EMISSION PERFORMANCE TESTING OF FRYER #8

SITE: EAGLE SNACKS, INC.
Visalia, California

DATE: FEBRUARY 3–4, 1992

Prepared For:

EAGLE SNACKS, INC.
2000 North Road 80
Visalia, California 93291

Contact: Don De Hart
(314) 577–4158

Prepared By:

THOMAS ROONEY
(310) 540–4676

WESTERN ENVIRONMENTAL SERVICES
1010 South Pacific Coast Highway
Redondo Beach, California 90277

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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 kettle fryer #8. The testing was performed from February 3 and 4, 1992 to provide compliance test data for Tulare County Air Pollution Control District.

Triplicate particulate tests were performed at the stack exhaust from kettle fryer #8. The particulate tests were conducted by using EPA Method 5.1.

These units produce potato chips for human consumption. Kettle Fryer #8 operates with a automated system.

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 and 2.2 show the test results. Table 2.1 presents the particulate sampling results from Kettle Fryer #8 while Table 2.2 shows the particulate analytical results.

The results are summarized below.

Test #	Process Input #/Hr	Particulates Concentration Grs/SDCF	Particulates Emission Rate #/Hr
Kettle #8			
1	563	0.0036	0.369
2	563	0.0017	0.167
3	472	0.0012	0.117
Average	533	0.0022	0.218

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: Fryer #8
DATE: February 3–4, 1992

STACK PARAMETERS	TEST 1	TEST 2	TEST 3	AVERAGE
Barometric Pressure "Hg	29.95	29.95	29.95	29.95
Static Pressure "H20	–0.24	–0.24	–0.24	–0.24
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
Stack Area FT^2	4.71	4.71	4.71	4.71
Stack Temperature F	69	78	67	71
Stack Pressure "Hg	29.93	29.93	29.93	29.93
TEST CONDITIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Sample Volume Ft3	109.063	111.621	108.873	109.852
Meter F	58	72	53	61
Nozzle Dia "	0.22	0.22	0.22	0.22
Time Min	180	180	180	180
Points	24	24	24	24
Pitot Tube Factor cp	0.87	0.87	0.87	0.87
Orfice Press "H2O	1.49	1.52	1.51	1.51
Condensate mls	41	46	38	42
Velocity Pressure "H2O	0.540	0.513	0.523	0.525
Meter Calibration	1.037	1.037	1.037	1.037
TEST CALCULATIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Water Vapor SDCF	1.930	2.165	1.789	1.961
Gas Sampled SDCF	115.773	115.379	116.704	115.95
Moisture %	1.64	1.84	1.51	1.66
Molecular Weight Dry	28.84	28.84	28.84	28.84
Molecular Weight Wet	28.66	28.64	28.67	28.66
Gas Velocity Ft/Sec	42.92	42.20	42.15	42.42
Flow Rate ACFM	12129	11927	11911	11989
Flow Rate DSCFM	11912	11494	11758	11722
Isokinetics %	96.39	99.56	98.44	98.13

TABLE 2.2 PARTICULATE ANALYSIS

SITE: EAGLE SNACKS
UNIT: Fryer #8
DATE: February 3–4, 1992

ANALYTICAL DATA	TEST 1	TEST 2	TEST 3	AVERAGE
FRONT HALF				
Probe mg	6.6	5.3	4.2	5.37
Filter mg	0.7	0.8	1.0	0.83
Blanks mg	1.5	1.5	1.5	1.50
Subtotal mg	5.8	4.6	3.7	4.70
BACK HALF				
Impingers Inorg mg	17.2	7.5	6.6	10.43
Impingers Org mg	5.6	2.1	0.0	2.57
Blank mg	1.5	1.5	1.5	1.50
Subtotal mg	21.3	8.1	5.1	11.50
Total Weight Gain mg	27.1	12.7	8.8	16.20
EMISSION DATA	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
FRONT HALF				
Grs/SDCF	0.0008	0.0006	0.0005	0.0006
Lbs/Hr	0.079	0.061	0.049	0.063
BACK HALF				
Grs/SDCF	0.0028	0.0011	0.0007	0.0015
Lbs/Hr	0.290	0.107	0.068	0.155
TOTAL EMISSIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Grs/SDCF	0.0036	0.0017	0.0012	0.0022
Lbs/Hrs	0.369	0.167	0.117	0.218

3.0 SITE DESCRIPTION

3.1 Kettle Fryer #8 Stack Exhaust

Samples were collected from a 31.5" x 21.75" rectangular vertical stack located above the roof. The sampling ports are located on a single side of the stack. Figure 3.1 is the site diagram while Figure 3.2 presents the traverse point location.

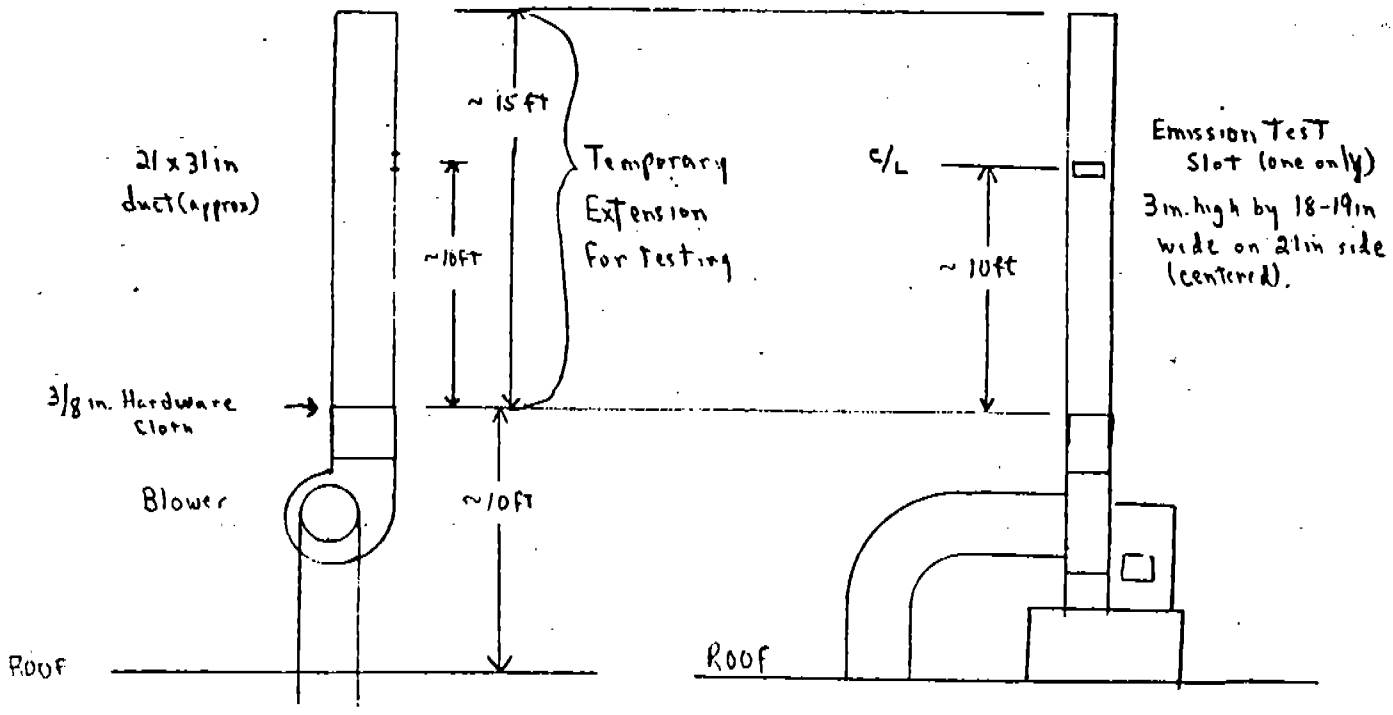
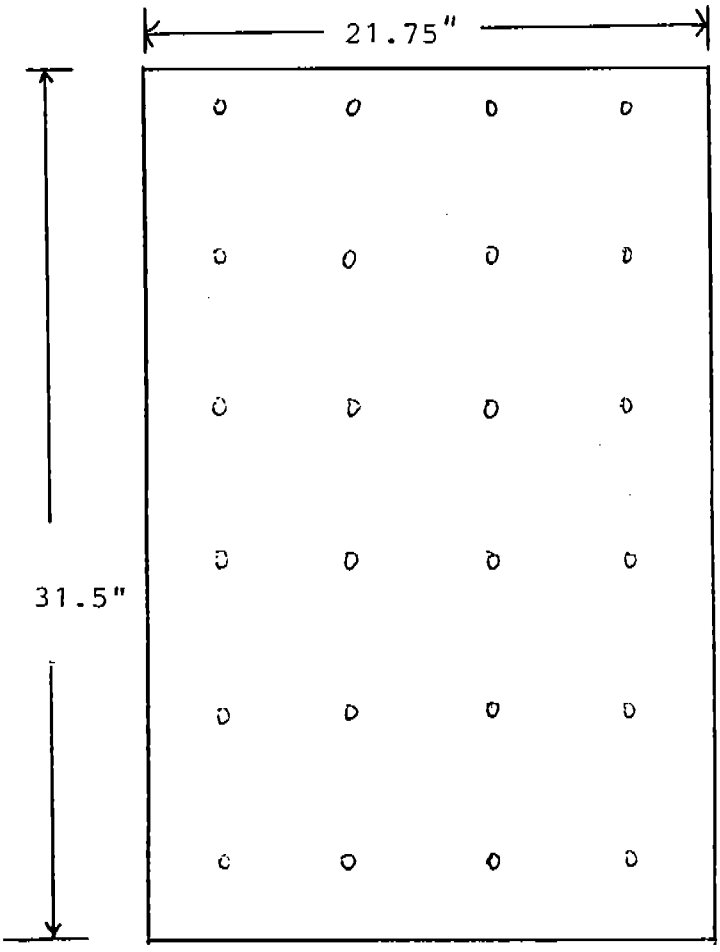

21 x 31 in
duct (approx)
~ 15 ft
Temporary
Extension
For Testing
~10FT
3/8 in. Hardware
Cloth
Blower
~10ft
ROOF
C/L
~ 10ft
Emission Test
Slot (one only)
3in. high by 18-19in
wide on 21in side
(centered).
ROOF
Kettle Fryer
DMD
4-14-89
3-2

FIGURE 3.1



TRAVERSE POINT LOCATION STACK EXHAUST
FIGURE 3.2

TRAVERSE POINT	POINT LOCATION
1	2.62
2	7.87
3	13.13
4	18.38
5	23.63
6	28.87

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

Particulates were collected by EPA Method Five. Triplicate three hour tests were conducted on the kettle fryer stack exhaust.

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 100 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.

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 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 5.1 calculations.

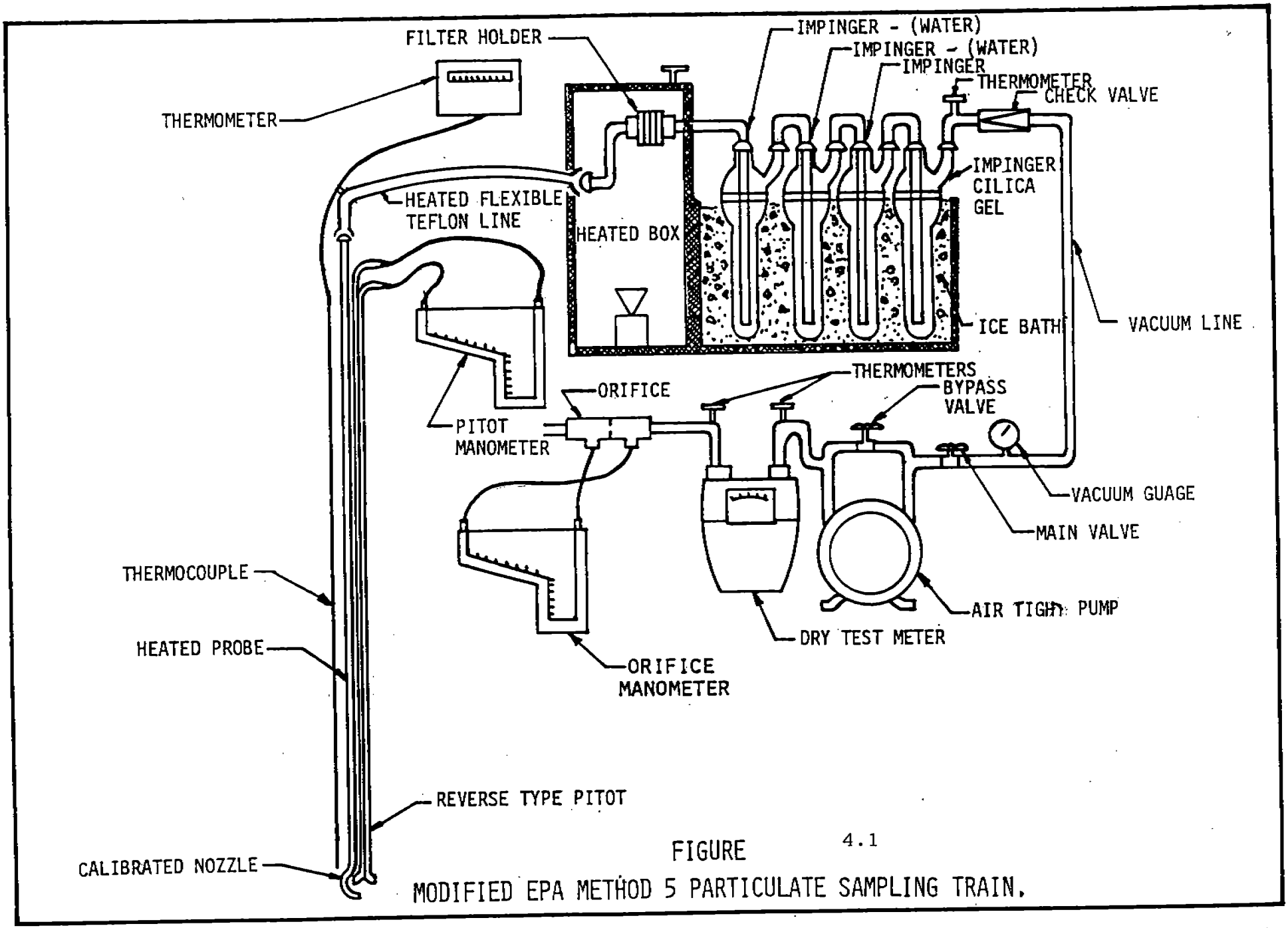


FIGURE 4.1

MODIFIED EPA METHOD 5 PARTICULATE SAMPLING TRAIN.

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 results were printed on a Westronics Data Logger.

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

5.0 QUALITY ASSURANCE

5.1 Field Equipment Quality Assurance

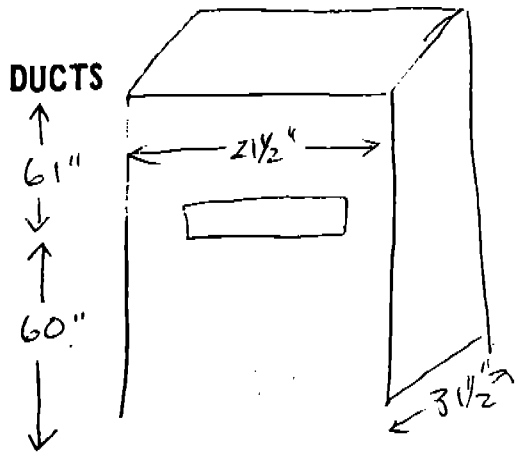
The calibration of the pitot tube, dry gas meter, digital thermometers, and manometers were performed by utilizing standard EPA Methodology, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods (EPA-600/4-77-0278).

WESTERN ENVIRONMENTAL SERVICES

APPENDIX A

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT _____
DATE _____
SAMPLING LOCATION Fryer 4 and Fryer 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

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					2,62
2					7.87
3					13,13
4					18.38
5					23,63
6					28.87

L = 31.5 ÷ 12 = 2.63
W = 21.5 ÷ 12 = 1.79
x 2.63 x 1.79 =
Area 4.71

FIELD DATA

PLANT Eagle Stacks
DATE 12-3-92
SAMPLING LOCATION Fryer # 8
SAMPLE TYPE Particulate
RUN NUMBER # 1 - 3 hr. run
OPERATOR Hastriter
AMBIENT TEMPERATURE 40
BAROMETRIC PRESSURE 29.95
STATIC PRESSURE, (P_s) -.24
FILTER NUMBER (s) 3,173

20 m/s
21 grams
41 v/c

PROBE LENGTH AND TYPE # 23
NOZZLE I.D. ~~.230~~ .220
ASSUMED MOISTURE, % 5
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 # 9 (0-1")

Preleak ✓ < .003 cfm at 15"

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 7½ MINUTES

Postleak ✓ < .007 cfm at 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 (1)	DRY GAS METER TEMPERATURE		PUMP VACUUM, in. Hg	SAMPLE BOX TEMPERATURE, °F (3)	IMPINGER TEMPERATURE, °F (4)
				DESIRED	ACTUAL		(2) INLET ($T_{m\,in}$), °F	(7) OUTLET ($T_{m\,out}$), °F			
	0 / 840	056.797									
1	847½	061.385	0.60	1.60	1.60	60	36	36	3	245	36
2	15 / 855	065.825	0.56	1.49	1.49	65	42	38	2	246	36
3	902½	070.190	0.52	1.39	1.39	67	50	42	2	247	43
4	30 / 910	074.625	0.52	1.40	1.40	67	52	42	2	249	45
5	917½	079.270	0.56	1.52	1.52	64	56	44	2	248	48
6	45 / 925	083.655	0.50	1.36	1.36	67	58	46	2	247	48
1	932½	088.210	0.52	1.41	1.41	71	60	48	2	247	48
2	60 / 940	092.700	0.56	1.50	1.50	75	61	49	2	247	48
3	947½	097.350	0.57	1.57	1.57	63	61	50	2	248	48
4	75 / 955	102.100	0.60	1.66	1.66	62	63	52	2	247	49
5	1002½	106.780	0.58	1.60	1.60	64	64	53	3	247	50
6	90 / 1010	111.665	0.50	1.37	1.37	65	65	54	3	248	52
1	1017½	115.115	0.42	1.16	1.16	65	66	56	2	249	53
2	105 / 1025	119.560	0.50	1.39	1.39	65	67	58	2	251	54
3	1032½	124.260	0.57	1.58	1.58	68	68	59	3	251	56
4	120 / 1040	129.000	0.58	1.59	1.59	72	69	59	3	251	57
5	1047½	133.755	0.58	1.59	1.59	72	70	60	3	251	58
6	135 / 1055	138.285	0.54	1.46	1.46	80	70	60	2	249	54
1	1102½	142.700	0.51	1.38	1.38	80	69	60	2	249	54
2	150 / 1110	147.175	0.52	1.43	1.43	71	70	61	2	256	53
3	1117½	151.770	0.54	1.49	1.49	71	70	61	2	248	53
4	165 / 1125	156.610	0.60	1.65	1.65	71	72	63	3	251	56
5	1132½	161.260	0.56	1.56	1.56	69	72	62	2	251	56
6	180 / 1140	165.860	0.54	1.50	1.50	70	73	63	2	251	56
		(109.063)	(0.54)		(1.49)	(69)	(58)				

COMMENTS:

EPA (Dur) 235

(24) (180)

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

Eagle Snacks
Fryer 8
PART #1

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 97.0705	9.	Probe	161.2	1. 97.0734	9.
2. 97.0698	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 97.0768	10.
3. 97.0701	11.	FILTER OR CONTAINER PLUS SAMPLE	97.0767	3. 97.0753	11.
4.	12.			4. 97.0768	12.
5.	13.	FILTER OR CONTAINER TARE	97.0701	5. 97.0766	13.
6.	14.			6.	14.
7.	15.	SAMPLE	66	7.	15.
8.	16.		6.6	8.	16.
1. 03486	9.	Filter	3.173	1. 03498	9.
2. 0.3492	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 0.3499	10.
3. 0.3496	11.	FILTER OR CONTAINER PLUS SAMPLE	0.3498	3. 0.3498	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	0.3491	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0007	7.	15.
8.	16.		.7	8.	16.
1. 101.6614	9.	Imp I	162.2	1. 101.6765	9.
2. 101.6615	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 101.6764 ✓	10.
3. 101.6616	11.	FILTER OR CONTAINER PLUS SAMPLE	101.6787	3. 101.6768	11.
4.	12.			4. 101.6789 ✓	12.
5.	13.	FILTER OR CONTAINER TARE	101.6615	5. 101.6789 ✓	13.
6.	14.			6.	14.
7.	15.	SAMPLE	172	7.	15.
8.	16.		17.2	8.	16.
1. 97.5444	9.	Imp O	163.2	1. 97.5460	9.
2. 97.5446	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 97.5497 ✓	10.
3. 97.5448	11.	FILTER OR CONTAINER PLUS SAMPLE	97.5502	3. 97.5481	11.
4.	12.			4. 97.5498	12.
5.	13.	FILTER OR CONTAINER TARE	97.5446	5. 97.5511	13.
6.	14.			6.	14.
7.	15.	SAMPLE	.0056	7.	15.
8.	16.		5.6	8.	16.

A00003

FIELD DATA

PLANT Eagle Snacks
DATE 2-3-92
SAMPLING LOCATION Fryer #8
SAMPLE TYPE Particulate
RUN NUMBER #2 - 180 min. run
OPERATOR Hastriter
AMBIENT TEMPERATURE 61°
BAROMETRIC PRESSURE 29.95
STATIC PRESSURE, (P_s) -.24
FILTER NUMBER (s) 3.174

28 m/s
18 grams
46 V/C

PROBE LENGTH AND TYPE #23
NOZZLE I.D. .220
ASSUMED MOISTURE, % 2%
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 #9 (0-1")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak < .012 cfm at 15"

READ AND RECORD ALL DATA EVERY 7½ MINUTES

Postleak < .01 cfm at 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
					DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0	100	166.562									
1	7½	107½	170.150	0.32	0.93	0.93	73	61	60	2	251	58
2	15	115	174.015	0.38	1.09	1.09	77	61	59	2	248	43
3		122½	178.240	0.44	1.27	1.27	77	64	60	2	249	46
4	30	130	183.115	0.58	1.68	1.68	77	68	61	3	249	48
5		137½	187.860	0.54	1.57	1.57	81	71	62	3	250	49
6	45	145	192.620	0.54	1.58	1.58	75	73	63	3	249	50
1		152½	197.185	0.50	1.45	1.45	80	74	64	3	249	49
2	60	200	201.985	0.54	1.60	1.60	72	75	65	3	249	49
3		207½	206.835	0.56	1.66	1.66	73	76	66	3	249	49
4	75	215	211.670	0.56	1.66	1.66	74	77	67	3	249	49
5		222½	216.410	0.52	1.54	1.54	75	78	68	3	250	50
6	90	230	220.685	0.42	1.24	1.24	75	78	69	2	251	49
1		237½	225.305	0.50	1.48	1.48	75	78	69	3	250	49
2	105	245	230.345	0.60	1.78	1.78	75	79	70	3	251	50
3		252½	235.390	0.60	1.78	1.78	77	80	71	3	252	50
4	120	300	240.030	0.50	1.48	1.48	78	81	71	3	252	50
5		307½	244.465	0.46	1.36	1.36	79	81	72	2	253	50
6	135	315	249.115	0.50	1.47	1.47	80	81	72	3	252	49
1		322½	253.855	0.52	1.53	1.53	81	81	72	3	253	49
2	150	330	258.620	0.52	1.53	1.53	83	81	73	3	252	50
3		337½	263.230	0.50	1.47	1.47	81	82	73	3	253	50
4	165	345	268.110	0.58	1.71	1.71	80	81	73	3	252	49
5		352½	273.100	0.60	1.76	1.76	83	82	73	3	252	50
COMMENTS: 6	180	400	278.183	0.60	1.78	1.78	79	81	73	3	251	50
			111.621	0.513		1.52	78		72			

EPA (Dur) 235
(24) (180)

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

Eagle Stacks
Fryer #8
Part. #2

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 100.7490	9.	Probe	164.2	1. 100.7509	9.
2. 100.7488	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 100.7538 ✓	10.
3. 100.7492	11.			3. 100.7525	11.
4.	12.	FILTER OR CONTAINER PLUS SAMPLE	100.7543	4. 100.7544 ✓	12.
5.	13.			5. 100.7547 ✓	13.
6.	14.	FILTER OR CONTAINER TARE	100.7490	6.	14.
7.	15.	SAMPLE	.0053	7.	15.
8.	16.		5.3	8.	16.
1. 0.3481	9.	Filter	3.174	1. 0.3495	9.
2. 0.3490	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 0.3496	10.
3. 0.3491	11.			3. 0.3495	11.
4.	12.	FILTER OR CONTAINER PLUS SAMPLE	0.3495	4.	12.
5.	13.			5.	13.
6.	14.	FILTER OR CONTAINER TARE	0.3487	6.	14.
7.	15.	SAMPLE	0.0008	7.	15.
8.	16.		0.8	8.	16.
1. 101.0397	9.	Imp I	165.2	1. 101.0440	9.
2. 101.0398	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 101.0471 ✓	10.
3. 101.0399	11.			3. 101.0457	11.
4.	12.	FILTER OR CONTAINER PLUS SAMPLE	101.0473	4. 101.0473 ✓	12.
5.	13.			5. 101.0485	13.
6.	14.	FILTER OR CONTAINER TARE	101.0398	6. 101.0475	14.
7.	15.	SAMPLE	.0075	7.	15.
8.	16.		7.5	8.	16.
1. 101.9852	9.	Imp O	166.2	1. 101.9834	9.
2. 101.9853	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 101.9867 ✓	10.
3. 101.9849	11.			3. 101.9857	11.
4.	12.	FILTER OR CONTAINER PLUS SAMPLE	101.9872 ✓	4. 101.9875 ✓	12.
5.	13.			5. 101.9873 ✓	13.
6.	14.	FILTER OR CONTAINER TARE	101.9851	6.	14.
7.	15.	SAMPLE	.0021	7.	15.
8.	16.		2.1	8.	16.

A06005

FIELD DATA

PLANT Eagle Snacks
DATE 2-4-92
SAMPLING LOCATION Fryer #8
SAMPLE TYPE Particulate
RUN NUMBER #3 - 180 min run
OPERATOR Hastriter / Clarke
AMBIENT TEMPERATURE 35
BAROMETRIC PRESSURE 29.95
STATIC PRESSURE, (P_s) -0.24
FILTER NUMBER (s) 3.175

17 m/s
21 grams
38 v/c

PROBE LENGTH AND TYPE 3' - #23
NOZZLE I.D. .220
ASSUMED MOISTURE, % 2%
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 #9 (0-1")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .012 cfm at 15" READ AND RECORD ALL DATA EVERY 7½ MINUTES Postleak ✓ < .005 cfm at 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
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F			
	0 / 730	279.247									
FAR RGHT 1	737½	284.015	0.58	1.64	1.64	64	38	38	2	230	35
2	745	288.740	0.58	1.63	1.63	65	39	37	3	239	35
3	752½	293.670	0.60	1.71	1.71	63	44	38	3	239	39
4	800	297.910	0.48	1.38	1.38	59	48	40	3	243	43
5	807½	302.465	0.54	1.53	1.53	72	51	41	3	243	44
6	815	306.770	0.50	1.45	1.45	60	52	42	3	242	45
1 CNT	822½	311.250	0.52	1.51	1.51	60	53	43	3	243	44
2	830	315.865	0.53	1.54	1.54	62	54	44	3	243	44
3	837½	320.440	0.52	1.51	1.51	62	54	44	3	243	43
4	845	325.285	0.60	1.73	1.73	64	55	45	3	244	44
5	852½	330.155	0.57	1.64	1.64	65	56	45	3	244	44
6	900	334.450	0.50	1.44	1.44	67	57	46	3	245	46
1 EFT	907½	338.720	0.47	1.36	1.36	67	57	47	3	245	46
2	915	343.230	0.52	1.50	1.50	67	58	48	3	246	46
3	922½	348.080	0.58	1.68	1.68	68	59	49	3	246	47
4	930	352.610	0.52	1.51	1.51	69	61	50	3	246	49
5	937½	357.340	0.51	1.48	1.48	69	63	51	3	246	50
6	945	361.445	0.50	1.46	1.46	69	64	53	3	247	51
AC EFT 1	952½	366.110	0.55	1.60	1.60	70	65	54	3	247	51
2	1000	371.100	0.58	1.69	1.69	72	66	55	3	247	51
3	1007½	375.720	0.53	1.55	1.55	71	69	57	3	249	52
4	1015	380.110	0.50	1.46	1.46	72	70	58	3	248	53
5	1022½	384.160	0.39	1.14	1.14	74	71	60	3	250	55
COMMENTS: 6	1030	388.120	0.38	1.12	1.12	72	72	61	3	251	58
	(24) (180)	108.873	0.523		1.51	67		53			

EPA (Dur) 235

A00006

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

Eagle Snacks
Fryer #8
Part #3

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 97.2848	9.	Probe	167.2	1. 97.2890	9.
2. 97.2850	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 97.2892	10.
3. 97.2850	11.	FILTER OR CONTAINER PLUS SAMPLE	97.2891	3. 97.2880	11.
4.	12.			4. 97.2892	12.
5.	13.	FILTER OR CONTAINER TARE	97.2849	5. 97.2890	13.
6.	14.	SAMPLE	0.0042	6.	14.
7.	15.			7.	15.
8.	16.			8.	16.
1. 0.3487	9.	Filter	3.175	1. 03502	9.
2. 0.3497	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 0.3503	10.
3. 0.3496	11.	FILTER OR CONTAINER PLUS SAMPLE	0.3503	3. 0.3503	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	0.3493	5.	13.
6.	14.	SAMPLE	0.0010	6.	14.
7.	15.			7.	15.
8.	16.			8.	16.
1. 100.6336	9.	Imp I	169.2	1. 100.6378	9.
2. 100.6338	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 100.6407	10.
3. 100.6337	11.	FILTER OR CONTAINER PLUS SAMPLE	100.6403	3. 100.6397	11.
4.	12.			4. 100.6406	12.
5.	13.	FILTER OR CONTAINER TARE	100.6337	5. 100.6416	13.
6.	14.	SAMPLE	0.0066	6.	14.
7.	15.			7.	15.
8.	16.			8.	16.
1. 98.7058	9.	Imp O	170.2	1. 90.7031	9.
2. 98.7058	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 98.7052	10.
3. 98.7050	11.	FILTER OR CONTAINER PLUS SAMPLE	98.7054	3. 98.7053	11.
4.	12.			4. 98.7058	12.
5.	13.	FILTER OR CONTAINER TARE	98.7055	5. 98.7053	13.
6.	14.	SAMPLE	0.0001	6.	14.
7.	15.			7.	15.
8.	16.			8.	16.

FIELD DATA REDUCTION

Site: EAGLE SNACKS
Date: February 3, 1992
Unit: Fryer #8
Test: Part. #1

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Far Right	56.797	0.60	0.774596	1.60	60	36	36
	165.860	0.56	0.748331	1.49	65	42	38
	---	0.52	0.721110	1.39	67	50	42
	109.063	0.52	0.721110	1.40	67	52	42
	=========	0.56	0.748331	1.52	64	56	44
	(DIFFERENCE)	0.50	0.707106	1.36	67	58	46
Mid Right		0.52	0.721110	1.41	71	60	48
		0.56	0.748331	1.50	75	61	49
		0.57	0.754983	1.57	63	61	50
		0.60	0.774596	1.66	62	63	52
		0.58	0.761577	1.60	64	64	53
		0.50	0.707106	1.37	65	65	54
Mid Left		0.42	0.648074	1.16	65	66	56
		0.50	0.707106	1.39	65	67	58
		0.57	0.754983	1.58	68	68	59
		0.58	0.761577	1.59	72	69	59
		0.58	0.761577	1.59	72	70	60
		0.54	0.734846	1.46	80	70	60
Far Left		0.51	0.714142	1.38	80	69	60
		0.52	0.721110	1.43	71	70	61
		0.54	0.734846	1.49	71	70	61
		0.60	0.774596	1.65	71	72	63
		0.56	0.748331	1.56	69	72	62
		0.54	0.734846	1.50	70	73	63
			---	AVERAGE SQUARED			
		AVERAGES	0.736847	0.543	1.49	69	58
			=========	=======	==========	=========	=========

A06008

FIELD DATA REDUCTION

Site: EAGLE SNACKS
Date: February 3, 1992
Unit: Fryer #8
Test: Part. #2

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Far Left	166.562	0.32	0.565685	0.93	73	61	60
	278.183	0.38	0.616441	1.09	77	61	59
		0.44	0.663324	1.27	77	64	60
	111.621	0.58	0.761577	1.68	77	68	61
		0.54	0.734846	1.57	81	71	62
	(DIFFERENCE)	0.54	0.734846	1.58	75	73	63
Mid Left		0.50	0.707106	1.45	80	74	64
		0.54	0.734846	1.60	72	75	65
		0.56	0.748331	1.66	73	76	66
		0.56	0.748331	1.66	74	77	67
		0.52	0.721110	1.54	75	78	68
		0.42	0.648074	1.24	75	78	69
Mid Right		0.50	0.707106	1.48	75	78	69
		0.60	0.774596	1.78	75	79	70
		0.60	0.774596	1.78	77	80	71
		0.50	0.707106	1.48	78	81	71
		0.46	0.678232	1.36	79	81	72
		0.50	0.707106	1.47	80	81	72
Far Right		0.52	0.721110	1.53	81	81	72
		0.52	0.721110	1.53	83	81	73
		0.50	0.707106	1.47	81	82	73
		0.58	0.761577	1.71	80	81	73
		0.60	0.774596	1.76	83	82	73
		0.60	0.774596	1.78	79	81	73
				AVERAGE SQUARED			
	AVERAGES		0.716390	0.513	1.52	78	72

A06009

FIELD DATA REDUCTION

Site: EAGLE SNACKS
Date: February 4, 1992
Unit: Fryer #8
Test: Part. #3

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
Far Right	279.247	0.58	0.761577	1.64	64	38	38
	388.120	0.58	0.761577	1.63	65	39	37
		0.60	0.774596	1.71	63	44	38
	108.873	0.48	0.692820	1.38	59	48	40
		0.54	0.734846	1.53	72	51	41
	(DIFFERENCE)	0.50	0.707106	1.45	60	52	42
Mid Right		0.52	0.721110	1.51	60	53	43
		0.53	0.728010	1.54	62	54	44
		0.52	0.721110	1.51	62	54	44
		0.60	0.774596	1.73	64	55	45
		0.57	0.754983	1.64	65	56	45
		0.50	0.707106	1.44	67	57	46
Mid Left		0.47	0.685565	1.36	66	57	47
		0.52	0.721110	1.50	67	58	48
		0.58	0.761577	1.68	68	59	49
		0.52	0.721110	1.51	69	61	50
		0.51	0.714142	1.48	69	63	51
		0.50	0.707106	1.46	69	64	53
Far Left		0.55	0.741619	1.60	70	65	54
		0.58	0.761577	1.69	72	66	55
		0.53	0.728010	1.55	71	69	57
		0.50	0.707106	1.46	72	70	58
		0.39	0.624499	1.14	74	71	60
		0.38	0.616441	1.12	72	72	61
				AVERAGE SQUARED			
	AVERAGES		0.722054	0.521	1.51	67	53

A06010

WESTERN ENVIRONMENTAL SERVICES

APPENDIX B

WESTERN ENVIRONMENTAL SERVICES

GAS METER CALIBRATION

Meter #: WES #10
Pb: 29.95
Date: January 3, 1992
Calibrator: Ty Hastriter

Orifice	Standard Meter Start	Standard Meter Finish	Temp F	Test Meter Start	Test Meter Finish	Temp F	Time Min	V	Delta H
0.50	963.106	966.890	63	379.738	383.433	65	10	1.027	1.93
0.50	966.890	970.708	63	383.433	387.153	66	10	1.031	1.89
1.00	970.917	976.222	63	387.362	392.514	68	10	1.037	1.95
1.00	976.222	981.526	63	392.514	397.693	71	10	1.037	1.94
2.00	981.855	989.365	63	398.000	405.287	73	10	1.045	1.93
2.00	989.365	996.872	63	405.287	412.596	74	10	1.044	1.92
						Average		1.037	1.93
								=======	=======

B00001

WESTERN ENVIRONMENTAL SERVICES

PITOT TUBE CALIBRATION

Date: JANUARY 17, 1992
By: B.WESSEL
Number: 23
Source: Magnehlic 0-2" 0-5"

Delta P std	Delta P leg 1	Delta P leg 2	Cp leg 1	Cp leg 2
0.25	0.30	0.30	0.91	0.91
1.00	1.25	1.20	0.89	0.91
1.90	3.00	2.95	0.80	0.80
		Averages	0.87	0.88
		Average	0.87	

B06002

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)

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

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.

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

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

ANHEUSER-BUSCH COMPANIES

March 4, 1992

Mr. Thomas L. Rooney
Western Environmental Services
1010 South Pacific Coast Highway
Redondo Beach, California 90277

Re: **Visalia Eagle Snacks, Inc.**
Process Weight Rate
Kettle Fryer No. 8

Dear Tom:

Attached is a copy of the plant's production records for February 3 and 4, 1992. These records include the testing periods for Kettle Fryer No. 8 as noted on each record.

Please include this process rate data in your pending report for your particulate emission testing on Kettle Fryer No. 8. If you have other questions or need more information, please call me at my St. Louis office.

Sincerely,

ANHEUSER-BUSCH COMPANIES, INC.

Donald M. DeHart
Sr. Environmental Engineer
Environmental Affairs Department

Enclosure
Tel: 314/577-4158
Fax: " " -1032

DMD:cd

Anheuser-Busch Companies, Inc.
Executive Offices
One Busch Place
St. Louis, MO U.S.A. 63118-1852
Telex 44-847 ANHEUSER STL

PRODUCTION REPORT FOR WORKSTATION VKET1 - VIS KET FRY PROC 1st SHFT

SUPERVISOR: MR
PRODUCTION MANAGER: RL

DATE: 02/03/92
SHIFT: 1
JOB#: 275793

PRODUCT PRODUCED: 700701 - COD SALTED FLAT CHIP
QUANTITY PRODUCED: 5,004 LBS.

TIME WORKSTATION STARTED UP: 07:30AM
TIME WORKSTATION SHUT DOWN: 03:30PM

	HOURS	
TOTAL MACHINE TIME:	48.00	100.0%
DOWN TIME - PLANNED:	0.00	0.0%
DOWN TIME - UNPLANNED:	6.00	12.5%
PRODUCTIVE RUNNING TIME:	42.00	87.5%

	UNIT OF MEAS	ACTUAL USAGE
RAW POTATOES	LBS.	24,000

RAW WASTE: 355 LBS.
FINISHED WASTE: 265 LBS.

COMMENTS

Ave. fryer input per shift = $\frac{\text{Actual Usage} - \text{Raw Waste}}{\text{Prod. Running Time}}$

$= \frac{24{,}000 - 355}{42.00} = 563$ lb/hr per fryer

Kettle #8, Runs 1 and 2

PRODUCTION REPORT FOR WORKSTATION VKET1 - VIS KET FRY PROC 1st SHFT

SUPERVISOR: MR
PRODUCTION MANAGER: RL

DATE: 02/04/92
SHIFT: 1
JOB#: 275796

PRODUCT PRODUCED: 700687 - RUSSET POTATO CHIPS
QUANTITY PRODUCED: 7,545 LBS.

			HOURS	
TIME WORKSTATION STARTED UP:	07:30AM	TOTAL MACHINE TIME:	56.00	100.0%
TIME WORKSTATION SHUT DOWN:	03:30PM	DOWN TIME - PLANNED:	0.00	0.0%
		DOWN TIME - UNPLANNED:	0.00	0.0%
		PRODUCTIVE RUNNING TIME:	56.00	100.0%

	UNIT OF MEAS	ACTUAL USAGE
RAW POTATOES - RUSSETS	LBS.	26,700

RAW WASTE: 250 LBS.
FINISHED WASTE: 420 LBS.

COMMENTS

Ave Fryer input per shift = $\frac{\text{Actual Usage} - \text{Raw Waste}}{\text{Prod. Running Time}}$

$= \frac{26,700 - 250}{56.00} = 472$ lb/hr per fryer

Kettle # 8, Run 3