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.

AP42 Section: 11.1

Reference Number: 42

Title: Particulate Emission Testing On The Baghouse Exhaust, Blythe Industries, Inc., Biscoe, North Carolina,

Analytical Testing Consultants, Inc., Kannapolis, NC,

November 1987.

AP-42 Section 11.1
Reference 42
Report Sect. 4
Reference 42

PARTICULATE EMISSION TESTING

THE BAGHOUSE EXHAUST

BLYTHE INDUSTRIES, INC.

Biscoe, N. C,

November 17-19, 1987

Test Report #4765

REPORT

of

PARTICULATE EMISSION TESTING

on the

THE BAGHOUSE EXHAUST

at

BLYTHE INDUSTRIES, INC.

in

BISCOE, N. C.

on

NOVEMBER 17-19, 1987

RECEIVED
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ENV. MANAGEMENT
FAYETTEVILLE REG. OFFICE

TEST REPORT #4765

ANALYTICAL TESTING CONSULTANTS, INC.
506 Broad Street
Kannapolis, N. C.

Prepared by:
cc

Issue Dates:
November 25, 1987

Distribution:
Mr. H. Turbyville
(5 copies)

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INTRODUCTION

This report presents the results of particulate emiss.
performed on the baghouse exhaust at Blythe Industries
Biscoe, N. C. on November 17-19, 1987.

The purpose of this test was to determine compl.
applicable emission rate codes of the state of North Ca

The test was conducted by ANALYTICAL TESTING CONSULTA
Kannapolis, N. C. Members of the test team were Dan
Keith Poole, Vincent Rogers, and Dan Fink.

SOURCE DESCRIPTION

The system tested was the exhaust a bag collector. The baghouse is utilized for particulate control of emissions from an asphalt plant drying kiln. During sampling, the plant was running approximately 30% recycled material.

TEST SUMMARY

PARAMETER	RUN 1	RUN 2	RUN 3	AVERAGE
DATE	11/17/87	11/17/87	11/17-19/87	
QS, FLOW ACFM	49446	47647	42928	46674
Q STD DRY SCFM	29373	27770	28973	28705
VM STD, CU.FT	25.87	16.27	25.87	
%I	98.5	81.1	103	
PMR AVG, LB/HR	3.9	6.4	6.3	5.5
CS, GRAINS/SCF	.0156	.0296	.0251	.0234
ALLOWABLE GR/SCF				.04

RESULTS, CONCLUSIONS AND COMMENTS

A summary of some pertinent results appear in th
RESULTS SUMMARY. For additional information please
CALCULATIONS and DATA SHEETS sections of this report.

The average particulate emission rate was .0234
standard cubic foot. This concentration is less th
gr/scf NSPS.

REFERENCES

1. CODE OF FEDERAL REGULATIONS, Title 40, Part 60, Appendix A, July 1, 1986.

CALCULATIONS

Particulate Emission Rate Calculation
Square Root of DP
Nomenclature
Calculation Formulae

EMISSION RATE CALCULATION

ENTRY/CALC.	RUN 1	RUN 2	RUN 3	AVERAGE
DATE	11/17/87	11/17/87	11/17-19/87	
AVG DH (IN H2O)	.9	.8	.9	
P ATM (IN HG)	29.38	29.38	29.53	
PM (IN HG)	29.4461764705	29.4388235294	29.5961764705	
PS(GUAGE)	.4	.4	.4	
PS (IN HG)	29.4094117647	29.4094117647	29.5594117647	
TM (DEG F)	85	97	62	
TM (DEG R)	545	557	522	
VM (FT3)	21.93	17.44	25.86	
VM STD (FT3)	20.909486778	16.2661236356	25.874142107	
VLQ (ML)	105.3	96.9	56.2	
VV STD (FT3)	4.9614882352	4.5656999999	2.6480117647	
V STD (FT3)	25.8709750132	20.8318236355	28.5221538717	
%M	19.1778169654	21.916948222	9.284052588	16.7929392584
MD	.8082218304	.7808305178	.9071594742	
MWD	29.24	29.24	29.24	
M	27.0844133736	26.77653502	28.19647249	
TS (DEG F)	247	236	242	
TS (DEG R)	707	696	702	701.66666666
SUM SQRT DP	15.228	14.705	16.286	
N DP	20	20	24	
AVG SQRT DP	.7614	.73525	.678583333333	
CP	.84	.84	.84	
VS (FT/SEC)	51.5066720389	49.6321503785	44.7167527505	48.6185250533
AS (FT2)	16	16	16	
QS (FT3/MIN)	49446.405157	47646.864363	42928.08264	46673.784053
Q STD (FT3/MIN)	36342.646777	35564.595124	31938.338596	34615.193499
Q STD DRY (CFM)	29372.920499	27769.921226	28973.166447	28705.336057
WT (GM)	.0211	.0312	.0421	
PMRC (LB/HR)	3.9214443482	7.0470120969	6.2369454025	5.7351339492
DN (IN)	.188	.188	.188	
AN (IN2)	.02774504	.02774504	.02774504	
TIME (MIN)	60	60	72	
PMRA (LB/HR)	3.8635645145	5.7129484765	6.4240152474	5.3335094128
%I	98.5240174649	81.0690885434	102.99938243	
PMR AVG (LB/HR)	3.8925044313	6.3799802867	6.3304803249	5.5343216809
%CO2	3.5	3.5	3.5	
%O2	17	17	17	
%CO	0	0	0	
%N2	79.5	79.5	79.5	
%EA	426.2788365	426.2788365	426.2788365	
CS GRAINS/SCF	.015570587812	.029596233914	.025106262356	.02342436136

.43 .34 .396

SUM SQUARE ROOT OF DP CALCULATION

DATE 11/17-19/87

RUN 1		RUN 2		RUN 3	
DP	SQRT DP	DP	SQRT DP	DP	SQRT DP
2.3	1.516575089	0	0	2.2	1.483239697
1.7	1.303840481	0	0	1.6	1.264911064
2.6	1.612451550	0	0	2.6	1.612451550
3	1.732050807	.32	.5656854248	2.9	1.702938636
1.3	1.140175425	0	0	1.6	1.264911064
.45	.6708203927	0	0	1.3	1.140175425
1.4	1.183215957	0	0	1	1
2.4	1.549193338	.56	.7483314761	1	1
.56	.7483314761	.56	.7483314761	.98	.9899494845
0	0	.25	.5000000001	.78	.8831760826
.56	.7483314761	.32	.5656854248	.52	.7211102543
1.4	1.183215957	1.2	1.095445115	0	0
0	0	1.2	1.095445115	.15	.3872983346
0	0	.7	.8366600238	.56	.7483314761
.25	.5000000001	1.2	1.095445115	.62	.7874007856
.56	.7483314761	2	1.414213562	.16	.4
0	0	2.2	1.483239697	.1	.3162277660
0	0	2.2	1.483239697	0	0
0	0	1.8	1.341640786	0	0
.35	.5916079781	3	1.732050807	.13	.3605551276
	0		0	.05	.2236067978
	0		0	0	0
	0		0	0	0
	0		0	0	0
	0		0		0
	0		0		0
	0		0

CALCULATION FORMULAE

1. Absolute pressure in dry gas meter

   PM = P ATM + DH/13.6

2. Absolute Stack Pressure

   PS = P ATM + PS guage/13.6

3. Sample volume at standard conditions

   VM STD = (VM)(T STD/TM)(PM/P STD)

4. Volume of water collected, corrected to standard conditions

   VW STD = (.00267)(VLQ)(T STD/P STD)

5. Total sample volume at standard conditions

   V STD = VM STD + VW STD

6. Percent moisture in stack gas

   %M = (100)(VW STD)/V STD

7. Mole Fraction of dry gas

   MD = (100-%M)/100

8. Molecular weight of the wet gas

   M = (MWD)(MD) + 18(1-MD)

9. Stack velocity

   VS = (85.48)(CP)((TS/(PS)(PM))$^{1/2}$(Sum DP$^{1/2}$/N DP))

10. Stack volume flow rate

    QS = (60)(VS)(AS)

11. Stack volume flow rate, standard conditionsincluding moisture

Q STD = (T STD/P STD)(PS/TS)(QS)

12. Stack volume flow rate standard conditions dry

Q STD DRY = (Q STD)(1-%M)

13. Pollutant mass rate, concentration basis

PMRC = (.1323)(WT)(Q STD)/V STD

14. pollutant mass rate ratio of areas basis

PMRA = (.1323)(WT)(AS)/(Q)(AN)(144)

15. Percent Isokineticity

%I = (100)(PMRA)/PMRC

16. Average pollutant mass rate

PMR AVG = (PMRA + PMRC)/2

17. % excess air

%EA = (100)(%oxygen - (.5)(%carbon monoxide))
(.264)(%nitrogen) - %oxygen + (.5)(%carbon monoxide)

18. Heat input rate

HI = ((.6)(Q STD DRY)/F)((20.9 - %oxygen)/20.9)

19. Specific emission rate

PMRU = PMR AVG/HI

NOMENCLATURE

AN (square inches), Cross sectionl area of nozzle

AS (square feet), Cross sectional area of stack

CP Pitot tube calibration coefficient

%EA Precent Excess Air

F (scfd/10 6 BTU), F factor

DH (inches of water) Average orifice meter reading

HI (million BTU/hr), Heat Input Rate

%I Percent Isokineticity

M (lb/lb mole), Molecular Weight of wet gas

%M Percent Moisture

MD Mole fraction of dry gas

MWD (lb/lb mole) molecular weight of dry gas

N DP Number of sample points

P ATM (in Hg), Local atmospheric pressure

PM (in Hg), Absolute pressure in dry gas meter

PS (in Hg), Absolute stack pressure

PS guage (inches of water), Measured static stack pressure (gage)

P STD (29.92 in Hg), Standard pressure

PMRA (lb/hr), Pollutant mass rate based on ratio of areas

PMR AVG. (lb/hr), Average pollutant mass rate

PMRC (lb/hr), Pollutant mass rate based on concentration

PMRU (lb/million BTU), Specific emission rate

DP (inches of water), Velocity pressure

QS (cubic feet/min.) Actual stack volume flow rate

Q STD (cubic feet/min.), Stack volume flow rate at standard conditions

TM (degrees R), Average dry gas meter temperature

TS (degrees R) Average stack temperature

T STD (528 degrees R), Standard temperature

VLQ (ml), Liquid volume

VM (cubic feet), Sample volume measured by dry gas meter

VM STD (cubic feet), Sample volume at standard conditions

VS (ft/sec), stack velocity

VV STD (cubic feet), Volume of water vapor collected, corrected to standard conditions

WT (gm), Total weight of particulate collected

θ (min), Duration of test

DATA SHEETS

Method 5 Sampling Data Sheets
Impinger Data Sheets
Temperature Data Sheets
Chain of Custody Sheets
Preliminary Traverse Data
Laboratory Reports
Calibration Information

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Bythle TEST # _____ DATE 11-17-8

COLLECTED BY McCombs Poole UNIT SAMPLED Exhaust

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run ONE

Time	Sampling Point	Line V_1 in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp.	V_p Pitot Rdg.	ΔH P_m Orifice Rdg.	V_m Dry Gas Meter Rdg	Remarks
10:30	A1	4	75	/	251	2.3	2.2	378.28	Begin Run
:33	2	4	77	/	250	1.7	1.7	380.39	
:36	3	5	78	/	258	2.6	1.7	382.62	
:39	4	6	80	/	257	3.0	3.0	384.39	
:42	SHUT DOWN				PORT			386.75	
:44	B1	5	81	/	248	1.3	1.2	386.75	Resume
:47	2	2	83	/	246	.45	.43	388.63	
:50	3	3	85	/	245	1.4	1.3	—	
:53	4	6	85	/	255	2.4	2.3	391.48	
:56	SHUT DOWN				PORT			393.30	
:58	C1	2	86	/	240	.56	.54	393.30	
:01	2			/		Neg	—	394.50	
:02	3	2	88	/	238	.56	.54	394.60	
:05	4	4	90	/	248	1.4	1.4	395.60	
:08	SHUT DOWN							397.55	
	D1	—	—	/	—	Neg	—	397.55	
	2	—	—	/	—	Neg	—	—	
:11	3	2	92	/	240	.25	.23	—	
:14	4	2	94	/	242	.56	.54	—	
:17	SHUT DOWN							399.56	

P_{bar}: 29.38 in. Hg.
Static Pressure: _____ in.
Static Pressure: .4 in.

Module S/N: NUT one
Filter, Thimble S/N: 471-C
Nozzle S/N: 3/16 #1
Pitot S/N: 5' #1

Sample Train Used

☒ EPA Method 5 ☐ AS
☐ EPA Method 6/8 ☐ Ot

Pre-Test Leak Check
< .02 ft.^{3} @ 15 "Hg. for 40
Pitot OK 5.8 6.2
Post-Test Leak Check
< ___ ft.^{3} @ ___ "Hg. for ___
Pitot _____
Opacity: Max. ___
Avg. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Paramete

Calib. Factor 1.8
t_m = 110 F
% H_2O = 10
P_s/P_m = 1.0
Nozzle Dia. 3/16
t_s = 230
∴ Theo. Pitot = 1.8

C = 1.0

Notes: ABCDE Some Neg Pitot Readings

• indicates change in isokinetics

Note: Avg. t_1 and t_2 to determine Avg. t_m

Avg. t_m = _____ F Avg. t_s = _____ F
Avg. P_m (ΔH) = _____ W.G. ÷ 13.6 = _____
V_m = _____

D Form #RA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Bythle TEST # _____ DATE 11-17-

COLLECTED BY McCombs, Foole UNIT SAMPLED Exhaust

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run ONE

Time	Sampling Point	Line V_1 in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp.	V_p Pitot Rdg.	$\Delta H_{@}$ Orifice Rdg.	V_m Dry Gas Meter Rdg.	Remarks
	E1			/		~~.35~~ neg	~~.25~~	399.56	Continue
	2			/		Neg			
	3			/		Neg			
:22	4		95	/	236	.35	.25	399.56	
:25	Shut Down And Run							400.21	

P_{bar}: _____ in. Hg.
Static Pressure: _____ in
Static Pressure: _____ in

Module S/N: _____
Filter, Thimble S/N: _____
Nozzle S/N: _____
Pitot S/N: _____

Sample Train Used

☑ EPA Method 5 ☐ AS
☐ EPA Method 6/8 ☐ O

Pre-Test Leak Check
< ___ ft.^{3} @ ___ "Hg. for ___
Pitot ___

Post-Test Leak Check
< .017 ft.^{3} @ 11 "Hg. for 60
Pitot OK 5.8 6.9
Opacity: Max. ___
AVG. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Parameters

Calib. Factor ___
t_m = ___ F
% H_2O = ___
P_s/P_m = ___
C = ___
Nozzle Dia. ___
t_s = ___
∴ Theo. Pitot = ___

Notes:

• indicates change in isokinetics

Note: Avg. t_1 and t_2 to determine Avg. t_m

Avg. t_m = 85 F Avg. t_s = 247 F
Avg. P_m (ΔH) = .9 W.C. ÷ 13.6 = ___
V_m = 0.93

FORM #RA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Byhle TEST # _____ DATE 11-17

COLLECTED BY Mc Combs Poole UNIT SAMPLED Baghouse Exhaust

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run Two

Time	Sampling Point	Line V_l in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp	V_p Pitot Rdg.	$\Delta H_{@}$ Orifice Rdg.	V_m Dry Gas Meter Rdg	Remarks
11:40	E1			/		NEG	—	401.20	
	2			/		Neg	—		
	3			/		Neg	—	401.20	
:43	4	2	95	/	248	.32	.32	401.20	
:46	SHUT	Down			PORT			402.02	
	D1			/		Neg	—		
	2			/		Neg	—		
:48	3			/		Neg	—	402.02	
:48	4	2	96	/	230	.56	.54	402.02	
:51	SHUT	Down			PORT			403.15	
:53	C1	3	96	/	223	.56	.54	403.15	
:56	2	3	97	/	229	.25	.23	—	
:59	3	3	97	/	229	.32	.30	405.14	
:02	4	3	98	/	238	1.2	1.1	406.00	
:05	SHUT	Down			PORT			407.61	
:07	B1	3	98	/	223	1.2	1.1	407.61	
:10	2	3	98	/	236	.78	.68	—	
:13	3	3	98	/	237	1.2	1.1	—	
:16	4	5	98	/	244	2.0	1.8	—	
:19	SHUT	Down			PORT			414.32	

P_{bar}: 29.38 in. Hg.
Static Pressure: _____ in.
Static Pressure: +.4 in.

Module S/N: _____
Filter, Thimble S/N: _____
Nozzle S/N: 3/16 #2
Pitot S/N: S #2

Sample Train Used

☒ EPA Method 5 ☐ AS
☐ EPA Method 6/8 ☐ Ot

Pre-Test Leak Check
<.02 ft.^{3} @ 12 "Hg. for 60
Pitot O/K
Post-Test Leak Check
< ___ ft.^{3} @ ___ "Hg. for ___
Pitot _____
Opacity: Max. ___
AVE. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Parameter

Calib. Factor
t_m = _____ F #
% H_2O = Run
P_s/P_m = _____
C = _____
Nozzle Dia. _____
t_s = _____
Theo. Pitot = _____

Notes:

• indicates change in isokinetics

Note: Avg. t_1 and t_2 to determine Avg. t_m

AVE. t_m = _____ F AVE. t_s = _____ F

AVE. P_m (ΔH) = _____ W.C. ÷ 13.6 = _____

V_m = _____

Form #PA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Bythle TEST # _____ DATE 11-17-8

COLLECTED BY McCombs Poole UNIT SAMPLED Exhaust Baghouse

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run 2

Time	Sampling Point	Line V_1 in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp.	V_p Pitot Rdg.	ΔH P_m Orifice Rdg.	V_m Dry Gas Meter Rdg	Remarks
:21	A1	5	97	/	230	2.2	2.1	414.32	
:24	2	5	98	/	241	2.2	2.1	416.99	
:27	3	5	98	/	245	1.8	1.6	419.58	
:30	4	6	99	/	248	3.0	3.0	421.18	
:33	SHUT Down				END	Run		423.64	STOP
11/19	B1			/	254	1.6	1.5	437.42	[illegible]
	2			/	255				
	3			/	254				
	4			/	253				
	5			/	246				
	—								

P_{bar}: _____ in. Hg.
Static Pressure: _____ in
Static Pressure: _____ in

Module S/N: NUT # 1
Filter, Thimble S/N: _____
Nozzle S/N: _____
Pitot S/N: _____

Sample Train Used

☑ EPA Method 5 ☐ AS
☐ EPA Method 6/8 ☐ O

Pre-Test Leak Check
< ___ ft.^{3} @ ___ "Hg. for ___
Pitot _____
Post-Test Leak Check
< .005 ft.^{3} @ 12 "Hg. for 60
Pitot OK
Opacity: Max. ___
Avg. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Paramete

Calib. Factor ___
t_m = _____ F
% H_2O = _____
P_s/P_m = _____
C = ___
Nozzle Dia. _____
t_s = _____
∴ Theo. Pitot = _____

Notes:

• indicates change in isokinetics

Note: Avg. t_1 and t_2 to determine Avg. t_m

Avg. t_m = 97 F Avg. t_s = 236 F
Avg. P_m (ΔH) = .8 W.G. ÷ 13.6 = _____
V_m = 17.44

D Form #RA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Bythle TEST # _____ DATE 11-19

COLLECTED BY McCombs Poole UNIT SAMPLED Baghouse Exhaust

Fink - Rogers

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run 3

Time	Sampling Point	Line V_1 in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp.	V_p Pitot Rdg.	ΔH_{P_m} Orifice Rdg.	V_m Dry Gas Meter Rdg	Remarks
1256	A1	4	90	/	247	2.2	2.2	423.82	
58	2	4	91	/	249	1.6	1.6	425.97	
101	3	5	90	/	251	2.6	2.6	427.82	8.31
~~104~~	4	5	91	/	252	2.9	2.9	–	
0707	SHUT	Down	Check		Plant			432.13	
11/19 8:40	B1	6	46	/	254	1.6	1.5	437.4	Leak ck good (Rerun)
843	2	5	47	/	255	1.3	1.3	–	
846	3	5	48	/	254	1.0	1.0	–	
849	4	5	48	/	253	1.0	1.0	–	
852	5	5	48	/	246	.98	.99	445.16	
855	–	STOP	CHANGE		PORT			446.67	stop for Trucks
1035	C1	4	56	/	226	.78	.76	446.67	Rerun
1038	2	3	56	/	228	.52	.50	–	
1041	3	–	5	/	231	neg	0	449.20	
1041	4	1	56	/	232	.15	.14	449.20	
1044 ~~1047~~	5	3	56	/	230	.56	.55	449.97	
1047 ~~1050~~	–	STOP	CHANGE		PORT			451.53	
			Cont on next page						

P_{bar}: 29.53 in. Hg.
Static Pressure: _____ in.
Static Pressure: +.4 in.

Module S/N: NGT#1
Filter, Thimble S/N: 472
Nozzle S/N: 3/16 #1
Pitot S/N: 5' #1

Sample Train Used

☑ EPA Method 5 ☐ AS
☐ EPA Method 6/8 ☐ Ot

Pre-Test Leak Check
< 102 ft.^{3} @ 14" Hg. for 2
Pitot OK

Post-Test Leak Check
< ___ ft.^{3} @ ___" Hg. for ___
Pitot _____

Opacity: Max. ___
Avg. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Paramete

Calib. Factor ___
t_m = _____ F
% H_2O = _____
P_s/P_m = _____
C = 1

Nozzle Dia. _____
t_s = _____
∴ Theo. Pitot = 1.8

Notes: .04 NSPS

• indicates change in isokinetics

Note: Avg. t_1 and t_2 to determine Avg. t_m

Avg. t_m = 62 F Avg. t_s = 242 F
Avg. P_m (ΔH) = .9 W.G. ÷ 13.6 = _____
V_m = 25.86

Form #RA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

SAMPLING DATA SHEET

CUSTOMER/LOCATION Blythe TEST # _____ DATE 11-19

COLLECTED BY Fink / Rogers UNIT SAMPLED Baghouse Exhaust

PROCESS OPERATING CONDITIONS (SEE SEPARATE LOG)

Run 3

Time	Sampling Point	Line V_1 in. Hg	t_m Dry Gas Meter t_1	t_m Dry Gas Meter t_2	t_s Stack Temp.	V_p Pitot Rdg.	$\Delta H_{@}$ Orifice Rdg.	V_m Dry Gas Meter Rdg	Remarks
1051	D1	4	57	/	242	.62	.60	451.53	
1054	2	1	57	/	240	.16	.15	452.92	
1057	3	1	57	/	239	.10	.09	453.65	
1100	4		59	/		neg	0		
1100	5			/		neg	0		
1100	—	STOP CHANGE PORT						454.12	
1103	E1	1	61	/	236	.13	.11	454.12	
1106	2	1	62	/	233	.05	.04	454.62	
1109	3			/		neg	0	454.97	
	4			/		neg	0		
	5			/		neg	0		
1109	—	STOP END RUN						454.97	

P_{bar}: _____ in. Hg.
Static Pressure: _____ in.
Static Pressure: _____ in.

Module S/N: _____
Filter, Thimble S/N: _____
Nozzle S/N: _____
Pitot S/N: _____

Sample Train Used

☐ EPA Method 5 ☐ AST
☐ EPA Method 6/8 ☐ Oth

Pre-Test Leak Check
< ___ ft.^{3} @ ___ "Hg. for ___ s
Pitot _____
Post-Test Leak Check
< .005 ft.^{3} @ 10 "Hg. for 0 s
Pitot OK
Opacity: Max. ___
Avg. ___

Odor: _____
Orsat # _____ @ _____

Isokinetic Parameter

Calib. Factor ___
t_m = _____ F
% H_2O = _____
P_s/P_m = _____
C = ___

Nozzle Dia. _____
t_s = _____
∴ Theo. Pitot = _____

Notes:

• indicates change in isokinetics
Note: Avg. t_1 and t_2 to determine Avg. t_m

Avg. t_m = _____ F Avg. t_s = _____ F
Avg. P_m (ΔH) = _____ W.G. ÷ 13.6 = _____
V_m = _____

Form #RA-16 - Rev. P

ANALYTICAL TESTING CONSULTANTS, INC.

IMPINGER DATA SHEET

JOB Blythe LOCATION Biscoe, N.C. UNIT Baghouse Exhaust

80% IPA - ΔWT = 83.4 G
3% H_2O_2 - " = 99.8 G
(100 ml)

RUN #		DATE	YCL-ONE	CONTENTS OF IMPINGERS 1	2	3	Δ (cc)	TOTAL V_{sc} EPA	CONDENSATE (OR V_w) WP-50	LOCATION REMARKS
1	START	11/17		100	100	Dry	300 SiO2			
	END			182	108	2	313.3			
	Δ			82	8	2	13.3	105.3	ml	
2	START			100	100	Dry	300 SiO2			
	END	11/17		181	105	1	314.4			
	Δ			81	5	1	14.4	96.9	ml	
3	START			100	100	Dry	300 SiO2			
	END			145	98	2	311.2			
	Δ			45	-2	2	11.2	56.2	ml	
	START									
	END									
	Δ								ml	
	START									
	END									
	Δ								ml	

Data by Poole Approved by

(11)

ANALYTICAL TESTING CONSULTANTS, INC.

TEMPERATURE DATA

JOB Blythe LOCATION Biscoe, N.C. UNIT Baghouse exhaust

DATE 11/17/87 MADE BY KPol CHECKED BY

Run # 1				Run # 2				Run # 3			
Time or Pt.	Probe Temp. F.	"Hot Box" Temp. F.	Exit Gas Temp. F.	Time or Pt.	Probe Temp. F.	"Hot Box" Temp. F.	Exit Gas Temp. F.	Time or Pt.	Probe Temp. F.	"Hot Box" Temp. F.	Exit Gas Temp. F.
A 1	OK	235°	70°	A 1	OK	220°	66°	A 1	OK	260°	68°
2		240°	68°	2		220°	66°	2		260°	68°
3		270°	68°	3		225°	66°	3		265°	68°
4		270°	68°	4		230°	67°	4		265°	68°
B 1		260°	67°	B 1		240°	67°	B 1		250	52
2		260°	67°	2		240°	67°	2		255	54
3		270°	67°	3		250°	67°	3		255	56
4		270°	67°	4		250°	68°	4		260	58
								5		260	59
C 1		280°	66°	C 1		250°	67°	C 1		260	60
2		270°	66°	2		255°	68°	2		255	60
3		270°	67°	3		260°	68°	3		255	61
4		260°	67°	4		260°	68°	4		255	61
D 1		250°	68°	D 1		265°	68°	D 1		255	61
2		250°	68°	2		265°	68°	2		255	61
3		260°	68°	3		260°	69°	3			
4		250°	68°	4		260°	69°	4			
								5			
E 1		240°	68°	E 1		260°	69°	E 1		255	61
2		240°	68°	2		260°	70°	2		255	61
3		240°	69°	3		255°	70°	3			
4		240°	69°	4		255°	70°	4			
								5			

ANALYTICAL TESTING CONSULTANTS, INC.

CHAIN OF CUSTODY FORM

Plant Blythe Industries

Run No. 1, 2, 3

Sampling Location Baghouse Exhaust

Filter No. 471-C, 463-C, 472-C

Test Method

☒ EPA 5 ☐ EPA

☐ EPA 6 ☐ ____

☐ EPA 7 ☐ ____

Container No.	Contents	Sample Recovered by	Remarks
Filter Bell 1, 2, 3	Filter	Fink	
Dry 1, 2, 3 -Dry Catch Wash	Probe, nozzle and cyclone washings	Fink	
____-Wet Catch Solution	Impinger solutions		
Imp. 1, 2, 3 -Wet Catch Wash	Impinger washings	Poole	
Imp. 1, 2, 3	Silica gel	Poole	
Blank	Solvent blank	Fink	

Note: Liquid levels to be marked with grease pencil on all sample containers and to be checked when delivered to lab.

Delivered to lab by: Rogers Date 11/19/87

Received in lab by: Fink Date 11/19/87

Analysis completed by Fink Date 11/20/87

SOURCE TEST SURVEY

SOURCE NAME: Blythe Ind
LOCATION: Biscoe, N.C.
DATE 11/17/87
OBSERVER'S NAME: _____

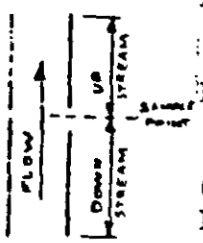
PURPOSE OF TEST: Compliance
TESTING DONE BY: ATC, Inc
LAB ANALYSIS DONE BY: ATC, Inc

COMPANY CONTACT: Horace Turbyville, J. Anderson TELEPHONE _____
CONTROL EQUIPMENT OPERATING: Baghouse
OPACITY READING MADE: ____ YES X NO

UNIT/PROCESS NAME: Baghouse – Kiln exhaust
RATED CAPACITY: 200 ton/hr
TYPE FUEL USED: _____

APPROX. PROCESS RATE: 190 ton/hr
METHOD OF DETERMINING PROCESS RATE: _____
STACK HEIGHT: _____
INDIVIDUAL STACK X COMMON STACK _____
DIAMETER: (IF ROUND) _____ (IF RECTANGULAR) WIDTH 4' LENGHT

I. SAMPLING POINT LOCATION



A. DISTANCE DOWNSTREAM FROM ANY FLOW DISTURBANCE: 8'
NATURE OF DISTURBANCE
(BEND, CONTRACTION, EXPANSION, FAN, BAFFLES, ETC.)
B. DISTANCE UPSTREAM FROM ANY FLOW DISTRUBANCE: 2'
NATURE OF DISTURBANCE
(BEND, STACK EXIT, CONTRACTION, FAN, BAFFLES, EXPANSION.
C. NUMBER OF PORTS IN STACK: 5
D. NUMBER OF POINTS SAMPLED PER PORT: 4

II. STACK GAS

A. STACK TEMPERATURE: 240
B. ORSAT ANALYSIS: Pyerite
GRAB X CONTINUOUS _____ NUMBER OF INTEGRATED SAMPLES _____
C. PRELIMINARY ΔP: MIN. negative MAX. 2.4

III. PARTICULATE TEST

A. SAMPLING TRAIN:
1. TEST METHOD: EPA METHOD 5 ✓ ASME PTC 21/27 _____
OTHER (DISCRIBE) _____
2. TYPE FILTERS A/E Glass Fiber
3. PROBE IDENTIFICATION 5'#1, 5'#2
4. METER CALIBRATION FACTOR 1.0
5. ORIFICE Δ H @ FACTOR 1.8
6. DATE OF LAST CALIBRATION CHECK See Cal Data
a. ORIFICE METER
b. TEMPERATURE DEVICES
c. NOZZLE DIAMETER
d. DRY GAS METER
e. PITOT TUBE
f. OTHER _____

ANALYTICAL TESTING CONSULTANTS, INC. Form # 15

TRAVERSE DATA & FLOW COMPUTATION

Customer Bythe Test No. _____ Test Team McCoy Poole

Location Biscoe, NC Date 11-17

Unit Baghouse Barometer 29.38 in. Hg.

Dry Bulb _____ F.

Wet Bulb _____ F.

Time 9 . 50 AM/PM

SP 1.4 in WG / in Hg

Pitot Type _____

Fs for Pitot .84

48" X 48"

SMPL POINT	Vp inches	$\sqrt{V_p}$	Temp. ts F.	ΔP 0°REF.	α#
1A	.2				
B	-				
C	-		225		
D	-				
3A	.95		228		
B	.4				
C	-				
D	.4				
4 A	1.3				
B	.75				
C	1.4				
D	2.1				
5 A	2.4		240		
B	1.6				
C	1.5		240		
D	1.7				
AVERAGE					

ρ_s = Spec. Wt. of Air = .075 lbs/ft^3

#α = angle in degree of to yield 0ΔP

Sketch (if applicable)

1. ts (Avg.) = _____ + 460

_____ T_s (Rank

2. Duct Area = A = _____

_____ Sq.Ft.

3. P_s = Barometer ± SP =

_____ in. H

4. G.D. = $\rho_s \left(\frac{530}{T_s}\right)\left(\frac{P_s}{29.92}\right)$ =

_____ lbs/

5. K=Constant= $\frac{1096.5}{\sqrt{G.D.}}$ = _____

6. V=Velocity=K F_s $\sqrt{V_p}$ Avg

_____ ft

7. VOLUME average =AxV =

_____

8. SCFM = Volume $\left(\frac{530}{T_s}\right)\left(\frac{P_s}{29.9}\right.$

_____ SC

Blythe-Biscoe 11/17-19
Balance Check - Auto Cal

Wash

Run	Beaker	Final	Initial	Det
1	1	76.3728	76.3553	.0175
2	2	79.8957	79.8804	.0153
3	3	76.9832	76.9584	.0248
Blank	100 cc Acetone B	79.1653	79.1651	.0002

Volumes

Run #	Volume
1	334
2	296
3	283

Filters

Run	Filter #	Final 1	Final 2	Init	Det
1	471-C	.2248	.2247	.2212	.0036
2	463-C	.1842	.1842	.1683	.0159
3	472-C	.2362	.2362	.2189	.0173

Totals

Run	Filter	Wash	Correction	Total
1	.0036	.0175	NA	.0211
2	.0159	.0153	NA	.0312
3	.0173	.0248	NA	.0421

WD7 11/24/87

ION CALCULATIONS

TW	TD	TIME	GAMMA
62	77	10	.9995828
62	81	10	.9984067
62	84	10	.9937335
		AVG.	.9972410

TD	TIME	GAMMA	D H A
82	10	.9982445	1.748223
86	10	.9932355	1.714570
88	10	.9973662	1.637648
89	10	1.008367	1.621671
90	10	1.004349	1.645540
		1.000313	1.673530

NOZZLE CALIBRATION DATA FORM

Date 10/31/87 Calibrated by Fink

Nozzle identification number	Nozzle Diameter[a]				
	D_1, [redacted] (in.)	D_2, [redacted] (in.)	D_3, [redacted] (in.)	ΔD, [redacted] (in.)[b]	D_{avg}[c]
1/8 #1	.130	.127	.129	.003	.129
3/16 #1	.188	.187	.188	.001	.188
1/4 #1	.250	.250	.249	.001	.250
5/16 #1	.312	.313	.315	.003	.313
3/8 #1	.375	.375	.375	0	.375
1/2 #1	.500	.501	.500	.001	.500

where:

[a] $D_{1,2,3}$, = three different nozzles diameters, mm (in.); each diameter must be within (0.025 mm) 0.001 in.

[b] ΔD = maximum difference between any two diameters, mm (in.), $\Delta D \leq$ (0.10 mm) 0.004 in.

[c] D_{avg} = average of D_1, D_2, and D_3.

NOZZLE CALIBRATION DATA FORM

Date 10/31/87 Calibrated by Fink

Nozzle identification number	Nozzle Diameter[a]			ΔD,[b] mm (in.)	D_{avg}[c]
	D_1, mm (in.)	D_2, mm (in.)	D_3, mm (in.)		
1/8 #2	—	sent for reconditioning			—
3/16 #2	.187	.188	.188	.001	.188
1/4 #2	.249	.250	.250	.001	.250
1/4 #3	.248	.251	.251	.003	.250
5/16 #2	.312	.313	.314	.002	.313
3/8 #2	.376	.375	.375	.001	.375
1/2 #2	.502	.502	.503	.001	.502

where:

[a] $D_{1,2,3}$, = three different nozzles diameters, mm (in.); each diameter must be within (0.025 mm) 0.001 in.

[b] ΔD = maximum difference between any two diameters, mm (in.), $\Delta D \leq$ (0.10 mm) 0.004 in.

[c] D_{avg} = average of D_1, D_2, and D_3.

TYPE S PITOT TUBE INSPECTION DATA FORM

S' #2

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 1 ° (<10°), α_2 = 0 ° (<10°), β_1 = 2 ° (<5°),
β_2 = 3 ° (<5°)

γ = 0 °, θ = 1 °, A = 1.3 (in.)

z = A sin γ = 0 (in.); <0.32 cm (<1/8 in.),
w = A sin θ = .02 (in.); <.08 cm (<1/32 in.)

P_A .65 (in.) P_b .65 (in.)

D_t = 3/8 (in.)

Comments: Wire brush liner interior

Calibration required? _____ yes X no

WDF
9/28/87

TYPE S PITOT TUBE INSPECTION DATA FORM

5' #1

Pitot tube assembly level? ✓ yes _____ no

Pitot tube openings damaged? _____ yes (explain below) ✓ no

α_1 = 0 ° (<10°), α_2 = 0 ° (<10°), β_1 = 0 ° (<5°),
β_2 = 0 ° (<5°)

γ = 0 °, θ = 0 °, A = 1.0 (in.)

z = A sin γ = 0 (in.); <0.32 cm (<1/8 in.),
w = A sin θ = 0 (in.); <.08 cm (<1/32 in.)

P_A .5 (in.) P_b .5 (in.)

D_t = 9/8 (in.)

Comments: Nutech Replacement Tips installed 9/8/87.
Wire Brush exterior + Liner Interior

Calibration required? _____ yes X no

WDT
9/8/87

Quality Assurance Handbook

DRAFT/WP
d3006-4/971130
03/30/92 1

Do NOT USE! Ref 15

Emission Test Report
Review Checklist

Reviewer: Brian Shrager
Review Date: 4/8/92

A. Background Information

1. Facility name: Blythe Industries, Inc.

   Location: Biscoe, North Carolina

2. Source category: Asphaltic Concrete Plants

3. Test date: November 17-19, 1987

4. Test sponsor: Blythe Industries, Inc.

5. Testing contractor: Analytical Testing Consultants, Inc.

6. Purpose of test: To determine compliance with applicable emission rate codes of the State of North Carolina.

7. Pollutants measured

   (PM) PM-10 CO SO_2 NO_x VOC Pb (CO_2)

   Others (list): _____

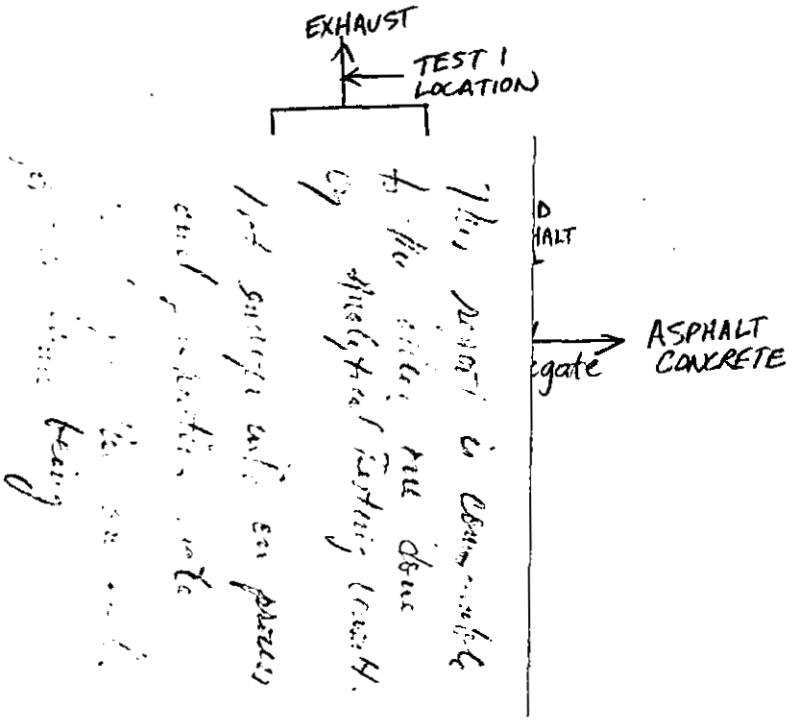
8. Process overview: On an attached page provide a block diagram of the unit operations and associated air pollution control systems at the facility. Identify process tested with letters from the beginning of the alphabet (A, B, C, etc.) and APC systems with letters from end of alphabet (V, W, X, etc.). Also identify test locations with Arabic numerals (1,2,3, ...). Using the ID symbols from that sketch complete the table below that identifies processes or unit operations tested.

Test ID	Process	Process ID	Emissions tested		APCD (controlled emissions only)
			Uncontrolled	Controlled	
1	Drying (Kiln)	A		✓	Baghouse

B. Process Information

1. Provide a brief narrative description of the process. With as much detail as possible, (e.g., if a furnace or conveyor system is used, identify the type of unit) describe the equipment used for those operations tested. (Note: If process description provided in test report is adequate, attach copy or reproduce here.)

The system tested was the exhaust from a bag collector. The baghouse is used for control of particulate emissions from and asphalt plant drying kiln.



2. For each process tested list feedstock materials and products. Indicate if activity factors are for feed (F) rate or product (P) rate.

Process ID	Feedstock materials	Products	Basis for activity factor	F/P
A	Wet Aggregate	Asphalt Concrete	Asphalt Concrete	P

Basis for data: SOURCE TEST SURVEY (8 pages from end)
(Indicate page/table Nos. in test report)

3. For each process or operation tested and each test run note process capacity and operating rate during test.

Process ID	Capacity	Units	Test run	Process rate	Units
	300	ton/hr	1	190	ton/hr
			2	190	ton/hr
			3	190	ton/hr
			4		
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		
			1		
			2		
			3		
			4		

Basis for data: SOURCE TEST SURVEY (8 pages from end)

C. Air Pollution Control Systems Tested

1. For each air pollution control system pollution control system identified in A.8, note the following

ID	Type of APCD	Manufacturer	Model No.
Z	Baghouse		

Note: Be as specific as possible in identifying APCD. For example, indicate "pulse jet fabric filter" rather than simply "fabric filter."

2. For each system identified above, provide a narrative description. For fugitive systems describe capture techniques as well as the removal techniques (use a separate page if necessary)

3. Using the attached parameter list for guidance complete the table below. (Use additional pages as needed.)

APCD ID	Parameter	Units	Readings			
			Run 1	Run 2	Run 3	Run 4
Z						
Type of APCD: Baghouse						
Type of APCD:						
Type of APCD:						

D. Sampling and Analysis Methods

1. Complete the following table

Test location	Pollutant	S & A method	Reference/ conditional method	Deviations noted
1	ALL	EPA METHOD 5	Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N
			Y/N	Y/N

2. If a method used was not a reference or conditional method, provide a narrative discussion including any data manipulation needed to make results correspond to reference or conditional method results.

3. Describe any deviations identified above.

E. Emission Data Documentation

1. Tabulate the following stack gas data from the test report. (Use additional pages as needed.)

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	°F	247	236	242	
	Moisture	%	19.2	21.9	9.3	
	Oxygen	%	17	17	17	
	Volumetric flow, actual	ACFM	49446	47647	42928	
	Volumetric flow, standard	SCFM	36,343	35,565	31,938	
	Percent isokinetic		98.5	81.1	103.0	
	Pollutant concentration:					
	PM	gr/SCF	0.01557	0.02960	0.02511	
	CO2	%	3.5	3.5	3.5	
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					
	Stack temperature					
	Moisture					
	Oxygen					
	Volumetric flow, actual					
	Volumetric flow, standard					
	Percent isokinetic					
	Pollutant concentration:					

2. Tabulate pollutant mass flux rates

Test ID	Pollutant	Units	Mass flux rates			
			Run 1	Run 2	Run 3	Run 4
1	PM	lb/hr	3.92	7.05	6.24	
	CO_2	lb/hr	8929	8,738	7,847	

3. Present example emission factor calculations below.

PM

$$\frac{(3.92+7.05+6.24)}{3} \text{ lb/hr} \div 190 \text{ ton/hr} = 0.0302 \text{ lb/ton produced}$$

4. Tabulate emission factors

Process	Pollutant	Units	Average emission factor	
			Uncontrolled	Controlled
A	PM	lb/ton		0.0302
	CO_2	lb/ton	44.76	

ATTACHMENT A
APCD PARAMETERS

Type of APCD	Parameters
Fabric filter	Cleaning mechanism Bag type Cleaning frequency Air to cloth ratio (A/C) Pressure drop Inlet temperature
ESP	Type (wet or dry) Number of fields Rapping cycle (if dry) Specific Collection Area (SCA) Particulate resistivity (if known) Spark rate Current and power levels
Venturi (or other high energy) scrubber	Pressure drop Liquid/gas (L/G) ratio Mist eliminator type
Packed-bed scrubber	Packing depth L/G ratio Caustic use (Y/N) pH Mist eliminator type
Carbon absorber	Bed depth Superficial gas velocity Bed temperature Desorption mechanism (media) Flue-gas moisture Cycle length Time-on-line after breakthrough