EMISSION PERFORMANCE TESTING OF ONE TORTILLA CONTINUOUS FRYING LINE

SITE: EAGLE SNACKS, INC.
Visalia, California

DATE: OCTOBER 20–21, 1992

Prepared For:

EAGLE SNACKS, INC.
P.O. Box 3008
Visalia, California 93278–3008

Contact: Dean Davison
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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, 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 tortilla fryer line #1. The testing was performed on October 20 & 21, 1992 to provide compliance test data for the San Joaquin Valley Unified Air Pollution Control District.

Triplicate particulate tests were performed at a single location, the stack exhaust of the continuous tortilla fryer line #1. The particulate tests were conducted by using EPA Method 5.1.

The unit produces tortilla chips for human consumption. The continuous tortilla fryer vents exhaust directly to 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 and 2.2 show the test results. Table 2.1 presents the particulate sampling results while Table 2.2 shows the particulate analytical results.

The results are summarized below.

Test #	Process Output #/Hr	Particulates Concentration Grs/SDCF	Emission Rate #/Hr	#/ton of product
Tortilla Line #1				
1	1106	0.0115	0.176	0.318
2	1106	0.0112	0.176	0.318
3	1374	0.0133	0.198	0.288
Average	1195	0.0120	0.183	0.307

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: TORTILLA LINE #1
DATE: OCTOBER 20 & 21, 1992

STACK PARAMETERS	TEST 1	TEST 2	TEST 3	AVERAGE
Barometric Pressure "Hg	29.85	29.85	29.85	29.85
Static Pressure "H20	0.09	0.09	0.09	0.09
CO2 %	0.01	0.01	0.01	0.01
O2 %	20.90	20.90	20.90	20.90
N2 %	79.09	79.09	79.09	79.09
CO ppm	0	0	0	0.00
Stack Diameter "	18	18	18	18.00
Stack Temperature F	178	179	181	179.33
Stack Pressure "Hg	29.86	29.86	29.86	29.86

TEST CONDITIONS	TEST 1	TEST 2	TEST 3	AVERAGE
Sample Volume Ft3	75.769	78.770	68.607	74.382
Meter F	74	94	74	80.67
Nozzle Dia "	0.27	0.27	0.27	0.27
Time Min	180	180	180	180.00
Points	24	24	24	24.00
Pitot Tube Factor cp	0.85	0.85	0.85	0.85
Orfice Press "H2O	0.64	0.65	0.51	0.60
Condensate mls	217	198	201	205.33
Velocity Pressure "H2O	0.131	0.135	0.125	0.130
Meter Calibration	1.019	1.019	1.019	1.019

TEST CALCULATIONS	TEST 1	TEST 2	TEST 3	AVERAGE
Water Vapor SDCF	10.214	9.320	9.461	9.67
Gas Sampled SDCF	76.252	76.412	69.022	73.90
Moisture %	11.81	10.87	12.05	11.58
Molecular Weight Dry	28.84	28.84	28.84	28.84
Molecular Weight Wet	27.56	27.66	27.53	27.58
Gas Velocity Ft/Sec	23.16	23.49	22.69	23.11
Flow Rate ACFM	2456	2490	2406	2450
Flow Rate DSCFM	1788	1830	1739	1786
Isokinetics %	105.3	103.2	98.1	102.19

TABLE 2.2 PARTICULATE ANALYSIS

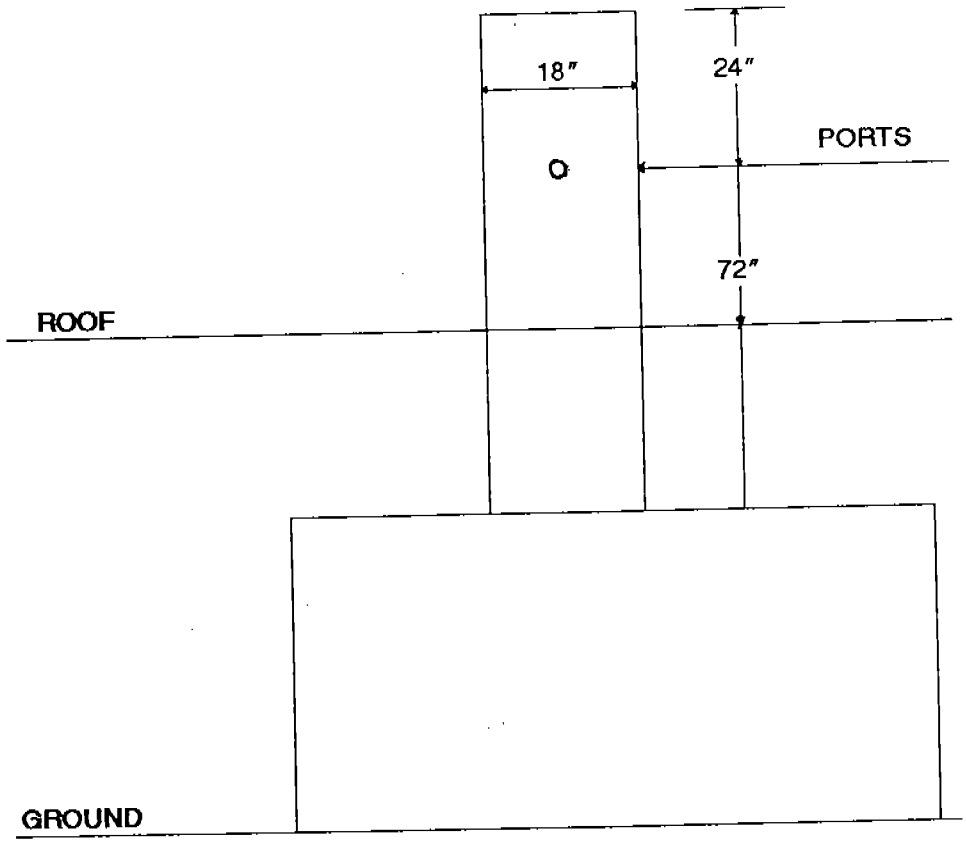
SITE: EAGLE SNACKS
UNIT: TORTILLA LINE #1
DATE: OCTOBER 20 & 21, 1992

ANALYTICAL DATA	TEST 1	TEST 2	TEST 3	AVERAGE
FRONT HALF				
Probe mg	30.8	36.7	39.2	35.57
Filter mg	9.1	9.2	13.4	10.57
Blanks mg	1.5	3.5	3.5	2.83
Subtotal mg	38.4	42.4	49.1	43.30
BACK HALF				
Impingers Inorg mg	16.5	12.6	9.7	12.93
Impingers Org mg	3.5	2.0	2.2	2.57
Blank mg	1.5	1.5	1.5	1.50
Subtotal mg	18.5	13.1	10.4	14.00
Total Weight Gain mg	56.9	55.5	59.5	57.30
EMISSION DATA	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
FRONT HALF				
Grs/SDCF	0.0078	0.0086	0.0110	0.0091
Lbs/Hr	0.119	0.134	0.163	0.139
BACK HALF				
Grs/SDCF	0.0037	0.0026	0.0023	0.0029
Lbs/Hr	0.057	0.041	0.035	0.044
TOTAL EMISSIONS	**TEST 1**	**TEST 2**	**TEST 3**	**AVERAGE**
Grs/SDCF	0.0115	0.0112	0.0133	0.0120
Lbs/Hrs	0.176	0.176	0.198	0.183

3.0 SITE DESCRIPTION

3.1 Tortilla Fryer Line #1

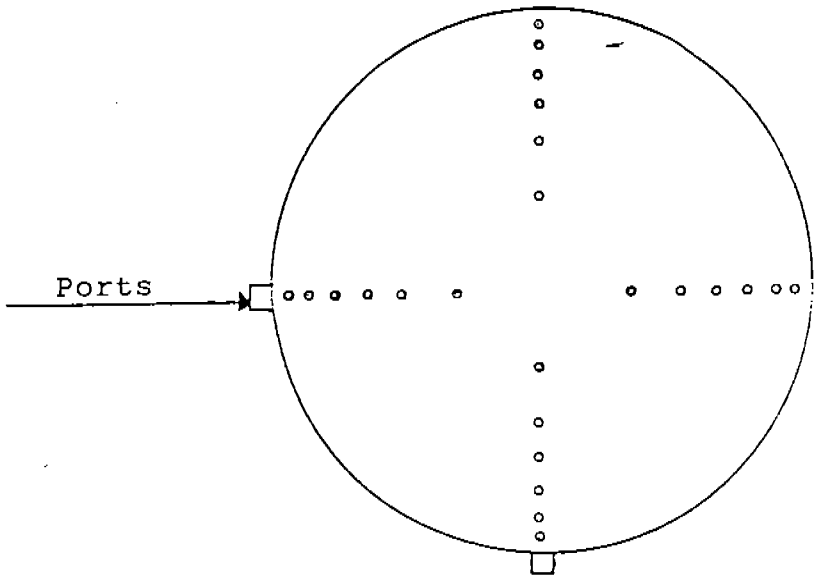
Samples were collected from a 18" diameter vertical stack located on the roof. The sampling ports are located at 90 degrees of each other on the same horizontal plane. Figure 3.1 is the site diagram while Figure 3.2 presents the traverse point location.



SITE DIAGRAM: TORTILLA LINE

FRYER #1

FIGURE 3.1



TRAVERSE POINT LOCATION STACK EXHAUST
FIGURE 3.2

TRAVERSE POINT	POINT LOCATION
1	0.50
2	1.21
3	2.12
4	3.19
5	4.50
6	6.41
7	11.59
8	13.50
9	14.81
10	15.88
11	16.79
12	17.50

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 5.1 particulate samples were collected at the stack exhaust of tortilla line #1.

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.

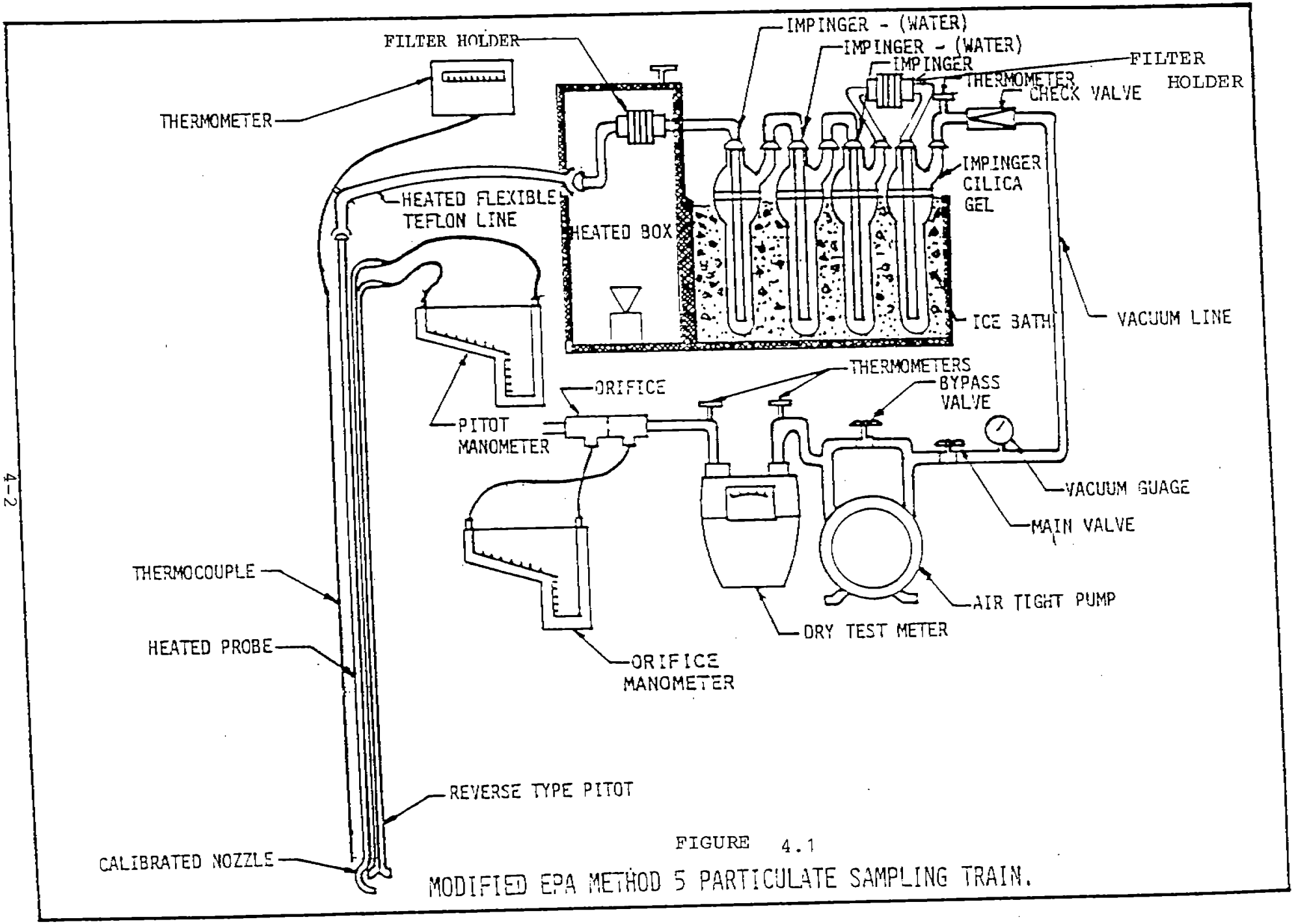


FIGURE 4.1

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 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.

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

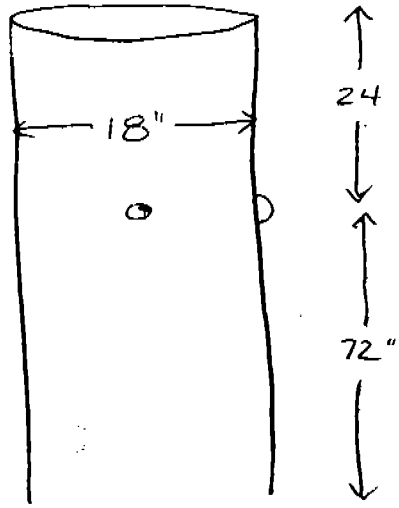
The calibration of the pitot tube, dry gas meter, digital thermometers, and manometers were performed by utilizing standard EPA Methodology, "Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III, Stationary Source Specific Methods (EPA-600/4-77-0278).

WESTERN ENVIRONMENTAL SERVICES

APPENDIX A

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT Eagle Snack
DATE 10-20-92
SAMPLING LOCATION Tortilla Line #1
INSIDE OF FAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE A) 18"
INSIDE OF NEAR WALL TO OUTSIDE OF NIPPLE, (DISTANCE B) Ø"
STACK I.D., (DISTANCE A - DISTANCE B) 18"
NEAREST UPSTREAM DISTURBANCE 24" or 1.33 dd
NEAREST DOWNSTREAM DISTURBANCE 72" or 4.00 dd
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	.021	18"	0.38	Ø"	0.50"
2	.067		1.21		1.21"
3	.118		2.12		2.12"
4	.177		3.19		3.19"
5	.250		4.50		4.50"
6	.356		6.41		6.41"
7	.644		11.59		11.59"
8	.750		13.50		13.50"
9	.823		14.81		14.81"
10	.882		15.88		15.88"
11	.933		16.79		16.79"
12	.979		17.62		17.50"

FIELD DATA

PLANT Eagle Snacks
DATE 10-20-92
SAMPLING LOCATION Tortilla Line
SAMPLE TYPE Particulate
RUN NUMBER #1 - 3 hr. run
OPERATOR Ty Hastreiter
AMBIENT TEMPERATURE 57°
BAROMETRIC PRESSURE 29.85
STATIC PRESSURE, (P_s)
FILTER NUMBER (s) 3.221

Process Rate
1334 lbs/hr

PROBE LENGTH AND TYPE 5' - #26
NOZZLE I.D. .270
ASSUMED MOISTURE, % 5%
SAMPLE BOX NUMBER WES #11
METER BOX NUMBER WES #10
METER $\Delta H_@$ (1.90) WES #10
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp #2 (0-.50")

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY 7½ MINUTES

Preleak < .020 cfm at 15"   Postleak < .010 cfm at 5"

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	~~802½~~ ~~803~~	725.900										
1	7½	810	728.875	0.120	0.59	0.59	177	58	58	1	256	55	
2	15	817½	732.000	0.130	0.64	0.64	174	62	58	1	256	47	244
3	22½	825	735.110	0.130	0.64	0.64	172	64	58	1	257	50	245
4	30	832½	738.385	0.140	0.71	0.71	161	~~67~~ 64	59	2	257	52	
5	37½	840	741.790	0.150	0.77	0.77	156	68	60	2	258	54	243
6	45	847½	745.185	0.150	0.76	0.76	165	71	61	2	258	54	
7	52½	855	748.555	0.150	0.74	0.74	185	73	63	2	258	54	242
8	60	902½	751.765	0.135	0.67	0.67	180	73	63	1	258	54	
9	67½	910	754.875	0.125	0.62	0.62	180	73	64	1	258	54	250
10	75	917½	757.985	0.125	0.62	0.62	181	74	65	1	258	56	
11	82½	925	761.020	0.120	0.59	0.59	184	77	67	1	258	54	252
12	90	932½	764.224	0.130	0.65	0.65	183	79	69	1	260	56	
	Ø	937	764.224										251
1	97½	944½	767.355	0.135	0.63	0.63	182	76	72	1	262	68	
2	105	952	770.460	0.130	0.61	0.61	178	81	73	1	260	57	
3	112½	959½	773.480	0.125	0.58	0.58	180	81	73	1	260	58	251
4	120	1007	776.600	0.130	0.61	0.61	181	82	74	1	262	59	
5	127½	1014½	779.750	0.135	0.63	0.63	184	84	76	1	262	61	251
6	135	1022	783.100	0.150	0.70	0.70	184	85	77	2	263	60	
7	142½	1029½	786.230	0.130	0.61	0.61	181	86	78	1	263	61	249
8	150	1037	789.400	0.130	0.63	0.63	164	87	79	1	263	61	
9	157½	1044½	792.500	0.125	0.59	0.59	180	89	80	1	264	62	249
10	165	1052	795.540	0.120	0.57	0.57	182	90	81	1	264	62	
11	172½	1059½	798.600	0.120	0.57	0.57	183	91	83	1	265	63	248
12	180	1107	801.669	0.120	0.57	0.57	183	92	84	1	265	62	
	(180)		(75.769)	(0.13)		(0.64)	(178)	(74)					

North

East

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA

PLANT Eagle Snacks
DATE 10-20-92
SAMPLING LOCATION Tortilla Line
SAMPLE TYPE Particulate
RUN NUMBER # 2 - 180 min. run
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 84°
BAROMETRIC PRESSURE 29.85
STATIC PRESSURE, (P_s) 0.09
FILTER NUMBER (s) 3.225

1,150 #/Hr

PROBE LENGTH AND TYPE 5' - #26
NOZZLE I.D. .270
ASSUMED MOISTURE, % 5%
SAMPLE BOX NUMBER WES # 11
METER BOX NUMBER WES # 10
METER $\Delta H_@$ (1.90) WES # 10
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp # 2 (0 - .50")

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ✓ < .020 cfm at 15" READ AND RECORD ALL DATA EVERY 7½ 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	Probe Temp. °F
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	0 / 1141	802.000										
1	7½ / 1148½	805.300	0.140	0.67	0.67	170	84	84	1	253	68	245
2	15 / 1156	808.725	0.145	0.72	0.72	153	88	86	2	254	66	
3	22½ / 1203½	812.100	0.140	0.70	0.70	152	90	86	2	257	68	249
4	30 / 1211	815.475	0.140	0.70	0.70	151	93	87	2	256	70	
5	37½ / 1218½	818.850	0.145	0.70	0.70	177	95	87	2	252	70	249
6	45 / 1226	822.275	0.150	0.72	0.72	182	95	88	2	252	61	
7	52½ / 1233½	825.635	0.145	0.69	0.69	183	96	88	1	252	60	249
8	60 / 1241	828.855	0.130	0.62	0.62	182	97	89	1	251	59	
9	67½ / 1248½	832.010	0.125	0.60	0.60	183	98	90	1	250	61	248
10	75 / 1256	835.225	0.130	0.62	0.62	183	99	91	1	250	62	
11	82½ / 1303½	838.400	0.125	0.60	0.60	183	98	91	1	250	62	250
12	90 / 1311	841.520	0.120	0.58	0.58	183	99	92	1	248	61	
	ø / 1313½	841.520										
1	97½ / 1321	845.0	0.140	0.67	0.67	183	97	92	1	250	68	250
2	105 / 1328½	848.20	0.140	0.67	0.67	184	100	93	1	250	63	251
3	112½ / 1336	851.40	0.135	.58	.58	184	100	94	1	250	64	252
4	120 / 1343½	854.70	0.150	.72	.72	185	100	94	2	249	64	251
5	127½ / 1351	858.40	0.160	.77	.77	185	98	92	2	247	62	249
6	135 / 1358½	861.80	0.160	.77	.77	185	99	93	2	249	62	252
7	142½ / 1406	865.220	0.140	.67	.67	185	100	93	1	248	62	251
8	150 / 1413½	868.355	0.120	0.58	0.58	183	101	93	1	247	63	
9	157½ / 1421	871.4	0.115	0.55	0.55	184	99	93	1	249	63	251
10	165 / 1428½	874.75	0.13	0.63	0.67	184	101	94	2	248	66	252
COMMENTS:	172½ / 1436	877.60	0.11	0.53	0.53	188	101	94	2	247	66	251
12	180 / 1443¼	880.770	0.12	.59	.58	185	100	94	2	249	67	250

North

East

A-3

EPA (Rev. 235
4-72

FIELD DATA

PLANT Eagle Snacks
DATE 10 - 20 - 92
SAMPLING LOCATION Tortilla Line
SAMPLE TYPE Particulate
RUN NUMBER #3 - 3 hr. run
OPERATOR Ty Hastriter
AMBIENT TEMPERATURE 64°
BAROMETRIC PRESSURE 29.85
STATIC PRESSURE, (P_s) 0.09
FILTER NUMBER (s) 3.229

Process Rate
1300 #/hr

PROBE LENGTH AND TYPE 5' - #26
NOZZLE I.D. .270
ASSUMED MOISTURE, % 11%
SAMPLE BOX NUMBER WES # 11
METER BOX NUMBER WES # 10
METER $\Delta H_@$ (1.90) WES # 10
C FACTOR
PROBE HEATER SETTING 250°
HEATER BOX SETTING 250°
REFERENCE Δp # 2 (0 - 0.50")

CS6

SCHEMATIC OF TRAVERSE POINT LAYOUT

Preleak ≤ .007 cfm at 15"

READ AND RECORD ALL DATA EVERY 7½ MINUTES

Postleak ≤ .003 cfm at 7"

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 Temp.
				DESIRED	ACTUAL		INLET ($T_{m\,in}$), °F	OUTLET ($T_{m\,out}$), °F				
	0 / 716	887.300										
1	7½ / 723½	890.020	0.120	0.48	0.48	176	64	64	1	240	61	248
2	15 / 731	892.705	0.115	0.46	0.46	178	65	64	1	244	54	
3	22½ / 738½	895.475	0.120	0.48	0.48	180	68	64	1	250	57	250
4	30 / 746	898.280	0.125	0.50	0.50	178	70	65	2	252	60	
5	37½ / 753½	901.170	0.130	0.52	0.52	181	71	65	2	250	60	250
6	45 / 801	904.050	0.130	0.52	0.52	182	73	66	2	250	60	
7	52½ / 808½	906.965	0.130	0.53	0.53	181	74	67	2	250	58	248
8	60 / 816	909.760	0.120	0.49	0.49	181	75	68	2	249	56	
9	67½ / 823½	912.500	0.115	0.47	0.47	180	76	69	2	249	56	249
10	75 / 831	915.320	0.120	0.49	0.49	180	76	69	2	249	53	
11	82½ / 838½	918.320	0.120	0.50	0.50	181	79	71	5	249	49	249
12	90 / 846	921.145	0.120	0.50	0.50	181	79	72	5	257	50	
	Ø / 848	921.145										
1	97½ / 855½	924.125	0.135	0.55	0.55	178	77	72	3	274	52	252
2	105 / 903	927.155	0.140	0.57	0.57	177	78	72	3	272	51	
3	112½ / 910½	930.135	0.135	0.55	0.55	179	78	72	3	271	49	253
4	120 / 918	933.120	0.135	0.55	0.55	180	78	73	3	271	50	
5	127½ / 925½	935.845	0.135	0.55	0.55	181	78	73	3	271	50	252
6	135 / 933	938.865	0.140	0.57	0.57	182	79	74	6	271	52	
7	142½ / 940½	941.800	0.130	0.53	0.53	183	80	74	6	271	53	252
8	150 / 948	944.690	0.125	0.51	0.51	182	81	75	3	272	56	
9	157½ / 955½	947.515	0.120	0.49	0.49	183	82	76	3	272	56	263
10	165 / 1003	950.295	0.115	0.47	0.47	184	84	77	3	271	57	
COMMENTS: 11	172½ / 1010½	953.140	0.120	0.49	0.49	183	85	78	3	273	57	262
12	180 / 1018	955.907	0.115	0.47	0.47	184	86	80	3	275	58	
	(180)	(68.607)	(0.125)		(0.51)	(181)		(74)				

North

East

A-4

EPA (Dur) 235
4/72

FIELD DATA

10 min ✓

PLANT _____
DATE _____
SAMPLING LOCATION _____
SAMPLE TYPE _____
RUN NUMBER _____
OPERATOR _____
AMBIENT TEMPERATURE _____
BAROMETRIC PRESSURE _____
STATIC PRESSURE, (P_s) _____
FILTER NUMBER (s) _____

PROBE LENGTH AND TYPE _____
NOZZLE I.D. _____
ASSUMED MOISTURE, % _____
SAMPLE BOX NUMBER _____
METER BOX NUMBER _____
METER $\Delta H_@$ _____
C FACTOR _____
PROBE HEATER SETTING _____
HEATER BOX SETTING _____
REFERENCE Δp _____

SCHEMATIC OF TRAVERSE POINT LAYOUT

READ AND RECORD ALL DATA EVERY _____ MINUTES

TRAVERSE POINT NUMBER	CLOCK TIME (24-hr CLOCK) / SAMPLING TIME, min	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			
	~~1209~~	~~665.000~~	~~.07~~		~~1.90~~						
			.12			149					
	1211	665.234	.13								
	1221	672.352	.13		1.90	153	81	81			
			.13								
			.11								

COMMENTS:

EPA (Dur) 235
4/72

FIELD DATA REDUCTION

SITE: EAGLE SNACKS
DATE: OCTOBER 20, 1992
UNIT: TORTILLA LINE #1
TEST: PART. #1

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
North	725.900	0.120	0.346410	0.59	177	58	58
	801.669	0.130	0.360555	0.64	174	62	58
	---------	0.130	0.360555	0.64	172	64	58
	75.769	0.140	0.374165	0.71	161	67	59
	=========	0.150	0.387298	0.77	156	68	60
	(DIFFERENCE)	0.150	0.387298	0.76	165	71	61
		0.150	0.387298	0.74	185	73	63
		0.135	0.367423	0.67	180	73	63
		0.125	0.353553	0.62	180	73	64
		0.125	0.353553	0.62	181	74	65
		0.120	0.346410	0.59	184	77	67
		0.130	0.360555	0.65	183	79	69
East		0.135	0.367423	0.63	182	76	72
		0.130	0.360555	0.61	178	81	73
		0.125	0.353553	0.58	180	81	73
		0.130	0.360555	0.61	181	82	74
		0.135	0.367423	0.63	184	84	76
		0.150	0.387298	0.70	184	85	77
		0.130	0.360555	0.61	181	86	78
		0.130	0.360555	0.63	164	87	79
		0.125	0.353553	0.59	180	89	80
		0.120	0.346410	0.57	182	90	81
		0.120	0.346410	0.57	183	91	83
		0.120	0.346410	0.57	183	92	84
			---------	AVERAGE SQUARED			
		AVERAGES	0.362324	0.131	0.64	178	74
			=========	=======	==========	=========	=========

FIELD DATA REDUCTION

SITE: EAGLE SNACKS
DATE: OCTOBER 20, 1992
UNIT: TORTILLA LINE #1
TEST: PART. #2

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
North	802.000	0.140	0.374165	0.67	170	84	84
	880.770	0.145	0.380788	0.72	153	88	86
	---------	0.140	0.374165	0.70	152	90	86
	78.770	0.140	0.374165	0.70	151	93	87
	=========	0.145	0.380788	0.70	177	95	87
	(DIFFERENCE)	0.150	0.387298	0.72	182	95	88
		0.145	0.380788	0.69	183	96	88
		0.130	0.360555	0.62	182	97	89
		0.125	0.353553	0.60	183	98	90
		0.130	0.360555	0.62	183	99	91
		0.125	0.353553	0.60	183	98	91
		0.120	0.346410	0.58	183	99	92
East		0.140	0.374165	0.67	183	97	92
		0.140	0.374165	0.67	184	100	93
		0.135	0.367423	0.58	184	100	94
		0.150	0.387298	0.72	185	100	94
		0.160	0.400000	0.77	185	98	92
		0.160	0.400000	0.77	185	99	93
		0.140	0.374165	0.67	185	100	93
		0.120	0.346410	0.58	183	101	93
		0.115	0.339116	0.55	184	99	93
		0.130	0.360555	0.63	184	101	94
		0.110	0.331662	0.53	188	101	94
		0.120	0.346410	0.58	185	100	94
			---------	AVERAGE SQUARED			
		AVERAGES	0.367840	0.135	0.65	179	94
			=========	=======	==========	=========	=========

FIELD DATA REDUCTION

SITE: EAGLE SNACKS
DATE: OCTOBER 21, 1992
UNIT: TORTILLA LINE #1
TEST: PART. #3

	GAS METER READING	VELOCITY HEAD	SQUARE ROOT	ORIFICE PRESSURE DELTA H	STACK TEMPERATURE	DRY GAS METER TEMPERATURE	
North	887.300	0.120	0.346410	0.48	176	64	64
	955.907	0.115	0.339116	0.46	178	65	64
	---------	0.120	0.346410	0.48	180	68	64
	68.607	0.125	0.353553	0.50	178	70	65
	=========	0.130	0.360555	0.52	181	71	65
	(DIFFERENCE)	0.130	0.360555	0.52	182	73	66
		0.130	0.360555	0.53	181	74	67
		0.120	0.346410	0.49	181	75	68
		0.115	0.339116	0.47	180	76	69
		0.120	0.346410	0.49	180	76	69
		0.120	0.346410	0.50	181	79	71
		0.120	0.346410	0.50	181	79	72
East		0.135	0.367423	0.55	178	77	72
		0.140	0.374165	0.57	177	78	72
		0.135	0.367423	0.55	179	78	72
		0.135	0.367423	0.55	180	78	73
		0.135	0.367423	0.55	181	78	73
		0.140	0.374165	0.57	182	79	74
		0.130	0.360555	0.53	183	80	74
		0.125	0.353553	0.51	182	81	75
		0.120	0.346410	0.49	183	82	76
		0.115	0.339116	0.47	184	84	77
		0.120	0.346410	0.49	183	85	78
		0.115	0.339116	0.47	184	86	80
			---------	AVERAGE SQUARED			
		AVERAGES	0.353962	0.125	0.51	181	74
			=========	=======	==========	=========	=========

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

Eagle Snacks
Tortilla Line
Part. #1

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 99.1936	9.	Probe	19.1	1. 99.2261	9.
2. 99.1941	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 99.2246	10.
3. 99.1943	11.	FILTER OR CONTAINER PLUS SAMPLE	99.2248	3. 99.2247	11.
4.	12.			4. 99.2251	12.
5.	13.	FILTER OR CONTAINER TARE	99.1940	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0308	7.	15.
8.	16.			8.	16.
1. 0.3547	9.	Filter	3.221	1. 0.3640	9.
2. 0.3547	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 0.3637	10.
3. 0.3547	11.	FILTER OR CONTAINER PLUS SAMPLE	0.3638	3. 0.3638	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	0.3547	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0091	7.	15.
8.	16.			8.	16.
1. 100.8878	9.	Imp I	20.1	1. 100.9058	9.
2. 100.8882	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 100.9050	10.
3. 100.8884	11.	FILTER OR CONTAINER PLUS SAMPLE	100.9046	3. 100.9040	11.
4.	12.			4. 100.9047	12.
5.	13.	FILTER OR CONTAINER TARE	100.8881	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0165	7.	15.
8.	16.			8.	16.
1. 100.1335	9.	Imp O	21.1	1. 100.1384	9.
2. 100.1338	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 100.1375	10.
3. 100.1338	11.	FILTER OR CONTAINER PLUS SAMPLE	100.1372	3. 100.1368	11.
4.	12.			4. 100.1374	12.
5.	13.	FILTER OR CONTAINER TARE	100.1337	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0035	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.

Eagle Snacks
Tortilla Like
Part. #2

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT		Sample Number	Filter or Container #	TARE + SAMPLE WEIGHT	
1. 98.3345	9.	Probe	22.1	1. 98.3726	9.
2. 98.3348	10.			2. 98.3714	10.
3. 98.3349	11.			3. 98.3711	11.
4.	12.	Filter or Container Plus Sample	98.3714	4. 98.3718	12.
5.	13.			5.	13.
6.	14.	Filter or Container Tare	98.3347	6.	14.
7.	15.			7.	15.
8.	16.	Sample	~~0.0367~~ 0.0367	8.	16.
1. 0.3509	9.	Filter	3,225	1. 0.3602	9.
2. 0.3510	10.			2. 0.3600	10.
3. 0.3508	11.			3. 0.3600	11.
4.	12.	Filter or Container Plus Sample	0.3601	4.	12.
5.	13.			5.	13.
6.	14.	Filter or Container Tare	0.3509	6.	14.
7.	15.			7.	15.
8.	16.	Sample	0.0092	8.	16.
1. 102.9218	9.	Imp I	23.1	1. 102.9359	9.
2. 102.9221	10.			2. 102.9345	10.
3. 102.9219	11.			3. 102.9342	11.
4.	12.	Filter or Container Plus Sample	102.9345	4. 102.9348	12.
5.	13.			5.	13.
6.	14.	Filter or Container Tare	102.9219	6.	14.
7.	15.			7.	15.
8.	16.	Sample	0.0126	8.	16.
1. 96.2527	9.	Imp O	24.1	1. 96.2558	9.
2. 96.2530	10.			2. 96.2554	10.
3. 96.2529	11.			3. 96.2546	11.
4.	12.	Filter or Container Plus Sample	96.2549	4. 96.2533	12.
5.	13.			5. 96.2546	13.
6.	14.	Filter or Container Tare	96.2529	6.	14.
7.	15.			7.	15.
8.	16.	Sample	0.0020	8.	16.

DESICCATION OF SOLID SAMPLES TO CONSTANT WEIGHT

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

Eagle Snacks, Tortilla Line Part. # 3

Requestor _____
JN _____
Assigned to _____
Date Assigned _____

ALL WEIGHTS IN GRAMS

TARE WEIGHT				TARE + SAMPLE WEIGHT	
1. 100.1030	9.	Probe	25.1	1. 100.1437	9.
2. 100.1030	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 100.1423	10.
3. 100.1030	11.	FILTER OR CONTAINER PLUS SAMPLE	100.1423	3. 100.1424	11.
4.	12.			4. 100.1422	12.
5.	13.	FILTER OR CONTAINER TARE	100.1031	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0392	7.	15.
8.	16.			8.	16.
1. 0.3493	9.	Filter	3229	1. 0.3626	9.
2. 0.3493	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 0.3626	10.
3. 0.3493	11.	FILTER OR CONTAINER PLUS SAMPLE	0.3627	3. 0.3628	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	0.3493	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0134	7.	15.
8.	16.			8.	16.
1. 99.5046	9.	Imp I	26.1	1. 99.5133	9.
2. 99.5037	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 99.5140	10.
3. 99.5040	11.	FILTER OR CONTAINER PLUS SAMPLE	99.5138	3. 99.5141	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	99.5041	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0097	7.	15.
8.	16.			8.	16.
1. 98.8672	9.	Imp O	27.1	1. 98.8688	9.
2. 98.8663	10.	SAMPLE NUMBER	FILTER OR CONTAINER #	2. 98.8691	10.
3. 98.8668	11.	FILTER OR CONTAINER PLUS SAMPLE	98.8690	3. 98.8692	11.
4.	12.			4.	12.
5.	13.	FILTER OR CONTAINER TARE	98.8668	5.	13.
6.	14.			6.	14.
7.	15.	SAMPLE	0.0022	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
								=======	=======

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.

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

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 VTORT1 - VIS TORT PROC-1st SHIFT

SUPERVISOR: SW
PRODUCTION MANAGER: RL

DATE: 10/20/92
SHIFT: 1
JOB#: 338127

PRODUCT PRODUCED: 700782 - WHITE REST ROUNDS
QUANTITY PRODUCED: 6,557 LBS. DATE CODE USED: DEC2192V20110

		HOURS	
TIME WORKSTATION STARTED UP:	07:30AM	TOTAL MACHINE TIME:	8.00	100.0%
TIME WORKSTATION SHUT DOWN:	03:30PM	DOWN TIME - PLANNED:		0.0%
		DOWN TIME - UNPLANNED:	1.00	12.5%
		PRODUCTIVE RUNNING TIME:	7.00	87.5%

STANDARD LINE SPEED: 950 LBS./HOUR
ACTUAL LINE SPEED: 820 LBS./HOUR OF PRODUCTIVE RUNNING TIME
EFFICIENCY RATING: 86.3%

CONFIDENTIAL

YIELD = 74.0

RAW WASTE: 0 LBS. OR 0.0%
FINISHED WASTE: 1,184 LBS. OR 15.3%

COMMENTS

ZEROED AND CANCELLED BY MREQ16
UPDT- XFER PUMP.
HOURS CLEAN FOR THE DAY.

Finished waste is weighed after it has passed through the fryer. Total pounds passed through Fryer is ~~6557~~ 7,741 LBS. in seven hours = ~~937~~ 1106 LBS/hr Average.

$$\frac{6,557 + 1,184}{7\ hr} = \frac{7741}{7} = 1106\ lb/hr.$$

PRODUCTION REPORT FOR WORKSTATION VTORT1 - VIS TORT PROC-1st SHIFT

SUPERVISOR: SW
DATE: 10/21/92
PRODUCTION MANAGER: RL
SHIFT: 1
JOB#: 338130

PRODUCT PRODUCED: 700782 - WHITE REST ROUNDS
QUANTITY PRODUCED: 10,778 LBS. DATE CODE USED: DEC2192V21110

			HOURS	
TIME WORKSTATION STARTED UP:	07:30AM	TOTAL MACHINE TIME:	8.00	100.0
TIME WORKSTATION SHUT DOWN:	03:30PM	DOWN TIME - PLANNED:		0.0
		DOWN TIME - UNPLANNED:		0.0
		PRODUCTIVE RUNNING TIME:	8.00	100.0

STANDARD LINE SPEED: 950 LBS./HOUR
ACTUAL LINE SPEED: 1,347 LBS./HOUR OF PRODUCTIVE-RUNNING TIME
EFFICIENCY RATING: 141.8%

CONFIDENTIAL

YIELD = 99.5

RAW WASTE: 0 LBS. OR 0.0%
FINISHED WASTE: 212 LBS. OR 1.9%

COMMENTS

HOURS CLEAN FOR THE DAY.

Finish waste is weighed after it has passed through fryer. TOTAL Pounds passed through fryer is 10,990 ~~10,778~~ LBS. in 8 hours or ~~1347~~ 1374 LBS/hour average.

$$\frac{10778 + 212}{8} = \frac{10990}{8} = 1374\ \#/hr$$