~26.3~~ 13.3
FILTER OR CONTAINER PLUS SAMPLE: 100.1814
FILTER OR CONTAINER TARE: 100.1333
SAMPLE: 0.0481

Imp I

TARE WEIGHT		TARE + SAMPLE WEIGHT	
1. 98.3323	9.	1. 98.3344	9.
2. 98.3341	10.	2. 98.3343	10.
3. 98.3343	11.	3. 98.3348	11.
4. 98.3345	12.	4.	12.
5.	13.	5.	13.
6.	14.	6.	14.
7.	15.	7.	15.
8.	16.	8.	16.

SAMPLE NUMBER: Imp I
FILTER OR CONTAINER #: 28.7
FILTER OR CONTAINER PLUS SAMPLE: 98.3345
FILTER OR CONTAINER TARE: 98.3343
SAMPLE: 0.0002

FIELD DATA

PLANT Eagle Smack
DATE 10-11-89
SAMPLING LOCATION Cont. Fryer
SAMPLE TYPE Particulate
RUN NUMBER #5
OPERATOR Ty Hastnter
AMBIENT TEMPERATURE 75°
BAROMETRIC PRESSURE 29.05
STATIC PRESSURE, (P_s) -.10
FILTER NUMBER (s) 4.056
.02 @ 25 sec

PROBE LENGTH AND TYPE #9 glass
NOZZLE I.D. .85
ASSUMED MOISTURE, % 45% 55%
SAMPLE BOX NUMBER Green
METER BOX NUMBER #86 Green
METER $\Delta H_@$ 1.7
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp New #2
.076 @ 23

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak < .012 cfm at 16"

READ AND RECORD ALL DATA EVERY 5 MINUTES

Postleak < .02 cfm at 19"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1100	246.400									
1	5 / 1105	248.605	.20	.74	.74	238	76	76	19	230	68
2	10 / 1110	250.750	.20	.73	.66	242	80	77	19	250	64
3	15 / 1115	252.885	.21	.78	.60	246	91	79	18	225	85
4	20 / 1120	255.040	.21	.80	.60	243	108	84	18	250	82
5	25 / 1125	257.385	.22	.58	.55	246	142	92	17	250	84
6	30 / 1130	259.800	.22	.58	.62	246	134	107	17	250	85
7	35 / 1135	262.115	.21	.55	.60	243	120	110	16	250	85
8	40 / 1140	264.375	.19	.49	.55	245	114	108	15	240	85
9	45 / 1145	266.615	.17	.44	.50	244	112	106	15	245	86
10	50 / 1150	268.685	.16	.42	.45	242	120	104	10	250	86
11	55 / 1155	270.795	.16	.42	.47	243	114	106	10	250	86
12	60 / 1200	272.739	.16	.41	.41	241	106	104	8	255	86
	60	26.339	.19	.58	.56	243	110	96	15	245	82
			.14								

COMMENTS:

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Completion Dates
1. _____ 2. _____
3. _____ 4. _____
Indicate by numbers in box under Sample column.

ABF Test #5

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. 103.1656	9.	Prob	93.6	1. 103.1823	9.
2. 103.1658	10.			2. 103.1823	10.
3. 103.1661	11.	FILTER OR CONTAINER PLUS SAMPLE	103.1824	3. 103.1825	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	103.1658	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0166	7.	15.
8.	16.			8.	16.

1. 0.6352	9.	Filter	4.056	1. 0.6748	9.
2. 0.6352	10.			2. 0.6753	10.
3. 0.6352	11.	FILTER OR CONTAINER PLUS SAMPLE	0.6732	3. 0.6727	11.
4.	12.			4. 0.6733	12.
5.	13.	FILTER OR CONTAINER TARE	0.6352	5. 0.6736	13.
6.	14.			6.	14.
7.	15.	SAMPLE	37.5	7.	15.
8.	16.		0.0380	8.	16.

1. 100.7689	9.	Imp O	~~93~~ 9.7	1. 100.8117	9.
2. 100.7703	10.			2. 100.8090	10.
3. 100.7707	11.	FILTER OR CONTAINER PLUS SAMPLE	100.8103	3. 100.8100	11.
4. 100.7712	12.			4. 100.8101	12.
5.	13.	FILTER OR CONTAINER TARE	100.7707	5. 100.8108	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0396	7.	15.
8.	16.			8.	16.

1. 96.3194	9.	Imp I	17.7	1. 96.3223	9.
2. 96.3207	10.			2. 96.3226	10.
3. 96.3214	11.	FILTER OR CONTAINER PLUS SAMPLE	96.3218	3. 96.3238	11.
4. 96.3215	12.			4. 96.3214	12.
5.	13.	FILTER OR CONTAINER TARE	96.3212	5. 96.3217	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0006	7.	15.
8.	16.			8.	16.

FIELD DATA

PLANT Eagle Snack
DATE 10-11-89
SAMPLING LOCATION Cent. Fryer
SAMPLE TYPE Particulate
RUN NUMBER #6
OPERATOR Ty Hastings
AMBIENT TEMPERATURE 85°
BAROMETRIC PRESSURE 29.05
STATIC PRESSURE, (P_s) -.10
FILTER NUMBER (s) 4.057
.032 @ 46

PROBE LENGTH AND TYPE #9 - glass
NOZZLE I.D. ~~.33~~ .350
ASSUMED MOISTURE, % 55%
SAMPLE BOX NUMBER Green
METER BOX NUMBER #86 Green
METER $\Delta H_@$ #7
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp ~~.026~~ New #2
.026 @ 20

Preleak ✓ < .012 cfm at 16"

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 5 MINUTES

Postleak ✓ < .003 cfm at 6"

TRAVERSE POINT NUMBER	SAMPLING TIME, min / CLOCK TIME (24-hr CLOCK)	GAS METER READING (V_m), ft^3	VELOCITY HEAD (Δp_s), in. H_2O	ORIFICE PRESSURE DIFFERENTIAL (ΔH), in. H_2O		STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 1300	273.672									
1	5 / 1305	275.440	.18	.54	.54	242	88	88	1	250	85
2	10 / 1310	277.720	.19	.57	.57	249	94	90	1	230	84
3	15 / 1315	279.980	.19	.57	.57	248	94	90	1	240	85
4	20 / 1320	282.255	.20	.60	.60	248	95	92	1	250	85
5	25 / 1325	284.445	.20	.60	.60	247	96	92	1	240	86
6	30 / 1330	286.705	.21	.63	.63	249	94	94	1	250	84
7	35 / 1335	288.885	.19	.58	.58	246	94	94	1	250	84
8	40 / 1340	291.060	.17	.52	.52	247	95	95	1	245	84
9	45 / 1345	293.060	.15	.46	.46	246	96	96	1	230	84
10	50 / 1350	294.900	.13	.40	.40	243	98	96	1	250	84
11	55 / 1355	296.790	.13	.40	.40	239	100	98	1	280	84
12	60 / 1400	298.665	.13	.40	.40	239	100	98	1	260	84
		24.993	.17	.52		245	94		1	248	84
			1.45								

COMMENTS:

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

Requestor ______

JN ______

Assigned to ______

Date Assigned ______

Completion Dates

1. ______ 2. ______

3. ______ 4. ______

Indicate by numbers in box under Sample column.

ABT Test #6

ALL WEIGHTS IN GRAMS

Sample Number: Rinse — **Filter or Container #:** 95.6

	Tare Weight	Tare + Sample Weight
1.	96.3036	96.3385
2.	96.3037	96.3387
3.	96.3037	96.3383
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Filter or Container Plus Sample: 96.3385

Filter or Container Tare: 96.3037

Sample: 0.0348

Sample Number: Filter — **Filter or Container #:** 4.07

	Tare Weight	Tare + Sample Weight
1.	0.6350	0.6846
2.	0.6350	0.6786
3.	0.6347	0.6746
4.		0.6766
5.		0.6768
6.		0.6767
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Filter or Container Plus Sample: 0.6767

Filter or Container Tare: 0.6349

Sample: 0.0418

Sample Number: Imp 0 — **Filter or Container #:** 11.7

	Tare Weight	Tare + Sample Weight
1.	101.1300	✓101.1585
2.	101.1285	101.1604
3.	101.1277	101.1607
4.	101.1282	101.1610
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Filter or Container Plus Sample: 101.1607

Filter or Container Tare: 101.1281

Sample: 0.0326

Sample Number: Imp I — **Filter or Container #:** 16.7

	Tare Weight	Tare + Sample Weight
1.	105.0513	105.0517
2.	105.0516	105.0524
3.	105.0516	105.0530
4.		105.0526
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		
16.		

Filter or Container Plus Sample: 105.0527

Filter or Container Tare: 105.0515

Sample: 0.0012

APPENDIX B

Ts # 1

Digital Thermometers Calibration

by: Ty Hastriter

Date: 11-30-88
Instrument: Thermocouple Thermometer

Calibrator Temperature	Digital Thermonmeter	Difference
	47	
50		
[illegible]	97	
100		
250	250	
300	300	
350	349	
400	399	
450	448	
500	499	
550	548	
600	597	
650		
700	648	
750	697	
800	747	
850	797	
900	848	
950	898	
1000	948	
	999	

GAS METER CALIBRATION

Meter No. 86 Green Box
Barometric Pressure 29.92
Date: Sept 19, 1989 Calibrated by: Ty

Orifice	Standard Meter Start	Finish	Temp F	Test Meter Start	Finish	Temp F	Time Min	V	Delta H
0.50	522.300	526.204	73	585.672	589.657	74	10	0.980	1.849
0.50	526.204	530.080	72	589.657	593.650	80	10	0.984	1.848
1.00	530.157	535.632	73	593.722	599.391	85	10	0.985	1.842
1.00	535.632	541.083	73	599.391	605.090	93	10	0.990	1.832
2.00	541.199	548.773	73	605.206	613.153	97	10	0.991	1.884
2.00	548.773	556.323	74	613.153	621.105	100	10	0.991	1.893
						Average		0.987	1.858

APPENDIX C

Nomenclature

P_b	Barometric Pressure, in. Hg.
P_m	Average Orifice Pressure Drop, in. Hg.
T_m	Average Dry Gas Meter Temperature, ^oF.
V_m	Volume of Dry Gas Sampled at Meter Conditions, ft^3
$V_{m_{std}}$	Volume of Dry Gas Sampled at Standard Conditions (1), ft^3
V_w	Total H_2O Collected in Impingers and Silica Gel, ml
$V_{w_{std}}$	Volume of Water Vapor Collected at Standard Conditions (1), ft^3
%M	Percent Moisture in Stack Gas, by Volume
M_d	Mole Fraction Dry Stack Gas
$\%CO_2$	Percent CO_2 by volume, dry
$\%O_2$	Percent O_2 by volume, dry
%CO	Percent CO by volume, dry
$\%N_2$	Percent N_2 by volume, dry
MW_d	Molecular Weight of Dry Stack Gas, gm/gm-mole
MW	Molecular Weight of Wet Stack Gas, gm/gm-mole
MW_c	Molecular Weight of Chemical
C_p	Pitot Tube Coefficient
P_s	Stack Gas Pressure, in. Hg., absolute
PPM	Parts per million
T_s	Stack Gas Temperature, ^oF
$\bar{T}_s$	Average Stack Gas Temperature, ^oF
T_{std}	Standard Temperature, ^oF

p	Velocity head, in. H_2O
V_s	Average Stack Gas Velocity, Stack Conditions, ft/sec
A_s	Stack Area, ft^2
Q_s	Stack Gas Flow Rate at Standard Conditions (1), dry ft^3/min
Q_a	Stack gas flow rate at stack conditions, ft^3/min
T_t	Net time of test min.
D_n	Sampling nozzle diameter, in.
%I	Percent isokinetic
M_f	Particulate collected in probe, cyclone and filter, mg.
M_t	Total particulate collected mg.
I_c	Percent of particulate caught in impingers
C_{sf}	Particulate concentrations at standard conditions (1), dry, based on probe, cyclone and filter catch, GRS/SDCF
C_{st}	Particulate concentration at standard conditions (1), dry based on total catch, GRS/SDCF
E_f	Particulate emission rate, based on probe, cyclone and filter catch, lbs/hr
E_t	Particulate emission rates based on total particulate catch, lbs/hr
P_u	Unit process rate
PE_f	Particulate emission rate on a process basis, probe, cyclone and filter catch
PE_t	Particulate emission rate on a process basis, total catch
%EA	Percent excess air in stack gas

Calculations

1. Volume of water vapor at standard conditions (1)

$$V_{w_{std}} = .00267 \times \frac{460 + Tstd}{29.92} \times Vlc$$

2. Volume of dry gas sampled at standard conditions (1)

$$V_{m_{std}} = 17.64 \times \frac{Vm\ (Pb + Pm)}{(Tm + 460)}$$

3. Percent moisture in stack gas by volume

$$\%M = \frac{100 \times V_{w_{std}}}{V_{w_{std}} + V_{m_{std}}}$$

4. Mole fraction dry stack gas

$$M_s = \frac{100 - \%M}{100}$$

5. Molecular weight of dry stack gas (gm/gm - Mole)

$$MW_d = \left[(\%\ CO_2 \times .44) + (\%\ O_2 \times .32) + (\%\ N_2 \times .28) + (\%\ CO \times .28) + (\%\ \underset{Gas}{Additional} \times \underset{Gas}{MW\ of\ Additional})\right]$$

6. Molecular weight of wet stack gas (gm/gm - Mole)

$$MW = (18 \times Bwo) + \left[(1 - Bwo) \times MW_d\right]$$

7. Stack gas velocity at stack conditions (2), (ft/sec)

$$V_s = 85.49 \times CP \times \sqrt{\Delta p} \times \sqrt{\frac{(Ts + 460)}{Ms \times Ps}}$$

8. Stack gas volumetric flow rate at stack conditions

$$Qa = Vs \times As \times 60$$

9. Stack gas volumetric flow rate at standard conditions (1)

$$Q_s = Qa \times \frac{528}{460 + Ts} \times \frac{Ps}{29.92} \times (1.00 - Bwo)$$

10. Percent isokinetic $\%I = \left[\frac{(Ts + 460) \times Vmstd}{Ps \times Vs \times AN \times T_t} \times (1-Bwo)\right] X.0945$

11. Particulate concentrations at standard conditions (1), dry, based on probe, cyclone and filter catch

$$Csf = \frac{MF \times 15.43}{Vmstd \times 1000}$$

12. Particulate concentration at standard conditions (1), dry, based on total catch

$$Cst = \frac{Mt \times 15.43}{Vmstd \times 1000}$$

13. Particulate emission rate, based on probe, cyclone, and filter catch

$$Ef = \frac{MF \times 60 \times Qs}{454000 \times (Vm(std))}$$

14. Particulate emission rate, based on total catch

$$Et = \frac{Mt \times 60 \times Qs}{454000 \times (Vm(std))}$$

15. Particulate emission rate on a process basis, probe, cyclone, and filter catch

$$PF_f = \frac{E_f}{P_u}$$

16. Particulate emission rate on a process basis, total catch

$$PE_t = \frac{E_t}{P_u}$$

17. Particulate emission rate, part per million

$$PPM = \frac{M_t}{V_{m_{std}}} \times \frac{863.3}{MW(c)}$$

(1) Standard conditions: 68^0, 29.92 "Hg

(2) $\sqrt{\Delta P_s \times (T_s + 460)}$ is determined by averaging the square root of the product of the velocity head (ΔP_s) and the absolute stack temperature ($T_s + 460$) for each individual point

APPENDIX D

PROCESS DATA

Visalia Eagle Snacks. Continuous Potato Chip Fryer Oct , 1989

Date	Time	Input, raw potatoes: Totalizer lb	Input, raw potatoes: rate lb/hr	Testing start/stop Time	Run No	Frying Oil Makeup lb	Frying Oil Circ. rate gal/min	Oil Temp, °F @Fryer Disch	Oil Temp, °F @HT Exch	Exhaust Damper %	Input SCO	Comments
10/11	0845:00	377300	11700		1	4345	1050	309	357	55		Occasional steam from [illegible] 1.107 Sp. Gr. Potatoes (~27% solids)
	0900:00	380250	11400	0900		4681	1043	311	359	55		
	0915:00	383210	11830			4947?	1073?	[illegible]	[illegible]	5		1,071 Sp. Gr. Potatoes [illegible] (~19% solids)
	0932:00	386550	12112			5344?	1077?	309	358	55		9:30 [illegible]
	0945:00	389108	11066?			5664?	1072	309	35-	55	59%	Slow down chip rate thru fryer to get longer fry time [illegible]
	1000:00	392060	11947		↓	5921	1070	312?	362	55		
	10:05:00	393145	12240	1005	1.	5942?	1060	3??	359	55		9:37 opened [illegible] to check
		12895 lb	in 65 min	≈ 11,903 lb/hr	→ use	11,900 lb/hr	Run #1					
	11:00:00	403580	11570	1100	2	7125	858	313	361	55	57%	% of 20,000 lb/hr max [illegible]
	11:15:00	406437	11400			7454	830	312	356	55		
	11:30:00	409292	11277			7682	770	310	357	55		
	11:45:00	412150	11210			7966	810	309	356	55		
	12:01:00	415196	11573	1200	2	8315	820	312	359	55		
		11616 lb	in 61 min	≈ 11,426 lb/hr	use	11,430 lb/hr	Run #2		360	55	57%	(≈ 20,000 × 0.57 = 11,400 lb/hr) Lower rate due to high potato moisture @1.071 Sp.gr (≈19% solids)
	13:00:00	426433	11484	1300	3	9450	830	311				
	13:15:00	429290	11720			9774	810	311	358	55		
	13:30:00	432147	11077			10056	820	308	357	55		
	13:45:00	435007	11785			10306	780	307	358	55		
	14:00:00	437862	11043	1400	3	10648	800	309	358	55	57%	
		11,429 lb		use 11,430 lb/hr		Run #3						

Visalia Eagle Snacks Kettle Fryer #5 Oct 9, 1989

Date	Test No	Emission Sample Time	Batch Set, lb	Batch Times Start hr:min	Cook Time m/s	Batch Weight lb (max)	Oil Temp °F Set	Inlet	Min	Out	psig To Seal	B.C. Time m/s
10/9	1		65.4	10:03		[illegible]	310	295	257	278	9	
		1007 (start)	65.4	10:10	6:40	64.2	310	291	257	278	9	7:56
			65.4	10:15	6:44	66.[illegible]	310	294	257	278		8:0[illegible]
			65.4	10:27	6:02	63.6	310	298	259	280	9	7:33
			65.4	10:35	7:12	73.2	310	299	256	281		8:01
			65.4	10:42	5:48	64.2	310	296	263	279		6:50
				10:49	5:46	63.0	310	292	264	278		6:05
				10:56	6:41	67.4	"	291	261	278		7:42
				11:04	6:17	63.2	"	292	264	279	9	7:12
Oct 9th	1		↓	11:11	6:05	65.2		292	263	279		7:03
				11:18	6:31	70.2	310	293	260	278		7:27
				11:26	6:06	6[illegible]		293	258	278		7:03
				11:33	6:21	66.0	311	292	263	279	9	7:20
			65.4	11:40	6:19	66.4	310	293	260	278		7:17
				11:47	5:56	63.4	311	292	263	279		6:57
				11:54	5:54	64.0	311	293	262	278		6:52
				1201	6:04	64.4	311	293	26[illegible]	278	9	7.02
			65.4	1208	6:14	6[illegible]	310	292	261	278		7.12
	1			1215	6:28	67.6	310	295	258	279		7:26
				1223	5:55	[illegible]	310	295	263	277		6:54
				1230	6:06	65.2	310	293	259	279		7:08
				1237	6:02	170	311	296	262	279		7:11
			65.4	1244	6:12	64.2	311	294	262	280	9	7:17
				1251	6:02	69.2	311	29[illegible]	260	279		7.03
				1258	6:15	65.2	310	292	262	281		7.13
		1302	←—	1305		67.2						

Comments

Delegard's level posted @ ~90°F
Suzanne called ~ [illegible] 733-[illegible]
Tony [illegible]
Computer transmitter not working. Batch size + start time do not appear on screen (temps + batch cycle do). Have operator record load manually off reading on control panel (digital) must record start times manually.
Weston Env. times at same time as wall clock time
1005 h = 1005 h

Processed
Σ batches from 10:03 → 13:05 (25 batches) / 3 hr + 02 min (182 min) = 1637.6 lb / 182 min

539.9 lb/h use → 540 lb/h

Visalia Eagle Snacks Kettle fryer #5 Oct. 9, 198[illegible]

Date	Test No.	Emission Sample Time	Batch Set lb	Batch Start hr/min	Weight act lb	Oil Temp °F Set	Initial	Min max	Out	Cook Time m/s	Batch cycle Time m/s	psig To seal psig
10/9	2		65.4	1341	64.8	310	298	263	279	6:04	7.20	9
		1347 (Start)	65.4	1348	63.0	311	295	260	279	550	645	
				1355	68.6	310	294	260	279	6:04	7:05	
				1402	67.6	310	292	259	279	5.47	640	
			65.4	1409	64.6	310	295	265	279	547	655	9
				1416	63.0	310	295	271	278	4:49	5.58	
				1422	63.2	311	292	265	279	5 34	6 32	
				1429	67.2	311	294	259	282	557	718	9
				1436	67.6	310	296	266	280	5 38	635	
	2			1443	66.6	310	297	263	280	5 43	700	
				1449	62.8	310	295	261	279	5 50	639	9
				1456	63.8	m	m	m	m	m	m	
				1503	67.6	310	299	265	280	5.51	719	
			65.4	1510	65.0	311	306	271	278	454	625	
				1517	64.4	310	293	262	278	603	712	9
				1524	65.8	310	296	260	280	601	712	
				15 31	63.6	310	297	260	279	6:03	659	
			65.4	15:38	67.2	310	294	258	280	6 10	7[illegible]	
				15 45	66.8	310	297	259	278	557	715	9
				15 52	65.[illegible]	311	305	267	276	5.12	702	
				1558	68.8	310	293	259	275	605	702	
				1605	64.[illegible]	311	295	263	279	5 33	642	
				1612	63.6	310	297	266	280	527	637	9
	2		65.4	1619	64.6	311	293	261	282	558	6.59	
				1626	63.8	310	296	265	281	533	631	
				1632	620	310	298	270	285	451	608	
				1638	67.8	310	2[illegible]4	263	281	507	647	9
		1642		1645	63.6							

Comments

Suzanne Tonys + Dave Warner of TCAPCD were observing from about 1410 to 1535

Σ batch (27) from 1341 → 1645 / 3 h 04 min (184) = 1765.8 lb

575.8 lb/h

use 576 lb/h

D-2

Visalia Eagle Snacks Kettle Fryer #5 Oct. 10, 1989

Test No	Emission Sample Time	Batch Start hr	Batch Weight lb	Oil Temp. °F Set	Oil Temp. °F Initial	Oil Temp. °F Minimum	Oil Temp. °F Out	Cook Time min/sec	Batch Cycle Time	Scrubbing psig	Comments
		0806	65.2	31[illegible]	29[illegible]	[illegible]	279	5:50	6:49	9	[illegible]
3	0815 (Start)	0812	64.0	311	292	263	279	5 [illegible]	615		
		0819	66.4	310	289	261	27[illegible]	[illegible]02	658		
		0826	63.4	310	299	269	28[illegible]	455	617		[illegible]
		0833	63.0	310	301	262	283	556	735		
		0840	72.0	310	297	261	280	602	714		
		0847	75.6	311	292	254	276	710	812	9	[illegible]
		0855	63.6	311	296	26[illegible]	27[illegible]	6:03	706		
		0902	65.2	311	293	271	280	5:14	6:16		[illegible]
		0908	64.6	311	293	26[illegible]	281	5:56	6:5[illegible]		
3		0915	67.4	310	294	2[illegible]	2[illegible]	5 3[illegible]	6:3[illegible]		
		0922	69.0	310	2[illegible]	[illegible]	27[illegible]	5:4[illegible]	6 37		
		0928	65.8	311	290	25[illegible]	279	6 32	7[illegible]	9	[illegible]
		0936	64.4	310	292	2[illegible]	279	607	658		[illegible]
		0943	68.4	310	295	260	279	613	709		[illegible]
		0950	66.8	311	294	263	277	6:18	7:07		[illegible]
		0957	62.4	310	290	268	27[illegible]	5 [illegible]	638		[illegible]
		1004	65.8	31[illegible]	293	26[illegible]	281	603	7[illegible]		[illegible]
		1011	65.4	310	29[illegible]	26[illegible]	277	5:42	64[illegible]		[illegible]
		1018	[illegible]	31[illegible]	29[illegible]	[illegible]	[illegible]	5 [illegible]	6 [illegible]		[illegible] -65.4
		1024	63.6	310	287	259	27[illegible]	[illegible]	72[illegible]		Batch set -64.4
		1032	65.0	310	295	264	277	546	648		
		1039	63.2	311	294	266	279	5 26	637		
		1045	65.4	310	291	256	27[illegible]	621	716	9	
		1052	67.0	310	294	264	279	559	657		[illegible] 65.4 lb Batch [illegible]
		1059	67.6	311	290	263	293	701	750		[illegible]
		1108	62.0	310	316	263	281	5 37	7 20		
		1120	66.0	311	313	257	279	7 27	13 [illegible]		
		1129	67.6	310	298	26[illegible]	281	504	634		
		1136	64.0	310	300	268	28[illegible]	556	726		
		1143	62.0	311	292	269	279	533	636	9	
		1149	[illegible].0	310	288	265	279	614	708		
		1156	70.4	310	297	269	27[illegible]	519	6.25		
		1203	67.2	311	289	263	279	632	728		Reset batch size to 67.0 lb
		1210	67.8	310	292	271	280	503	554		(potato moisture must be [illegible]
		1216	68.6	310	287	260	278	641	735		[illegible]
	1225 end	1224	69.2								smaller batches w/ higher moisture)
			66.0								

Process Rate

$$\frac{\Sigma\ 35\text{ batches } (0812 \rightarrow 1224)}{4\text{ hr } 9\text{ min} \times \frac{1}{60}} = \frac{2312.0}{249\text{ m}} \times \frac{60}{1} =$$

557.2 lb/hr (use 557 lb/hr)

Kettle 5

Run 1: 0.0251 g PM = 25.1 mg PM × 0.015432 gr/mg = 0.387 gr

0.387 gr / 86.037 dscf = 0.0045 gr/dscf

0.0045 gr/dscf × 1 #/7000 gr × 9826 dscf/min × 60 min/hr = 0.337 #PM/hr

0.337 #PM/hr × 1 hr/151 # potato product ⊗ × 2000 lb/ton = **4.46 #PM/ton potato product**

Run 2

.0024 gr/dscf × 1#/7000 × 9522 × 60 = 0.197 #PM/hr

0.197 × 1 hr/151 × 2000 = **2.61 #PM/ton potato product**

Run 3

.0024 × 1/7000 × 9485 × 60 = 0.195

0.195 × 1 hr/151 × 2000 = **2.58 #PM/ton potato product**

Avg 3.22 #PM/ton potato product

⊗ From report dated Feb 4-5, 1992 on Fryer II C.

ISOKINETIC DATA SHEET*

INSTALLATION: Eagle Snacks, Inc Visalia, CA DATE: Oct. 9, 1989

LOCATION: Kettle #5 Stack RUN NO. 2

FROM FIELD DATA SHEET

Square duct 21½ x 31½ = 4.7 ft²

C_p = 0.83 T_s = 533 A_s = 4.899 V_m = 98.965 P_{bar} = 29.03 $(\Delta p)^{0.5}_{avg}$ = 0.624

Θ = 175 T_m = 579 A_n = 0.00026 γ_m = 0.98 P_{stat} = -0.24 ΔH = 0.38

FROM PHYSICAL SCIENCE:

V_{lc} = 36 M_n = – $\%CO_2$ = 0 $\%O_2$ = 20.94 $\%N_2$ = 81.36 $\%CO$ = 0

PRESSURE CALCULATIONS:

$$P_m = P_{bar} + \frac{\Delta H}{13.6} = (29.03) + \frac{(0.38)}{13.6} = 29.06 \text{ in. } H_g$$

$$P_s = P_{bar} + \frac{P_{stat}}{13.6} = 29.03 + \frac{(-0.24)}{13.6} = 29.01 \text{ in. } H_g$$

DRY GAS VOLUME:

$$V_{m_{std}} = \frac{17.65\, V_m\, \gamma_m\, P_m}{T_m} = \frac{17.65\,(98.965)(0.98)(29.06)}{(579)} = 85.915 \text{ scf}$$

MOISTURE CONTENT: $V_{w_{std}} = 0.04707 \times V_{lc} = 0.0407 \times 36 = 1.69$

$$B_{wo} = \frac{V_{w_{std}}}{V_{m_{std}} + V_{w_{std}}} = \frac{(1.69)}{(85.915) + (1.69)} = 0.019$$

*Standard Temperature, 68°F (528°R)

*Standard Pressure, 29.92 in. H_g

ISOKINETIC DATA SHEET*
(continued)

INSTALLATION: DATE:

LOCATION: RUN NO.

STACK GAS MOLECULAR WEIGHT:

$M_s = (1 - B_{wo})\,[0.44\,(\%CO_2) + 0.32\,(\%O_2) + 0.28\,(\%N_2 + \%CO)] + 18B_{wo}$

$= (0.981)\,[0.44(\ 0\ ) + 0.32(20.94\ [6.700]) + 0.28(81.36\ [22.78])]\ +18(0.019)$

$= 29.26$ lb/lb mole wet [29.418]

STACK GAS VELOCITY:

$$V_{s_{avg}} = 85.48\ C_p(\Delta P^{0.5})_{avg}\left(\frac{T_s}{(P_s\ M_s)}\right)0.5$$

$$= 85.48\ (0.83)\left(\frac{68.820}{0.629}\right)\left(\frac{(533)}{(29.01)(29.26)}\right)0.5$$

$= 35.08$ ft/sec [848.83]

STACK GAS FLOW RATE:

$$Q_s = \frac{63{,}529\ (1 - B_{wo})\ (V_{s_{avg}})\ (A_s)\ (P_s)}{T_s} = \frac{63{,}529\ (0.981)\ (35.08)\ (4.7)\ (29.01)}{(533)}$$

$= 559267$ dscf/hr $= 9321$ dscf/min

PERCENT ISOKINETIC:

$$I = \frac{0.0945\ (T_s)\ (V_{m_{std}})}{\Theta V_s\ P_s\ A_n\ (1 - B)_{wo}}$$

$$= \frac{0.0945\ (533)\ (85.915)}{(175)\ (29.01)\ (0.00026)\ (0.981)\ (35.08)}$$

$= 95.3$ %

$\frac{4327.4}{70.61}$

*Standard Temperature, 68°F (528°R)
*Standard Pressure, 29.92 in. H_g