Sec 9 Sec. 4
Ref. 5 Ref. 4

AP-42 Section 9.13.3
Reference 5
Report Sect.
Reference

EMISSION PERFORMANCE TESTING ON ONE CONTINUOUS FRYER

SITE: EAGLE SNACKS, INC.
Visalia, California

DATE: January 26, 1993

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

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

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1.0 INTRODUCTION

At the request of Anheuser Busch Companies, Inc., St Louis, Missouri, Western Environmental Services (WES) conducted a compliance test at Eagle Snacks, Visalia, California. The testing consisted of collecting and analyzing particulate samples from the Continuous Potato Chip Fryer #1. The testing was performed on January 26, 1993 to provide compliance in-house engineering test data.

Triplicate particulate tests were performed at a single location, the stack exhaust of the Continuous Potato Chip Fryer #1. This Fryer is a Heat and Control Model PC-32. The particulate tests were conducted by using EPA Method 5. The laboratory analysis for organics was conducted by the State of Pennsylvania Method listed in Appendix D.

The unit produces potato chips for human consumption. This Fryer's exhaust vents through a larger improved demister, directly into the stack.

The following sections will be presented 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, Sample Calculations, and Process Data.

2.0 SUMMARY OF RESULTS

2.1 Discussion of Results

Tables 2.1 through 2.3 show the test results. Table 2.1 presents the particulate sampling results while Table 2.2 shows the particulate analytical results without the inorganic portion of the analysis included. Table 2.3 shows the particulate analysis with the inorganic portion in the emission data.

The results are summarized below.

Test #	Process Input #/Hr	Particulates (Without Inorganic Portion) Concentration Grs/SDCF	Emission Rate #/Hr
Potato Chip Line			
1	13,530	0.0499	1.297
2	13,530	0.0322	0.827
3	13,530	0.0192	0.516
Average	13,530	0.0338	0.880

Test Run #1 started approximately 15 minutes after a cold fire start up. These results are questionable because equilibrium was not reached.

2.2 Quality Assurance

The particulate sampling train was checked for leaks prior to and after each test. The sampling equipment was calibrated according to the Quality Assurance Handbook for Air Pollution Measurement Systems.

TABLE 2.1 PARTICULATE SAMPLING

SITE: EAGLE SNACKS
UNIT: CONTINUOUS FRYER
DATE: JANUARY 26, 1993

STACK PARAMETERS	TEST 1	TEST 2	TEST 3	AVERAGE
Barometric Pressure "Hg	29.85	29.85	29.87	29.86
Static Pressure "H20	0.02	0.02	0.02	0.02
CO2 %	0	0	0	0.00
O2 %	20.94	20.94	20.94	20.94
N2 %	79.06	79.06	79.06	79.06
CO ppm	0	0	0	0.00
Stack Diameter "	28	28	28	28.00
Stack Temperature F	209	204	206	206.33
Stack Pressure "Hg	29.85	29.85	29.87	29.86

TEST CONDITIONS	TEST 1	TEST 2	TEST 3	AVERAGE
Sample Volume Ft3	21.079	25.678	23.179	23.312
Meter F	48	53	56	52.33
Nozzle Dia "	0.29	0.29	0.29	0.29
Time Min	60	72	72	68.00
Points	24	24	24	24.00
Pitot Tube Factor cp	0.80	0.80	0.80	0.80
Orfice Press "H2O	0.46	0.48	0.37	0.44
Condensate mls	472	619	496	529.00
Velocity Pressure "H2O	0.201	0.210	0.209	0.207
Meter Calibration	1.019	1.019	1.019	1.019

TEST CALCULATIONS	TEST 1	TEST 2	TEST 3	AVERAGE
Water Vapor SDCF	22.217	29.136	23.347	24.90
Gas Sampled SDCF	22.289	26.889	24.141	24.44
Moisture %	49.92	52.01	49.16	50.36
Molecular Weight Dry	28.84	28.84	28.84	28.84
Molecular Weight Wet	23.43	23.20	23.51	23.38
Gas Velocity Ft/Sec	29.99	30.69	30.45	30.38
Flow Rate ACFM	7694	7873	7812	7793
Flow Rate DSCFM	3034	2998	3143	3058
Isokinetics %	114.2	116.2	99.5	109.97

TABLE 2.2 PARTICULATE ANALYSIS

SITE: EAGLE SNACKS
UNIT: CONTINUOUS FRYER
DATE: JANUARY 26, 1993

ANALYTICAL DATA	TEST 1	TEST 2	TEST 3	AVERAGE
FRONT HALF				
Probe mg	31.2	18.7	15.5	21.80
Filter mg	7.6	12.1	6.6	8.77
Blanks mg	3.5	3.5	3.5	3.50
Subtotal mg	35.3	27.3	18.6	27.07
BACK HALF				
Impingers Org mg	38.3	30.3	12.9	27.17
Blank mg	1.5	1.5	1.5	1.50
Subtotal mg	36.8	28.8	11.4	25.67
Total Weight Gain mg	72.1	56.1	30.0	52.73
EMISSION DATA	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
FRONT HALF				
Grs/SDCF	0.0244	0.0157	0.0119	0.0173
Lbs/Hr	0.635	0.402	0.320	0.452
BACK HALF				
Grs/SDCF	0.0255	0.0165	0.0073	0.0164
Lbs/Hr	0.662	0.424	0.196	0.428
TOTAL EMISSIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Grs/SDCF	0.0499	0.0322	0.0192	0.0338
Lbs/Hrs	1.297	0.827	0.516	0.880

NOTE: SEE SECTION 2.1 ABOUT THE DISCUSSION OF TEST #1

Impingers Inorg mg 18.1

TABLE 2.3 PARTICULATE ANALYSIS

WITH INORGANIC PARTICULATES

SITE: EAGLE SNACKS
UNIT: CONTINUOUS FRYER
DATE: JANUARY 26, 1993

ANALYTICAL DATA	TEST 1	TEST 2	TEST 3	AVERAGE
FRONT HALF				
Probe mg	31.2	18.7	15.5	21.80
Filter mg	7.6	12.1	6.6	8.77
Blanks mg	3.5	3.5	3.5	3.50
Subtotal mg	35.3	27.3	18.6	27.07
BACK HALF				
Impingers Inorg mg	50.0	36.4	18.1	34.83
Impingers Org mg	38.3	30.3	12.9	27.17
Blank mg	1.5	1.5	1.5	1.50
Subtotal mg	86.8	65.2	29.5	60.50
Total Weight Gain mg	122.1	92.5	48.1	87.57
EMISSION DATA	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
FRONT HALF				
Grs/SDCF	0.0244	0.0157	0.0119	0.0173
Lbs/Hr	0.635	0.402	0.320	0.452
BACK HALF				
Grs/SDCF	0.0601	0.0374	0.0189	0.0388
Lbs/Hr	1.562	0.961	0.508	1.010
TOTAL EMISSIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Grs/SDCF	0.0845	0.0531	0.0307	0.0561
Lbs/Hrs	2.197	1.363	0.828	1.462

NOTE: SEE SECTION 2.1 ABOUT THE DISCUSSION OF TEST #1

3.0 SITE DESCRIPTION

3.1 Continuous Potato Chip Fryer Line

Samples were collected from a 28" diameter vertical stack located on the roof. The sampling ports are located at 90 degrees of each other on the same horizontal plane. Figure 3.1 is the site diagram while Figure 3.2 presents the traverse point location.

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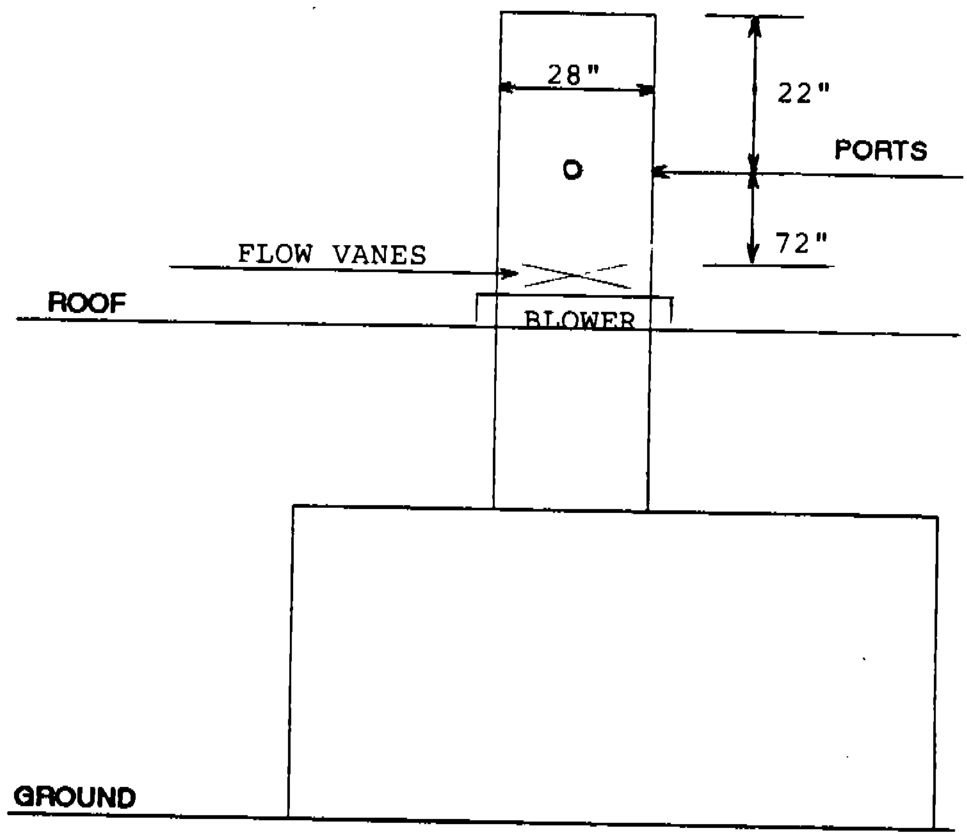
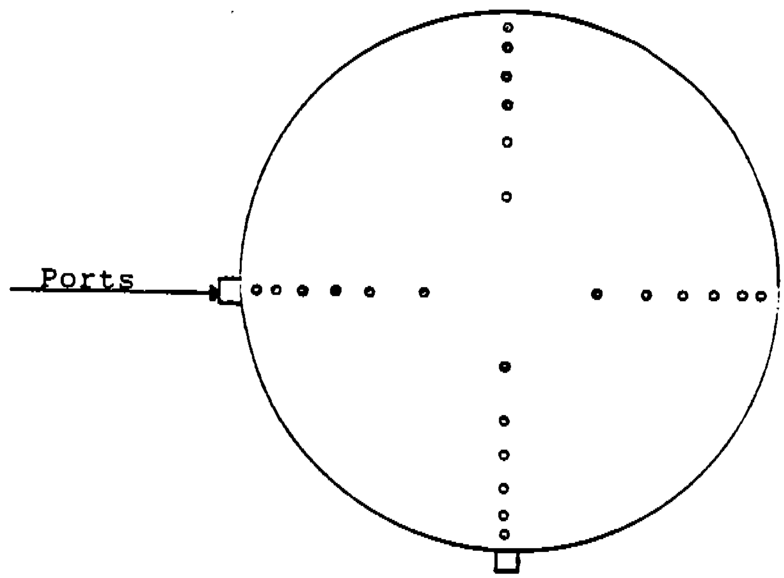




TRAVERSE POINT LOCATION STACK EXHAUST
FIGURE 3.2

TRAVERSE POINT	POINT LOCATION
1	6.59
2	7.88
3	9.90
4	10.96
5	13.00
6	15.97
7	24.03
8	27.00
9	29.04
10	30.70
11	32.12
12	33.41

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."

4.2 Particulate Sampling and Analysis

Triplicate EPA Method 5 particulate samples were collected at the stack exhaust of the continuous potato chip fryer line.

The sampling train consisted of a glass nozzle, glass probe, heated flex line, heated four inch filter, three glass impingers, silica gel impinger, pump, and a calibrated dry gas meter. The first and second impingers each contained 50 milliliters of distilled water. The third impinger was empty. The fourth contained silica gel to protect the pump. Figure 4.1 depicts the sampling train.

After assembling the sampling train, it was checked for leaks 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 on each traverse. The velocity measurements were made at individual traverse points using a Type "S" pitot tube connected to an inclined manometer with divisions measuring 0.02 inches of water. The stack temperature was measured by using a Type K thermocouple wire attached to a calibrated digital readout.

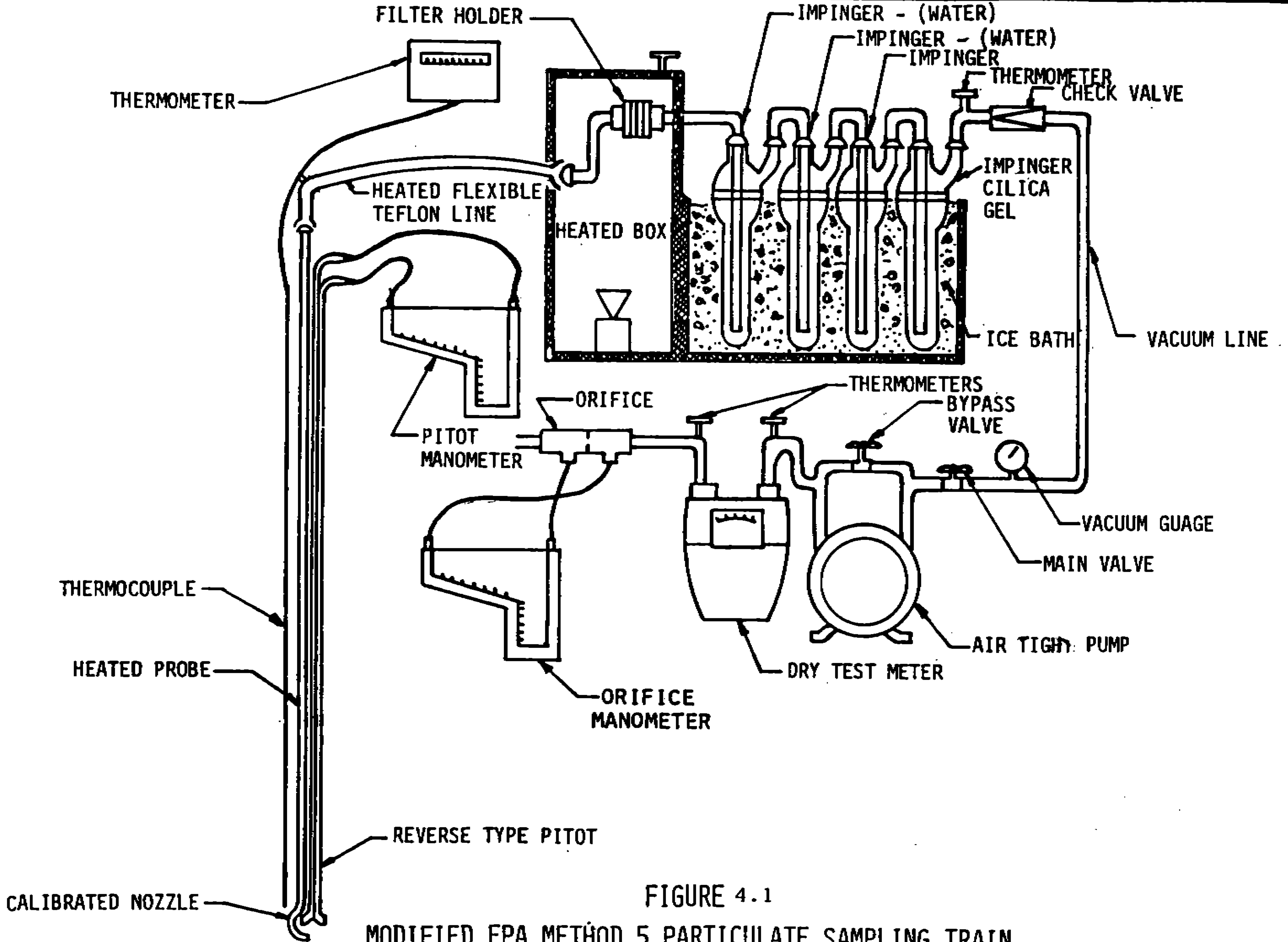


FIGURE 4.1
MODIFIED EPA METHOD 5 PARTICULATE SAMPLING TRAIN.

Upon completion of each test, the sampling train was checked for leaks 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 rinses were placed into a 950 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 a separate bottle.

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 into a separate bottle.

The analysis was performed by the Pennsylvania Department of Environmental Resources test procedure. The impinger solutions were extracted with ether. The organic fraction was filtered through a Whatman 42 into tared beakers. The extraction was repeated two times. The extraction was repeated by using chloroform. The chloroform and ether extracts were combined in a tared beaker. The The acetone rinses were filtered into individual tared beakers. The filter was extracted with ether and chloroform and dried in individual tared containers.

The data reduction was performed by using EPA Method 5 calculations.

4.3 Inorganic Gas Determination

During each particulate test, gaseous samples from the stack were sampled and analyzed for carbon dioxide and oxygen. Bag samples were collected and analyzed with a continuous monitoring system. The CEM system consisted of a Horiba PIR 2000 carbon dioxide gas analyzer and a Teledyne electrochemical oxygen analyzer.

The instruments were zeroed and spanned prior to and after the sampling period.

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).

WESTERN ENVIRONMENTAL SERVICES

APPENDIX A

FIELD DATA

PLANT Eagle Snacks
DATE 1-26-93
SAMPLING LOCATION Cont. Fryer
SAMPLE TYPE Particulate
RUN NUMBER #1 -
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 43
BAROMETRIC PRESSURE 29.85
STATIC PRESSURE, (P_s) +.02
FILTER NUMBER (s) 3,258

461 mls
11 grams
472 Vlc

PROBE LENGTH AND TYPE 5' - #
NOZZLE I.D. ~~.275~~ .290
ASSUMED MOISTURE, % 45%
SAMPLE BOX NUMBER WES #10
METER BOX NUMBER WES #10
METER $\Delta H_@$ WES #10
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp ± (0")

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY ______ MINUTES

Preleak ✓ = .005 cfm at 15"

Post leak ✓ = .007 cfm at 18"

	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	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	Probe Temp (F)
		0	736	843.437										
NW	1	2.5		844.3	0.20	.48	.48	182	44	42	3	266	40	247
	2	5	741	845.4	.27	.53	.53	192	44	42	3	268	40	247
	3	7.5		846.2	.24	.54	.54	209	45	42	3	268	39	248
	4	10	746	847.1	.23	.52	.52	195	46	43	6	267	41	248
	5	12.5		848.3	.25	.56	.56	197	47	43	7	271	44	248
	6	15.0	751	849.0	.25	.56	.56	191	48	43	10	274	46	247
	7	17.5		849.9	.20	.45	.45	195	49	43	12	273	47	247
	8	20	801	850.8	.20	.46	.46	195	49	44	12	274	47	245
	9	22.5		851.7	.19	.43	.43	200	49	44	12	273	48	244
	10	25		852.5	.19	.42	.42	201	50	44	12	274	47	244
	11	27.5		853.6	.20	.45	.45	205	51	45	12	274	49	245
	12	30	811	854.255	.18	.41	.41	208	52	45	11	274	49	246
		30	814											
SW	1	32.5		855.2	.22	.50	.50	200	51	46	13	275	49	246
	2	35.0	819	856.0	.21	.48	.48	215	52	46	15	274	49	248
	3	37.5		857.0	.21	.47	.47	221	52	46	15	275	49	248
	4	40.0	824	857.9	.20	.45	.45	224	52	46	12	275	49	248
	5	42.5		858.9	.19	.42	.42	226	53	46	14	275	50	248
	6	45.0	829	859.6	.18	.40	.40	227	53	47	14	275	50	248
	7	47.5		860.4	.18	.40	.40	226	53	47	14	276	50	247
	8	50		861.2	.18	.40	.40	226	53	47	14	275	50	246
	9	52.5		862.0	.18	.40	.40	224	53	47	14	276	49	247
	10	55		862.9	.18	.40	.40	223	53	47	14	273	48	246
	11	57.5		863.7	.18	.40	.40	220	54	47	15	274	48	246
	12	60		864.516	.18	.40	.40	216	54	48	15	275	48	246

COMMENTS:

EPA (Dur) 233 4/72

A00001

FIELD DATA

PLANT EAGLE SNACKS
DATE 1-26-92
SAMPLING LOCATION CONT FRYER
SAMPLE TYPE PARTICULATE
RUN NUMBER #2
OPERATOR ROONEY
AMBIENT TEMPERATURE 45
BAROMETRIC PRESSURE 29.85
STATIC PRESSURE, (P_s) ±.102
FILTER NUMBER (s) 3.261

605 mls
14 grams
619 V/C

PROBE LENGTH AND TYPE 5' GLASS
NOZZLE I.D. .240
ASSUMED MOISTURE, % 4.5
SAMPLE BOX NUMBER 10
METER BOX NUMBER 10
METER $\Delta H_@$ 1.96
C FACTOR
PROBE HEATER SETTING 250
HEATER BOX SETTING 270
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak Test ∠.005 cfm @ 16" Hg   READ AND RECORD ALL DATA EVERY 3 MINUTES   Post leak Test ∠.01 cfm at 20" Hg

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 DESIRED	ACTUAL	STACK TEMPERATURE (T_s), °F	DRY GAS METER TEMPERATURE INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F	PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F	IMPINGER TEMPERATURE, °F	
	0	1035	865.890										
NW 1	3	1038	867.2	.24	.55	.55	195	50	48	3	243	45	272
2	6	1041	868.2	.25	.58	.58	192	50	48	3	246	42	265
3	9	1044	869.3	.24	.55	.55	206	51	49	3	258	44	267
4	12	1047	870.4	.24	.55	.55	205	52	49	12	260	46	258
5	15	1050	871.6	.23	.52	.52	207	53	49	14	265	51	257
6	18	1053	872.7	.22	.50	.50	207	54	49	15	264	52	258
7	21	1056	873.7	.20	.45	.45	205	55	49	13	267	53	256
8	24	1059	874.7	.18	.41	.41	207	55	49	12	266	53	255
9	27	1102	875.9	.16	.36	.34	202	56	50	12	269	54	255
10	30	1105	876.6	.16	.37	.37	201	56	51	12	267	54	255
11	33	1108	877.6	.17	.39	.39	204	56	50	14	265	52	254
12	36	1111	878.543	.17	.39	.39	203	57	51		265	51	254
		1112											
SW 1	39	1115	879.7	.24	.54	.54	190	56	51	16	268	52	257
2	42	1118	880.9	.24	.55	.55	212	57	51	16	270	50	256
3	45	1121	881.2	.23	.51	.51	214	57	51	16	270	50	258
4	48	1124	883.2	.26	.58	.58	208	57	51	16	269	49	256
5	51	1127	884.2	.22	.50	.50	208	58	52	16	272	50	256
6	54	1130	885.4	.22	.50	.50	208	58	52	15	270	50	257
7	57	1133	886.4	.20	.46	.46	204	58	53	14	259	49	255
8	60	1136	887.4	.20	.46	.46	201	58	52	16	263	49	255
9	63	1139	888.7	.21	.48	.48	201	59	53	16	266	49	254
10	66	1142	889.5	.20	.46	.46	203	59	53	15	270	50	254
COMMENTS: 11	69	1145	890.5	.19	.43	.43	205	59	53	15	267	49	254
12	72	1148	891.568	.19	.43	.43	209	59	53	15	272	49	255
			25.678	0.211		[illegible]	[illegible]						

EPA (Dur) 235
4/72

A00002

FIELD DATA

PLANT Eagle Snacks
DATE 11/26/93
SAMPLING LOCATION Cont Fryer Outlet
SAMPLE TYPE Part
RUN NUMBER #3
OPERATOR Rooney
AMBIENT TEMPERATURE 50
BAROMETRIC PRESSURE 24.87
STATIC PRESSURE, (P_s) +.02
FILTER NUMBER (s)

488 mls
8 grams
496 Vlc

PROBE LENGTH AND TYPE 5' Glass
NOZZLE I.D. .29
ASSUMED MOISTURE, % 52
SAMPLE BOX NUMBER 10
METER BOX NUMBER 10
METER $\Delta H_@$
C FACTOR
PROBE HEATER SETTING
HEATER BOX SETTING
REFERENCE Δp

SCHEMATIC OF TRAVERSE POINT LAYOUT

Pre leak test 2.007 @ 18" Hg

READ AND RECORD ALL DATA EVERY 3 MINUTES

Post leak test 2.01 CFM @ 18" Hg

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 (ΔH), in. H_2O 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 Temp
	135	0	892.201										
N-1	138	3	893.2	.24	.43	.43	190	53	51	2	265	50	240
2	141	6	894.20	.23	.40	.40	204	54	52	2	267	46	252
3	144	9	895.3	.24	.42	.42	206	54	53	2	272	47	252
4	147	12	896.2	.24	.42	.42	206	55	52	2	272	50	254
5	150	15	897.3	.24	.42	.42	208	56	53	6	271	51	256
6	153	18	898.3	.22	.39	.39	206	57	53	8	275	52	264
7	156	21	899.3	.22	.39	.39	206	58	53	8	268	52	264
8	159	24	900.2	.18	.32	.32	194	58	53	8	270	51	268
9	202	27	901.1	.17	.30	.30	202	58	54	10	271	50	268
10	205	30	901.9	.17	.30	.30	203	59	54	10	277	50	268
11	208	33	902.7	.17	.30	.30	205	59	54	10	276	50	269
12	211	36	903.635	.17	.30	.30	205	59	54	11	274	50	273
	212												
S-1	215	39	904.7	.24	.42	.42	210	60	55	15	277	51	275
2	218	42	905.7	.23	.40	.40	214	60	55	12	274	49	278
3	221	45	906.7	.23	.40	.40	213	60	55	12	274	49	278
4	224	48	907.7	.23	.40	.40	213	61	55	14	273	49	278
5	227	51	908.7	.23	.40	.40	208	60	55	14	275	49	277
6	230	54	909.8	.22	.39	.39	206	61	55	14	275	48	273
7	233	57	910.8	.21	.37	.37	204	61	56	14	273	49	272
8	236	60	911.6	.20	.36	.36	205	60	56	12	272	49	272
9	239	63	912.6	.19	.34	.34	207	60	56	12	274	49	272
10	242	66	913.7	.19	.34	.34	205	60	56	12	273	49	271
11	245	69	914.5	.19	.34	.34	208	60	56	13	274	48	272
12	248	72	915.380	.19	.34	.34	209	61	56	15	276	51	273

COMMENTS:

EPA (Dur) 236
4/72

A00003

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

93-ABI-
CONT FRYER #1

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

Requestor ______
JN ______
Assigned to ______
Date Assigned ______

ALL WEIGHTS IN GRAMS

Tare Weight		Sample		Tare + Sample Weight	
1. ~~102.0018~~	9.	Sample Number: Probe + acetone wash rinse	Filter or Container #: 95.1	1. 102.0317	9.
2. 102.0005	10.	Filter or Container plus Sample: 102.0316		2. 102.0316	10.
3. 102.0005	11.	Filter or Container Tare: 102.0004		3. 102.0329	11.
4. 102.0003	12.	Sample: 0.0312		4. 102.0315	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Tare Weight		Sample		Tare + Sample Weight	
1. .3617	9.	Sample Number: Filter extracted	Filter or Container #: 3.258	1. 0.3770	9.
2. .3618	10.	Filter or Container plus Sample: 0.3693		2. 0.3694	10.
3. .3617	11.	Filter or Container Tare: 0.3617		3. 0.3693	11.
4.	12.	Sample: 0.0076		4. 0.3693	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Tare Weight		Sample		Tare + Sample Weight	
1. 98.3293	9.	Sample Number: Imp I solid	Filter or Container #: 94.1	1. 98.3796	9.
2. 98.3297	10.	Filter or Container plus Sample: 98.3798		2. 98.3794	10.
3. 98.3303	11.	Filter or Container Tare: 98.3298		3. 98.3805	11.
4.	12.	Sample: 0.0500		4.	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Milky col...

Tare Weight		Sample		Tare + Sample Weight	
1. 98.4924	9.	Sample Number: Imp C extracted	Filter or Container #: 96.1	1. 98.5295	9.
2. 98.4924	10.	Filter or Container plus Sample: 98.5305		2. 98.5300	10.
3. 98.4918	11.	Filter or Container Tare: 98.4922		3. 98.5310	11.
4. 98.4917	12.	Sample: 0.0383		4. 98.5306	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

93-ABT
CONT FRYER
Test #2

Requestor ______
JN ______
Assigned to ______
Date Assigned ______

ALL WEIGHTS IN GRAMS

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. ~~100.9854~~	9.	Probe	97.1	✓1. 101.0034	9.
2. 100.9847	10.	FILTER OR CONTAINER PLUS SAMPLE	101.0036	✓2. 101.0037	10.
3. 100.9851	11.	FILTER OR CONTAINER TARE	100.9849	3. 101.0045	11.
4. 100.9849	12.	SAMPLE	0.0187	✓4. 101.0036	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. .3590	9.	Filter	3.261	1. .4916	9.
2. .3591	10.	FILTER OR CONTAINER PLUS SAMPLE	.3712	✓2. .3713	10.
3. .3591	11.	FILTER OR CONTAINER TARE	.3591	✓3. .3712	11.
4.	12.	SAMPLE	0.0121	✓4. .3712	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. 100.8997	9.	Imp I	100.1	✓1. 100.9367	9.
2. 100.8999	10.	FILTER OR CONTAINER PLUS SAMPLE	100.9363	2. 100.9375	10.
3. 100.9000	11.	FILTER OR CONTAINER TARE	100.8998	✓3. 100.9360	11.
4.	12.	SAMPLE	0.0364	✓4. 100.9361	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

Milk Cele

TARE WEIGHT		SAMPLE NUMBER	FILTER OR CONTAINER #	TARE + SAMPLE WEIGHT	
1. 105.4739	9.	Imp O	98.1	✓1. 105.5033	9.
2. 105.4731	10.	FILTER OR CONTAINER PLUS SAMPLE	105.5036	✓2. 105.5035	10.
3. 105.4729	11.	FILTER OR CONTAINER TARE	105.4733	✓3. 105.5041	11.
4.	12.	SAMPLE	0.0303	4.	12.
5.	13.			5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

FIELD DATA REDUCTION

SITE: EAGLE SNACKS
DATE: JANUARY 26, 1993
UNIT: CONTINUOUS FRYER
TEST: PARTICULATE #1

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	AVERAGE SQUARED	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
NW	843.437	0.20	0.447213		0.48	182	44	42
Port	864.516	0.23	0.479583		0.53	192	44	42
	---------	0.24	0.489897		0.54	201	45	42
	21.079	0.23	0.479583		0.52	195	46	43
	=========	0.25	0.500000		0.56	197	47	43
	(DIFFERENCE)	0.25	0.500000		0.56	191	48	43
		0.20	0.447213		0.45	195	49	43
		0.20	0.447213		0.46	195	49	44
		0.19	0.435889		0.43	200	49	44
		0.19	0.435890		0.43	201	50	44
		0.20	0.447213		0.45	205	51	45
		0.18	0.424264		0.41	208	52	45
SW		0.22	0.469041		0.50	200	51	46
Port		0.21	0.458257		0.48	215	52	46
		0.21	0.458257		0.47	221	52	46
		0.20	0.447213		0.45	224	52	46
		0.19	0.435889		0.42	226	53	46
		0.18	0.424264		0.40	227	53	47
		0.18	0.424264		0.40	226	53	47
		0.18	0.424264		0.40	226	53	47
		0.18	0.424264		0.40	224	53	47
		0.18	0.424264		0.40	223	53	47
		0.18	0.424264		0.40	220	54	47
		0.18	0.424264		0.40	216	54	48
		AVERAGES	0.44[illegible]	0.201	0.46	209		48

A00006

FIELD DATA REDUCTION

SITE: EAGLE SNACKS
DATE: JANUARY 26, 1993
UNIT: CONTINUOUS FRYER
TEST: PARTICULATE #2

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	AVERAGE SQUARED	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
NW	865.890	0.24	0.489897		0.55	195	50	48
Port	891.568	0.25	0.500000		0.58	192	50	48
	---------	0.24	0.489898		0.55	206	51	49
	25.678	0.24	0.489898		0.55	205	52	49
	=========	0.23	0.479583		0.52	207	53	49
	(DIFFERENCE)	0.22	0.469042		0.50	207	54	49
		0.20	0.447214		0.45	205	55	49
		0.18	0.424264		0.41	207	55	49
		0.16	0.400000		0.36	202	56	50
		0.16	0.400000		0.37	201	56	51
		0.17	0.412310		0.39	204	56	50
		0.17	0.412310		0.39	203	57	51
SW		0.24	0.489897		0.54	190	56	51
Port		0.24	0.489897		0.55	212	57	51
		0.23	0.479583		0.51	214	57	51
		0.26	0.509901		0.58	208	57	51
		0.22	0.469041		0.50	208	58	52
		0.22	0.469041		0.50	208	58	52
		0.20	0.447213		0.46	204	58	42
		0.20	0.447213		0.46	201	58	52
		0.21	0.458257		0.48	201	59	53
		0.20	0.447213		0.46	203	59	53
		0.19	0.435889		0.43	205	59	53
		0.19	0.435899		0.43	209	59	53
	AVERAGES		0.45[illegible]	0.210	0.48	204		53

FIELD DATA REDUCTION

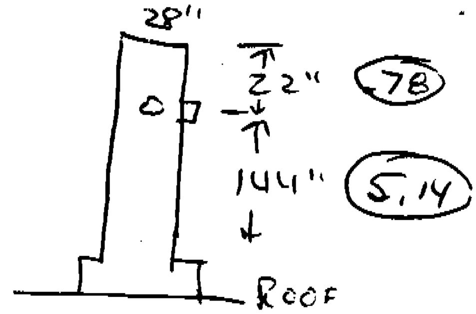
SITE: EAGLE SNACKS
DATE: JANUARY 26, 1993
UNIT: CONTINUOUS FRYER
TEST: PARTICULATE #3

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	AVERAGE SQUARED	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
NW	892.201	0.24	0.489897		0.43	190	53	51
Port	915.380	0.23	0.479583		0.40	204	54	52
	---------	0.24	0.489898		0.42	206	54	53
	23.179	0.24	0.489898		0.42	206	55	52
	=========	0.24	0.489898		0.42	208	56	53
	(DIFFERENCE)	0.22	0.469042		0.39	206	57	53
		0.22	0.469042		0.39	206	58	53
		0.18	0.424264		0.32	194	58	53
		0.17	0.412311		0.30	202	58	54
		0.17	0.412311		0.30	203	59	54
		0.17	0.412310		0.30	205	59	54
		0.17	0.412310		0.30	205	59	54
SW		0.24	0.489897		0.42	210	60	55
Port		0.23	0.479583		0.40	214	60	55
		0.23	0.479583		0.40	213	60	55
		0.23	0.479583		0.40	213	61	55
		0.23	0.479583		0.40	208	60	55
		0.22	0.469041		0.39	206	61	55
		0.21	0.458257		0.37	204	61	56
		0.20	0.447213		0.36	205	60	56
		0.19	0.435889		0.34	207	60	56
		0.19	0.435889		0.34	205	60	56
		0.19	0.435889		0.34	208	60	56
		0.19	0.435889		0.34	209	61	56
		AVERAGES	0.457377	0.209	0.37	206		56

WESTERN ENVRIONMENTAL SERVICES

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT: EAGLE SNACKS
DATE: 1/25/97
SAMPLING LOCATION: CONTINUOUS FRYER STACK OUTLET
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A): 34
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B): 6
STACK I.D., (DISTANCE A - DISTANCE B): 28
NEAREST UPSTREAM DISTURBANCE: .78
NEAREST DOWNSTREAM DISTURBANCE: 5.14
CALCULATOR: 12 pts x 2 = 24 pts



SCHEMATIC OF SAMPLING LOCATION

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	.021	28"	.59	6"	6.59
2	.067	28	1.88	6"	7.88
3	.118	28	3.3	6"	9.9
4	.177	28	4.96	6"	10.96
5	.250	28	7.0	6	13.0
6	.356	28	9.97	6	15.97
7	.644	28	18.03	6	24.03
8	.75	28	21.0	6	27.0
9	.823	28	23.04	6	29.04
10	.882	28	24.7	6	30.7
11	.933	28	26.12	6	32.12
12	.979	28	27.41	6	33.41

EPA (Dur) 232
4/72

A00009

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

93-ABT
CONT FRYER
#3

Requestor ______
JN ______
Assigned to ______
Date Assigned ______

ALL WEIGHTS IN GRAMS

TARE WEIGHT		SAMPLE		TARE + SAMPLE WEIGHT	
1. 101.1219	9.	SAMPLE NUMBER	Probe	✓1. 101.1362	9.
2. 101.1207	10.	FILTER OR CONTAINER #	101.1	✓2. 101.1365	10.
3. 101.1207	11.	FILTER OR CONTAINER PLUS SAMPLE	101.1366	✓3. 101.1372	11.
4. ~~101.1710~~	12.	FILTER OR CONTAINER TARE	101.1211	4.	12.
5.	13.	SAMPLE	0.0155	5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

TARE WEIGHT		SAMPLE		TARE + SAMPLE WEIGHT	
1. .3575	9.	SAMPLE NUMBER	Filter	✓1. 0.3641	9.
2. .3578	10.	FILTER OR CONTAINER #	3.262	✓2. 0.3642	10.
3. .3574	11.	FILTER OR CONTAINER PLUS SAMPLE	0.3642	✓3. 0.3643	11.
4.	12.	FILTER OR CONTAINER TARE	0.3576	4.	12.
5.	13.	SAMPLE	0.0066	5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

TARE WEIGHT		SAMPLE		TARE + SAMPLE WEIGHT	
1. 100.8839	9.	SAMPLE NUMBER	Imp I	✓1. 100.9005	9.
2. 100.8827	10.	FILTER OR CONTAINER #	102.1	✓2. 100.9005	10.
3. 100.8828	11.	FILTER OR CONTAINER PLUS SAMPLE	100.9008	✓3. 100.9015	11.
4. 100.8825	12.	FILTER OR CONTAINER TARE	100.8827	4.	12.
5.	13.	SAMPLE	0.0181	5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

TARE WEIGHT		SAMPLE		TARE + SAMPLE WEIGHT	
1. 98.8628	9.	SAMPLE NUMBER	Imp O	✓1. 98.8736	9.
2. 98.8611	10.	FILTER OR CONTAINER #	103.1	✓2. 98.8740	10.
3. 98.8611	11.	FILTER OR CONTAINER PLUS SAMPLE	98.8740	✓3. 98.8744	11.
4. 98.8611	12.	FILTER OR CONTAINER TARE	98.8611	4.	12.
5.	13.	SAMPLE	0.0129	5.	13.
6.	14.			6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

WESTERN ENVIRONMENTAL SERVICES

APPENDIX B

WESTERN ENVIRONMENTAL SERVICES

GAS METER CALIBRATION

Meter #: WES #10
Pb: 29.96
Date: November 9, 1992
Calibrator: Michael H. Jacobs

Orifice	Standard Meter Start	Standard Meter Finish	Temp F	Field Meter Start	Field Meter Finish	Temp F	Time Min	V	Delta H
0.50	121.702	125.443	71	29.419	33.286	72	10	0.968	2.00
0.50	125.443	129.213	71	33.286	36.967	73	10	1.027	1.97
1.00	130.432	135.738	71	38.168	43.398	77	10	1.023	1.97
1.00	135.738	141.052	71	43.398	48.658	79	10	1.023	1.96
2.00	142.436	149.888	72	50.021	57.327	81	10	1.032	1.99
2.00	149.888	157.349	72	57.327	64.623	83	10	1.039	1.98
					Average			1.019	1.98

B00001

WESTERN ENVIRONMENTAL SERVICES

PITOT TUBE CALIBRATION

Date: November 11, 1992
By: Nat & Ty
Number: 5' – #73
Source: Magnehlic 0–2"

Delta P std	Delta P leg 1	Delta P leg 2	Cp leg 1	Cp leg 2
0.21	0.32	0.31	0.81	0.82
0.63	0.98	0.99	0.80	0.80
1.10	1.77	1.79	0.79	0.78
		Averages	0.80	0.80
		Average	0.80	

M.c.

WESTERN ENVIRONMENTAL SERVICES

APPENDIX C

WESTERN ENVIRONMENTAL SERVICES

NOMENCLATURE

%CO	Percent CO by volume, dry
$\%CO_2$	Percent CO_2 by volume, dry
%EA	Percent excess air in stack gas
%I	Percent Isokinetic
%M	Percent Moisture in Stack Gas, by Volume
$\%N_2$	Percent N_2 by volume, dry
$\%O_2$	Percent O_2 by volume, dry
A_s	Stack Area, ft^2
C_p	Pitot Tube Coefficient
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
D_n	Sampling nozzle diameter, in.
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
I_c	Percent of particulate caught in impingers
M_d	Mole Fraction Dry Stack Gas
M_f	Particulate collected in probe, cyclone and filter, mg.
M_t	Total particulate collected mg.
MW	Molecular Weight of Wet Stack Gas, gm/gm-mole
MW_c	Molecular Weight of Chemical
MW_d	Molecular Weight of Dry Stack Gas, gm/gm-mole
P	Velocity head, in. H_2O
P_b	Barometric Pressure, in. Hg.
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
P_m	Average Orifice Pressure Drop, in. Hg.

WESTERN ENVIRONMENTAL SERVICES

NOMENCLATURE
(CONT)

PPM	Parts per million
P_s	Stack Gas Pressure, in. Hg., absolute
P_u	Unit process rate
Q_a	Stack Gas Flow Rate at Stack Conditions, ft^3/min
Q_s	Stack Gas Flow Rate at Standard Conditions (1), dry ft^3/min
T_m	Average Dry Gas Meter Temperature, ^0F.
T_s	Stack Gas Temperature, ^0F
T_s	Average Stack Gas Temperature, ^0F
T_{std}	Standard Temperature, ^0F
T_t	Net time of test min.
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_s	Average Stack Gas Velocity, Stack Conditions, ft/sec
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

WESTERN ENVIRONMENTAL SERVICES

CALCULATIONS

1. Volume of water vapor at standard conditions [1]

$$V_{w_{std}} = .00267 * \frac{460 + T_{std}}{29.92} * Vlc$$

2. Volume of dry gas sampled at standard conditions [1]

$$V_{m_{std}} = 17.64 * \frac{V_m (P_b + P_m)}{(T_m + 460)}$$

3. Percent moisture in stack gas by volume.

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

4. Mole fraction dry stack gas.

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

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

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

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

$$MW + (18 * Bwo) + [(1-Bwo) * MW_d]$$

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

$$V_s = 85.49 * CP * \sqrt{\Delta P} * \sqrt{\frac{(T_s + 460)}{Ms * P_s}}$$

8. Stack gas volumetric flow rate at stack conditions.

$$Q_a = V_s * A_s * 60$$

CALCULATIONS

9. Stack gas volumetric folw rate at standard conditions [1]

$$Q_s = Q_a * \frac{528}{460 + T_s} * \frac{P_s}{29.92} * (1.00 - Bwo)$$

10. Percent isokinetic

$$\%I = \left[\frac{(T_s + 460) * V_{m\,std}}{P_s * V_s * AN * T_t} * (1 - Bwo)\right] * .0945$$

11. Particulate Concentrations at standard conditions [1], dry, based on probe, cyclone and filter catch.

$$C_{sf} = \frac{M_f * 15.43}{V_{m_{std}} * 1000}$$

12. Particulate concentration at standard conditions [1], dry, based on total catch.

$$C_{st} = \frac{M_t * 15.43}{V_{m_{std}} * 1000}$$

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

$$E_f = \frac{M_f * 60 * Q_s}{454,000 * V_{m_{std}}}$$

14. Particulate emission rate, based on total catch.

$$E_t = \frac{M_t * 60 * Q_s}{454,000 * V_{m_{std}}}$$

CALCULATIONS

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

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

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

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

17. Particulate emission rate, part per million.

$$ppm = \frac{M_t}{V_{m_{std}}} * \frac{863.3}{MW_c}$$

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

(2) $\sqrt{\Delta P_s * (T_s + 460)}$ 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 indibidual point

WESTERN ENVIRONMENTAL SERVICES

APPENDIX D

PRODUCTION REPORT FOR WORKSTATION VPOT50 - VIS-PC PROC. 50% SEASONED

SUPERVISOR: MR

PRODUCTION MANAGER: LL

DATE: 01/26/93

SHIFT: 1 p.1

JOB#: 361924

PRODUCT PRODUCED: 700723 - MSQ BBQ THINS POTATO CHIP

QUANTITY PRODUCED: 11,042 LBS.

TIME WORKSTATION STARTED UP: 07:30AM

TIME WORKSTATION SHUT DOWN: 03:30PM

	HOURS	
TOTAL MACHINE TIME:	8.00	100.(
DOWN TIME - PLANNED:	0.00	0.C
DOWN TIME - UNPLANNED:	0.50	6.3
PRODUCTIVE RUNNING TIME:	7.50	93.E

CONFIDEN

	UNIT OF MEAS	ACTUAL USAGE
RAW POTATOES	LBS.	50,000 (est.)

RAW WASTE: 785 LBS.

FINISHED WASTE: 695 LBS.

COMMENTS

UNPLANNED DOWNTIME PROCESSING WAS DUE TO MAINT WORKING ON THE OPTISORT RECYCLE CONVEYOR AND STARCH VACUUM PUMP AND INCLINE BELT.

Note: Two products produced during shift, but time per product not specified. Use average of both products over shift. For BBQ, There is an additional 5% seasoning added after the 2% salt (on all current potato chip types). See p. 2 for process rate calculations

PRODUCTION REPORT FOR WORKSTATION VPOT50 - VIS-PC PROC. 50% SEASONED

SUPERVISOR:	MR	DATE:	01/26/93
PRODUCTION MANAGER:	LL	SHIFT:	1 p.2
		JOB#:	361918

PRODUCT PRODUCED: 700668 - THIN POTATO CHIPS

QUANTITY PRODUCED: 11,359 LBS.

			HOURS	
TIME WORKSTATION STARTED UP: 07:30AM		TOTAL MACHINE TIME:	8.00	100.0%
TIME WORKSTATION SHUT DOWN: 03:30PM		DOWN TIME - PLANNED:	0.00	0.0%
		DOWN TIME - UNPLANNED:	0.50	6.3%
		PRODUCTIVE RUNNING TIME:	7.50	93.8%

CONFIDENTIAL

	UNIT OF MEAS	ACTUAL USAGE
RAW POTATOES	LBS.	53,000 (est.)

RAW WASTE: 720 LBS.

FINISHED WASTE: 685 LBS.

COMMENTS

UNPLANNED DOWNTIME PROCESSING WAS DUE TO MAINT WORKING ON THE OPTI-SORT RECYCLE CONVEYOR AND STARCH PUMP AND INCLINE CONVEYOR TO PACKAGING.

$$\text{Average output per shift} = \frac{\Sigma(\text{Quantity Produced} + \text{Finished waste})(1.0 - \text{wt. fract. salt added})(1.0 - \text{wt. fract. seasoning added})}{\text{Productive Running Time}}$$

$$= \frac{[(11,359 + 685) + (11,042 + 695)(1.0 - 0.05)](1.0 - 0.02)}{7.50} = 3,093 \text{ lb/hr}$$

$$\text{Average input per shift} = \frac{\Sigma(\text{Actual Usage} - \text{Raw Waste})}{\text{Productive Running Time}}$$

$$= \frac{(53,000 - 720) + (50,000 - 785)}{7.50} = 13,530 \text{ lb/hr.}$$

Pennsylvania Department of Environmental Resources
Bureau of Air Quality Control

Analysis of Organics

I. Introduction

This procedure is to be used for the analysis of organic material collected by the method specified in the Special Testing section of the Source Testing Manual. This method applies to Heatset Web Offset Printing operations.

The impinger solutions, filter, charcoal and all water washings are extracted with chloroform and ethyl ether to remove organic compounds. The organics are determined gravimetrically.

II. Apparatus

Balance
Separatory funnels

III. Materials

Ethyl ether
Acetone
Chloroform

IV. Procedure

1. Dry at 105° +/- 5° C, sufficient evaporating dishes for this analysis, dessicate until cool, identify, weigh, and record the weight.
2. Place all of the impinger solution in a separatory funnel.
3. Place all of each of the washings in separatory funnels. Keep washing separate as required.
4. Rinse all train components that were in contact with the gas stream with a measured quantity of acetone. These washings are to be kept separate as required.
5. To 2 and 3 add a measured quantity of ether and shake for 5 minutes. Filter the ether through a Whatman 42 into a tared evaporation dish.
6. Repeat 5 two more times for a total of three extractions or until the ether is clear.
7. Repeat 5 and 6 using chloroform.
8. The ether and chloroform extracts for each portion are combined in the dish used in 5.

9. Filter the individual acetone washings through a Whatman 42 into individual tared evaporating dishes.

10. Extract the filter, using an evaporating dish and sufficient portions of ether and chloroform to cover the filter. Place the evaporating dish, containing the filter and solvent, in a ultrasonic bath and sonicate for 5 minutes. Filter the extract through a Whatman 42 filter into a tared evaporation dish and continue as in 6, 7, and 8.

11. The charcoal, if used, is extracted with ether and chloroform as in 5, 6, 7, and 8 using sufficient solvent to cover the charcoal. Use measured quantities of solvents.

12. Blanks are to be run on all solvents and the charcoal. The charcoal is extracted as in 11. The solvents are evaporated to dryness in a tared dish, dessicated and weighed.

13. All solvent extracts are evaporated to dryness in a hood or vacuum oven at ambient temperature. It may be necessary to supply a slight amount of heat, such as a water bath, to prevent moisture condensation.

V. Calculations

$$\frac{\text{Initial Vol.}}{\text{Sample Vol.}} \times ((\text{Final Wt.} - \text{Initial Wt.}) - (\text{Blank gms/ml})(\text{ml of solvent}))$$

Subtract background for each solvent.

Date 1/26/93 Continuous Chip Line #1

Test Average Values * Run 3 only *

- Front Half (Filterable)

~~15.5~~ 18.6 mg PM × 0.015432 gr/mg = ~~0.2392~~ 0.2870 gr

~~0.2392~~ 0.2870 gr / 24.141 dscf sampled = ~~0.0099~~ 0.0119 gr/dscf

~~0.0099~~ 0.0119 gr/dscf × 1#/7000 gr × 3143 dscf/min × 60 min/hr = ~~0.2669~~ **0.3203** # PM/hr

~~0.2669~~ 0.3203 # PM/hr × 1 hr/2987 # potato product × 2000#/ton = ~~0.1787~~ **0.2795** # PM/ton potato product

- Back Half (Condensible)

29.5 mg PM × 0.015432 gr/mg = 0.4552 gr

0.4552 gr / 24.141 dscf sampled = 0.0189 gr/dscf

0.0189 gr/dscf × 1#/7000 gr × 3143 dscf/min × 60 min/hr = **0.5080** # PM/hr

0.5080 # PM/hr × 1 hr/2987 # potato product × 2000#/ton = **0.3401** # PM/ton potato product

Runs 1 & 2 have isokinetic rate > 110%

Run 3

48.1 mg PM × 0.0154 gr/mg = 0.742 gr

0.742 gr / 24.141 dscf = 0.0307 gr/dscf

0.0307 gr/dscf × 1#/7000 gr × 3143 dscf/min × 60 min/hr = 0.827 #PM/hr

0.827 #PM/hr × 1 hr/2987 # potato product × 2000 #/ton = 0.55 PM/ton product

Reported Emiss. Factor = 0.6 #PM/ton of potato product

Note: This report calculated PM w/o the organic fraction included. The emission factor above includes all the fractions from the sampling train.

L Marsh
10-12-??