



ADVANCED INDUSTRIAL RESOURCES

***PERFORMANCE TEST REPORT OF ~~BAGHOUSE NO. 35~~
AND BAGHOUSE NO. 37 AT FRANKLIN INDUSTRIAL
MINERALS***

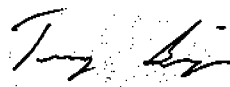
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NOVEMBER 1999

TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 TEST RESULTS	1
3.0 SOURCE DESCRIPTION	2
4.0 TEST PROCEDURES	2
5.0 FIELD DATA REDUCTION	4
6.0 CALIBRATION PROCEDURES	4

APPENDIX A	TEST RESULTS
APPENDIX B	FIELD DATA REDUCTION
APPENDIX C	EXAMPLE CALCULATIONS AND NOMENCLATURE
APPENDIX D	RAW FIELD DATA
APPENDIX E	LABORATORY REPORTS AND CUSTODY RECORDS
APPENDIX F	CALIBRATION DATA
APPENDIX G	PROCESS OPERATION DATA

1.0 INTRODUCTION

On November 4, 1999, Advanced Industrial Resources performed particulate matter and visible emissions testing at the Dalton, Georgia facility of Franklin Industrial Minerals. The sources tested were ~~Baghouse No. 35~~ and Baghouse No. 37. The testing was conducted in order to determine compliance with applicable standards for pollutant emissions, in accordance with the requirements of the Georgia Environmental Protection Division and as required by NSPS Subpart OOO of the *Code of Federal Regulations*, Title 40, Part 60.

2.0 TEST RESULTS

Detailed test results are presented in Appendix A. Please find below a summary of measured pollutant emissions and the conclusions of the performance testing.

Source	Average Measured Particulate Matter Emission Rate	Allowable Particulate Matter Emission Rate	Average Visual Opacity
	gr/dscf	gr/dscf	
Baghouse No. 35	.002	.02	0%
Baghouse No. 37	.001	.02	0%

Thus, it may be concluded that the above listed source complies with the given particulate matter emission standards, as required by the Georgia Environmental Protection Division and as required by NSPS Subpart OOO of the *Code of Federal Regulations*, Title 40, Part 60.

Advanced Industrial Resources would like to express our appreciation to the Environmental Protection Division of the Georgia Department of Natural Resources and to Mr. Jim Ruddel and Gary Oxford of Franklin Industrial Minerals for all their assistance with this test program.

3.0 SOURCE DESCRIPTION

Franklin Industrial Minerals operates a limestone ~~grinding and bagging facility~~, grinding and bagging facility in Dalton, Georgia.

~~Baghouse no. 35 (Source Code 1612) controls all emissions from Mill 5. Heated air and material are blown into Mill 5 (Source Code 1604) and ground. Material is recycled through the mill until the desired size is obtained and then blown into a storage silo. The material is blown into the storage silo at a rate of 4 to 6 tons per hour. The closed system is then vented to the atmosphere through baghouse no. 35. Baghouse no. 35 has three (3) sampling ports oriented parallel to one another in a horizontal plane along one wall of the stack. Sampling locations for this stack are at least 2 diameters upstream and at least 3.5 diameters downstream from the nearest flow disturbances, so 24 (3x8) traverse points were used for sampling from this baghouse. Each repetition lasted a minimum of sixty (60) minutes and achieved a minimum sample volume of 1.70 dscm (60 dscf). Visual opacity readings were taken for a total of three hours during the PM emissions testing by Mr. Scott Gunnell, who was certified by the Georgia Environmental Protection Division in October, 1999.~~

Baghouse no. 37 (Source Code 1122) controls all emissions from Silo 20 (Source Code 1121) and the Truck Loadout. The finished product is blown into the silo for storage at a rate of 1.3 tons per hour. The product is then loaded out of the silo and into a truck with a DCL loadout (Source Code 1124). Baghouse 37 controls all emissions resulting from the process of filling the silo with the product and then loading that same product into a truck. Baghouse 37 has a circular cross-section of 15 inches. The baghouse has two sampling ports oriented 90° to one another in a horizontal plane. Baghouse sampling locations are at least a half stack diameter upstream and two diameters downstream from the nearest flow disturbances, so a maximum of 24 sampling points were used. Each repetition lasted a minimum of sixty (60) minutes and achieved a minimum sample volume of 1.70 dscm (60 dscf). Visual opacity readings were taken for a total of three hours during the PM emissions testing by Mr. Scott Gunnell, who was certified by the Georgia Environmental Protection Division in October, 1999.

Process operation data from the date of testing is included in Appendix G.

4.0 TEST PROCEDURES

Performance testing for each source was conducted according to the methodology in the *Title 40 Code of Federal Regulations*, Part 60, Appendix A as applicable to particulate matter emitting sources. Specifically, Method 1 was used for the qualification of the location of sampling ports and for the determination of the number and positions of sampling points. Method 2 was used for the determination of the stack gas velocity and

volumetric flow rate. Method 3 was used for the determination of the composition and dry molecular weight of the effluent stack gas. Method 5 was used for the determination of the emission rate of particulate matter from each source. Finally, Method 9 was used for the determination of visual opacity.

Prior to each test run, the sampling line was cleaned with distilled water, and a labeled pre-tared glass-fiber filter was placed in the filter holder. The first two impingers were loaded with 100 mL each of water; the last impinger was loaded with 200 g of indicating silica gel; and the train was reassembled. After each test run, the filter was recovered and stored in a labeled petri dish, and the filter holder was rinsed with distilled water into a labeled sample bottle. The nozzle and probe liner were brushed and rinsed with distilled water, and the rinsing was added to the same sample bottle. Finally, the moisture collected in the impingers was measured, and the spent silica gel was stored in a labeled container. The final fluid level in the wash sample bottle was marked prior to shipment. All recovered filters and sample bottles were kept in a closed sample box until final laboratory analysis.

Laboratory reports and custody records are presented in Appendix E.

5.0 FIELD DATA REDUCTION

Reduced and tabulated data from the field testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D.

6.0 CALIBRATION PROCEDURES

PROBE NOZZLES

Probe nozzles are calibrated before each field use by measuring the internal diameter of the nozzle entrance orifice along three different diameters. Each diameter is measured to the nearest 0.001 inch, and all measurements are averaged. If the total variation of the three measurements exceeds 0.004", the nozzle shall be reshaped, sharpened, and recalibrated before further use.

PITOT TUBES

Before field use, each Type S pitot tube is examined in order to verify that the face planes of the tube are properly aligned, per Method 2 of 40 CFR 60, App A. The external tubing diameter and base-to-face plane distances are measured in order to verify the use of 0.84 as the baseline (isolated) pitot coefficient. At this time the entire probe assembly (i.e., the sampling probe, nozzle, thermocouple, and pitot tube) is inspected in order to verify that its components meet the interference-free alignment specifications given in 40 CFR 60, App A, Method 2. If the specifications are met, then the baseline pitot coefficient is used for the entire probe assembly.

After each field use, the face plane alignment of each pitot tube is checked. If any damage has occurred to the tube orifices, the tube shall be reshaped, realigned, and recalibrated before further use.

METERING SYSTEM

Before initial use, each dry gas meter (DGM) console is calibrated at five orifice settings according to Method 5 of 40 CFR 60, App A. From the calibration data, calculations of the values of Y_m and $\Delta H_{@}$ are made, and an average of each set of values is obtained. The limit of total variation of Y_m values is ± 0.02 , and the limit for $\Delta H_{@}$ values is ± 0.20 .

After each field use, the calibration of the DGM console is checked by performing three calibration runs at a single intermediate orifice setting that is representative of the range used during field testing. The limit of acceptable relative variation from Y_m is 5.0%.

TEMPERATURE GAUGES

After each field use, the temperature measuring instruments on each sampling train are calibrated against standardized mercury-in-glass reference thermometers. The limit of acceptable variation between the absolute reference temperature and the absolute indicated temperature is 1.5%.

BAROMETER

The barometric pressure at the test site is determined by correcting for altitude the absolute (mean-sea-level) barometric pressure. The absolute barometric pressure is obtained throughout the test period from local weather authorities.

Calibration data sheets are presented in Appendix F.

APPENDIX A

TEST RESULTS

Advanced Industrial Resources, LLC

Particulate Matter Test Results

Franklin Minerals
Dalton, Georgia
Baghouse No. 37

	Units	Run 1	Run 2	Run 3	Averages
Test Date		04-Nov-99	04-Nov-99	04-Nov-99	
P_m	inches Hg	30.55	30.45	30.55	30.52
P_s	inches Hg	30.02	30.02	30.01	30.02
$V_{m(std)}$	dscf	91.12	81.98	92.82	88.64
$V_{w(std)}$	scf	0.35	0.42	0.50	0.42
B_{ws}	dimensionless	0.004	0.005	0.005	0.005
M_d	lb./lb.-mole	28.84	28.84	28.84	28.84
M_s	lb./lb.-mole	28.79	28.78	28.78	28.78
v_s	ft./sec	34.32	30.89	34.54	33.25
A_n	ft ³	0.000767	0.000767	0.000767	0.000767
A_s	ft ³	1.23	1.23	1.23	1.23
Q_a	cfm	2,527	2,274	2,543	2,448
Q_{sd}	dscfm	2,416	2,168	2,466	2,350
I	percent	100.6	100.8	100.4	100.6
c_{PM}	mg/dscm	2.519	1.895	1.370	1.928
c_{PM}	gr/dscf	0.001100	0.000828	0.000598	0.001
E_{PM}	lb./hour	0.0228	0.0154	0.0127	0.0169
K_I	dimensionless	20.17	20.00	20.11	20.09

APPENDIX B

FIELD DATA REDUCTION

Advanced Industrial Resources, LLC

Compliance Data Reduction Sheet

Client: <u>Franklin Minerals</u> Location: <u>Dalton, Georgia</u> Source: <u>Baghouse No. 37</u> Test Team: <u>GSG, DJK, LK</u> EPA Methods: <u>1, 2, 3, 5</u>	Console ID: <u>C-001</u> Y_m: <u>0.990</u> ΔH_@: <u>1.780</u> C_p: <u>0.84</u> Analyte(s): <u>Particulate Matter</u>
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	Units	Run 1	Run 2	Run 3
Test Date		04-Nov-99	04-Nov-99	04-Nov-99
Start Time		14:49	16:23	17:37
End Time		15:50	17:25	18:40
V _m	dcf	92.560	82.871	92.755
V _{lc}	mL	7.5	9.0	10.5
Δp	inches H ₂ O	0.36	0.29	0.37
(Δp) ^{1/2}	(inches H ₂ O) ^{1/2}	0.598	0.538	0.606
ΔH	inches H ₂ O	7.18	5.88	7.39
θ	minutes	60.0	60.0	60.0
D _n	inches	0.375	0.375	0.375
D _s	inches	15.0	15.0	15.0
T _m	°R	542	538	533
T _s	°R	552	553	543
P _{bar}	inches Hg	30.02	30.02	30.01
P _g	inches H ₂ O	0.00	0.00	0.00
% O ₂	percent (v/v)	20.9	20.9	20.9
% CO ₂	percent (v/v)	0.0	0.0	0.0
% N ₂	percent (v/v)	79.1	79.1	79.1
m _{PM}	mg	6.50	4.40	3.60

APPENDIX C

EXAMPLE CALCULATIONS AND NOMENCLATURE

EXAMPLE CALCULATIONS

$$A_n = D_n \pi / 4$$

$$A_s = D_s \pi / 4$$

$$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{(std)})$$

$$c_{PM} = (m_{PM} / V_{m(std)}) (35.31466 \text{ ft}^3/\text{m}^3)$$

$$c_{PM} = (m_{PM} / V_{m(std)}) (0.015432 \text{ gr./mg})$$

$$E_{PM} = (m_{PM} / V_{m(std)}) Q_{sd} (60 \text{ min/hr}) (2.2046 \times 10^{-6} \text{ lb./mg})$$

$$I = 100 T_s (K_3 V_{lc} + Y_m V_m P_m / T_m) / (60 \theta v_s P_s A_n)$$

$$\text{where } K_3 = 0.002669 (\text{in. Hg ft}^3) / (\text{mL } ^\circ\text{R})$$

$$K_1 = [(2.0084 \times 10^7 \Delta H_{@}) A_n (1 - B_{ws})]^2 (M_d / M_s) (T_m / T_s) (P_s / P_m)$$

$$M_d = 0.440 (\% \text{ CO}_2) + 0.320 (\% \text{ O}_2) + 0.280 (\% \text{ N}_2 + \% \text{ CO})$$

$$M_s = M_d (1 - B_{ws}) + M_w B_{ws}$$

$$P_m = P_{bar} + \Delta H / 13.6$$

$$P_s = P_{bar} + p_g / 13.6$$

$$Q_a = (60 \text{ s/min}) v_s A_s$$

$$Q_{sd} = (60 \text{ s/min}) (1 - B_{ws}) v_s A_s (T_{std} / T_s) (P_s / P_{std})$$

$$T_m = t_m + 460^\circ$$

$$T_s = t_s + 460^\circ$$

$$V_{m(std)} = V_m Y_m (T_{std} / T_m) (P_m / P_{std})$$

$$V_{w(std)} = (V_{lc} \rho_w R T_{std}) / (M_w P_{std})$$

$$v_s = K_p C_p [\Delta p]^{1/2} [T_s / (P_s M_s)]^{1/2}$$

NOMENCLATURE

Symbol	Units	Description
A_n	ft^2	Area of the nozzle
A_s	ft^2	Area of the stack
B_{ws}	dimensionless	Volume proportion of water in the stack gas stream
C_p	dimensionless	Type S pitot tube coefficient
c_{PM}	mg/dscm	Concentration of PM in dry stack gas, standardized
$'c_{PM}$	gr./dscf	Concentration of PM in dry stack gas, standardized
D_n	inches	Internal diameter of the nozzle at the entrance orifice
D_s	inches	Internal diameter of the stack at sampling location
ΔH	inches H_2O	Average pressure differential across the meter orifice
$\Delta H_{@}$	inches H_2O	Orifice pressure differential that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of Hg
Δp	inches H_2O	Velocity head of stack gas
E_{PM}	lb./hour	Emission rate of PM, time basis
I	percent	Isokinetic sampling ratio-expressed as percentage
K_I	dimensionless	K-factor, ratio of ΔH to ΔP , ideal
K_p	$\frac{\text{ft}[(\text{lb/lb-mol})(\text{in. Hg})]^{1/2}}{s[(^\circ\text{R})(\text{in. H}_2\text{O})]^{1/2}}$	Type S pitot tube constant, = 85.49
L_p	cfm	Measured post-test leakage rate of the sampling train
M_d	lb./lb.-mole	Molecular weight of gas at the DGM
M_s	lb./lb.-mole	Molecular weight of gas at the stack
M_w	lb./lb.-mole	Molecular weight of water, = 18.0
m_{PM}	mg	Mass of PM in the sample
P_{bar}	inches Hg	Barometric pressure at measurement site
P_{input}	tons/hour	Process dry mass input rate
P_g	inches H_2O	Gauge (static) pressure of stack gas
P_m	inches Hg	Absolute pressure of meter gases
P_s	inches Hg	Absolute pressure of stack gases
P_{std}	inches Hg	Standard absolute pressure = 29.92

NOMENCLATURE

Symbol	Units	Description
Q_a	cfm	Volumetric flow rate of actual stack gas
Q_{sd}	dscfm	Volumetric flow rate of dry stack gas, standardized
R	$(\text{in. Hg})(\text{ft}^3)$ $(\text{lb-mole})(^\circ\text{R})$	Ideal gas constant, = 21.85
ρ_w	lb/mL	Density of water, = 0.002201
ρ_a	g/mL	Density of acetone, = 0.7899
T_m	$^\circ\text{R}$	Absolute temperature of dry gas meter
T_s	$^\circ\text{R}$	Absolute temperature of stack gas
T_{std}	$^\circ\text{R}$	Standard absolute temperature, = 528
t_m	$^\circ\text{F}$	Temperature of DGM
t_s	$^\circ\text{F}$	Temperature of stack gas
θ	minutes	Total sampling time
V_{lc}	mL	Total volume of liquid collected
V_m	dcf	Volume of gas sample as measured by the DGM
$V_{m(std)}$	dscf	Volume of gas sample as measured by the DGM, standardized
$V_{w(std)}$	scf	Volume of water vapor in the gas sample, standardized
v_s	ft./sec	Velocity of stack gas
Y_m	dimensionless	DGM calibration coefficient
Y_c	dimensionless	DGM calibration check value
Y_w	dimensionless	Reference (wet) gas meter calibration coefficient
% CO_2	percent	Percent CO_2 by volume, dry basis
% O_2	percent	Percent O_2 by volume, dry basis
% N_2	percent	Percent N_2 by volume, dry basis

APPENDIX D

RAW FIELD DATA

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client:	Franklin Minerals	Test Date:	November 4, 1999
Location:	Dalton, Georgia	Console ID:	C-001
Source:	Baghouse No. 37	$Y_m / \Delta H_{@}$:	0.990 1.780
Test Team:	GSG, DJK, LK	Sampling Box ID:	B-01
EPA Methods:	1, 2, 3, 5	Probe Assembly ID:	P3-01
D_s (in.):	15.0	D_n (in.):	0.375
% O_2 :	20.9	Assumed B_{ws} :	1.0
% CO_2 :	0.0	P_{bar} (in. Hg):	30.02
Start Run:	2:49 PM	P_g (in. H_2O):	0.0
End Run:	3:50 PM	Minutes/Point:	2.5
Run Number:	1	K-Factor:	20.0

Point	Meter (dcf)	Inches H_2O			Temperature Readings ($^{\circ}F$)				Vacuum (in. Hg)
		Δp	ΔH	$(\Delta p)^{1/2}$	t_s	Filter	Last Impinger	t_m Average	
1	0.000	0.44	8.80	0.663	90	240	56	78	11
2	4.15	0.40	8.00	0.632	90	241	57	78	10
3	8.28	0.44	8.80	0.663	91	231	60	78	11
4	12.46	0.40	8.00	0.632	91	234	64	79	10
5	16.55	0.40	8.00	0.632	91	233	64	80	10
6	20.61	0.39	7.80	0.624	92	231	65	81	9
7	24.64	0.33	6.60	0.574	91	231	65	81	8
8	28.40	0.33	6.60	0.574	91	233	64	82	8
9	32.11	0.30	6.00	0.548	92	231	64	83	7
10	35.69	0.30	6.00	0.548	92	232	64	83	7
11	39.24	0.29	5.80	0.539	92	234	65	83	6
12	42.78	0.29	5.80	0.539	92	231	65	84	6
13	46.236	0.33	6.60	0.574	89	236	68	83	7
14	49.87	0.38	7.60	0.616	93	235	64	83	8
15	53.83	0.39	7.80	0.624	93	235	64	83	9
16	57.81	0.40	8.00	0.632	93	235	65	83	9
17	61.87	0.40	8.00	0.632	93	240	64	84	9
18	65.94	0.40	8.00	0.632	93	244	63	83	9
19	69.99	0.36	7.20	0.600	93	244	64	83	8
20	73.90	0.36	7.20	0.600	93	243	63	83	8
21	77.80	0.33	6.60	0.574	93	243	63	84	7
22	81.55	0.32	6.40	0.566	92	242	62	84	7
23	85.23	0.34	6.80	0.583	93	241	62	84	7
24	88.96	0.30	6.00	0.548	93	241	63	84	7
End	92.560								

Total Moisture Collected (mL): 7.5

System Leak Check (cfm): 0.016

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client: Franklin Minerals
 Location: Dalton, Georgia
 Source: Baghouse No. 37
 Test Team: GSG, DJK, LK
 EPA Methods: 1, 2, 3, 5
 D_s (in.): 15.0
 % O₂: 20.9
 % CO₂: 0.0
 Start Run: 4:23 PM
 End Run: 5:25 PM
 Run Number: 2

Test Date: November 4, 1999
 Console ID: C-001
 Y_m / ΔH_@: 0.990 1.780
 Sampling Box ID: B-01
 Probe Assembly ID: P3-01
 D_n (in.): 0.375
 Assumed B_{ws}: 1.0
 P_{bar} (in. Hg): 30.02
 p_g (in. H₂O): 0.0
 Minutes/Point: 2.5
 K-Factor: 20.0

Point	Meter (dcf)	Inches H ₂ O			Temperature Readings (°F)				Vacuum (in. Hg)
		Δp	ΔH	(Δp) ^{1/2}	t _i	Filter	Last Impinger	t _m Average	
1	0.000	0.37	7.40	0.608	94	241	61	77	8
2	3.75	0.38	7.60	0.616	94	247	64	77	8
3	7.65	0.38	7.60	0.616	94	244	66	76	8
4	11.84	0.40	8.00	0.632	94	241	66	77	9
5	15.55	0.41	8.20	0.640	94	247	66	77	9
6	19.63	0.41	8.20	0.640	94	247	66	77	9
7	23.68	0.27	5.40	0.520	94	247	65	77	6
8	27.20	0.36	7.20	0.600	93	248	63	77	7
9	30.96	0.27	5.40	0.520	93	247	64	78	6
10	34.39	0.29	5.80	0.539	93	243	63	78	6
11	37.86	0.22	4.40	0.469	93	246	63	78	5
12	41.02	0.20	4.00	0.447	94	247	63	79	4
13	43.957	0.22	4.40	0.469	92	242	63	78	5
14	46.99	0.20	4.00	0.447	93	251	61	78	5
15	49.98	0.20	4.00	0.447	93	249	62	78	5
16	52.91	0.21	4.20	0.458	93	257	62	78	5
17	55.88	0.20	4.00	0.447	93	250	62	78	5
18	58.81	0.17	3.40	0.412	93	248	62	78	4
19		0.32	6.40	0.566	94	242	63	78	7
20	64.69	0.35	7.00	0.592	93	251	62	78	8
21	68.46	0.31	6.20	0.557	92	248	62	79	7
22	72.11	0.32	6.40	0.566	91	250	62	79	7
23	75.75	0.30	6.00	0.548	90	247	62	79	7
24	79.32	0.30	6.00	0.548	90	247	62	79	7
End	82.871								

Total Moisture Collected (mL): 9.0

System Leak Check (cfm): 0.004

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client: Franklin Minerals
Location: Dalton, Georgia
Source: Baghouse No. 37
Test Team: GSG, DJK, LK
EPA Methods: 1, 2, 3, 5
D_s (in.): 15.0
% O₂ 20.9
% CO₂ 0.0
Start Run: 5:37 PM
End Run: 6:40 PM
Run Number: 3

Test Date: November 4, 1999
Console ID: C-001
Y_m / ΔH_@: 0.990 1.780
Sampling Box ID: B-01
Probe Assembly ID: P3-01
D_n (in.): 0.375
Assumed B_{ws}: 1.0
P_{bar} (in. Hg): 30.01
p_g (in. H₂O): 0.0
Minutes/Point: 2.5
K-Factor: 20.0

Point	Meter (dcf)	Inches H ₂ O			Temperature Readings (°F)				Vacuum (in. Hg)
		Δp	ΔH	(Δp) ^{1/2}	t _s	Filter	Last Impinger	t _m Average	
1	0.000	0.42	8.40	0.648	85	245	61	74	9
2	3.58	0.45	9.00	0.671	87	246	64	72	10
3	7.47	0.42	8.40	0.648	87	245	64	73	10
4	11.57	0.37	7.40	0.608	87	244	64	72	10
5	15.53	0.37	7.40	0.608	86	248	64	73	9
6	19.48	0.36	7.20	0.600	85	248	63	73	8
7	23.40	0.37	7.40	0.608	85	247	63	74	9
8	27.36	0.34	6.80	0.583	85	251	62	74	8
9	31.18	0.33	6.60	0.574	84	246	61	74	7
10	34.89	0.27	5.40	0.520	83	251	60	74	6
11	38.30	0.27	5.40	0.520	83	248	60	74	6
12	41.74	0.27	5.40	0.520	83	249	60	74	6
13	45.180	0.40	8.00	0.632	82	248	58	73	10
14	49.07	0.40	8.00	0.632	82	248	60	74	10
15	53.16	0.39	7.80	0.624	82	249	61	73	8
16	57.03	0.41	8.20	0.640	82	247	60	73	10
17	61.12	0.43	8.60	0.656	82	247	61	73	10
18	65.29	0.44	8.80	0.663	82	249	62	74	10
19	69.51	0.40	8.00	0.632	81	248	62	74	10
20	73.57	0.37	7.40	0.608	81	247	62	73	8
21	77.49	0.37	7.40	0.608	81	244	61	74	8
22	81.39	0.35	7.00	0.592	81	246	61	74	8
23	85.23	0.35	7.00	0.592	81	248	61	73	8
24	89.07	0.32	6.40	0.566	81	245	60	73	7
End	92.755								

Total Moisture Collected (mL): 10.5

System Leak Check (cfm): 0.012

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client: FRANKLIN MINERALS
 Location: DALTON GA
 Source: BH NO. 37
 Test Team: GSG DJK CLK
 EPA Methods: 1, 2, 3, 5
 D_s (in.): 15"
 % O₂: 20.9
 % CO₂: 0.0
 Start Run: 2:49 PM
 End Run: 3:56 PM
 Run Number: 1

Test Date: 11-04-99
 Console ID: C-001
 Y_m/ΔH₀: 0.990/1.780
 Sampling Box ID: B-01
 Probe Assembly ID: P3-01
 D_a (in.): 0.375
 Assumed B_w: 1.07
 P_{bar} (in. Hg): 30.02
 P_g (in. H₂O): 0.00
 Minutes/Point: 2.5
 K-Factor: 20.0

Point	Meter (dcf)	Inches H ₂ O		Temperature Readings (°F)					Vacuum (in. Hg)
		Δp	ΔH	t _s	Filter	Last Impinger	t _m Inlet	t _m Outlet	
1	1.00	0.44	8.80	90	240	56	78	78	11
2	4.15	0.40	8.00	90	241	57	78	78	10
3	6.78	0.44	8.80	91	231	60	78	78	11
4	11.46	0.40	8.00	91	234	64	79	79	10
5	16.55	0.40	8.00	91	233	64	80	80	10
6	20.61	0.39	7.80	92	231	65	81	81	9
7	24.64	0.33	6.60	91	231	65	81	81	8
8	28.40	0.33	6.60	91	233	64	82	82	8
9	32.11	0.30	6.00	92	231	64	83	83	7
10	35.69	0.30	6.00	92	232	64	83	83	7
11	39.24	0.29	5.80	92	234	65	83	83	6
12	42.78	0.29	5.80	92	231	65	84	84	6
13	46.236	0.33	6.60	89	236	68	83	83	7
14	49.87	0.38	7.60	93	235	64	83	83	8
15	53.83	0.39	7.80	93	235	64	83	83	9
16	57.81	0.40	8.00	93	235	65	83	83	9
17	61.87	0.40	8.00	93	240	64	84	84	9
18	65.94	0.40	8.00	93	244	63	83	83	9
19	69.94	0.36	7.20	93	244	64	83	83	8
20	73.90	0.36	7.20	93	243	63	83	83	8
21	77.80	0.33	6.60	93	243	63	84	84	7
22	81.55	0.32	6.40	92	242	62	84	84	7
23	85.23	0.34	6.80	93	241	62	84	84	7
24	88.96	0.30	6.00	93	241	63	84	84	7
End	92.560								

Moisture Collected (g)		
Initial	Final	Net
Body: <u>200</u>	<u>206</u>	<u>6</u>
Silica Gel: <u>200.0</u>	<u>207.5</u>	<u>7.5</u>
Gel Number: <u>4</u>	Total:	<u>7.5</u>

A = 3.5'
 B = 8'

Post-Run Leak Checks (dcfm @ "Hg)
 Sampling Line: 0.016 @ 11"
 Pitot A: OK
 Pitot B: OK

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client: FRANKLIN MINERALS
 Location: JALTON 6A
 Source: BH 16-37
 Test Team: BSG DSK CK
 EPA Methods: 1.2.3, 5
 D_s (in.): 15"
 % O₂: 20.9%
 % CO₂: 0%
 Start Run: 4:23 PM
 End Run: 5:25 PM
 Run Number: 2

Test Date: 11-04-99
 Console ID: C-001
 Y_m / ΔH₂₀: 0.990 / 1.780
 Sampling Box ID: B-01
 Probe Assembly ID: P3-01
 D_n (in.): 0.375
 Assumed B_{ws}: 1%
 P_{bar} (in. Hg): 30.02
 P_g (in. H₂O): 0.00
 Minutes/Point: 2.5
 K-Factor: 20

Point	Meter (dcf)	Inches H ₂ O		Temperature Readings (°F)					Vacuum (in. Hg)
		Δp	ΔH	t _s	Filter	Last Impinger	t _m Inlet	t _m Outlet	
1	0.000	0.37	7.40	94	241	61	77	72	8
2	3.75	0.38	7.60	94	247	64	77	77	8
3	7.65	0.38	7.60	94	244	66	76	76	8
4	11.84	0.40	8.00	94	241	66	77	77	9
5	15.55	0.41	8.20	94	247	66	77	77	9
6	19.63	0.41	8.20	94	247	66	77	77	9
7	23.68	0.27	5.40	94	247	65	77	77	8.6
8	27.20	0.36	7.20	93	248	63	77	77	7
9	30.96	0.27	5.40	93	247	64	78	76	6
10	34.39	0.29	5.70	93	243	63	78	78	6
11	37.86	0.22	4.40	93	246	63	78	78	5
12	41.02	0.20	4.00	94	247	63	79	79	4
13	43.957	0.22	4.40	92	242	63	78	78	5
14	46.99	0.20	4.00	93	251	61	78	78	5
15	44.98	0.20	4.00	93	249	62	78	78	5
16	52.91	0.21	4.20	93	257	62	78	78	5
17	55.88	0.20	4.00	93	250	62	78	78	5
18	58.81	0.17	3.40	93	248	62	78	78	4
19		0.32	6.40	94	242	63	78	78	7
20	64.69	0.35	7.00	93	251	62	78	78	8
21	68.46	0.31	6.20	92	248	62	79	79	7
22	72.11	0.32	6.40	91	250	62	79	79	7
23	75.75	0.30	6.00	90	247	62	79	79	7
24	71.32	0.30	6.00	90	247	62	79	79	7
End	82.871								

Moisture Collected (g)

	Initial	Final	Net
Body:	200	202	2
Silica Gel:	200.0	207.0	7.0
Gel Number: <u>5</u>		Total:	9.0

Post-Run Leak Checks (dcfm @ "Hg)

Sampling Line: 0.004 @ 10"
 Pitot A: 0
 Pitot B: 0

Advanced Industrial Resources, LLC

Particulate Matter Field Data Sheet

Client: Franklin Minerals
 Location: Daltan GA
 Source: B4 Mo 37
 Test Team: CSG DSK LK
 EPA Methods: 1.2.3.5
 D_s (in.): 15
 % O₂: 10.9
 % CO₂: 0.0
 Start Run: 5:37 p.m.
 End Run: 6:40 p.m.
 Run Number: 3

Test Date: 11-04-99
 Console ID: C-001
 Y_m / ΔH_g: 0.990 / 1.780
 Sampling Box ID: B-C1
 Probe Assembly ID: P3-01
 D_a (in.): 0.375
 Assumed B_w: 1%
 P_{bar} (in. Hg): 30.02
 P_g (in. H₂O): 0.00
 Minutes/Point: 2.5
 K-Factor: 20

Point	Meter (dcf)	Inches H ₂ O		Temperature Readings (°F)					Vacuum (in. Hg)
		Δp	ΔH	t _s	Filter	Last Impinger	t _m Inlet	t _m Outlet	
1	0.000	0.42	8.40	85	245	61	74	74	9
2	3.58	0.45	9.00	87	246	64	72	72	10
3	7.47	0.42	8.40	87	245	64	73	73	10
4	11.57	0.37	7.40	87	244	64	72	72	10
5	15.53	0.37	7.40	86	248	64	73	73	9
6	19.48	0.36	7.20	85	248	63	73	73	8
7	23.40	0.37	7.40	85	247	63	74	74	9
8	27.36	0.34	6.80	85	251	62	74	74	8
9	31.18	0.33	6.60	84	246	61	74	74	7
10	34.89	0.27	5.40	83	251	60	74	74	6
11	38.30	0.27	5.40	83	248	60	74	74	6
12	41.74	0.27	5.40	83	249	60	74	74	6
13	45.180	0.40	8.00	82	248	58	73	73	10
14	49.07	0.40	8.00	82	248	60	74	74	10
15	53.16	0.39	6.80	82	249	61	73	73	8
16	57.03	0.41	8.20	82	247	60	73	73	10
17	61.12	0.43	8.60	82	247	61	73	73	10
18	65.29	0.44	8.80	82	249	62	74	74	10
19	69.51	0.40	8.00	81	249	62	74	74	10
20	73.57	0.37	7.40	81	247	62	73	73	8
21	77.49	0.37	7.40	81	244	61	74	74	8
22	81.39	0.35	7.00	81	246	61	74	74	8
23	85.23	0.35	7.00	81	248	61	73	73	8
24	89.07	0.32	6.40	81	245	60	73	73	7
End	92.755								

Moisture Collected (g)

	Initial	Final	Net
Body:	200	204	4
Silica Gel:	200.0	206.5	6.5
Gel Number:	6	Total:	10.5

Post-Run Leak Checks (dcfm @ "Hg)

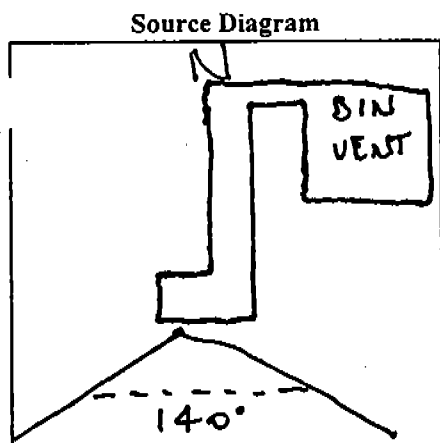
Sampling Line: 0.012 @ 12'
 Pitot A: 0.2
 Pitot B: 0.2

Advanced Industrial Resources, LLC

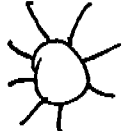
Visible Emissions Field Data Sheet

Client: FRANKLIN MINERALS
 Location: DALTON GA
 Source: BH No. 37
 Control Device: BIN VENT
 Test Personnel: SCOTT GINNELL
 Wind Direction: NORTHWEST
 Wind Speed: 0.3 KNOTS
 Sky Color: BLUE / CLEAR
 Background: SKY / WHITE SILO

Date: 11-04-99
 Run Number: 1
 Start Run: 2:50pm
 Distance to Source: 150'
 Height of Discharge Point: 60'
 Ambient Temperature: 66°
 Condensed H₂O in Plume: No
 Plume: Attached Detached



* Indicate Magnetic North



Minutes Read: 60

Percent Opacity: 0

Minutes	Seconds				Minutes	Seconds			
	0:00	0:15	0:30	0:45		0:00	0:15	0:30	0:45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Comments: DIFFERENTIAL PRESSURE READ EVERY 15 MIN.
(1) 3.5 (2) 3.5 (3) 3.5 (4) 4.0 (5) 4.0

Signature: [Signature]
 Certification Date: 10-19-99

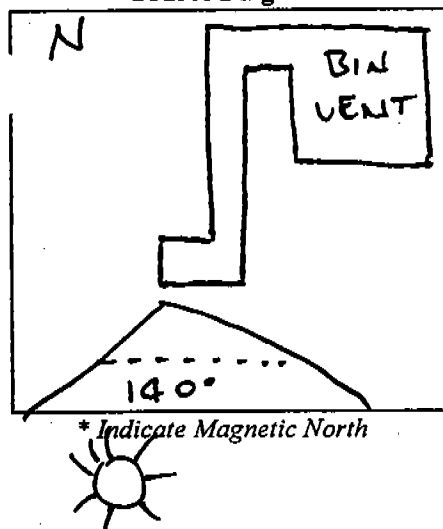
Advanced Industrial Resources, LLC

Visible Emissions Field Data Sheet

Client: FRANKLIN MINERALS
 Location: DALTON GA
 Source: BH No. 37
 Control Device: BIN VENT
 Test Personnel: SCOTT GUNNELL
 Wind Direction: NORTHWEST
 Wind Speed: 0-2 KNOTS
 Sky Color: BLUE - CLEAR
 Background: SKY / SILO

Date: 11-04-99
 Run Number: 2
 Start Run: 4:12 pm
 Distance to Source: 150'
 Height of Discharge Point: 60'
 Ambient Temperature: 65°
 Condensed H₂O in Plume: NO
 Plume: Attached Detached

Source Diagram



Minutes Read: 60

Percent Opacity: 0

Minutes	Seconds				Minutes	Seconds			
	0:00	0:15	0:30	0:45		0:00	0:15	0:30	0:45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Comments: DIFFERENTIAL PRESSURE READ EVERY 15 MIN.
(1) 4.0 (2) 4.0 (3) 4.0 (4) 4.0 (5) 4.0

Signature: [Signature]

Certification Date: 10-19-99

TANKER TRUCK WAS LOADED DURING RUN 2 - DURATION: 3.5 MINUTES
3-24 THOUSAND POUNDS WERE EMPTIED (1 LOAD). (SOME FUGITIVES WERE OBSERVED)

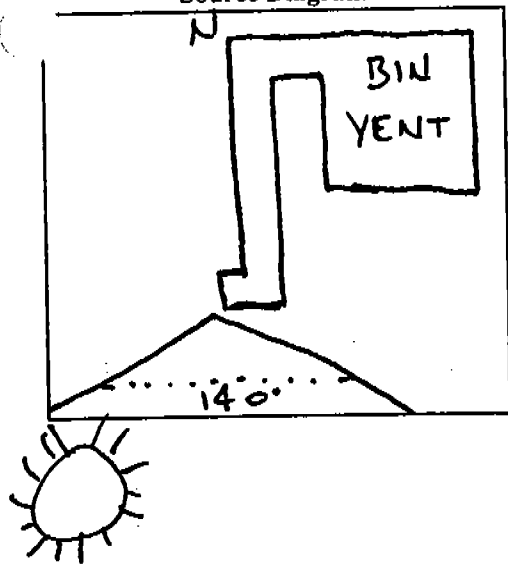
Advanced Industrial Resources, LLC

Visible Emissions Field Data Sheet

Client: FRANKLIN MINERALS
 Location: DALTON GA
 Source: BM No. 37
 Control Device: BIN VENT
 Test Personnel: SCOTT GUNNELL
 Wind Direction: NORTHWEST
 Wind Speed: 0-3 KNOTS
 Sky Color: BLUE - CLEAR
 Background: SKY/SILO

Date: 11-04-99
 Run Number: 3
 Start Run: 5:15 PM
 Distance to Source: 150'
 Height of Discharge Point: 60'
 Ambient Temperature: 61
 Condensed H₂O in Plume: No
 Plume: Attached Detached

Source Diagram



Minutes Read: 60

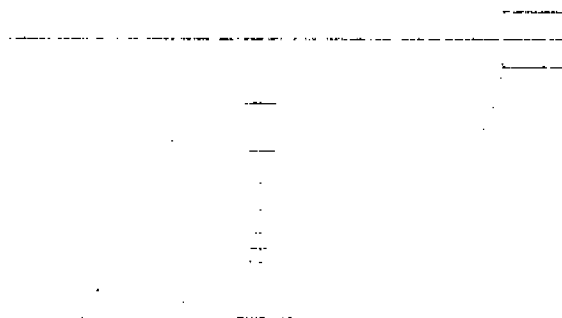
Average Percent Opacity: 0

Percent Opacity Readings									
Minutes	Seconds				Minutes	Seconds			
	0:00	0:15	0:30	0:45		0:00	0:15	0:30	0:45
0	0	0	0	0		0	0	0	0
1	0	0	0	0		0	0	0	0
2	0	0	0	0		0	0	0	0
3	0	0	0	0		0	0	0	0
4	0	0	0	0		0	0	0	0
5	0	0	0	0		0	0	0	0
6	0	0	0	0		0	0	0	0
7	0	0	0	0		0	0	0	0
8	0	0	0	0		0	0	0	0
9	0	0	0	0		0	0	0	0
10	0	0	0	0		0	0	0	0
11	0	0	0	0		0	0	0	0
12	0	0	0	0		0	0	0	0
13	0	0	0	0		0	0	0	0
14	0	0	0	0		0	0	0	0
15	0	0	0	0		0	0	0	0
16	0	0	0	0		0	0	0	0
17	0	0	0	0		0	0	0	0
18	0	0	0	0		0	0	0	0
19	0	0	0	0		0	0	0	0
20	0	0	0	0		0	0	0	0
21	0	0	0	0		0	0	0	0
22	0	0	0	0		0	0	0	0
23	0	0	0	0		0	0	0	0
24	0	0	0	0		0	0	0	0
25	0	0	0	0		0	0	0	0
26	0	0	0	0		0	0	0	0
27	0	0	0	0		0	0	0	0
28	0	0	0	0		0	0	0	0
29	0	0	0	0		0	0	0	0

Comments: DIFFERENTIAL PRESSURE READ EVERY 15 MIN
(1) 4.0 (2) 4.0 (3) 4.0 (4) 4.0 (5) 4.0

Signature: A. Scott
 Certification Date: 10-19-99

**Traverse Point Locations
for
Franklin Industrial Minerals
Baghouse 37**



15 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	0.5
2	1.0
3	1.8
4	2.7
5	3.8
6	5.3
7	9.7
8	11.3
9	12.3
10	13.2
11	14.0
12	15.5

Advanced Industrial Resources, LLC
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: Franklin Minerals
 Location: Dalton, GA
 Source: Baghouse No. 37
 Test Team: 656, DJK, LK
 Probe ID: P3-01
 C_p: .84

Date: November 4, 1999
 D_s (in.): 15
 A_s (ft²): 1.23
 D_a (in.): .375
 A_a (ft²): .000767

t_m (°F): 78
 Console ID: C-001
 Y_m: .990
 ΔH_@: 1.780
 Assumed B_{ws}: 1.0
 P_{bar} (in. Hg): 30.02

Point	Δp (in. H ₂ O)	α (degrees)
1	0.0	0.0
2	0.0	0.0
3	0.0	0.0
4	0.0	0.0
5	0.0	0.0
6	0.0	0.0
Change Ports		
7	0.0	0.0
8	0.0	0.0
9	0.0	0.0
10	0.0	0.0
11	0.0	0.0
12	0.0	0.0

Advanced Industrial Resources, LLC

Source Description Sheets

Client: FRANKLIN MINERALS
 Location: DALTON GA
 Source: BH No. 37

Date: November 4, 1999
 Test Team: 656, DJK, LK

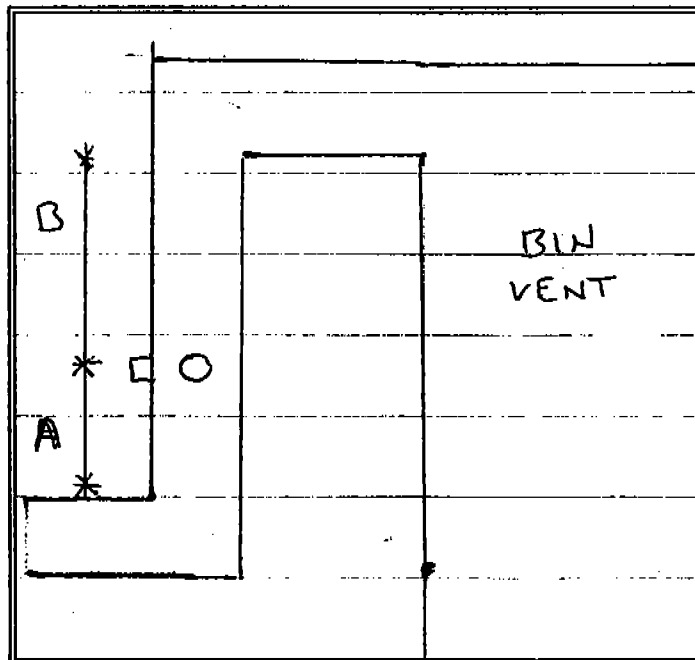
D_n (in.): .375
 A_n (ft²): .000767
 D_s (in.): 15
 A_s (ft²): 1.23
 Length A: 3.5'
 Length B: 8'

t_{amb} (°F): 78
 Assumed B_{ws} : 1.0
 P_{bar} (in. Hg): 30.02
 P_g (in. H₂O): 0.00
 % O₂: 20.9
 % CO₂: 0.0

Point	Δp (in. H ₂ O)	t_s (°F)
1	0.44	90
2	0.40	90
3	0.44	91
4	0.40	91
5	0.40	91
6	0.39	92

Console ID: C-001
 Y: 0.990
 $\Delta H_@$: 1.780
 C_p : .84
 K-Factor: 20

Sketch of Stack



APPENDIX E

LABORATORY REPORTS

AND

CUSTODY RECORDS

Advanced Industrial Resources, LLC

Laboratory Test Report

Client: Franklin Minerals
 Location: Dalton, GA
 Source: Baghouse No. 37

Test Date: November 4, 1999
 Analytical Method: EPA Method 5
 Target Analytes: PM

Particulate Matter Analysis Data and Results

Dist. H₂O Blank Volume: 200 mL Distilled H₂O Density: 1.0000 g/mL
 Blank Residue: 0.7 mg Residue Concentration: 0.0035 mg/g

Filter Samples

Test	Filter ID	Average Tare Weight (g)		Average Gross Weight (g)		Net Weight (g)
1	253	0.4061	0.4060	0.4066	0.4067	0.0006
2	254	0.4085	0.4086	0.4102	0.4102	0.0017
3	255	0.4015	0.4014	0.4027	0.4027	0.0013
Blank	256	0.4074	0.4073	0.4075	0.4077	0.0002

Solvent Wash Samples

Test	Beaker ID	Average Tare Weight (g)		Average Gross Weight (g)		Net Weight (g)
1	A-15	113.5108	113.5104	113.5175	113.5173	0.0068
2	A-8	116.9562	116.9559	116.9598	116.9595	0.0036
3	A-13	109.5521	109.5519	109.5553	109.5549	0.0031
Blank	A-20	117.4245	117.4250	117.4252	117.4248	0.0007

Solvent Blank Residue

Test	Beaker ID	Solvent Volume (mL)	Solvent Residue (g)
1	A-15	250	0.0009
2	A-8	235	0.0008
3	A-13	225	0.0008

Net Particulate Matter in Sample

Test	m _{PM} (g)
1	0.0065
2	0.0044
3	0.0036

Comments: None.

Prepared By: _____

Trey Sipe
 Trey Sipe, Project Engineer

Date: November 10, 1999

Compliance Sample Custody Record

Franklin Minerals

Dalton, GA 30721-5499

Analyses Desired:

Sample ID	Date	Source	Description	Matrix				Sample Condition
BH37-1	11/8/99	Baghouse 37	Test 1 Bottle	M5	x			G 000
BH37-2	11/8/99	Baghouse 37	Test 2 Bottle	M5	x			G 000
BH37-3	11/8/99	Baghouse 37	Test 3 Bottle	M5	x			G 000
BH37-1	11/8/99	Baghouse 37	Test 1 Filter	M5	x			G 000
BH37-2	11/8/99	Baghouse 37	Test 2 Filter	M5	x			G 000
BH37-3	11/8/99	Baghouse 37	Test 3 Filter	M5	x			G 000
			Distilled Water		x			G 000
			Glass Fiber Filter Blank		x			G 000
Relinquished By/Sign:	Date/Time	Received By / Sign:		Relinquished By / Sign:		Date/Time	Received By / Sign:	
D. Sae	11-5-99 9:10 am	Ray						
Relinquished By/Sign:	Date/Time	Received By / Sign:		Relinquished By / Sign:		Date/Time	Received By / Sign:	

62 DSK JK

Advanced Industrial Resources, LLC

Scott Gunnell

Q. 11

Scott Wilson

(770) 420-3080

APPENDIX F

CALIBRATION DATA

Advanced Industrial Resources, LLC

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-001
Serial Number:	801001

Reference Meter	
Meter ID:	28374
Calibration Factor, Y_w :	1.011

Date: 07/09/99

Barometric Pressure, P_b (in. Hg): 29.33

Performed By: GSG

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Reference Meter Volume V_w (ft ³)	Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)				Time Elapsed θ (min.)
				Reference Meter t_w	Dry Gas Meter			
					init. t_i	final t_f	avg. t_m	
4	1.00	5.000	5.212	75	78.0	79.0	78.5	9.00
4	2.00	5.551	5.655	75	79.0	81.0	80.0	7.00
4	4.00	5.643	5.752	76	81.0	82.0	81.5	5.00
4	5.00	6.31	6.436	76	83.0	85.0	84.0	5.00
4	8.00	6.328	6.419	76	85.0	86.0	85.5	4.00

Calculations			
ΔH (inches H ₂ O)	Y_m (dimensionless)	Variation	$\Delta H_{@}$ (inches H ₂ O)
1.00	0.974	-0.016	1.821
2.00	0.997	0.007	1.783
4.00	0.992	0.002	1.762
5.00	0.994	0.003	1.753
8.00	0.994	0.004	1.780
Averages:	0.990		1.780

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ± 0.02 .

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ± 0.20 .

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, LLC

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-001
Serial Number:	801001

Reference Meter	
Meter ID:	28374
Calibration Factor, Y_w :	1.011

Date:	11/09/99	Accepted Y_m :	0.990
Barometric Pressure, P_b (in. Hg):	29.50	Performed By:	GSG

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Net Reference Meter Volume V_w (ft ³)	Net Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter init. t_i	final t_f	avg. t_m	
4.5	6.00	5.547	5.691	73	72	74	73.0	4.00
4.5	6.00	5.541	5.698	74	74	76	75.0	4.00
4.5	6.00	8.301	8.580	74	76	79	77.5	6.00

Calculations			
ΔH (inches H ₂ O)	Y_m	Variation (dimensionless)	$\Delta H_{@}$ (inches H ₂ O)
6.00	0.971	0.000	1.748
6.00	0.970	0.000	1.752
6.00	0.970	0.000	1.748
Averages:	0.970		1.750

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ± 0.02 .

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ± 0.20 .

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

SHORT CALIBRATION FOR FRANKLIN MINERALS BH NO. 35 AND BH NO. 37

Advanced Industrial Resources, LLC

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-001
Serial Number:	801001

Reference Meter	
Meter ID:	28374
Calibration Factor, Y_w :	1.011

Date: 11-09-99 Accepted Y_m : 0.990
 Barometric Pressure, P_b (in. Hg): 29.50 Performed By: GSG

Data								
Vacuum (in. Hg)	ΔH (in. H ₂ O)	Net Reference Meter Volume V_w (ft ³)	Net Dry Gas Meter Volume V_m (ft ³)	Temperatures (°F)			Time Elapsed θ (min.)	
				Reference Meter t_w	Dry Gas Meter init. t_i	final t_f	avg. t_m	
4.5	6.00	27.379	0.000	73	72	74	73	4.0
4.5	6.00	232.926	5.691	74	74	76	75	4.0
4.5	6.00	238.467	11.389	74	76	79	77.5	6.0
		246.768	19.969					

Calculations			
ΔH (inches H ₂ O)	Y_m (dimensionless)	Variation	$\Delta H_{@}$ (inches H ₂ O)
6.00	0.971	+0.001	
6.00	0.970	0	
6.00	0.970	0	
Averages:			

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ± 0.02 .

$$Y_m = \frac{Y_w V_w P_b (t_m + 460)}{V_m (P_b + \Delta H/13.6) (t_w + 460)}$$

$\Delta H_{@}$ is the orifice pressure differential (inches H₂O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ± 0.20 .

$$\Delta H_{@} = \frac{0.0317 \Delta H ((t_w + 460) \theta)^2}{P_b (t_m + 460) (Y_w V_w)^2}$$

Advanced Industrial Resources, LLC

Type S Pitot Tube Calibration Data

Date: 11/04/99

Performed By: GSG

Probe Assembly	D_t (in.)	P_A (in.)	P_B (in.)	x (in.)	y (in.)	z (in.)	C_p
P3-01	0.375	0.440	0.440	1.0	3.7	2.5	0.84

It has been determined that the above listed pitot tubes meet the external tubing diameter, face plane alignment, and base-to-face plane distance specifications given in 40 CFR 60, Appendix A, Method 2 (see following pages). Thus, the baseline value of 0.84 is assumed for the pitot coefficient.

Assigned values of C_p apply to the Type S pitot tube either in isolated use or as a component of the indicated probe assembly. The baseline (isolated) and probe assembly coefficients are identical since the relative placement of the components (such as the sampling probe, thermocouple, and nozzle) of the indicated probe assembly meets the interference-free alignment specifications given in 40 CFR 60, Appendix A, Method 2 (see following pages), thereby eliminating adverse aerodynamic effects.

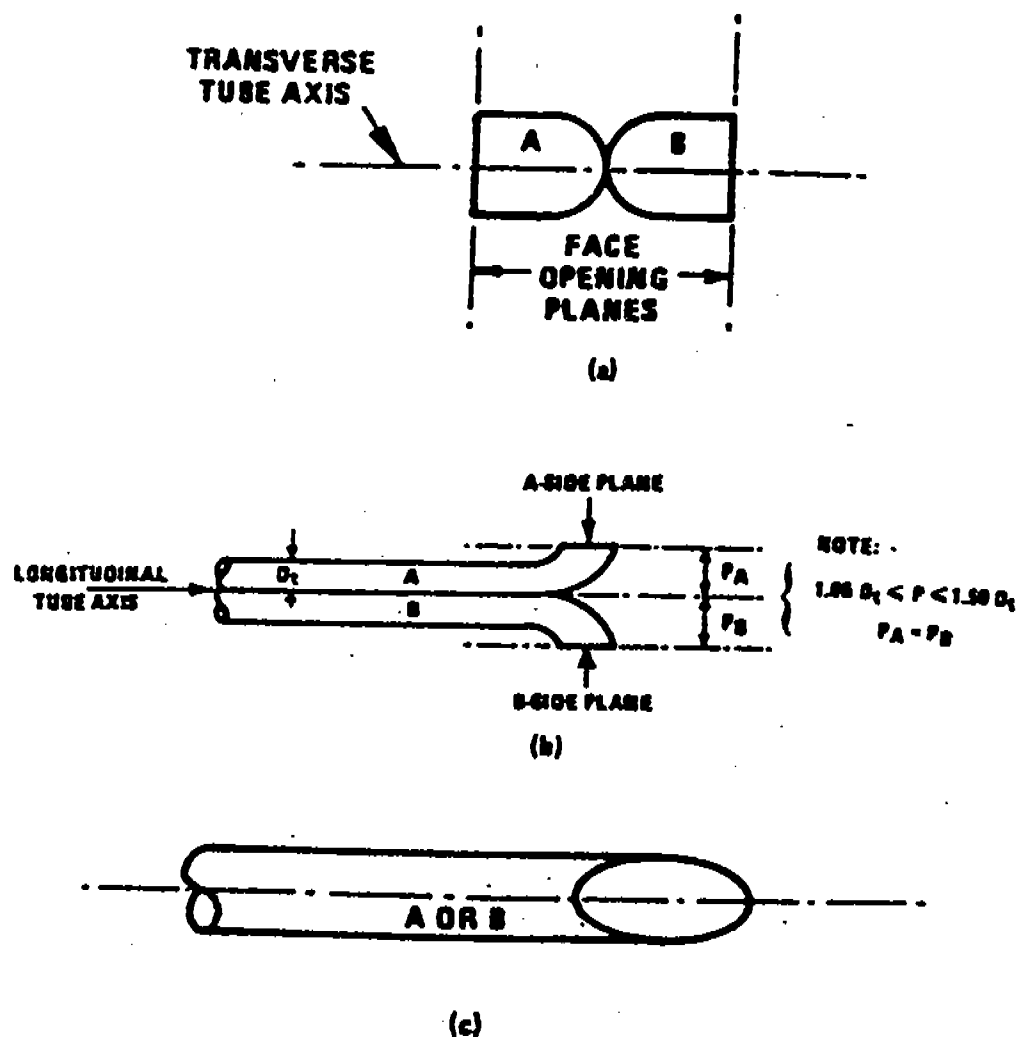


Figure 2-2. Properly constructed Type S pitot tube, shown in (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

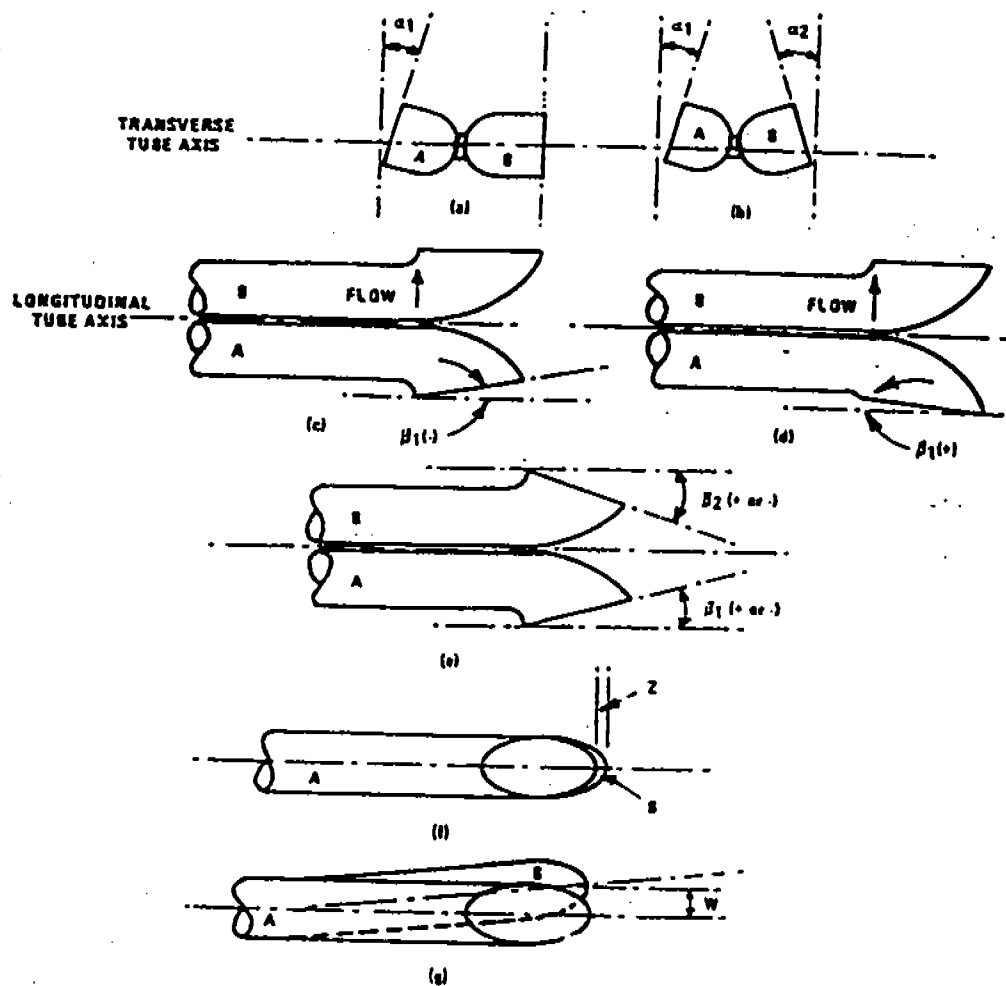


Figure 2-3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect the baseline value of $C_p(s)$ so long as α^1 and $\alpha^2 \leq 10^\circ$, β^1 and $\beta^2 \leq 5^\circ$, $z \leq 0.32$ cm (1/8 in.) and $w \leq 0.08$ cm (1/32 in.) (citation 11 in Bibliography).

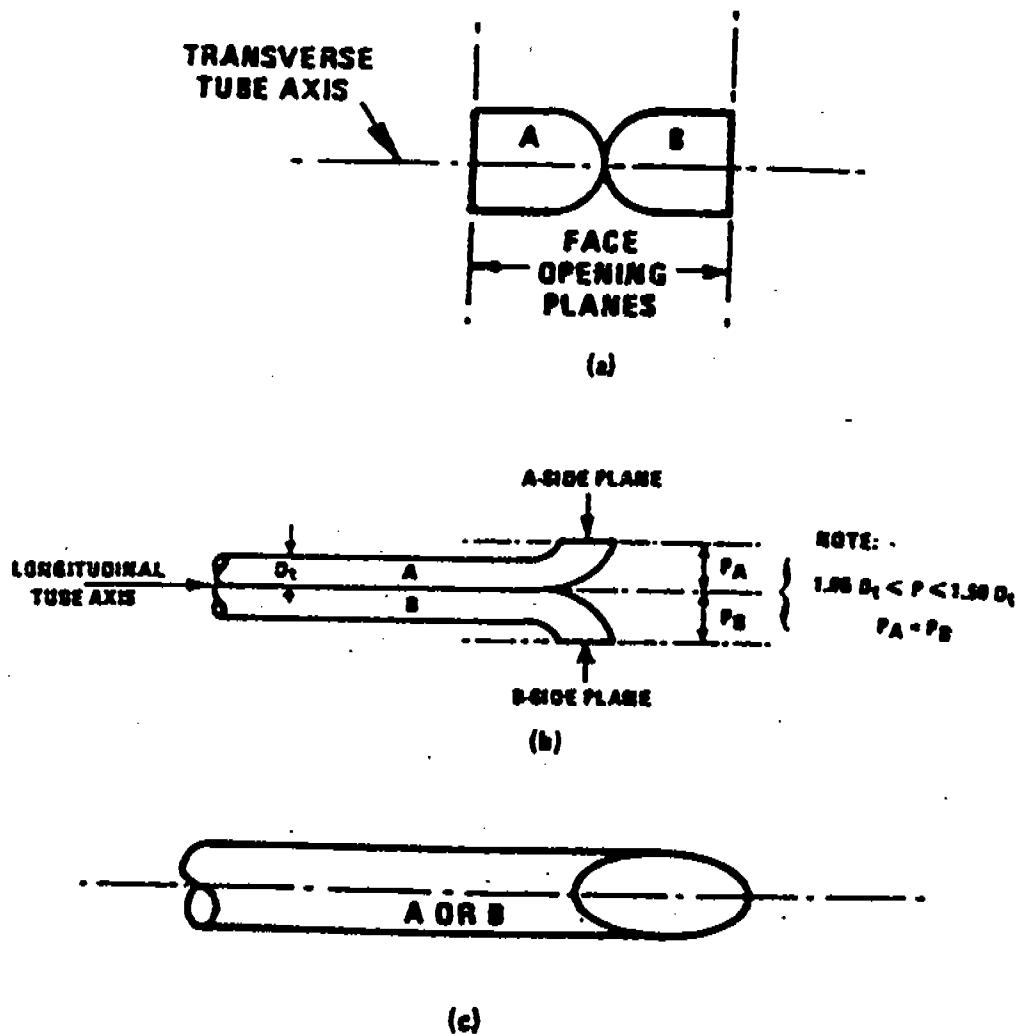


Figure 2-2. Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

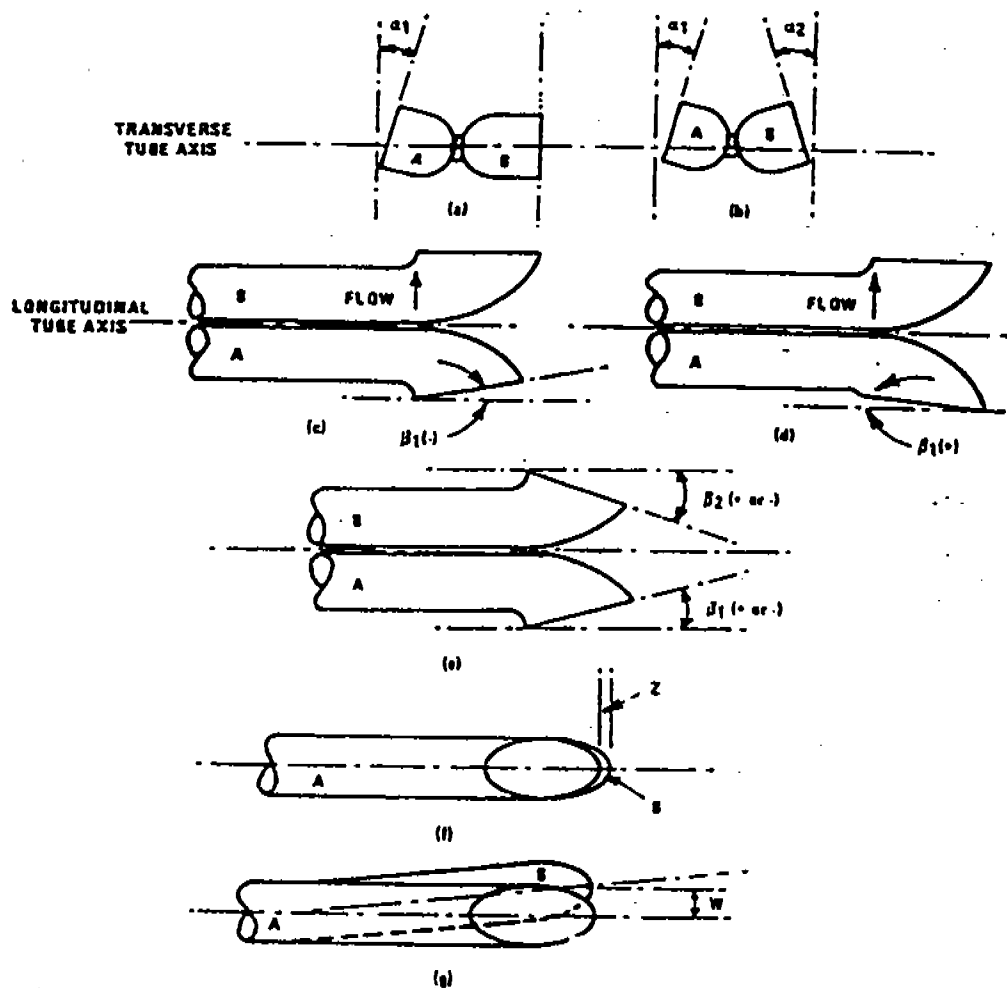


Figure 2-3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect the baseline value of $C_p(a)$ so long as α^1 and $\alpha^2 \leq 10^\circ$, β^1 and $\beta^2 \leq 5^\circ$, $z \leq 0.32$ cm (1/8 in.) and $w \leq 0.08$ cm (1/32 in.) (citation 11 in Bibliography).

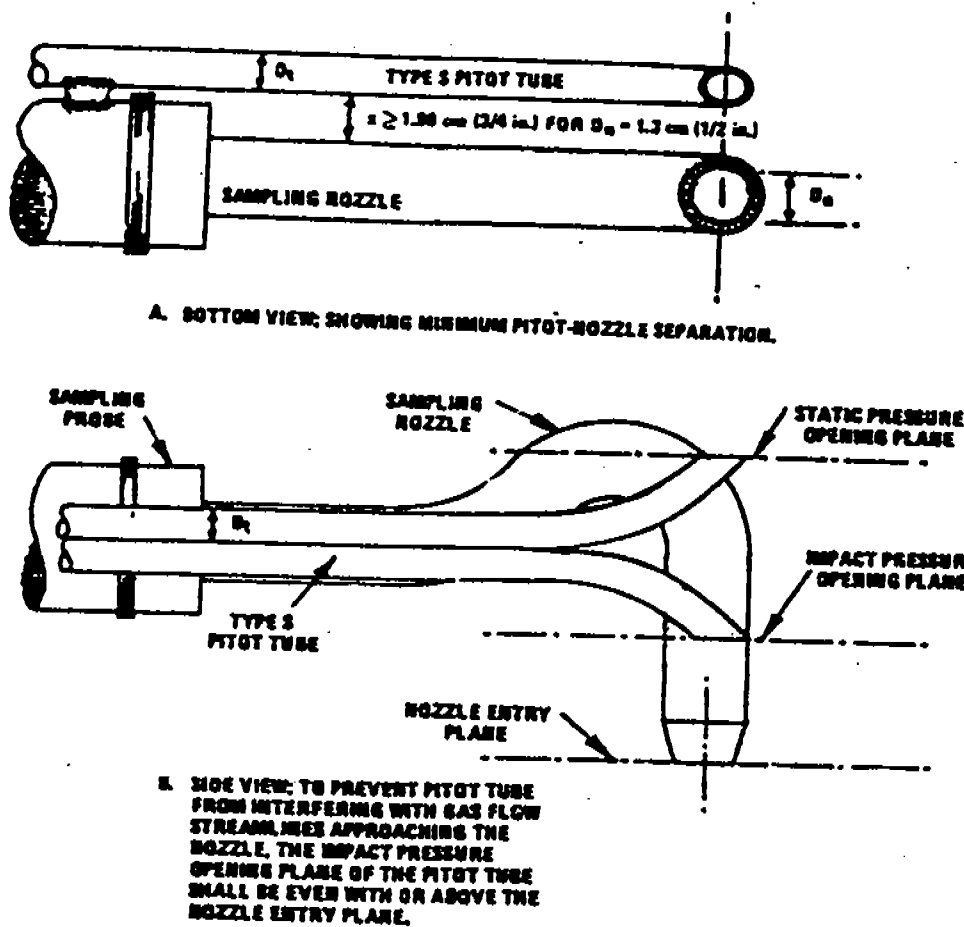


Figure 2-6. Proper pitot tube-sampling nozzle configuration to prevent aerodynamic interference; buttonhook-type nozzle; centers of nozzle and pitot opening aligned; D_1 between 0.48 and 0.95 cm ($3/16$ and $3/8$ in.).

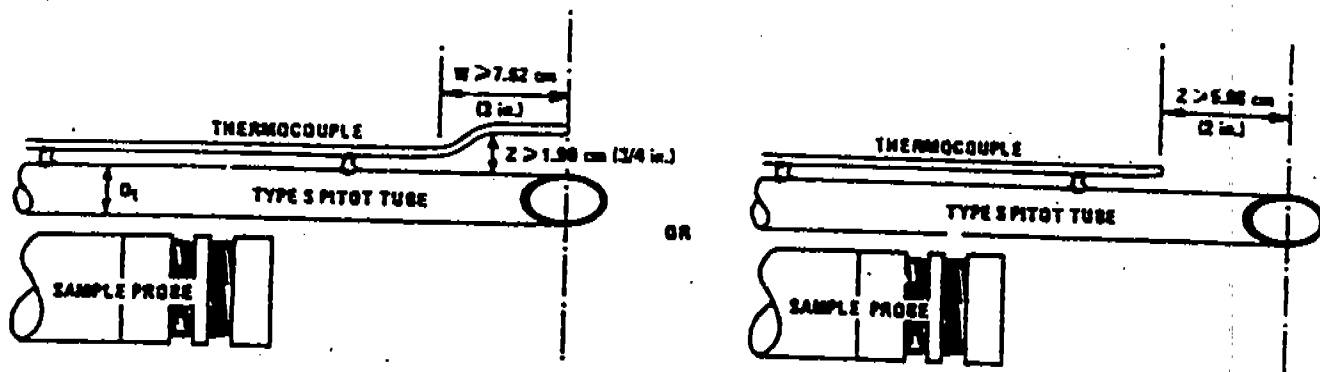


Figure 2-7. Proper thermocouple placement to prevent interference; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

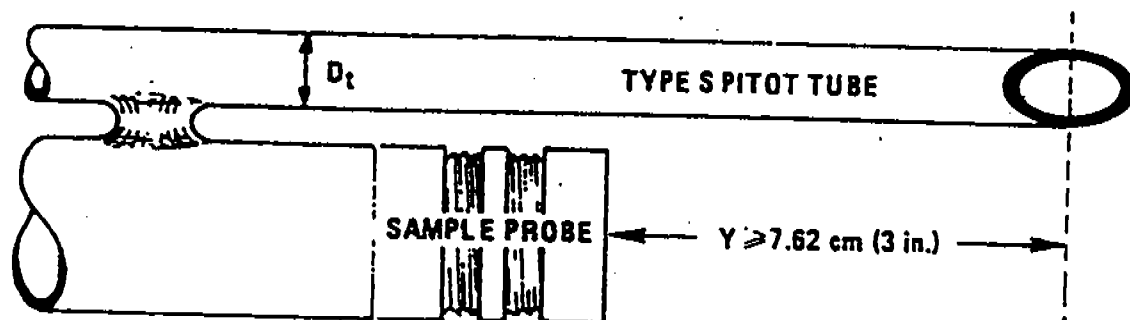


Figure 2-8. Minimum pitot-sample probe separation needed to prevent interference; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

Date: 11/04/99 **Performed By:** GSG

[illegible]

Advanced Industrial Resources, LLC

Thermocouple Calibration Data

Thermometer ID: T-01

Date: 11/09/99

Bias: 0

Performed By: GSG

[illegible]

Advanced Industrial Resources, LLC

Thermometer Calibration Data

Thermometer Type: Mercury-in-Glass Date: 11/09/99
Thermometer ID: RT-01
Barometric Pressure (in. Hg): 29.15 Performed By: GSG

Thermometric Fixed Points		Fixed points Corrected for Pressure		Reference Thermometer Reading	
°F	°R	°F	°R	°F	°R
32	492	32	492	32	492
212	672	211	671	211	671

Reference Calibration Procedure

1. Correct appropriate thermometric fixed points for variation from standard pressure.
2. Compare the reference thermometer readings to the corrected thermometric fixed points.
3. Find the linear relationship between the reference thermometer reading and the known temperature.
4. Use the linear factor, if necessary, to correct the temperature reading of the reference thermometer for calibration of thermocouples.

APPENDIX G

PROCESS OPERATION DATA

Advanced Industrial Resources, LLC

Differential Pressure Measurement Field Data

Client: Franklin Minerals
Location: Dalton, GA
Source: BH No. 37

Date: November 4, 1999
Start Tests: 2:50PM, 4:12PM, 5:15PM
Test Personnel: GSG

Clock Time		Δp (in. H ₂ O)	
1-1	2:50 PM	1-1	3.5
1-2	3:05 PM	1-2	3.5
1-3	3:20 PM	1-3	3.5
1-4	3:35 PM	1-4	4.0
1-5	3:50 PM	1-5	4.0
2-1	4:12 PM	2-1	4.0
2-2	4:27 PM	2-2	4.0
2-3	4:42 PM	2-3	4.0
2-4	4:57 PM	2-4	4.0
2-5	5:12 PM	2-5	4.0
3-1	5:15 PM	3-1	4.0
3-2	5:30 PM	3-2	4.0
3-3	5:45 PM	3-3	4.0
3-4	6:00 PM	3-4	4.0
3-5	6:15 PM	3-5	4.0

Comments: None

Signature: 