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.

AP-42 Section Number: **9.9.1**

Reference Number: **30**

Title: **Report of Particulate Emission Tests For Wayne Farms Laurel Feed Mill**

Environmental Monitoring Lab.

August 29 and September 20, 1994

AP-42 Section 9.9.1
Reference 30
Report Sect.
Reference

(26)

REPORT OF PARTICULATE EMISSIONS TESTS FOR WAYNE FARMS LAUREL FEED MILL

Laurel, Mississippi
August 29 and September 20, 1994

Wayne Farms
Post Office Drawer 328
Laurel, Mississippi 39441

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Performed By:
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<601/856-3092>

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September 27, 1994

Subject: Wayne Farms -- Laurel Feed Mill
Laurel, Mississippi

On August 29 and September 20, 1994, Environmental Monitoring Laboratories performed air emissions testing for Wayne Farm's feed mill in Laurel, Mississippi. (HAMMERMILL) Testing was performed to measure particulate (PM) emissions from the pouring aspiration – GRINDER FABRIC FILTER – cyclone stack and the cooler cyclone stack in accordance with requirements of the Mississippi Department of Environmental Quality.

Test results:

	PARTICULATE EMISSIONS	
	pounds/hr	grains/dscf
GRINDER FABRIC FILTER POURING ASPIRATION STACK (HAMMERMILL / GRINDER)	0.04	0.002
PELLET COOLER TRI-CLONE CYCLONE COOLER STACK	5.00	0.021

The testing project was coordinated by Mr. Greg Bull of Wayne Farms. Rodney Moore of Environmental Monitoring Laboratories was responsible for sample collection and delivery. Danny Russell of EML was responsible for sample analysis and for report preparation. Sample custody was limited to Mr. Russell.

Following is a report of the test.

REPORT OF PARTICULATE EMISSIONS TEST FOR
WAYNE FARMS
LAUREL FEED MILL
LAUREL, MISSISSIPPI
AUGUST 29 AND SEPTEMBER 20, 1994

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A. Field and Laboratory Data

B. Calibrations

REPORT CERTIFICATION

I certify that I have examined the information submitted herein, and based upon my inquires of those responsible for obtaining the data or upon my direct acquisition of data, I believe the submitted information is true, accurate and complete.

Signed _____

Daniel G. Russell

1.0 Test Results:

The following tables present the measured flow parameters and test results for particulate emissions testing done on August 29 and September 20, 1994. for Wayne Farms' feed mill in Laurel, Mississippi.

1.1 Pouring Aspiration Cyclone Stack

Run No.		1	2	3	AVG.
Date		8/29/94	8/29/94	8/29/94	——
Time Start		1315	1421	1529	——
Time End		1416	1522	1630	——
Particulate Emissions	#/hr	0.04	0.02	0.05	0.04
Particulate Emissions	gr/dscf	0.002	0.001	0.003	0.002
Volumetric Flowrate	acfm	2377	2411	2494	2428
Volumetric Flowrate	dscfm	2099	2143	2203	2148
Velocity	ft./sec.	31.5	31.9	33.0	32.1
Stack Temperature	°F	112	113	113	113
Moisture	%	4.3	3.4	4.1	3.9
Sample Rate	% isokinetic	104	103	100	102

1.2 Cooler Stack

Run No.		1	2	3	AVG.
Date		9/20/94	9/20/94	9/20/94	——
Time Start		1011	1236	1424	——
Time End		1112	1337	1525	——
Particulate Emissions	#/hr	4.10	7.27	3.62	5.00
Particulate Emissions	gr/dscf	0.018	0.028	0.018	0.021
Volumetric Flowrate	acfm	32115	34523	28712	31783
Volumetric Flowrate	dscfm	26953	30255	23348	26852
Velocity	ft./sec.	49.6	53.3	44.3	49.0
Stack Temperature	°F	112	98	118	109
Moisture	%	6.7	4.9	8.6	6.7
Sample Rate	% isokinetic	104	100	105	103

2.0 SOURCE DESCRIPTION: Source description here is limited to a description of the sampling locations. Process descriptions and records of operating conditions during the test may be requested of Wayne Farms.

The pouring aspiration cyclone exhausts to the atmosphere by way by way of a rectangular stack measuring 14.5 inches by 12.5 inches. A slot for sampling was installed at a location that is 21 inches below a vertical to horizontal elbow, and 48 inches above a horizontal to vertical elbow.

The cooler stack exhausts to the atmosphere by way of a 44.5 inch diameter stack. Sampling was performed in a vertical section of the stack at a location that is 258 inches (5.7 diameters) below an elbow, and 288 inches (6.4 diameters) above a horizontal to vertical elbow.

3.0 TEST PROCEDURES: Test procedures used are those described in the Code of Federal Regulations, Title 40, Part 60, Appendix A. Specifically, Method 1 was used to determine the number of sample points, and Method 5 to determine flow rates, moisture content, and particulate emissions. The sampling train used is identical to that described in Method 5 except that the cyclone was omitted. Sample duration was 60 minutes for each of three runs.

Filters were recovered by rinsing the front half of the filter holder into the probe wash and securing the filters in glass petri dishes. Part of the sample filter normally adheres to the filter gasket, and some of the adhering material is recovered into the probe wash. Therefore some of the filter weight is attributed to the probe wash weight. Filters were heated in an oven for 2 hours at 105° C, desiccated at least 24 hours and weighed to constant weight. Probe wash samples in acetone were evaporated to dryness over low heat in tarred beakers, desiccated for at least 24 hours and weighed to constant weight. Weighings are made at 6 hour or greater intervals (samples stored in desiccator). Final weights are considered valid and are recorded if there is no more than 0.5 milligrams difference from the previous weighing

4.0 DATA REDUCTION

Wayne Feeds - Laurel Feedmill
Pouring Aspiration Cyclone Stack
Particulate Emissions Test - August 29, 1994

Collected Test Data:		RUN 1	RUN 2	RUN 3	
Date	:	**8/29/94**	**8/29/94**	**8/29/94**	
Time start	:	**1315**	**1421**	**1529**	
Time end	:	**1416**	**1522**	**1630**	
1. As	: sq ft	1.2587	1.2587	1.2587	
2. Dn	: in.	0.275	0.275	0.275	
3. Cp	: dimensionless	0.84	0.84	0.84	
4. Theta	: minutes	60.00	60.00	60.00	
5. Y	: dimensionless	1.00	1.00	1.00	
6. Pbar	: in. Hg	29.90	29.90	29.90	
7. Pg	: in. H2O	-0.05	-0.05	-0.05	
8. Vm	: cf (dry gas)	45.543	46.234	45.934	
9. sqr(DP),avg	: in.H2O^.5	0.5338	0.5417	0.5598	
10. DH	: in. H2O	1.7875	1.8396	1.8042	
11. ts	: degrees F	112.04	113.21	113.04	112.76
12. tm	: degrees F	104.06	105.67	104.81	
13. Vlc	: ml	40.5	32.5	39	
14. CO2	: percent	0.00	0.00	0.00	
15. O2	: percent	20.90	20.90	20.90	
16. CO	: percent	0.00	0.00	0.00	
17. M,PM	: milligrams	6.5	3.5	7.4	

Wayne Feeds - Laurel Feedmill
Pouring Aspiration Cyclone Stack
Particulate Emissions Test - August 29, 1994

Calculations:		RUN 1	RUN 2	RUN 3	AVG.
1. Pm	: in.Hg (DH/13.6)+Pbar	30.0314	30.0353	30.0327	
2. Ps	: in. Hg (Pg/13.6)+Pbar	29.8963	29.8963	29.8963	
3. An	: sq ft ((Dn/24)^2)(3.1416)	4.12E-04	4.12E-04	4.12E-04	
4. Vmstd	: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	42.790	43.321	43.102	43.071
5. Vwstd	: scf (.04707cf/ml)(Vlc)	1.906	1.530	1.836	
6. Bws	: dimensionless Vwstd/(Vwstd+Vmstd)	0:0427	0.0341	0.0409	0.0392
7. Md	: mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	28.84	28.84	28.84	
8. Ms	: mol.wt. wet basis Md(1-Bws)+18 Bws	28.37	28.47	28.39	
9. Vs	: ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	31.48	31.93	33.03	32.14
10. Q	: cfm Vs As(60 sec/min)	2377	2411	2494	2428
11. Qstw	: scfm Q(Ps/Pstd)(Tstd/Ts)	2193	2219	2297	2236
12. Qstd	: dscfm Qstw(1-Bws)	2099	2143	2203	2148
13. I	: percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	103.68	102.80	99.52	102.00

Particulate Emissions

14. E,PM	: pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	0.04	0.02	0.05	0.04
15. C,PM	: grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.002	0.001	0.003	0.002

Wayne Feeds - Laurel Feedmill
Cooler Stack
Particulate Emissions Test - September 20, 1994

Collected Test Data:		RUN 1	RUN 2	RUN 3	
	Date :	**9/20/94**	**9/20/94**	**9/20/94**	
	Time start :	**1011**	**1236**	**1424**	
	Time end :	**1112**	**1337**	**1525**	
1. As	: sq ft	10.8006	10.8006	10.8006	
2. Dn	: in.	0.250	0.250	0.250	
3. Cp	: dimensionless	0.84	0.84	0.84	
4. Theta	: minutes	60.00	60.00	60.00	
5. Y	: dimensionless	1.01	1.01	1.01	
6. Pbar	: in. Hg	29.78	29.78	29.78	
7. Pg	: in. H2O	-8.5	-8.5	-8.5	
8. Vm	: cf (dry gas)	55.418	60.430	49.546	
9. sqr(DP),avg	: in.H2O^.5	0.8261	0.9020	0.7318	
10. DH	: in. H2O	2.5275	3.1275	2.0050	
11. ts	: degrees F	111.90	98.15	118.30	109.45
12. tm	: degrees F	98.25	104.80	107.95	
13. Vlc	: ml	81	63	93	
14. CO2	: percent	0.00	0.00	0.00	
15. O2	: percent	20.90	20.90	20.90	
16. CO	: percent	0.00	0.00	0.00	
17. M,PM	: milligrams	61	103.9	54.5	

Wayne Feeds - Laurel Feedmill
Cooler Stack
Particulate Emissions Test - September 20, 1994

Calculations:		RUN 1	RUN 2	RUN 3	AVG.
1. Pm	: in.Hg (DH/13.6)+Pbar	29.9658	30.0100	29.9274	
2. Ps	: in. Hg (Pg/13.6)+Pbar	29.1550	29.1550	29.1550	
3. An	: sq ft ((Dn/24)^2)(3.1416)	3.41E-04	3.41E-04	3.41E-04	
4. Vmstd	: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	53.020	57.229	46.533	52.261
5. Vwstd	: scf (.04707cf/ml)(Vlc)	3.813	2.965	4.378	
6. Bws	: dimensionless Vwstd/(Vwstd+Vmstd)	0.0671	0.0493	0.0860	0.0674
7. Md	: mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	28.84	28.84	28.84	
8. Ms	: mol.wt. wet basis Md(1-Bws)+18 Bws	28.11	28.30	27.90	
9. Vs	: ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	49.56	53.27	44.31	49.05
10. Q	: cfm Vs As(60 sec/min)	32115	34523	28712	31783
11. Qstw	: scfm Q(Ps/Pstd)(Tstd/Ts)	28892	31823	25545	28753
12. Qstd	: dscfm Qstw(1-Bws)	26953	30255	23348	26852
13. I	: percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm)]/(60 theta Vs Ps An)	103.88	99.89	105.25	103.01

Particulate Emissions

14. E,PM	: pounds/hr (M,PM/Vmstd)(Qstd)(60)/(453590)	4.10	7.27	3.62	5.00
15. C,PM	: grains/dscf (M,PM/Vmstd)(.0154 grains/mg)	0.018	0.028	0.018	0.021

5.0 NOMENCLATURE

SYMBOL	UNITS	DESCRIPTION
An	ft^2	Nozzle cross sectional area
As	ft^2	Stack cross sectional area
Bws	dimensionless	Wet gas fraction
CO_2	percent	Carbon dioxide content by volume
CO	percent	Carbon monoxide content by volume
Cp	dimensionless	Pitot correction factor
C,X	as labeled	Concentration of pollutant X
DGF	dimensionless	Dry gas fraction
Dn	inches	Nozzle diameter
ΔH	in. H_2O	Pressure drop across meter orifice
ΔP	in. H_2O	Stack gas velocity pressure
E,X	#/hr	Emission rate of pollutant X
EX	#/MM Btu	Emission rate of pollutant X
F	dscf	Volume of flue gas per MM Btu
I	percent	Nozzle velocity/stack gas velocity
Kp	consistent	Pitot tube constant
M,X	milligrams	Sample weight of pollutant X
Md	#/# mole	Dry molecular weight of stack gas
Ms	#/# mole	Wet molecular weight of stack gas
N2	percent	Nitrogen content by volume, dry basis
O_2	percent	Oxygen content by volume, dry basis
Pbar	in. Hg	Barometric pressure
Pg	in. Hg	Stack static pressure
Pm	in. Hg	Total pressure at meter (Pbar+(DH/13.6)
Ps	in. Hg	Total stack pressure (Pbar+(Pg/13.6))
Pstd	in. Hg	Standard barometric pressure = 29.92
Q	acfm	Volumetric flow rate at stack conditions
Qstd	dscfm	Volumetric flow rate at standard conditions, dry basis
Qstdw	scfm	Volumetric flow rate at standard conditions, wet basis
θ	minutes	Sample duration
tm	°F	Meter temperature (Tm denotes °R)
ts	°F	Stack temperature (Ts denotes °R)
Tstd	°R	Standard temperature = 528°R
Vlc	ml	volume of water collected
Vm	ft^3	Volume of dry gas sampled through meter
Vmstd	dscf	Sample volume at standard conditions
Vwstd	scf	Sample volume of water vapor
Y	dimensionless	Meter coefficient
Xsair	percent	Excess air

7.0 APPENDICES

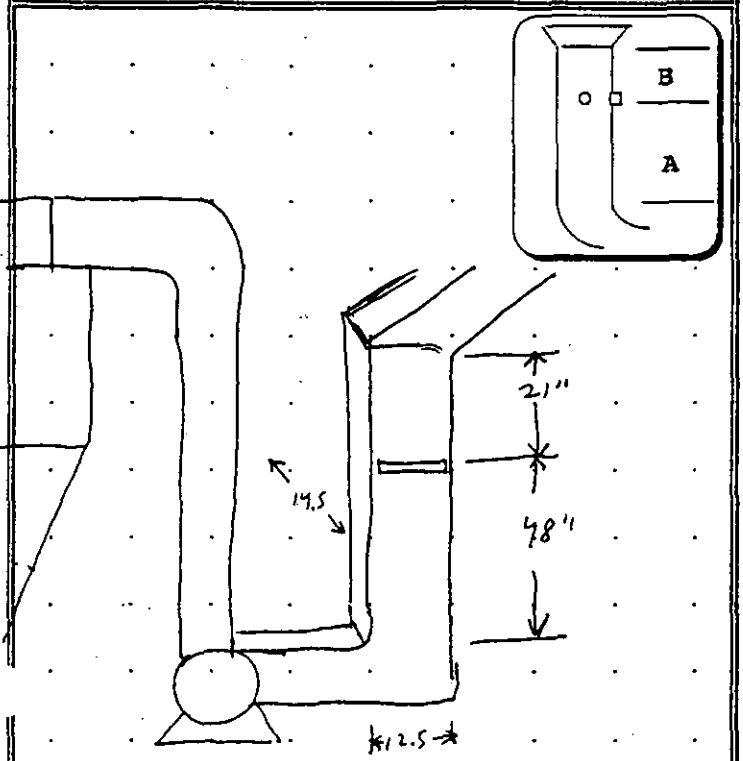
A. Field and Analytical Data

B. Calibrations

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: Wayne Farms - Laurel Feedmill Date: 8-29-94
SOURCE: Pouring Aspiration Stack
TEST FOR: PM
TEST OPERATORS: Moore / G. McKnight

SKETCH OF STACK



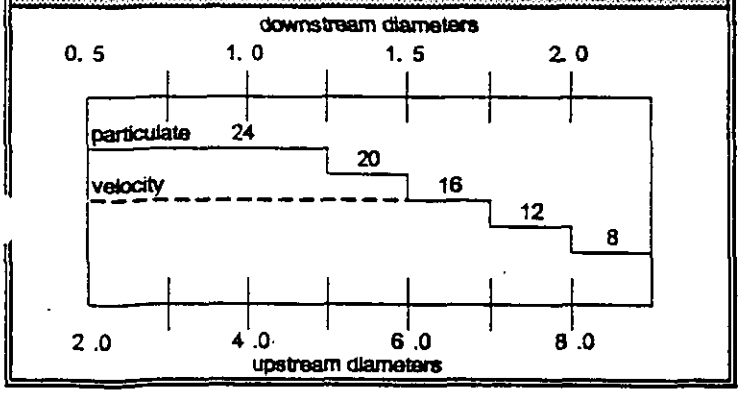
PERCENT OF DIAMETER

point no.	2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Point No.	Inches from wall	velocity head
1	1.2	
2	3.6	
3	6.0	
4	8.5	
5	10.9	
6	13.3	
		ports: 1 1.5
		2 4.7
		3 7.8
		4 10.9

STACK DIAMETER: 14.5 x 12.5 De = 13.43
Distance from ports to disturbance:
A. to upstream disturbance
B. to downstream disturbance
Upstream diameters:
Downstream diameters:
Minimum No. sample points required:
No. sample points selected:
Port Length:
Port Type:
Port Access:

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID : Pitot Cp: Stack Temp:
Remarks:

Plant	[illegible]		
Sampling Location	[illegible]	RUN No.	1
Test For	[illegible]	Date	8-29-94
Test Operators	[illegible]	Time start	1315 end 1416

Meter Box	[illegible]	No. Sample Pts.	6 x 4	Gas Analysis	Air
Sample Box	No. 4	Minutes/Pt.	2.5	CO_2	
Probe/Pitot	4' ins			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.275	ΔH@	1.90	Time	
Filter No.		Meter Temp.	110		
		% H_2O	5.0	Condensate:	
Amb. Temp. °F	92	C-Factor	1.05	tare 200	fin 231
Bar. Press. "Hg	29.90	Stack Temp.	110	Silica gel:	
Static Press. "H_2O	-.050	Ref. ΔP	.30	tare 713	fin 722.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0 00	362.481	0.20	1.25	109	96	96	[illegible]	55	2
2	2 30	364.2	0.25	1.55	108	97	96		56	2
3	5 00	365.9	0.24	1.50	110	101	97		57	2
4	7 30	367.8	0.29	1.80	110	105	100		58	2
5	10 00	369.5	0.34	2.10	109	103	97		58	2
6	12 30	371.6	0.34	2.10	110	106	96		59	2
1	15 00	373.651	0.23	1.45	111	107	103		56	2
2	2 30	375.4	0.26	1.60	115	109	100		58	2
3	5 00	377.2	0.27	1.65	117	109	102		57	2
4	7 30	379.0	0.30	1.85	115	109	102		60	2
5	10 00	381.0	0.31	1.95	115	110	100		62	2
6	12 30	383.0	0.35	2.20	114	111	101		64	2
1	30 00	385.998	0.27	1.70	113	111	101		68	2
2	2 30	386.9	0.28	1.75	114	113	103		65	2
3	5 00	388.8	0.28	1.75	114	111	102		69	2
4	7 30	390.6	0.32	2.00	110	109	102		70	2
5	10 00	392.6	0.32	2.00	110	109	101		68	2
6	12 30	394.5	0.35	2.20	109	107	101		68	2
1	45 00	396.729	0.23	1.45	108	114	104		69	2
2	2 30	398.4	0.18	1.10	112	111	103		65	2
3	5 00	400.0	0.28	1.75	114	110	103		62	2
4	7 30	401.9	0.29	1.80	113	108	101		66	2
5	10 00	403.9	0.34	2.10	112	107	100		67	2
6	12 30	405.9	0.37	2.30	112	108	103	[illegible]	69	2
end	60 00	408.024								

Leak ck: 0.064 — 0.071 = .007 (line 8 "Hg)

Pitot + @ 6.0

Pitot − @ 5.7

DGM	ΔP	ΔH	Stack Temp.	Meter Temp.
45.5430	.5338	1.7825	112.04	104.06

Plant: Wayne Farms & Smith Laurel

Sampling Location: Aspiration Pouring Aspiration Stack

Test For: PM

Test Operators: [illegible] / G. McKnight

RUN No. 2

Date: 8-29-96

Time start: 1421 end: 1522

Meter Box	Ad-C
Sample Box	No. 3
Probe/Pitot	4' [illegible]
Pitot Cp	~~.277~~ .84
Nozzle Dia.	.272
Filter No.	
Amb. Temp. °F	93
Bar. Press. "Hg	
Static Press. "H_2O	-.05

No. Sample Pts.	6x4
Minutes/Pt.	2.5
NOMOGRAPH	
ΔH@	1.90
Meter Temp.	110
% H_2O	4.0
C-Factor	1.05
Stack Temp.	110
Ref. ΔP	.30

Gas Analysis

CO_2	
O_2	
CO	
Time	

Condensate: tare 200 fin 225

Silica gel: tare 783 fin 790.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0.00	408.414	0.16	1.00	113	104	100	AA	67	2
2	2.30	409.9	0.24	1.50	111	106	104		65	2
3	5.00	411.7	0.30	1.85	111	106	101		64	2
4	7.30	413.6	0.34	2.10	113	109	101		62	2
5	10.00	415.6	0.36	2.25	115	107	101		62	2
6	12.30	417.8	0.36	2.25	117	111	97		64	2
1	15.00	419.851	0.27	1.65	111	110	102		65	2
2	2.30	421.7	0.26	1.60	114	111	104		66	2
3	5.00	423.5	0.28	1.75	113	111	103		67	2
4	7.30	425.4	0.30	1.85	114	111	101		68	2
5	10.00	427.3	0.33	2.05	112	111	103		65	2
6	12.30	429.3	0.38	2.40	114	112	102		64	2
1	30.00	431.557	0.26	1.60	113	107	101		62	2
2	2.30	433.4	0.26	1.60	114	111	102		61	2
3	5.00	435.2	0.28	1.75	113	109	102		60	2
4	7.30	437.1	0.31	1.95	115	110	104		61	2
5	10.00	439.1	0.34	2.10	115	112	105		63	2
6	12.30	441.2	0.36	2.25	114	111	104		64	2
1	45.00	443.236	0.24	1.50	113	109	101		65	2
2	2.30	445.1	0.24	1.50	115	111	106		66	2
3	5.00	446.7	0.26	1.60	112	109	101		69	2
4	7.30	448.6	0.29	1.80	113	111	100		70	2
5	10.00	450.5	0.32	2.00	114	111	102		70	2
6	12.30	452.4	0.36	2.25	112	111	101		70	2
end	60.00	454.648								
		Leak: .029 ——→ .036 = .007 cfm (8 "Hg)								
		Pitot + @ 9.5								
		Pitot − @ 9.6								
		46.2340	.5417	1.8396	113.21	105.67				

Plant	Wayne Farms / Amill / [illegible]
Sampling Location	Pouring Aspiration Stack
Test For	PM
Test Operators	Moore / G. McKnight
RUN No.	3
Date	9-29-94
Time start	1529
end	1630

Meter Box	AAC
Sample Box	No. 4
Probe/Pitot	4'
Pitot Cp	.84
Nozzle Dia.	.275
Filter No.	
Amb. Temp. °F	94
Bar. Press. "Hg	
Static Press. "H_2O	-.05

No. Sample Pts.	6×4
Minutes/Pt.	2.5
NOMOGRAPH	
ΔH@	1.90
Meter Temp.	110
% H_2O	<10
C-Factor	1.05
Stack Temp.	110
Ref. Δ P	.30

Gas Analysis			
CO_2			
O_2			
CO			
Time			

Condensate: tare 200 fin 232

Silica gel: tare 722.5 fin 729.5

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head Δ P, in. H_2O	Orifice Δ H in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	000	455.109	0.24	1.50	112	104	100	NA	60	3
2	230	456.9	0.26	1.60	114	107	100		62	3
3	500	458.7	0.28	1.75	116	104	100		63	3
4	730	460.6	0.30	1.85	114	109	103		62	3
5	1000	462.5	0.34	2.10	113	105	100		64	3
6	1230	464.5	0.37	2.50	115	110	101		62	3
			0.26	1.60						
1	15/00	466.768	~~0.30~~	~~1.85~~	114	107	100		63	3
2	230	467.6	0.26	1.60	114	108	100		63	3
3	500	470.3	0.26	1.60	111	105	99		63	3
4	730	472.0	0.30	1.85	114	108	101		63	3
5	1000	474.1	0.31	1.95	115	110	166		63	3
6	1230	476.5	0.25	1.55	114	111	101		64	3
1	30/00	478.124	0.26	1.60	114	113	100		65	3
2	230	480.2	0.26	1.60	113	111	101		64	3
3	500	482.5	0.28	1.75	113	103	102		62	3
4	730	483.6	0.28	1.75	113	112	103		64	3
5	1000	485.5	0.32	2.00	114	113	104		66	3
6	1230	487.4	0.34	2.10	114	111	102		66	3
1	45/00	489.530	0.24	1.50	114	111	100		65	3
2	230	491.2	0.26	1.60	113	108	102		66	3
3	500	493.1	0.27	1.70	113	110	103		68	3
4	730	495.0	0.30	1.85	111	108	100		69	3
5	1000	496.8	0.34	2.10	110	108	101		70	3
6	1230	498.9	0.37	2.30	105	109	103		65	3
end	60/00	501.043								

Leak ck: 86 0 —— 0.072 = .003 cfm 9 15 / s

Pitot + @ 4.7
Pitot − @ 4.5

45.9390	.5598	1.8042	113.04	104.81	

PAR[illegible]CULATE CATCH ANALYSIS

SAMPLES: Wayne Feeds - Laurel Feedmill (-Pouring Aspiration Stack)

DATE TAKEN: 8-29-94 DATE ANALYZED: 9-7-94

DELIVERED BY: RSm RECEIVED BY: [illegible]

ANALYZED BY: [illegible]

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3		
FILTER NO.	2331	2329	2332		
FILTER TARE, gms.	.5607	.5610	.5619		
	.5630	.5622	.5650		
	.5630	.5621	.5651		
FINAL WEIGHT, gms.	.5630	.5621	.5651		
NET GAIN, gms.	.0023	.0011	.0032		

PROBE WASH:

RUN NO.	1	2	3		
CONTAINER I.D.	Pour R1	Pour R2	Pour R3		
VOLUME INTACT?	✓	✓	✓		
VOLUME, ml	150	120	100		
TARE WEIGHT, gms.	(3) 104.6250	(67) 111.4662	(69) 112.5828		
	104.6294	111.4686	112.5874		
	104.6292	111.4686	112.5870		
FINAL WEIGHT, gms.	104.6292	111.4686	112.5870		
NET GAIN, gms.	.0042	.0024	.0042		
LESS BLANK, gms.					

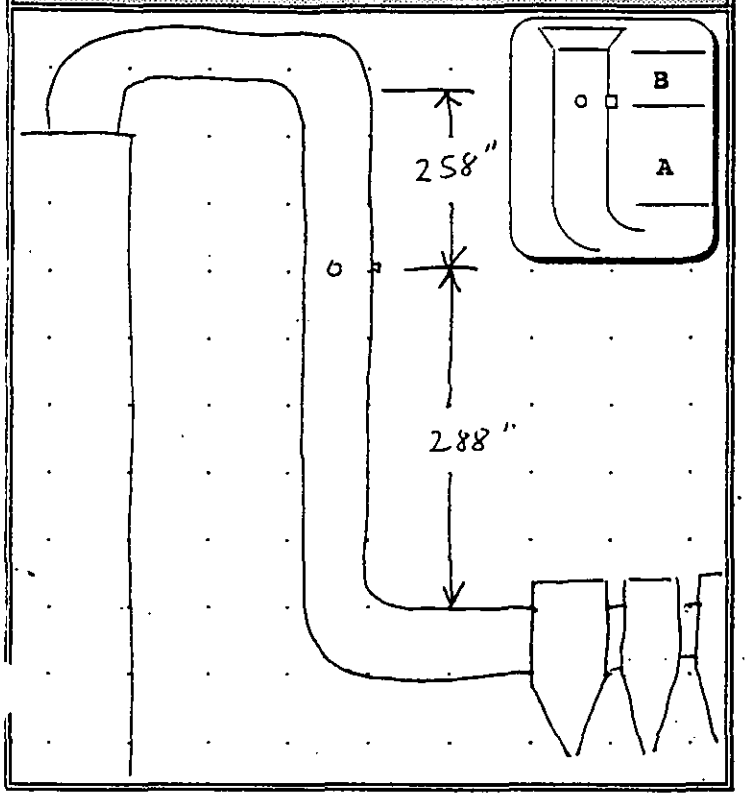
PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3		
filter + probe, mg.	6.5	3.5	7.4		

STACK CONFIGURATION AND SAMPLE POINT LAYOUT FOR CIRCULAR STACKS

PLANT: Wayne Farms - Laurel Feedmill Date: 5-20-94
SOURCE: Cooler Stack
TEST FOR: PM
TEST OPERATORS: Moore / G. McKnight

SKETCH OF STACK



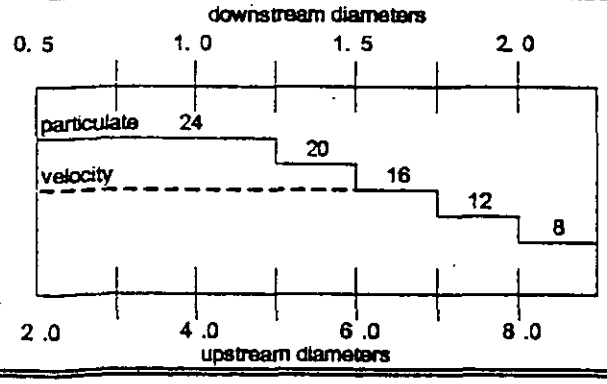
PERCENT OF DIAMETER

point no.	2	4	6	8	10	12	14	16
1	14.6	6.7	4.4	3.2	2.6	2.1	1.8	1.6
2	85.4	25.0	14.6	10.5	8.2	6.7	5.7	4.9
3		75.0	29.6	19.4	14.6	11.8	9.9	8.5
4		93.3	70.4	32.3	22.6	17.7	14.6	12.5
5			85.4	67.7	34.2	25.0	20.1	16.9
6			95.6	80.6	65.8	35.6	26.9	22.0
7				89.5	77.4	64.4	36.6	28.3
8				96.8	85.4	75.0	63.4	37.5
9					91.8	82.3	73.1	62.5
10					97.4	88.2	79.9	71.7
11						93.3	85.4	78.0
12						97.9	90.1	83.1
13							94.3	87.5
14							98.2	91.5
15								95.1
16								98.4

Point No.	Inches from wall	velocity head
1	1.2	
2	3.6	
3	6.5	
4	10.1	
5	15.2	
6	25.3	
7	34.4	
8	38.0	
9	40.9	
10	43.3	

STACK DIAMETER:	44.5"
Distance from ports to disturbance:	
A. to upstream disturbance	288"
B. to downstream disturbance	258"
Upstream diameters:	6.4
Downstream diameters:	5.7
Minimum No. sample points required:	16
No. sample points selected:	20 (10x2)
Port Length:	3.5"
Port Type:	4" pipe nipple
Port Access:	Bosun's Chair

MINIMUM NO. OF POINTS ON A DIAMETER



Pitot ID: Pitot Cp: Stack Temp:

Remarks:

Plant: Wayne Farms, Laurel, MS

Sampling Location: Cooler Stack

Test For: pm

Test Operators: [illegible] / G. McKnight

RUN No. 1

Date 9-20-94

Time start 1011 end 1112

Meter Box	Anderson
Sample Box	No. 2
Probe/Pitot	5' line
Pitot Cp	.84
Nozzle Dia.	.250
Filter No.	
Amb. Temp. °F	70
Bar. Press. "Hg	29.78
Static Press. "H_2O	−8.5

No. Sample Pts.	10×2
Minutes/Pt.	3.0
NOMOGRAPH	
ΔH@	1.75
Meter Temp.	100
% H_2O	10
C-Factor	.93
Stack Temp.	120
Ref. Δ P	.50

Gas Analysis

CO_2			
O_2			
CO			
Time			

Condensate: tare 200 fin 275

Silica gel: tare 729 fin 735

Remarks:

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head Δ P, in. H_2O	Orifice Δ H in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	2:00	784.068	0.78	2.90	113	75	74	242	65	3
2	3	786.8	0.81	3.00	111	81	74	257	60	3
3	6	789.8	0.81	3.00	110	88	74	250	62	3
4	9	792.7	0.76	2.80	110	95	76	248	60	3
5	12	795.6	0.70	2.60	110	100	77	252	61	3
6	15	798.4	0.55	2.05	110	103	79	248	61	3
7	18	800.8	0.54	2.00	111	104	80	257	58	3
8	21	803.2	0.54	2.00	111	106	82	256	58	3
9	24	805.7	0.56	2.05	110	108	84	257	58	3
10	27	808.2	0.66	2.45	110	111	86	251	60	3
1	30/0	810.989	0.67	2.45	109	108	88	250	60	2
2	3	813.8	0.77	2.85	112	116	90	251	62	3
3	6	816.8	0.68	2.55	113	119	92	228	60	3
4	9	819.6	0.63	2.25	114	121	94	230	60	3
5	12	822.3	0.57	2.10	115	121	96	258	62	3
6	15	824.8	0.67	2.45	115	122	97	242	65	3
7	18	827.6	0.76	2.80	115	125	98	248	64	3
8	21	830.5	0.73	2.65	115	127	99	251	65	3
9	24	833.4	0.76	2.80	112	128	101	256	66	3
10	27	836.3	0.76	2.80	112	129	102	260	67	3
	60/0	839.486								
		Leak chk: .052 →	.056 =	.004 (cfm)			8 "Hg			
		Pitot + @ 5.8								
		Pitot − @ 7.6								
		55.418	.8261	2.5225	111.90		98.25			

Plant Wayne Farms Laurel, MS

Sampling Location Cooler Stack

Test For PM

Test Operators Moon / G. McKnight

RUN No. 2

Date 9-20-94

Time start 1226 end 1337

Meter Box	Andersen	No. Sample Pts.	10×2	Gas Analysis	
Sample Box	no. 4	Minutes/Pt.	3 m	CO_2	
Probe/Pitot	5' m			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.250	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	10	Condensate:	
Amb. Temp. °F	74	C-Factor	.93	tare 200	fin 257
Bar. Press. "Hg	29.78	Stack Temp.	120 / 100	Silica gel:	
Static Press. "H_2O	-.6.5	Ref. ΔP	.50 / .49	tare 739	fin 745

Remarks:

Duration 11:25
12:35
1hr 10 m

Port Point	El. Time, Min.	DGM Reading, Ft.³	Velocity Head ΔP, in. H_2O	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp., °F In	Meter Temp., °F Out	Oven Temp. °F	Imp. Temp. °F	Vac in. Hg
1	0	839.820	1.10	4.10	107	79	79	271	64	4
2	3	843.1	1.10	4.10	105	87	80	261	61	4
3	6	846.4	1.10	4.10	106	96	80	269	62	4
4	9	849.7	1.00	3.70	93	102	81	267	62	4
5	12	852.8	0.90	3.40	95	107	83	273	60	4
6	15	856.0	0.67	2.50	96	110	84	274	62	3
7	18	858.8	0.61	2.30	97	114	86	271	62	3
8	21	861.5	0.52	2.00	98	116	88	275	64	3
9	24	864.0	0.55	2.10	97	119	90	274	65	3
10	27	866.6	0.35	1.35	96	121	92	268	66	3
1	30/00	868.735	0.82	3.10	98	119	94	274	64	3
2	3	871.7	0.85	3.20	98	125	95	266	62	3
3	6	874.9	0.77	2.90	98	127	96	270	60	3
4	9	877.9	0.70	2.65	99	128	99	270	62	2
5	12	880.8	0.70	2.65	100	129	100	270	63	3
6	15	883.7	0.82	3.10	98	130	101	268	60	3
7	19	886.7	0.92	3.50	98	131	103	274	61	3
8	21	890.0	0.92	3.50	92	134	103	272	62	3
9	24	893.2	1.30	4.90	96	136	104	260	64	4
10	27	896.8	0.90	3.40	96	136	106	271	64	4
	end 60/10	900.250								
		Leak chk .027 →		.033 =	.006	cfm @	8	14/hg		
		Pitot +Δ @ 4.9								
		Pitot -Δ @ 4.8								
		60.430	.9020	3.1275	98.15		104.80			

Plant: Wayne Farms — Laurel, MS

Sampling Location: Cooler Stack

Test For: pm

Test Operators: Moore/McKnight

RUN No. 3

Date: 9-20-94

Time start: 1407 1424 end: 1525

Meter Box	Ambelucci	No. Sample Pts.	10x2	Gas Analysis	
Sample Box	No. 2	Minutes/Pt.	3.0	CO_2	
Probe/Pitot	5' ss			O_2	
Pitot Cp	.84	NOMOGRAPH		CO	
Nozzle Dia.	.250	ΔH@	1.75	Time	
Filter No.		Meter Temp.	100		
		% H_2O	10	Condensate: tare 200 fin 289	
Amb. Temp. °F	78	C-Factor	.93		
Bar. Press. "Hg	29.78	Stack Temp.	100 / 120	Silica gel:	
Static Press. "H_2O	-0.05	Ref. ΔP	.47 / .50	tare 732 fin 737	

Remarks:

Downtime
13:49
14:05
= 15 min

Port Point	El. Time, Min.	DGM Reading, Ft.³ 904 1010	Velocity Head ΔP, in. H_2O 84	Orifice ΔH in. H_2O	Stack Temp. °F	Meter Temp. °F In	Meter Temp. °F Out	Oven Temp. °F	Imp. Temp. °F	Vac. in. Hg
1	000	~~900.741~~	~~1.10~~	~~4~~.20	119	92	88	274	68	3
2	3	906.5	0.62	2.25	120	98	89	268	65	3
3	6	909.0	0.57	2.10	120	103	89	269	62	3
4	9	911.6	0.48	1.80	122	107	90	275	63	3
5	12	913.9	0.45	1.65	123	109	92	272	62	3
6	15	916.2	0.42	1.55	123	111	93	265	60	3
7	18	918.4	0.57	2.10	125	113	94	260	60	3
8	21	921.0	0.40	1.50	122	117	96	231	61	3
9	24	923.3	0.50	1.85	121	117	97	269	62	3
10	27	925.5	0.34	1.25	110	120	99	270	62	3
11										
12										
1	30/00	927.645	0.58	2.15	120	116	99	267	60	3
2	3	930.4	0.53	1.95	124	122	100	269	64	3
3	6	932.8	0.58	2.15	122	123	101	265	64	3
4	9	935.8	0.70	2.60	121	126	103	271	63	4
5	12	938.1	0.69	2.55	120	128	103	268	64	4
6	15	940.8	0.59	2.20	118	129	105	273	65	4
7	18	943.4	0.68	2.55	109	130	106	261	64	4
8	21	946.2	0.66	2.45	108	131	107	274	65	4
9	24	949.2	0.44	1.65	109	131	108	270	66	3
10	27	951.3	0.38	1.40	110	128	108	268	66	3
end 60/10		953.556								
		Leakck. 043 →	049 =	006	ft³ @	8	"Hg			
		Pitot + @ 4.1								
		Pitot - @ 3.9								
		49.546	.2318	2.0050	118.30		102.95			

Environmental Monitoring Laboratories — Ridgeland, Mississippi — 601-856-3092

PARTICULATE CATCH ANALYSIS

SAMPLES: Wayne Farms - Cooler Stack

DATE TAKEN: 9/20/94 DATE ANALYZED: 9/20/94

DELIVERED BY: DCR RECEIVED BY: DCR

ANALYZED BY: DCR

(Attach chain of custody if additional exchanges occur)

FILTERS:

RUN NO.	1	2	3		
FILTER NO.	2383	2381	2385		
FILTER TARE, gms.	.5657	.5625	.5627		
	.5700	.5653	.5680		
	.5699	.5653	.5683		
FINAL WEIGHT, gms.	.5699	.5653	.5683		
NET GAIN, gms.	.0042	.0028	.0056		

PROBE WASH:

RUN NO.	1	2	3		
CONTAINER I.D.	WFR1	WFR2	WFR3		
VOLUME INTACT?	✓	✓	—		
VOLUME, ml	120	150	120		
TARE WEIGHT, gms.	(A) 104.7116	(F) 99.1360	(84) 105.3511		
	104.7686	99.2376	105.4002		
	104.7684	99.2371	105.4000		
FINAL WEIGHT, gms.	104.7684	99.2371	105.4000		
NET GAIN, gms.	.0568	.1011	.0489		
LESS BLANK, gms.					

PARTICULATE SAMPLE WEIGHT:

RUN NO.	1	2	3		
filter + probe, mg.	61.0	103.9	54.5		

DRY GAS METER CALIBRATION

Meter ID Andersen

Calibration Method DGM/DGM **By** DGR

Calibration Meter ID 651729 **Pbar** 29.66

Date 5/2/94

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft³	Vf ft³	Temp °F	Field Meter Vi ft³	Vf ft³	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	5.00	10.00	399.509	412.041	68	229.010	241.663	73	84	73	76	0.994	1.25	0.715	1.800
1	4.00	10.00	412.041	422.831	68	241.663	252.650	84	95	76	80	1.001	1.09	0.692	1.925
1	3.00	11.00	422.831	433.120	70	252.650	263.242	91	120	80	84	1.007	0.95	0.693	1.917
1	2.00	13.00	433.120	443.475	70	263.242	273.918	92	112	83	90	1.009	0.82	0.727	1.743
1	1.00	18.00	443.475	453.864	70	273.918	284.929	108	118	86	94	0.997	0.6	0.748	1.646
Averages:												1.00			1.81

Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]

K = Q(sqrt((Pm Mm)/((Tm out)(DH))

Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)

DH@ = 0.921/K^2

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID	Andersen		
Calibration Method	DGM/DGM	By	DGR
Calibration Meter ID	651729	Pbar	29.80
Date	4/11/94		

Vac. in. Hg	DH in. H2O	Time min	Calibrating Meter Vi cf	Vf cf	Temp F	Field Meter Vi cf	Vf cf	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	4.00	10.00	348.87	358.001	82	93.507	104.898	100	117	102	103	1.010	1.14	0.71	1.815
1	3.00	11.00	358.001	368.729	84	104.898	115.935	113	129	103	107	1.016	1.01	0.72	1.774
1	2.00	13.00	368.729	379.137	84	115.935	126.714	118	133	107	111	1.020	0.83	0.73	1.738
1	1.00	18.00	379.137	389.442	84	126.714	137.456	118	127	111	115	1.016	0.6	0.74	1.683
1	0.75	20.00	389.442	399.506	84	137.456	148.024	112	125	113	118	1.008	0.53	0.75	1.626
Averages:												1.01			1.73

Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]

K = Q(sqrt((Pm Mm)/((Tm out)(DH))

Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)

DH@ = 0.921/K^2

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID RAC

Calibration Method DGM/DGM **By** WBM

Calibration Meter ID 651729 **Pbar** 30.02

Date 8/30/94

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft³	Vf ft³	Temp °F	Field Meter Vi ft³	Vf ft³	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
2	2.00	15.00	161.245	173.181	77	501.245	513.049	79	91	78	77	1.014	0.79	0.715	1.802
2	2.00	15.00	173.245	184.785	77	513.049	524.946	97	103	89	79	0.992	0.78	0.695	1.904
2	2.00	15.00	184.785	196.379	77	524.946	536.910	102	108	81	83	0.994	0.78	0.697	1.894
Averages:												1.00			1.87

Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]

K = Q(sqrt((Pm Mm)/((Tm out)(DH))

Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)

DH@ = 0.921/K^2

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R

DRY GAS METER CALIBRATION

Meter ID	RAC		
Calibration Method	DGM/DGM	**By**	DGR
Calibration Meter ID	651729	**Pbar**	29.77
Date	9/20/94		

Vac. in. Hg	DH in. H_2O	Time min	Calibrating Meter Vi ft³	Calibrating Meter Vf ft³	Calibrating Meter Temp °F	Field Meter Vi ft³	Field Meter Vf ft³	Temp. in init.	Temp. in final	Temp out init.	Temp out final	Y	Q	K	DH@
1	5.00	11.50	199.805	213.726	70	437.242	451.721	104	116	82	87	0.999	1.23	0.696	1.901
1	3.25	12.50	213.726	225.644	70	451.721	464.230	113	112	85	88	0.998	0.98	0.683	1.976
1	2.00	15.00	225.644	236.916	71	464.230	476.105	110	112	88	89	0.996	0.77	0.687	1.952
1	1.50	20.50	236.916	250.473	72	476.105	490.370	110	107	89	89	0.994	0.68	0.697	1.893
1	0.85	21.00	250.473	261.354	72	490.370	501.830	106	104	88	89	0.992	0.53	0.726	1.746
Averages:												1.00			1.89

Y = [Vcal)(Pbar)(Tdgm)]/[(Vdgm)(Pm)(Tcal)]

K = Q(sqrt((Pm Mm)/((Tm out)(DH))

Q = ((Vmi-Vmf)/min.)(TM,out/Tm,avg)(Y)

DH@ = 0.921/K^2

Where:

Y = Meter correction factor, dimensionless

Vcal = Volume of gas through calibrating meter, cubic feet

Vdgm = Volume of gas through field dry gas meter, cubic feet

Pbar = Barometric pressure, in. Hg

Pm = Meter pressure, (Pbar = DH/13.6)

Tdgm = Average dry gas meter temp, degrees R

Tcal = Temperature of gas at calibrating meter, degrees R