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:	11.19.2
Reference:	17
Title:	*Report of Particulate Source Sampling Performed for Franklin Industrial Minerals Located in Sherwood, Tennessee,* Frank Ward & Company Report to Franklin Industrial Minerals, August 1994.

File Copy
August - 1994

A REPORT OF PARTICULATE SOURCE SAMPLING PERFORMED FOR FRANKLIN INDUSTRIAL MINERALS LOCATED IN SHERWOOD, TENNESSEE

FRANK WARD & COMPANY

AIR QUALITY ENGINEERING AND TESTING

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A REPORT OF PARTICULATE SOURCE SAMPLING PERFORMED FOR FRANKLIN INDUSTRIAL MINERALS LOCATED IN SHERWOOD, TENNESSEE

AUGUST 9, 1994

REPORT PREPARED BY:
FRANKLIN S. WARD
CONSULTING ENGINEER

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A REPORT OF PARTICULATE

SOURCE SAMPLING PERFORMED

FOR FRANKLIN INDUSTRIAL MINERALS

LOCATED IN SHERWOOD, TENNESSEE

INTRODUCTION

On July 27, 1994, compliance testing was performed for particulate matter emissions from the 66" Raymond Roller Mill baghouse exhaust stack operated by Franklin Industrial Minerals at their plant in Sherwood, Tennessee. The testing was conducted by Frank Ward and Cecelia Ward of Frank Ward & Company located in Lenoir City, Tennessee. The testing and process operation was observed by Mr. Steve Morgan and Mr. Jimmy Hill of the State of Tennessee Division of Air Pollution. Coordination with Franklin Minerals was conducted by Mr. Rory Smith.

TEST PROCEDURE

EPA Method 1 was used to determine the location and number of sampling points. The stack is circular with an inside diameter of 24 inches. Two 12-point traverses were made for each of the three runs. Each point was sampled for 2.5 minutes, thus each run required 60 minutes. Oxygen and carbon dioxide readings were taken with a Teledyne Max 5 for stack gas molecular weight determination.

Moisture content of the stack gas stream was determined using Method 5 procedures. The particulates were collected using standard Method 5 procedures. The particulate gravimetric weight gain of the samples was performed by Mr. Ward.

The sampling and laboratory analyses for particulates was conducted as outlined in Volume III of the "Quality Assurance Handbook for Air Pollution Measurement Systems".

A stainless steel probe with a borosilicate glass probe liner was used for the testing. The testing proceeded without incident.

The sampling equipment used in this testing meets, or exceeds, all criteria as set forth by EPA for source testing. The equipment was manufactured by Research Appliance Corporation, Nutech Corporation, or the testers.

PROCESS OPERATION AND DESCRIPTION

The process operated normally during the time of testing. The process operational conditions and rates as provided by Mr. Smith are presented in Appendix 5.

TEST RESULTS

STACK DATA

	RUN 1	RUN 2	RUN 3	AVE.
FLOW-ACTUAL CUBIC FEET	10,748	10,420	10,160	10,445
FLOW-STD. CUBIC FEET	8,605	8,150	8,025	8,260
VELOCITY-FT/MIN	3,030	2,940	2,865	2,945
DIAMETER 24"				

TEST RESULTS

PARTICULATES

	Run 1	Run 2	Run 3	Average
Grains/DSCF	0.002	0.002	0.004	0.0026
Lbs/hour	0.17	0.14	0.24	0.18

FRANKLIN.CAL

METHOD 5 CALCULATION

CLIENT: FRANKLIN MINERALS SOURCE: 60 INCH RAYMOND ROLLER MILL BAGHOUSE
DATE OF TEST: 7-27-94

DATA

	RUN 1	RUN 2	RUN 3	AVERAGE
Vm(actual cu. ft)	35.1940	35.1470	34.0980	34.8130
Pbar(in. Hg)	28.8200	28.8200	28.8200	28.8200
Ts(deg F)	153.8	159.9	160.2	158.0
(SQRT(delta P))Av	0.8133	0.7827	0.7646	0.7869
delta H(in. H20)	1.2800	1.2456	1.3206	1.2821
Tm(deg F)	95.5000	107.3000	110.9000	104.5667
Vwl(ml H2O)	26.2	35.0	26.8	29.3
P's(in. H2O)	-0.32	-0.32	-0.32	-0.32
Ps(in. Hg)	28.7965	28.80	28.80	28.7965
Cp	0.84	0.84	0.84	0.84
% Oxygen	20.1	20.1	20.2	20.1333
% Carbon Dioxide	0.5	0.5	0.5	0.5000
% Carbon Monoxide	0.0	0.0	0.0	0.0000
% Nitrogen	79.4	79.4	79.3	79.3667
Diameter-ID(in.)	25.50	25.50	25.50	25.50
As(sq. ft)	3.5466	3.5466	3.5466	3.5466
Dn(in.)	0.2100	0.2100	0.2100	0.2100
Dn(squared)	0.0441	0.0441	0.0441	0.0441
TIME(per Run-Min)	60.00	60.00	60.00	60.0000
Probe & Filter Catch(grams)	0.0049	0.0042	0.0070	0.0054
Mn(grams)	0.0049	0.0042	0.0070	0.0054
Lead Catch(grams)	0.0000	0.0000	0.0000	0.0000
(Ts+460)/(Ps*MW)	0.7481	0.76	0.76	0.7547
SQRT(Ts+460)/(Ps*MW)	0.8650	0.87	0.87	0.8687

CALCULATIONS

	RUN 1	RUN 2	RUN 3	Average
GAMMA(Y)	1.0252	1.0252	1.0252	1.0252
Vm(SCF)	33.13	32.39	31.23	32.2520
Vw(gas)	1.24	1.66	1.27	1.3904
%Moisture	3.6	4.9	3.9	4.1
Md	0.96	0.95	0.96	0.9587
MWdry	28.88	28.88	28.89	28.8853
MWstack	28.49	28.35	28.46	28.4357
Vstack(ft/min)	3,031	2,938	2,865	2,945
Qa(ACFM)	10,748	10,420	10,162	10,444
Qs(SCFM)	8,603	8,150	8,025	8,260
%Isokinetic	94.3	97.3	95.3	95.6
PARTICULATE EMISSIONS:				
C(grains/dscf)	0.0023	0.0020	0.0035	0.0026
A(lb/hour)	0.17	0.14	0.24	0.18

APPENDIX 1

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APPENDIX 7: PARTICULATE ANALYTICAL SHEETS
APPENDIX 8: TDAPC OBSERVATION REPORT SHEET

A REPORT OF PARTICULATE

SOURCE SAMPLING PERFORMED

FOR FRANKLIN INDUSTRIAL MINERALS

LOCATED IN SHERWOOD, TENNESSEE

INTRODUCTION

On July 27, 1994, compliance testing was performed for particulate matter emissions from the 66" Raymond Roller Mill baghouse exhaust stack operated by Franklin Industrial Minerals at their plant in Sherwood, Tennessee. The testing was conducted by Frank Ward and Cecelia Ward of Frank Ward & Company located in Lenoir City, Tennessee. The testing and process operation was observed by Mr. Steve Morgan and Mr. Jimmy Hill of the State of Tennessee Division of Air Pollution. Coordination with Franklin Minerals was conducted by Mr. Rory Smith.

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EPA Method 1 was used to determine the location and number of sampling points. The stack is circular with an inside diameter of 24 inches. Two 12-point traverses were made for each of the three runs. Each point was sampled for 2.5 minutes, thus each run required 60 minutes. Oxygen and carbon dioxide readings were taken with a Teledyne Max 5 for stack gas molecular weight determination.

Moisture content of the stack gas stream was determined using Method 5 procedures. The particulates were collected using standard Method 5 procedures. The particulate gravimetric weight gain of the samples was performed by Mr. Ward.

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The process operated normally during the time of testing. The process operational conditions and rates as provided by Mr. Smith are presented in Appendix 5.

TEST RESULTS

STACK DATA

	RUN 1	RUN 2	RUN 3	AVE.
FLOW-ACTUAL CUBIC FEET	10,748	10,420	10,160	10,445
FLOW-STD. CUBIC FEET	8,605	8,150	8,025	8,260
VELOCITY-FT/MIN	3,030	2,940	2,865	2,945
DIAMETER 24"				

TEST RESULTS

PARTICULATES

	Run 1	Run 2	Run 3	Average
Grains/DSCF	0.002	0.002	0.004	0.0026
Lbs/hour	0.17	0.14	0.24	0.18

APPENDIX 1

FRANKLIN.CAL

METHOD 5 CALCULATION

CLIENT: FRANKLIN MINERALS SOURCE: 60 INCH RAYMOND ROLLER MILL BAGHOUSE
DATE OF TEST: 7-27-94

DATA

	RUN 1	RUN 2	RUN 3	AVERAGE
Vm(actual cu. ft)	35.1940	35.1470	34.0980	34.8130
Pbar(in. Hg)	28.8200	28.8200	28.8200	28.8200
Ts(deg F)	153.8	159.9	160.2	158.0
(SQRT(delta P))Av	0.8133	0.7827	0.7646	0.7869
delta H(in. H20)	1.2800	1.2456	1.3206	1.2821
Tm(deg F)	95.5000	107.3000	110.9000	104.5667
Vwl(ml H2O)	26.2	35.0	26.8	29.3
P's(in. H2O)	-0.32	-0.32	-0.32	-0.32
Ps(in. Hg)	28.7965	28.80	28.80	28.7965
Cp	0.84	0.84	0.84	0.84
% Oxygen	20.1	20.1	20.2	20.1333
% Carbon Dioxide	0.5	0.5	0.5	0.5000
% Carbon Monoxide	0.0	0.0	0.0	0.0000
% Nitrogen	79.4	79.4	79.3	79.3667
Diameter-ID(in.)	25.50	25.50	25.50	25.50
As(sq. ft)	3.5466	3.5466	3.5466	3.5466
Dn(in.)	0.2100	0.2100	0.2100	0.2100
Dn(squared)	0.0441	0.0441	0.0441	0.0441
TIME(per Run-Min)	60.00	60.00	60.00	60.0000
Probe & Filter Catch(grams)	0.0049	0.0042	0.0070	0.0054
Mn(grams)	0.0049	0.0042	0.0070	0.0054
Lead Catch(grams)	0.0000	0.0000	0.0000	0.0000
(Ts+460)/(Ps*MW)	0.7481	0.76	0.76	0.7547
SQRT(Ts+460)/ (Ps*MW)	0.8650	0.87	0.87	0.8687

CALCULATIONS

	RUN 1	RUN 2	RUN 3	Average
GAMMA(Y)	1.0252	1.0252	1.0252	1.0252
Vm(SCF)	33.13	32.39	31.23	32.2520
Vw(gas)	1.24	1.66	1.27	1.3904
%Moisture	3.6	4.9	3.9	4.1
Md	0.96	0.95	0.96	0.9587
MWdry	28.88	28.88	28.89	28.8853
MWstack	28.49	28.35	28.46	28.4357
Vstack(ft/min)	3,031	2,938	2,865	2,945
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Qs(SCFM)	8,603	8,150	8,025	8,260
%Isokinetic	94.3	97.3	95.3	95.6
PARTICULATE EMISSIONS:				
C(grains/dscf)	0.0023	0.0020	0.0035	0.0026
A(lb/hour)	0.17	0.14	0.24	0.18

APPENDIX 2

METH5DAT.CAL

METHOD 5 FIELD DATA SHEET

CLIENT: FRANKLIN IND. ~~MATERIALS~~ MINERALS
LOCATION: 66" RAYMOND ROLLER MILL
RUN #: 1 BGHE. EXH. STACK
DATE: 7/27/94
BARO. PRESSURE: 28.82
OPERATOR: FJW
METER BOX #: II
FILTER : 858

START TIME: 8:25 AM
STOP TIME: 9:30 AM

ASSUMED MOISTURE: 10%
STATIC PRESSURE: -0.32
PROBE TIP DIA.: 0.21
STACK DIAMETER: 25.5
PITOT TUBE #: _____ CORR. FACTOR: 0.8

BEFORE TEST PITOT CHECK OK @ 5 ''H2O
BEFORE TEST LEAK CHECK 0.0 CFM @ 13 ''
AFTER TEST LEAK CHECK 0.0 CFM @ 12 ''
AFTER TEST PITOT CHECK OK @ 4 ''H2O

A B

BEGINNING METER READING: 453.263 Ft3 K Factor _____

POINT	TIME	DRY GAS METER CF	PITOT ''H20 Del. P	DELTA H ''H2O DESIRED	DELTA H ''H2O ACTUAL	TEMPERATURE INLET	TEMPERATURE OUTLET	PU IN H
1	2.5	454.32	0.33	0.49	0.49	78	78	1.0
2	5.0	455.55	0.52	0.81	0.81			1.0
3	7.5	456.86	0.55	0.83	0.83	87	78	1.0
4	10.0	458.29	0.53	0.81	0.81			1.0
5	12.5		0.47	0.72	0.72	92	79	1.0
A 6	15.0	460.63	0.53	0.81	0.81			1.0
7	17.5	461.58	0.24	0.38	0.38	95	80	1.0
8	20.0	462.48	0.23	0.36	0.36			1.0
9	22.5	463.71	0.35	0.55	0.55	98	81	1.0
10	25.0	464.87	0.47	0.73	0.73			1.0
11	27.5	466.07	0.48	0.74	0.74	105	84	1.0
12	30.0	467.395	0.55	0.87	0.87			1.0
		FW	7.8549	8.1		1035		
1	2.5	470.01	2.8	4.4	4.4	110	88	4.0
2	5.0	473.33	2.8	4.4	4.4			4.0
3	7.5	476.20	2.6	4.0	4.0	120	90	3.0
4	10.0	478.86	2.3	3.6	3.6			3.0
5	12.5	481.06	1.5	2.35	2.35	123	91	2.0
B 6	15.0	482.91	1.0	1.6	1.6			2.0
7	17.5	484.01	0.33	0.52	0.52	121	94	1.0
8	20.0	484.93	0.24	0.38	0.38			1.0
9	22.5	485.90	0.24	0.38	0.38	116	95	1.0
10	25.0	486.82	0.25	0.40	0.40			1.0
11	27.5	487.64	0.21	0.33	0.33	113	95	1.0
12	30.0	488.457	0.20	0.32	0.32			1.0

Vm = 35.194
Time = 60
(SQRT Delta P)Ave = 0.8133 OK
(Delta H)Ave = 1.28
(Tm)Ave = 95.5

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METH5DAT.CAL

METHOD 5 FIELD DATA SHEET

CLIENT: FRANKLIN INDUSTRIAL MINERALS MATERIALS
LOCATION: 66" RAYMOND ROLLER MILL
RUN #: 2 BLHE. EXH - STACK
DATE: 7/27/94
BARO. PRESSURE: 28.82
OPERATOR: FSW
METER BOX #: 2F
FILTER : 859

START TIME: 9:54 AM
STOP TIME: 10:58 AM

ASSUMED MOISTURE: 10%
STATIC PRESSURE: -0.32
PROBE TIP DIA.: 0.21
STACK DIAMETER: 25.5"
PITOT TUBE #: _____ CORR. FACTOR: 0.

BEFORE TEST PITOT CHECK OK @ 4 ''H2
BEFORE TEST LEAK CHECK 0.0 CFM @ 13 ''
AFTER TEST LEAK CHECK 0.0 CFM @ 10 ''
AFTER TEST PITOT CHECK OK @ 2.5 ''H2O

BEGINNING METER READING: 488.700 Ft3 K Factor _____

POINT	TIME	DRY GAS METER CF	PITOT ''H20 Del. P	DELTA H ''H2O DESIRED	DELTA H ''H2O ACTUAL	TEMPERATURE INLET	TEMPERATURE OUTLET	PU IN H
1	2.5	491.62	2.8	4.4	4.4	98	95	4.
2	5.0	494.64	2.8	4.4	4.4			4.
3	7.5	497.71	2.6	4.05	4.05	116	97	4.
4	10.0		2.25	3.5	3.5			3.
5	12.5	503.02	1.5	2.35	2.35	121	97	3.
B 6	15.0	504.72	1.0	1.60	1.60			2.
7	17.5	505.78	0.28	0.45	0.45	120	98	1.
8	20.0	506.57	0.20	0.32	0.32			1.
9	22.5	507.21	0.11	0.175	0.175	120	98	1.
10	25.0	507.95	0.13	0.21	0.21			1.
11	27.5	508.71	0.14	0.22	0.22	114	99	1.
12	30.0	509.573	0.19	0.31	0.31			1.
			11.1627	21.995		1273		
1	2.5	510.70	0.33	0.56	0.56	112	99	1.
2	5.0	511.92	0.44	0.70	0.70			1.
3	7.5	513.15	0.44	0.70	0.70	115	100	1.
4	10.0	514.32	0.48	0.76	0.76			1.
5	12.5	515.62	0.38	0.60	0.60	118	98	1.
A 6	15.0	516.60	0.33	0.53	0.53			1.
7	17.5	517.65	0.28	0.45	0.45	119	100	1.
8	20.0	518.59	0.20	0.32	0.32			1.
9	22.5	519.72	0.38	0.60	0.60	120	101	1.
10	25.0	521.0	0.52	0.82	0.82			1.
11	27.5	522.35	0.56	0.90	0.90	120	101	1.
12	30.0	523.847	0.60	0.96	0.96			1.

Vm = 35.147
Time = 60
(SQRT Delta P)Ave = 0.7827
(Delta H)Ave = 1.2456
(Tm)Ave = 107.3

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METH5DAT.CAL

METHOD 5 FIELD DATA SHEET

CLIENT: FRANKLIN IND. MINERALS
LOCATION: BGHE EXH. STACK
RUN #: 3
DATE: 7/27/94
BARO. PRESSURE: 28.82
OPERATOR: FJW
METER BOX #: 11
FILTER : 860

START TIME: 11:21 AM
STOP TIME: 12:28 PM

ASSUMED MOISTURE: 10%
STATIC PRESSURE: -0.32
PROBE TIP DIA.: 0.21
STACK DIAMETER: 25.5
PITOT TUBE #: _____ CORR. FACTOR: 0.8

BEFORE TEST PITOT CHECK OK @ 4 ''H2O
BEFORE TEST LEAK CHECK 0.0 CFM @ 13 ''
AFTER TEST LEAK CHECK 0.0 CFM @ 10 ''
AFTER TEST PITOT CHECK OK @ 3 ''H2O

BEGINNING METER READING: 524.045 Ft3 K Factor _____

POINT	TIME	DRY GAS METER CF	PITOT ''H20 Del. P	DELTA H ''H2O DESIRED	DELTA H ''H2O ACTUAL	TEMPERATURE INLET	TEMPERATURE OUTLET	PU IN H
1	2.5	525.26	0.34	0.54	0.54	101	100	1.6
2	5.0	526.31	0.37	0.58	0.58	—	—	1.0
3	7.5	527.49	0.43	0.68	0.68	110	100	1.0
4	10.0	—	0.47	0.75	0.75	—	—	1.0
5	12.5	530.08	0.47	0.75	0.75	114	100	1.0
A 6	15.0	531.15	0.33	0.52	0.52	—	—	1.0
7	17.5		0.21	0.37	0.37	116	100	1.0
8	20.0	533.16	0.27	0.43	0.43	—	—	1.0
9	22.5	534.20	0.35	0.56	0.56	118	100	1.0
10	25.0	535.43	0.45	0.71	0.71	—	—	1.0
11	27.5	—	0.62	0.98	0.98	120	101	1.0
12	30.0	538.375	0.62	0.98	0.98	—	—	1.0
1	2.5	541.60	2.8	4.4	4.4	122	104	4.0
2	5.0	544.46	2.8	4.4	4.4	—	—	4.0
3	7.5	547.16	2.4	3.8	3.8	130	105	5.0
4	10.0	549.71	2.0	3.2	3.2	—	—	3.0
5	12.5	551.89	1.5	2.4	2.4	132	105	3.0
B 6	15.0	553.65	0.85	1.35	1.35	—	—	3.0
7	17.5	554.60	0.22	0.35	0.35	125	105	1.0
8	20.0	555.21	0.10	1.6	1.6	—	—	1.0
9	22.5	55[illegible]	0.10	1.6	1.6	121	106	1.0
10	25.0	555.55	0.13	0.21	0.21	—	—	1.0
11	27.5	557.32	0.15	0.24	0.24	120	106	1.0
12	30.0	558.143	0.19	0.30	0.30	—	—	

Vm = 34.098
Time = 60
(SQRT Delta P)Ave = 0.7646
(Delta H)Ave = 1.3206
(Tm)Ave = 110.9

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MAX5.DOC

CO2 AND O2 DETERMINATION - MAX 5

CLIENT: FRANKLIN INDUSTRIAL MINERALS
DATE: 7/27/94
SOURCE: BAGHOUSE EXHAUST STACK - 66' RAYMOND ROLLER MILL

MAX 5 CALIBRATION (CALIBRATED WITH AMBIENT AIR)

	AMBIENT AIR O2%	MAX 5 O2%
CALIBRRATION #1	20.9	20.9
CALIBRRATION #2	20.9	20.9
CALIBRRATION #3	20.9	20.9
CALIBRRATION #4	20.9	

TYPE OF FUEL: PROPANE

	RUN 1	RUN 2	RUN 3
CO2	0.5	0.5	0.5
O2	20.1	20.1	20.2
CO	-f		

	RUN 4	RUN 5	RUN 6
CO2			
O2			
CO			

STACKDAT.DOC

STACK DATA SHEET

CLIENT: Franklin ~~Refractories~~ Refractories SOURCE: Refractories

DATE: 7/27/94

BARO. PRESSURE: _____

W3-08-98

RUN # 1 — FILTER # 858

POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0	152	248°	62
2	2;15		+or-	
3	4;45	152	10'	62
4	7;15			
5	9;45	153		62
6	12;15			
7	14;45	152		62
8	17;15			
9	19;45	152		64
10	22;15			
11	24;45	153		64
12	27;15			
	xxxxx			
1	0	154		64
2	2;15			
3	4;45	154		64
4	7;15			
5	9;45	155		64
6	12;15			
7	14;45	155		66
8	17;15			
9	19;45	156		66
10	22;15			
11	24;45	158		66
12	27;15			

A

B

AVERAGE STACK TEMP. 153.8

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ ml

ORSAT

BEGINNING LEAK CHECK OK @ ____ ''Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ ____ ''Hg

RUN # 2 — FILTER # 859

POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0	156	248°	64
2	2;15		+or-	
3	4;45	157	10'	64
4	7;15			
5	9;45	158		64
6	12;15			
7	14;45	160		66
8	17;15			
9	19;45	160		66
10	22;15			
11	24;45	162		64
12	27;15			
	xxxxx			
1	0	158		66
2	2;15			
3	4;45	160		66
4	7;15			
5	9;45	160		66
6	12;15			
7	14;45	162		64
8	17;15			
9	19;45	163		64
10	22;15			
11	24;45	163		64
12	27;15			

B

A

AVERAGE STACK TEMP. 159.9

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ ml

ORSAT

BEGINNING LEAK CHECK OK @ ____ ''Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ ____ ''Hg

Frank Ward & Co. (615)986-9025

STACKDAT.DOC

STACK DATA SHEET

CLIENT: Franklin Industrial Minerals SOURCE: _____
DATE: 7/27/94
BARO. PRESSURE: _____

RUN # 3
FILTER # 8660

POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0	135	248	66
2	2;15		for-	
3	4;45	144	10°	66
4	7;15	157		
5	9;45	160		66
6	12;15	164		
7	14;45	164		66
8	17;15	165		
9	19;45	165		66
10	22;15	166		
11	24;45	168		66
12	27;15	168		
	xxxxx			
1	0	150		66
2	2;15			
3	4;45	155		66
4	7;15			
5	9;45	163		68
6	12;15			
7	14;45	166		68
8	17;15			
9	19;45	166		68
10	22;15			
11	24;45	168		68
12	27;15			

AVERAGE STACK TEMP. 160.2

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ ml

ORSAT

BEGINNING LEAK CHECK OK @ ____ ''Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ _____ ''Hg

RUN # _____
FILTER # _____

POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0			
2	2;15			
3	4;45			
4	7;15			
5	9;45			
6	12;15			
7	14;45			
8	17;15			
9	19;45			
10	22;15			
11	24;45			
12	27;15			
	xxxxx			
1	0			
2	2;15			
3	4;45			
4	7;15			
5	9;45			
6	12;15			
7	14;45			
8	17;15			
9	19;45			
10	22;15			
11	24;45			
12	27;15			

AVERAGE STACK TEMP. _____

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ ml

ORSAT

BEGINNING LEAK CHECK OK @ ____ ''Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ _____ ''Hg

Frank Ward & Co. (615)986-9025

APPENDIX 3

MOISTURE.DOC

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Franklin Industrial Minerals
Sample Date 7/27/94
Sample Location 66" RRM
Run # 1
Sample Recovery Person CEW
Recovery Date 7/27/94
Filter Number(s) 858

MOISTURE

1) 217 ml
2) 217 ml
3) _____ ml

IMPINGERS

Final volume _____ ml
Initial volume 200 ml
Net volume 17 ml
Total moisture 26.2 gm

SILICA GEL

Final wt 508.8 gm
Initial wt 499.6 gm
Net wt 9.2 gm

Color of silica gel Mostly blue
Description of impinger water Clear

RECOVERED SAMPLE

Blank filter container # FUM-B Sealed ✓
Filter container # 858 Sealed ✓
Description of particulate on filter Not visible

Acetone rinse container number Franklin #1 Liquid level marked? ✓

Acetone blank container number FUM-B Liquid level marked? ✓

Samples stored and locked? ✓

Date of laboratory custody 7/27/94

Laboratory personnel taking custody FSW

Comments:

Frank Ward & Co. (615)986-9025

MOISTURE.DOC

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Franklin Indust. Minerals Sample Date 7/27/94
Sample Location 66" RRM Run # 2
Sample Recovery Person CPW Recovery Date 7/27/94
Filter Number(s) 859

MOISTURE

1) ~~228~~ ml
2) ml
3) ml

IMPINGERS
Final volume ml
Initial volume 200 ml
Net volume 28 ml
Total moisture 35.0 gm

SILICA GEL
Final wt 526.8 gm
Initial wt 519.8 gm
Net wt 7.0 gm

Color of silica gel mostly blue
Description of impinger water clear

RECOVERED SAMPLE

Blank filter container # FLM-B Sealed ✓
Filter container # 859 Sealed ✓
Description of particulate on filter not visible

Acetone rinse container number Franklin #2 Liquid level marked? ✓

Acetone blank container number FLM-B Liquid level marked? ✓

Samples stored and locked? ✓

Date of laboratory custody 7/27/94

Laboratory personnel taking custody FSW

Comments:

Frank Ward & Co. (615)986-9025

MOISTURE.DOC

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

Plant Franklin Indust. Minerals Sample Date 7/27/94
Sample Location 66" RRM Run # 3
Sample Recovery Person CRW Recovery Date 7/27/94
Filter Number(s) 860

MOISTURE

1) 220 ml
2) 220 ml
3) ____ ml

IMPINGERS
Final volume ____ ml
Initial volume 200 ml
Net volume 20 ml
Total moisture 26.8 gm

SILICA GEL
Final wt 473.4 gm
Initial wt 466.6 gm
Net wt 6.8 gm

Color of silica gel mottly blue
Description of impinger water clear

RECOVERED SAMPLE

Blank filter container # FLM-B Sealed ✓
Filter container # 860 Sealed ____
Description of particulate on filter N. visible

Acetone rinse container number Franklin #3 Liquid level marked? ✓

Acetone blank container number FLM-B Liquid level marked? ✓

Samples stored and locked? ✓

Date of laboratory custody 7/27/94

Laboratory personnel taking custody TSW

Comments:

Frank Ward & Co. (615)986-9025

APPENDIX 4

PRE TEST DRY GAS METER CALIBRATION

CLIENT: FRANKLIN IND. MINERALS
CALIBRATED BY: CRW
DATE OF CALIBRATION: 3-22-94
METER BOX #: II
MODEL # 201009
SERIAL # 2750
WET TEST METER #: II
BAROMETRIC PRESSURE(Hg) 28.51

S.N. I =2360
S.N. II =2750
S.N. III=2856
S.N. IV =6104
PRETEST GAMMA 1.0252
AVE. DELTA H@ 1.7295

CALIBRATION DATA

delta H(in. H2O)	0.50	1.00	1.50	2.00	3.00	4.00
Vw(cu. ft)	5.000	5.000	10.200	10.000	10.000	10.000
Vd(cu. ft)	5.012	5.030	10.325	10.224	10.255	10.284
Tw(deg. F)	61.00	61.00	61.00	61.00	61.00	61.00
Tdi(deg. F)	66.60	81.60	96.70	108.85	107.50	124.60
Tdo(deg. F)	61.14	64.40	69.28	77.43	82.67	87.40
Td(deg. F)	63.87	73.00	82.99	93.14	95.09	106.00
theta(min.)	12.37	8.57	14.67	12.55	10.50	8.95
Pb(in. Hg)	28.51	28.51	28.51	28.51	28.51	28.51
delta H/13.6 (in. Hg)	0.0368	0.0735	0.1103	0.1471	0.2206	0.2941

CALCULATIONS

	74678	75979	157903	157700	158255	161367
	74543	74907	153958	152648	153503	154331
GAMMA(Y)	1.0018	1.0143	1.0256	1.0331	1.0310	1.0456
	1E-06	2E-06	3E-06	4E-06	6E-06	8E-06
	1289	892.99	749.32	653.86	547.05	466.3
	1289	892.99	749.32	653.86	547.05	466.3
	2E+06	797438	561481	427526	299264	217431
delta H@	1.763	1.664	1.725	1.719	1.798	1.709
Vacuum	4	8	7	8	8	10

Ave. GAMMA 1.0252
Ave. delta H@ 1.729

POST TEST DRY GAS METER CALIBRATION

CLIENT: FRANKLIN INDUSTRIAL MINERALS	
CALIBRATED BY:	CRW
DATE OF CALIBRATION:	7-28-94
METER BOX #:	2
MODEL #:	201009
SERIAL #:	2750
WET TEST METER:	II
BAROMETRIC PRESSURE (in. Hg)	28.79
PRE TEST GAMMA (LAST CALIB.)	1.0252

CALIBRATION DATA

delta H(in.)	0.20	1.30	4.40
Vw(cu. ft)	7.100	11.700	11.00
Vd(cu. ft)	7.260	11.967	11.14
Tw(deg. F)	83.00	84.00	83.00
Tw(deg. R)	543.00	544.00	543.00
Tdi(deg. F)	90.70	109.40	121.80
Tdo(deg. F)	84.30	89.80	94.20
Td(deg. F)	87.50	99.60	108.00
Td(deg. R)	547.50	559.60	568.00
theta(min.)	26.73	17.92	9.38
Pb(in. Hg)	28.79	28.79	28.79
delta H/13.6(Hg)	0.015	0.096	0.324
Vacuum Setting (in. Hg)	2.1	5.3	9.5

CALCULATIONS

GAMMA(Y)	0.9856	1.0024	1.0210
GAMMA(ave)	1.0030		
PRETEST GAMMA(Y)	1.0252		
% DIFFERENCE	-2.21		

THERMOCOUPLE CALIBRATION

DATE OF CALIBRATITION:
3-3-94

73 IN. EFFECTIVE - 6 FT.

THERMOCOUPLE READING DEG. F	Hg in GLASS DEG. F	% DIFF
71	70	1.4%
105	106	-1.0%
129	130	-0.8%
166	165	0.6%
180	182	-1.1%
211	212	-0.5%
0	0	#DIV/
0	0	#DIV/
0	0	#DIV/
0	0	#DIV/

120 IN. EFFECTIVE - 10 FT.

THERMOCOUPLE READING DEG. F	Hg in GLASS DEG. F	% DIFF
70	70	0.0%
104	106	-1.9%
129	130	-0.8%
164	165	-0.6%
181	182	-0.6%
213	212	0.5%
0	0	#DIV/
0	0	#DIV/
0	0	#DIV/
0	0	#DIV/

36 IN. EFFECTIVE - 3 FT. #1

THERMOCOUPLE READING DEG. F	Hg in GLASS DEG. F	% DIFF
69	70	-1.4%
107	106	0.9%
131	130	0.8%
165	165	0.0%
180	182	-1.1%
212	212	0.0%

36 IN. EFFECTIVE - 3 FT. #2

THERMOCOUPLE READING DEG. F	Hg in GLASS DEG. F	% DIFF
70	70	0.0%
105	106	-1.0%
129	130	-0.8%
166	165	0.6%
181	182	-0.6%
213	212	0.5%

36 IN. EFFECTIVE - 3 FT. #3

THERMOCOUPLE READING DEG. F	Hg in GLASS DEG. F	% DIFF
70	70	0.0%
107	106	0.9%
129	130	-0.8%
166	165	0.6%
181	182	-0.6%
214	212	0.9%

THERMOCOUPLE CALIBRATION

DATE OF CALIBRATITION:
3-3-94

DGM-INLET THERMOMETER

	READING DEG. F	Hg in GLASS DEG. F	% DIFF
DIAL THERMOMETER BOX #1	90	91	-1.1%
DIAL THERMOMETER BOX #2	91	91	0.0%
DIAL THERMOMETER BOX #3	90	91	-1.1%
DIAL THERMOMETER BOX #4	92	91	1.1%
DIAL THERMOMETER BOX #5	91	91	0.0%

DGM-OUTLET THERMOMETER

	READING DEG. F	Hg in GLASS DEG. F	% DIFF
DIAL THERMOMETER BOX #1	91	91	0.0%
DIAL THERMOMETER BOX #2	90	91	-1.1%
DIAL THERMOMETER BOX #3	92	91	1.1%
DIAL THERMOMETER BOX #4	N.A.-IN & OUT COMBINED		
DIAL THERMOMETER BOX #5	90	91	-1.1%

IMPINGER BOX OUTLET THERMOMETER

	READING DEG. F	Hg in GLASS DEG. F	% DIFF
DIAL THERMOMETER IMP. #1	90	90	0.0%
DIAL THERMOMETER IMP. #2	90	90	0.0%
DIAL THERMOMETER IMP. #3	90	90	0.0%
DIAL THERMOMETER IMP. #4	92	90	2.2%
DIAL THERMOMETER IMP. #5	91	90	1.1%

NOZZLE.DOC NOZZLE CALIBRATION DATA

DATE 7/27/94

CALIBRATED BY FJW

Nozzle Identification Number	D1, inches	D2, inches	D3, inches	delta h, inches	Average Diameter
0.210	0.210	0.210	0.210	—	0.210

D 1,2,3 = Nozzle diameter measured on a different diameter, inches.

delta D = Maximum difference in any to measurements, inches.

D average = Average of D1, D2, and D3.

PITOT.REP

The pitot tube is manufactured by Nutech, Inc. to EPA requirements. The pitot is checked upon receipt to ensure that the specifications are met. The pitot is subsequently visually checked, prior to testing, to determine if there is physical damage to the pitot tube. If there is no physical damage noted, the pitot tube requires no further calibration check.

CLIENT: FRANKLIN IND. MINERALS

SOURCE: ROLLER MILL BGHE. EXH.

CHECK DATE: 7/27/94

F. S. Ward

Frank Ward

APPENDIX 5

ANDERSON ROLLER MILL PROCESS DESCRIPTION

Limestone material is stored in two, 400 ton silos to serve as feed for a raymond 66" roller mill. The feed is delivered to the mill via vibrator feeders and associated conveyor belts controlled by high/low bindicators and differential pressure sensors. The 6669 ABB Raymond Roller Mill grinds the 1-1/4 stone to a 82% -200 mesh product with no by product produced. Using a negative pressure closed loop circuit, the mill system fan supplies air to the bottom of the mill to mix or fluidize the material in the grinding zone (at the journals and bull ring which turn at sufficient rpm to suspend the journals with centrifugal force) thus grinding the stone between the bull ring and grinding rolls. The system fan intake is thru a cyclone with uptake duct from the top of the roller mill . As the material is ground finer, it becomes suspended in the top of the mill by a high negative pressure at the classifier (whizzer) in the top of the mill. Product of proper size will pass thru the whizzer whereas rejects will fall back down into the grinding zone in the bottom of the mill. A 5.3 million BTU flash dryer heats air as it enters the bottom of the mill to dry the <4% moisture laden stone as it is ground. A 10,000 cfm Dust collector vents excess air entering the mill thru the combustion chamber of the air heater. Product from the top of the mill to the cyclone drops down to a pneumatic conveying system and air returns to the system fan in a closed loop. The pneumatic system conveys the product to a storage silo located in the plant (see dwg-ROLLER MILL PID).

ROLLER MILL OPERATING PARAMETERS

Roller mill operations are governed by the optimum material load maintained in the grinding zone. Excess material or a deficit of material in the grinding zone both lowers production and increases machine wear. The optimum load is determined by the system design criteria and is operated at a fixed production rate with only minor variability. The amount of load in the grinding zone of the mill is controlled by the Differential Pressure (DP) across the mill, taken at a point upstream of the grinding zone in the system airflow and compared to a point downstream in the system airflow. The higher the DP, the more the load in the grinding zone and vice/versa. The DP is monitored by a DOS based, PC system as are critical motor loads, air heater temperature and feed rate. The DP is controlled by the adjustment of a vibratory feeder administering material into the mill grinding zone. The PC system controls the vibratory feeder on the mill to average +/- .2" of differential pressure across the mill. Production rate is measured by the amount of material delivered to a feed bin, located at the side of the mill, over a given period of time, i.e. an operating shift. The amount of feed material delivered to the mill feed bin is measured via a set of electronic scales, mounted under the belt, which measures the flow rate of material on the belt and integrates it over the run time of the belt *.

PROCESS OPERATIONAL CONDITIONS DURING TESTING

Prior to the testing done on the 66" Raymond Roller Mill Baghouse exhaust stack, the mill circuit was started up and allowed to run for approximately 1 hour. This insured the mill operating conditions would be at maximum production rate and the air heater temperature would be stabilized. The Differential Pressure setpoint of the PID controller was set at 10.60" of water which measures at approximately 13" on the backup analog monitoring magnahelic gauge (this setting is not a fixed parameter but can vary due to varying hardness of the rock, moisture present in the rock, temperature of the airstream, etc.).

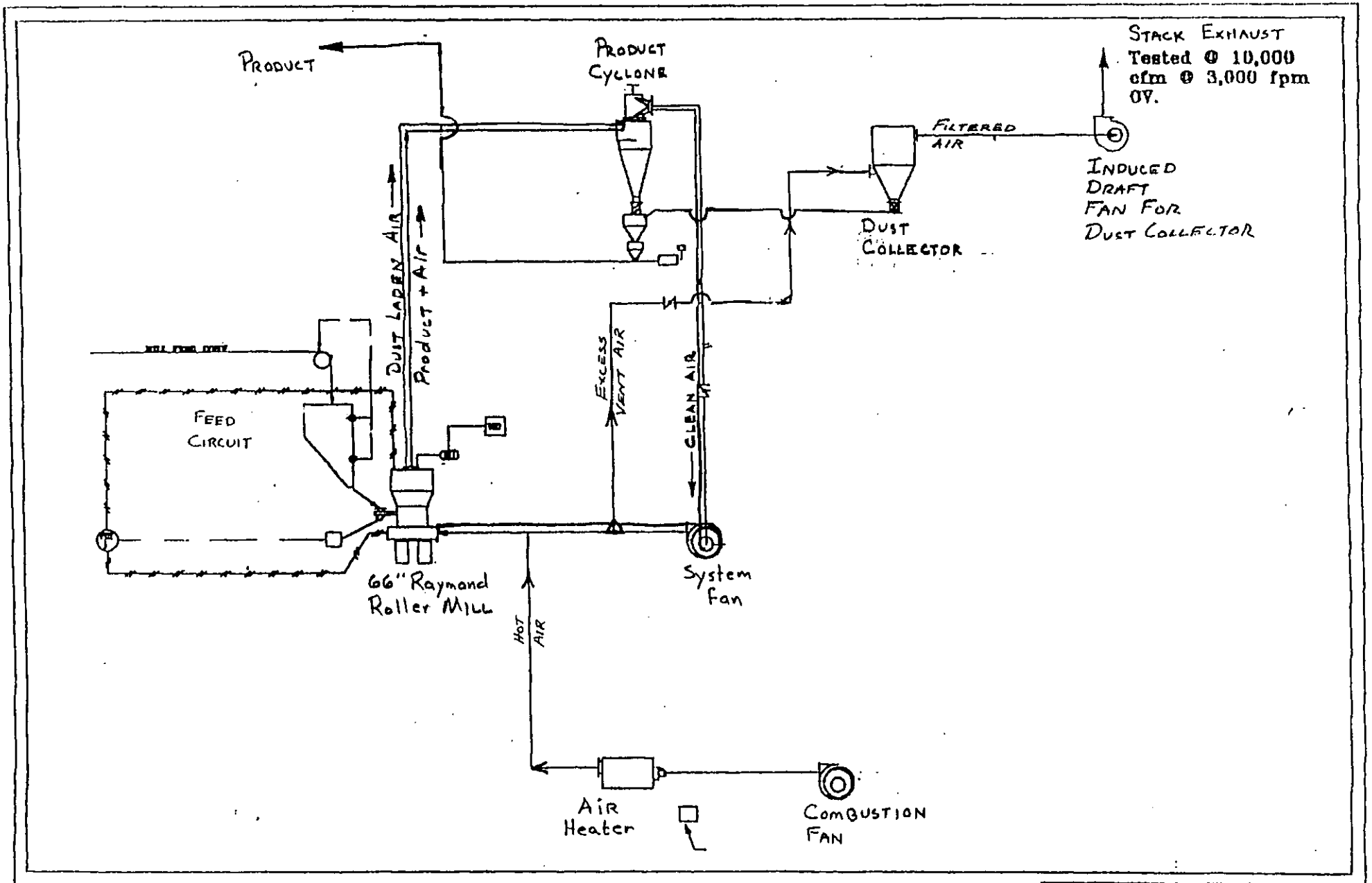
During the actual testing of the exhaust stack, the following parameters were monitored and recorded via the DOS based PC system (see attached print-out *):

Mill DP	10.38-10.71"
Exit gas Temperature	153-207 deg F
Hot gas Temperature	407-428 deg F
Fan Amps	142-149 Amps
Production	56 tons/ 4.16 hour period 13.46 Tons/hour

Typically, the mill will average around 13.00 tons/hour, will require a DP setpoint of 10.60, and will operate around 195-205 degrees F on the exit gas temperature. Mill motor amps will average around 130 Amps.

The variables listed here are just that, variables. They should not be mis-construed as limits or maximum values to govern production but are indicators to mill performance. No controls exist to limit or adjust this roller mill production circuit...When operating, it produces at maximum rate for its particular design and configuration with production rates varying by minor amounts.

* The DOS based PC system was not calibrated at this time for the Feed Rate AI (feed rate analog input); therefore, the feed rates listed on the computer printout are not correct and should be ignored.



FRANKLIN INDUSTRIAL MINERALS

ROLLER MILL PID

ANDERSONVILLE, ROLLER MILL

LL DP AI	07:30:00	0.04	0.04	PSI	LO LO
IT GAS TEMP AI	07:30:00	129	129	DEG F	
T GAS TEMP AI	07:30:00	364	364	DEG F	LO
STEM FAN-A AI	07:30:00	3	3	AMPS	LO LO
ED RATE AI	07:30:00	9.52	9.52	TONS	
	07:33:16	STARTING LOG	HISTORY		
LL DP AI	07:35:00	3.66	3.62	PSI	LO LO
IT GAS TEMP AI	07:35:00	97	-32	DEG F	LO
T GAS TEMP AI	07:35:00	328	-36	DEG F	LO LO
STEM FAN-A AI	07:35:00	177	174	AMPS	
ED RATE AI	07:35:00	9.52	0.00	TONS	
LL DP AI	07:40:00	6.21	2.55	PSI	LO
IT GAS TEMP AI	07:40:00	130	33	DEG F	
T GAS TEMP AI	07:40:00	376	48	DEG F	LO
STEM FAN-A AI	07:40:00	180	3	AMPS	
ED RATE AI	07:40:00	10.99	1.47	TONS	
LL DP AI	07:45:00	9.82	3.61	PSI	
IT GAS TEMP AI	07:45:00	156	26	DEG F	
T GAS TEMP AI	07:45:00	398	22	DEG F	LO
STEM FAN-A AI	07:45:00	154	-26	AMPS	
ED RATE AI	07:45:00	8.79	-2.20	TONS	
LL DP AI	07:50:00	10.70	0.88	PSI	
IT GAS TEMP AI	07:50:00	153	-3	DEG F	
T GAS TEMP AI	07:50:00	407	9	DEG F	LO
STEM FAN-A AI	07:50:00	149	-5	AMPS	
ED RATE AI	07:50:00	9.16	0.37	TONS	
LL DP AI	07:55:00	10.63	-0.07	PSI	
IT GAS TEMP AI	07:55:00	155	2	DEG F	
T GAS TEMP AI	07:55:00	407	0	DEG F	LO
STEM FAN-A AI	07:55:00	147	-2	AMPS	
ED RATE AI	07:55:00	9.52	0.36	TONS	
LL DP AI	08:00:00	10.61	-0.02	PSI	
IT GAS TEMP AI	08:00:00	159	4	DEG F	
T GAS TEMP AI	08:00:00	411	4	DEG F	LO
STEM FAN-A AI	08:00:00	147	0	AMPS	
ED RATE AI	08:00:00	9.52	0.00	TONS	
LL DP AI	08:05:00	10.71	0.10	PSI	
IT GAS TEMP AI	08:05:00	162	3	DEG F	
T GAS TEMP AI	08:05:00	413	2	DEG F	LO
STEM FAN-A AI	08:05:00	146	-1	AMPS	
ED RATE AI	08:05:00	9.89	0.37	TONS	
LL DP AI	08:10:00	10.59	-0.12	PSI	
IT GAS TEMP AI	08:10:00	165	3	DEG F	
T GAS TEMP AI	08:10:00	414	1	DEG F	LO
STEM FAN-A AI	08:10:00	147	1	AMPS	
ED RATE AI	08:10:00	9.16	-0.73	TONS	
LL DP AI	08:15:00	10.60	0.01	PSI	
IT GAS TEMP AI	08:15:00	167	2	DEG F	
T GAS TEMP AI	08:15:00	416	2	DEG F	LO
STEM FAN-A AI	08:15:00	147	0	AMPS	

ED RATE AI	08:15:00	538.70	529.54	TONS	
LL DP AI	08:20:00	10.68	0.08	PSI	
XIT GAS TEMP AI	08:20:00	169	2	DEG F	
T GAS TEMP AI	08:20:00	416	0	DEG F	LO
YSTEM FAN-A AI	08:20:00	146	-1	AMPS	
ED RATE AI	08:20:00	521.86	-16.84	TONS	
LL DP AI	08:25:00	10.54	-0.14	PSI	
KIT GAS TEMP AI	08:25:00	171	2	DEG F	
T GAS TEMP AI	08:25:00	417	1	DEG F	LO
YSTEM FAN-A AI	08:25:00	145	-1	AMPS	
ED RATE AI	08:25:00	11.35	-510.51	TONS	
LL DP AI	08:30:00	10.58	0.04	PSI	
KIT GAS TEMP AI	08:30:00	173	2	DEG F	
T GAS TEMP AI	08:30:00	417	0	DEG F	LO
YSTEM FAN-A AI	08:30:00	146	1	AMPS	
ED RATE AI	08:30:00	11.35	0.00	TONS	
LL DP AI	08:35:00	10.61	0.03	PSI	
KIT GAS TEMP AI	08:35:00	173	0	DEG F	
T GAS TEMP AI	08:35:00	416	-1	DEG F	LO
YSTEM FAN-A AI	08:35:00	146	0	AMPS	
ED RATE AI	08:35:00	8.79	-2.56	TONS	
LL DP AI	08:40:00	10.71	0.10	PSI	
KIT GAS TEMP AI	08:40:00	175	2	DEG F	
T GAS TEMP AI	08:40:00	419	3	DEG F	LO
YSTEM FAN-A AI	08:40:00	147	1	AMPS	
ED RATE AI	08:40:00	9.89	1.10	TONS	
LL DP AI	08:45:00	10.63	-0.08	PSI	
KIT GAS TEMP AI	08:45:00	176	1	DEG F	
T GAS TEMP AI	08:45:00	416	-3	DEG F	LO
YSTEM FAN-A AI	08:45:00	147	0	AMPS	
ED RATE AI	08:45:00	10.62	0.73	TONS	
LL DP AI	08:50:00	10.63	0.00	PSI	
KIT GAS TEMP AI	08:50:00	176	0	DEG F	
T GAS TEMP AI	08:50:00	419	3	DEG F	LO
YSTEM FAN-A AI	08:50:00	146	-1	AMPS	
ED RATE AI	08:50:00	11.35	0.73	TONS	
LL DP AI	08:55:00	10.57	-0.06	PSI	
KIT GAS TEMP AI	08:55:00	178	2	DEG F	
T GAS TEMP AI	08:55:00	419	0	DEG F	LO
YSTEM FAN-A AI	08:55:00	146	0	AMPS	
ED RATE AI	08:55:00	9.16	-2.19	TONS	
LL DP AI	09:00:00	10.61	0.04	PSI	
IT GAS TEMP AI	09:00:00	179	1	DEG F	
T GAS TEMP AI	09:00:00	420	1	DEG F	LO
STEM FAN-A AI	09:00:00	146	0	AMPS	
ED RATE AI	09:00:00	9.52	0.36	TONS	
LL DP AI	09:05:00	10.43	-0.18	PSI	
IT GAS TEMP AI	09:05:00	180	1	DEG F	
T GAS TEMP AI	09:05:00	420	0	DEG F	LO
STEM FAN-A AI	09:05:00	146	0	AMPS	

AGID	TIME	READING	CHANGE	UNIT	ALARM
EED RATE AI	09:05:00	9.16	-0.36	TONS	
ILL DP AI	09:10:00	10.52	0.09	PSI	
XIT GAS TEMP AI	09:10:00	182	2	DEG F	
OT GAS TEMP AI	09:10:00	419	-1	DEG F	LO
YSTEM FAN-A AI	09:10:00	145	-1	AMPS	
EED RATE AI	09:10:00	8.42	-0.74	TONS	
ILL DP AI	09:15:00	10.54	0.02	PSI	
XIT GAS TEMP AI	09:15:00	183	1	DEG F	
OT GAS TEMP AI	09:15:00	421	2	DEG F	LO
YSTEM FAN-A AI	09:15:00	146	1	AMPS	
EED RATE AI	09:15:00	11.72	3.30	TONS	
ILL DP AI	09:20:00	10.66	0.12	PSI	
XIT GAS TEMP AI	09:20:00	183	0	DEG F	
OT GAS TEMP AI	09:20:00	421	0	DEG F	LO
YSTEM FAN-A AI	09:20:00	146	0	AMPS	
EED RATE AI	09:20:00	11.72	0.00	TONS	
ILL DP AI	09:25:00	10.70	0.04	PSI	
XIT GAS TEMP AI	09:25:00	183	0	DEG F	
OT GAS TEMP AI	09:25:00	420	-1	DEG F	LO
YSTEM FAN-A AI	09:25:00	145	-1	AMPS	
EED RATE AI	09:25:00	11.35	-0.37	TONS	
ILL DP AI	09:30:00	10.63	-0.07	PSI	
XIT GAS TEMP AI	09:30:00	186	3	DEG F	
OT GAS TEMP AI	09:30:00	422	2	DEG F	LO
YSTEM FAN-A AI	09:30:00	144	-1	AMPS	
EED RATE AI	09:30:00	11.72	0.37	TONS	
ILL DP AI	09:35:00	10.56	-0.07	PSI	
XIT GAS TEMP AI	09:35:00	186	0	DEG F	
OT GAS TEMP AI	09:35:00	422	0	DEG F	LO
YSTEM FAN-A AI	09:35:00	145	1	AMPS	
EED RATE AI	09:35:00	8.42	-3.30	TONS	
ILL DP AI	09:40:00	10.67	0.11	PSI	
XIT GAS TEMP AI	09:40:00	188	2	DEG F	
OT GAS TEMP AI	09:40:00	424	2	DEG F	LO
YSTEM FAN-A AI	09:40:00	145	0	AMPS	
EED RATE AI	09:40:00	491.83	483.41	TONS	
ILL DP AI	09:45:00	10.70	0.03	PSI	
XIT GAS TEMP AI	09:45:00	189	1	DEG F	
OT GAS TEMP AI	09:45:00	421	-3	DEG F	LO
YSTEM FAN-A AI	09:45:00	145	0	AMPS	
EED RATE AI	09:45:00	8.79	-483.04	TONS	
ILL DP AI	09:50:00	10.63	-0.07	PSI	
XIT GAS TEMP AI	09:50:00	191	2	DEG F	
OT GAS TEMP AI	09:50:00	423	2	DEG F	LO
YSTEM FAN-A AI	09:50:00	144	-1	AMPS	
EED RATE AI	09:50:00	10.99	2.20	TONS	
ILL DP AI	09:55:00	10.56	-0.07	PSI	
XIT GAS TEMP AI	09:55:00	191	0	DEG F	
OT GAS TEMP AI	09:55:00	420	-3	DEG F	LO
YSTEM FAN-A AI	09:55:00	145	1	AMPS	

FEED RATE AI	09:55:00	12.09	1.10	TONS	
MILL DP AI	10:00:00	10.67	0.11	PSI	
EXIT GAS TEMP AI	10:00:00	191	0	DEG F	
HOT GAS TEMP AI	10:00:00	423	3	DEG F	LO
SYSTEM FAN-A AI	10:00:00	144	-1	AMPS	
FEED RATE AI	10:00:00	8.79	-3.30	TONS	
MILL DP AI	10:05:00	10.71	0.04	PSI	
EXIT GAS TEMP AI	10:05:00	191	0	DEG F	
HOT GAS TEMP AI	10:05:00	423	0	DEG F	LO
SYSTEM FAN-A AI	10:05:00	144	0	AMPS	
FEED RATE AI	10:05:00	9.52	0.73	TONS	
MILL DP AI	10:10:00	10.67	-0.04	PSI	
EXIT GAS TEMP AI	10:10:00	192	1	DEG F	
HOT GAS TEMP AI	10:10:00	423	0	DEG F	LO
SYSTEM FAN-A AI	10:10:00	143	-1	AMPS	
FEED RATE AI	10:10:00	8.42	-1.10	TONS	
MILL DP AI	10:15:00	10.62	-0.05	PSI	
EXIT GAS TEMP AI	10:15:00	193	1	DEG F	
HOT GAS TEMP AI	10:15:00	424	1	DEG F	LO
SYSTEM FAN-A AI	10:15:00	144	1	AMPS	
FEED RATE AI	10:15:00	10.62	2.20	TONS	
MILL DP AI	10:20:00	10.65	0.03	PSI	
EXIT GAS TEMP AI	10:20:00	195	2	DEG F	
HOT GAS TEMP AI	10:20:00	422	-2	DEG F	LO
SYSTEM FAN-A AI	10:20:00	143	-1	AMPS	
FEED RATE AI	10:20:00	11.72	1.10	TONS	
MILL DP AI	10:25:00	10.56	-0.09	PSI	
EXIT GAS TEMP AI	10:25:00	194	-1	DEG F	
HOT GAS TEMP AI	10:25:00	422	0	DEG F	LO
SYSTEM FAN-A AI	10:25:00	144	1	AMPS	
FEED RATE AI	10:25:00	9.52	-2.20	TONS	
MILL DP AI	10:30:00	10.54	-0.02	PSI	
EXIT GAS TEMP AI	10:30:00	194	0	DEG F	
HOT GAS TEMP AI	10:30:00	422	0	DEG F	LO
SYSTEM FAN-A AI	10:30:00	143	-1	AMPS	
FEED RATE AI	10:30:00	8.79	-0.73	TONS	
EXIT GAS TEMP AI	10:31:14	195	1	DEG F	HI
MILL DP AI	10:35:00	10.59	0.05	PSI	
EXIT GAS TEMP AI	10:35:00	195	0	DEG F	HI
HOT GAS TEMP AI	10:35:00	422	0	DEG F	LO
SYSTEM FAN-A AI	10:35:00	143	0	AMPS	
FEED RATE AI	10:35:00	9.16	0.37	TONS	
MILL DP AI	10:40:00	10.60	0.01	PSI	
EXIT GAS TEMP AI	10:40:00	196	1	DEG F	HI
HOT GAS TEMP AI	10:40:00	424	2	DEG F	LO
SYSTEM FAN-A AI	10:40:00	142	-1	AMPS	
FEED RATE AI	10:40:00	10.99	1.83	TONS	
MILL DP AI	10:45:00	10.61	0.01	PSI	
EXIT GAS TEMP AI	10:45:00	195	-1	DEG F	HI
HOT GAS TEMP AI	10:45:00	425	1	DEG F	LO

TAGID	TIME	READING	CHANGE	ENG	ALARM
SYSTEM FAN-A AI	10:45:00	142	0	AMPS	
FEED RATE AI	10:45:00	11.35	0.36	TONS	
MILL DP AI	10:50:00	10.61	0.00	PSI	
EXIT GAS TEMP AI	10:50:00	197	2	DEG F	HI
HOT GAS TEMP AI	10:50:00	424	-1	DEG F	LO
SYSTEM FAN-A AI	10:50:00	144	2	AMPS	
FEED RATE AI	10:50:00	9.52	-1.83	TONS	
MILL DP AI	10:55:00	10.63	0.02	PSI	
EXIT GAS TEMP AI	10:55:00	198	1	DEG F	HI
HOT GAS TEMP AI	10:55:00	427	3	DEG F	LO
SYSTEM FAN-A AI	10:55:00	144	0	AMPS	
FEED RATE AI	10:55:00	9.89	0.37	TONS	
EXIT GAS TEMP AI	10:57:23	199	1	DEG F	HI HI
MILL DP AI	11:00:00	10.65	0.02	PSI	
EXIT GAS TEMP AI	11:00:00	199	0	DEG F	HI HI
HOT GAS TEMP AI	11:00:00	426	-1	DEG F	LO
SYSTEM FAN-A AI	11:00:00	144	0	AMPS	
FEED RATE AI	11:00:00	477.55	467.66	TONS	
MILL DP AI	11:05:00	10.61	-0.04	PSI	
EXIT GAS TEMP AI	11:05:00	200	1	DEG F	HI HI
HOT GAS TEMP AI	11:05:00	427	1	DEG F	LO
SYSTEM FAN-A AI	11:05:00	144	0	AMPS	
FEED RATE AI	11:05:00	480.11	2.56	TONS	
MILL DP AI	11:10:00	10.59	-0.02	PSI	
EXIT GAS TEMP AI	11:10:00	200	0	DEG F	HI HI
HOT GAS TEMP AI	11:10:00	427	0	DEG F	LO
SYSTEM FAN-A AI	11:10:00	145	1	AMPS	
FEED RATE AI	11:10:00	10.99	-469.12	TONS	
MILL DP AI	11:15:00	10.53	-0.06	PSI	
EXIT GAS TEMP AI	11:15:00	202	2	DEG F	HI HI
HOT GAS TEMP AI	11:15:00	425	-2	DEG F	LO
SYSTEM FAN-A AI	11:15:00	144	-1	AMPS	
FEED RATE AI	11:15:00	9.52	-1.47	TONS	
MILL DP AI	11:20:00	10.63	0.10	PSI	
EXIT GAS TEMP AI	11:20:00	201	-1	DEG F	HI HI
HOT GAS TEMP AI	11:20:00	424	-1	DEG F	LO
SYSTEM FAN-A AI	11:20:00	143	-1	AMPS	
FEED RATE AI	11:20:00	10.99	1.47	TONS	
MILL DP AI	11:25:00	10.67	0.04	PSI	
EXIT GAS TEMP AI	11:25:00	201	0	DEG F	HI HI
HOT GAS TEMP AI	11:25:00	424	0	DEG F	LO
SYSTEM FAN-A AI	11:25:00	144	1	AMPS	
FEED RATE AI	11:25:00	10.99	0.00	TONS	
MILL DP AI	11:30:00	10.59	-0.08	PSI	
EXIT GAS TEMP AI	11:30:00	201	0	DEG F	HI HI
HOT GAS TEMP AI	11:30:00	423	-1	DEG F	LO
SYSTEM FAN-A AI	11:30:00	144	0	AMPS	
FEED RATE AI	11:30:00	8.06	-2.93	TONS	
MILL DP AI	11:35:00	10.65	0.06	PSI	
EXIT GAS TEMP AI	11:35:00	201	0	DEG F	HI HI

OT GAS TEMP AI	11:35:00	425	2	DEG F		LO
YSTEM FAN-A AI	11:35:00	144	0	AMPS		
EED RATE AI	11:35:00	10.99	2.93	TONS		
ILL DP AI	11:40:00	10.59	-0.06	PSI		
XIT GAS TEMP AI	11:40:00	201	0	DEG F	HI	HI
OT GAS TEMP AI	11:40:00	425	0	DEG F		LO
YSTEM FAN-A AI	11:40:00	143	-1	AMPS		
EED RATE AI	11:40:00	9.89	-1.10	TONS		
ILL DP AI	11:45:00	10.60	0.01	PSI		
XIT GAS TEMP AI	11:45:00	202	1	DEG F	HI	HI
OT GAS TEMP AI	11:45:00	425	0	DEG F		LO
YSTEM FAN-A AI	11:45:00	143	0	AMPS		
EED RATE AI	11:45:00	11.72	1.83	TONS		
ILL DP AI	11:50:00	10.59	-0.01	PSI		
XIT GAS TEMP AI	11:50:00	201	-1	DEG F	HI	HI
OT GAS TEMP AI	11:50:00	424	-1	DEG F		LO
YSTEM FAN-A AI	11:50:00	142	-1	AMPS		
EED RATE AI	11:50:00	10.99	-0.73	TONS		
ILL DP AI	11:55:00	10.43	-0.16	PSI		
XIT GAS TEMP AI	11:55:00	201	0	DEG F	HI	HI
OT GAS TEMP AI	11:55:00	426	2	DEG F		LO
YSTEM FAN-A AI	11:55:00	144	2	AMPS		
EED RATE AI	11:55:00	8.42	-2.57	TONS		
ILL DP AI	12:00:00	10.50	0.07	PSI		
XIT GAS TEMP AI	12:00:00	201	0	DEG F	HI	HI
OT GAS TEMP AI	12:00:00	427	1	DEG F		LO
YSTEM FAN-A AI	12:00:00	143	-1	AMPS		
EED RATE AI	12:00:00	10.99	2.57	TONS		
ILL DP AI	12:05:00	10.41	-0.09	PSI		
XIT GAS TEMP AI	12:05:00	203	2	DEG F	HI	HI
OT GAS TEMP AI	12:05:00	427	0	DEG F		LO
YSTEM FAN-A AI	12:05:00	144	1	AMPS		
EED RATE AI	12:05:00	11.35	0.36	TONS		
ILL DP AI	12:10:00	10.59	0.18	PSI		
XIT GAS TEMP AI	12:10:00	203	0	DEG F	HI	HI
OT GAS TEMP AI	12:10:00	428	1	DEG F		LO
YSTEM FAN-A AI	12:10:00	143	-1	AMPS		
EED RATE AI	12:10:00	12.09	0.74	TONS		
ILL DP AI	12:15:00	10.41	-0.18	PSI		
XIT GAS TEMP AI	12:15:00	205	2	DEG F	HI	HI
OT GAS TEMP AI	12:15:00	428	0	DEG F		LO
YSTEM FAN-A AI	12:15:00	143	0	AMPS		
EED RATE AI	12:15:00	12.09	0.00	TONS		
ILL DP AI	12:20:00	10.69	0.28	PSI		
XIT GAS TEMP AI	12:20:00	205	0	DEG F	HI	HI
OT GAS TEMP AI	12:20:00	430	2	DEG F		LO
YSTEM FAN-A AI	12:20:00	144	1	AMPS		
EED RATE AI	12:20:00	9.89	-2.20	TONS		
ILL DP AI	12:25:00	10.38	-0.31	PSI		
XIT GAS TEMP AI	12:25:00	207	2	DEG F	HI	HI

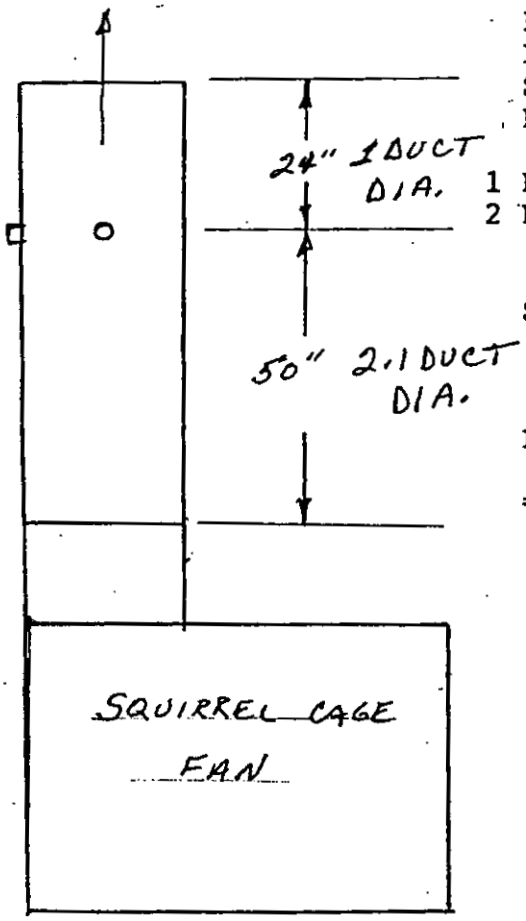
TAGID	TIME	READING	CHANGE	ENG	ALARM
HOT GAS TEMP AI	12:25:00	429	-1	DEG F	LO
SYSTEM FAN-A AI	12:25:00	144	0	AMPS	
FEED RATE AI	12:25:00	540.54	530.65	TONS	
MILL DP AI	12:30:00	10.40	0.02	PSI	
EXIT GAS TEMP AI	12:30:00	207	0	DEG F	HI HI
HOT GAS TEMP AI	12:30:00	428	-1	DEG F	LO
SYSTEM FAN-A AI	12:30:00	142	-2	AMPS	
FEED RATE AI	12:30:00	505.75	-34.79	TONS	
MILL DP AI	12:35:00	10.55	0.15	PSI	
EXIT GAS TEMP AI	12:35:00	208	1	DEG F	HI HI
HOT GAS TEMP AI	12:35:00	430	2	DEG F	LO
SYSTEM FAN-A AI	12:35:00	142	0	AMPS	
FEED RATE AI	12:35:00	9.89	-495.86	TONS	
MILL DP AI	12:40:00	10.40	-0.15	PSI	
EXIT GAS TEMP AI	12:40:00	208	0	DEG F	HI HI
HOT GAS TEMP AI	12:40:00	429	-1	DEG F	LO
SYSTEM FAN-A AI	12:40:00	143	1	AMPS	
FEED RATE AI	12:40:00	9.52	-0.37	TONS	
MILL DP AI	12:45:00	10.58	0.18	PSI	
EXIT GAS TEMP AI	12:45:00	208	0	DEG F	HI HI
HOT GAS TEMP AI	12:45:00	429	0	DEG F	LO
SYSTEM FAN-A AI	12:45:00	143	0	AMPS	
FEED RATE AI	12:45:00	11.72	2.20	TONS	
MILL DP AI	12:50:00	10.63	0.05	PSI	
EXIT GAS TEMP AI	12:50:00	208	0	DEG F	HI HI
HOT GAS TEMP AI	12:50:00	428	-1	DEG F	LO
SYSTEM FAN-A AI	12:50:00	141	-2	AMPS	
FEED RATE AI	12:50:00	11.72	0.00	TONS	
MILL DP AI	12:55:00	10.50	-0.13	PSI	
EXIT GAS TEMP AI	12:55:00	209	1	DEG F	HI HI
HOT GAS TEMP AI	12:55:00	429	1	DEG F	LO
SYSTEM FAN-A AI	12:55:00	140	-1	AMPS	
FEED RATE AI	12:55:00	9.16	-2.56	TONS	
MILL DP AI	13:00:00	10.47	-0.03	PSI	
EXIT GAS TEMP AI	13:00:00	209	0	DEG F	HI HI
HOT GAS TEMP AI	13:00:00	430	1	DEG F	LO
SYSTEM FAN-A AI	13:00:00	142	2	AMPS	
FEED RATE AI	13:00:00	10.62	1.46	TONS	
MILL DP AI	13:05:00	10.44	-0.03	PSI	
EXIT GAS TEMP AI	13:05:00	210	1	DEG F	HI HI
HOT GAS TEMP AI	13:05:00	428	-2	DEG F	LO
SYSTEM FAN-A AI	13:05:00	142	0	AMPS	
FEED RATE AI	13:05:00	8.06	-2.56	TONS	
MILL DP AI	13:10:00	10.50	0.06	PSI	
EXIT GAS TEMP AI	13:10:00	209	-1	DEG F	HI HI
HOT GAS TEMP AI	13:10:00	428	0	DEG F	LO
SYSTEM FAN-A AI	13:10:00	142	0	AMPS	
FEED RATE AI	13:10:00	9.16	1.10	TONS	
MILL DP AI	13:15:00	10.48	-0.02	PSI	
EXIT GAS TEMP AI	13:15:00	210	1	DEG F	HI HI

APPENDIX 6

PRELIM.DOC

PRELIMINARY STACK DATA

STACK GEOMETRY



Plant Name FRANKLIN
Plant Location SHERWOOD, TN
Sampling Location
Date 7/27/94

1 Nipple + Stack Wall(refrac.) 2 3/8 = 2.375
2 Nipple + Stack Wall(refrac.) + Stack I.D.

Stack I.D.(2-1) = 25.5

Point	% of Diameter	% of Diameter x I.D	Sample Location
1	2.1	0.54	2.92
2	6.7	1.71	4.09
3	11.8	3.01	5.4
4	17.7	4.51	6.89
5	25.0	6.38	9.55
6	35.6	9.08	11.83
7	64.4	16.48	16.45
8	75.0	19.13	21.51
9	82.3	20.99	23.37
10	88.2	22.49	24.87
11	93.3	23.79	26.17
12	97.9	24.96	27.34

18.80

Sketch of Stack Dimensions & Locations of Sampling Points

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APPENDIX 7

FRANKANA.CAL

SAMPLE ANALYTICAL DATA

CLIENT: FRANKLIN INDUSTRIAL MINERALS
SAMPLE LOCATION: ROLLER MILL BAGHOUSE EXHAUST
RELATIVE HUMIDITY: 41
DENSITY OF ACETONE (Pa) g/ml: 0.7857

SAMPLE TYPE:	Sample Identifiable	Liquid Level Marked and/or Container Sealed
ACETONE RINSE:	yes	yes
FILTER(S):	yes	yes

PROBE WASH:		Run 1	Run 2	Run 3
ACETONE RINSE CONTAINER #		18	30	34R
ACETONE RINSE VOLUME (Vaw)	ml	81	125	131
ACETONE RINSE RESIDUE CON. (Ca)	g/g	0	0	0
Wa = Ca*Va*Pa =	g	0	0	0
DATE: TIME:				
7-29-94 8A Gross Weight	g	67.5181	70.2399	68.3372
7-30-94 8A Gross Weight	g	67.5181	70.2398	68.3372
Ave. Gross Wt.	g	67.5181	70.2399	68.3372
Tare Wt.	g	67.5138	70.2365	68.3310
Less Acetone Blank Wt (Wa)	g	0.0000	0.0000	0.0000
Wt. of Part. in Acetone Rinse (Ma)	g	0.0043	0.0033	0.0062

FILTER CATCH:				
FILTER CONTAINER #		858	859	860
DATE: TIME:				
7-29-94 8A Gross Weight	g	0.3494	0.3389	0.3397
7-30-94 8A Gross Weight	g	0.3495	0.3388	0.3396
Ave. Gross Wt.	g	0.3495	0.3389	0.3397
Tare Wt.	g	0.3489	0.3380	0.3388
Wt. of Part. on Filter (mf)	g	0.0005	0.0008	0.0009
Wt. of Part. in Acetone Rinse (Ma)	g	0.0043	0.0033	0.0062
Total Weight of Part. (mn)	g	0.0049	0.0042	0.0070

ACETONE BLANK DATA

BLANK VOLUME (Va) ml 122

DATE: TIME:		
7-29-94 8A Gross Weight	g	65.9983
7-30-94 8A Gross Weight	g	65.9983
Ave Gross Weight	g	65.9983
Tare Wt.	g	65.9983
Weight of Blank (mab)	g	0

Ca = mab/(Va*Pa) = 0.00000000 g/g NOTE: Must not be >0.00001

B

METH5LAB.DOC

METHOD 5 LABORATORY SHEET

CLIENT: FRANKLIN INDUSTRIAL MINERALS
DATE: 7/27/94
SOURCE: ROLLER MILL
TIME FIRST WEIGHING: 7/29/94 8A
TIME SECOND WEIGHING: 7/30/94 8A

FILTERS

RUN #	FILTER #	TARE	FINAL	COMMENTS
1	858	0.3489	0.3494	0.3495
2	859	0.3380	0.3389	0.3388
3	860	0.3388	0.3397	0.3396
4				
5				
6				
7				

BEAKERS

RUN #	BEAKER #	TARE	FINAL	COMMENTS
1	18	67.5138	67.5181	67.5181
2	30	70.2365	70.2399	70.2398
3	34R	68.3310	68.3372	68.3372
4				
5	BLANK	65.9983	65.9983	65.9983
6				
7				

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APPENDIX 8

TENNESSEE AIR POLLUTION CONTROL DIVISION
SOURCE SAMPLING SECTION
Source Sampling Observation Report Sheet (Particulates)

Company Franklin Industrial Minerals Ref. No. 937547P
Source I.D. Roller Mill System with Flash Dryer Pneumatic Conveying System Cyclone & Baghouse
Test Conducted by Frank Ward & Co.
Person in Charge of Test Frank Ward
Observer Steve Morgan, Jimmy Hill
Run Number Observed 2, 3

Date 7/27/94 Time Test Observed 09:45 - 12:30

THIS REPORT SHEET IS AN EVALUATION OF SAMPLING PROCEDURES CONDUCTED AT THE ABOVE MENTIONED SITE. THIS EVALUATION COVERS ONLY GENERAL ITEMS OBVIOUS TO THE OBSERVER. THIS DOES NOT IN ANY WAY IMPLY THAT ALL TEST PROCEDURES ARE ACCURATE OR THAT THE TEST REPORT WILL BE ACCEPTED BY THE TAPCD. EVEN THOUGH THE FIELD PROCEDURE MAY BE ACCEPTABLE, INFORMATION PRESENTED IN THE TEST REPORT MAY RENDER THE ENTIRE TEST UNACCEPTABLE. THIS REPORT APPLIES ONLY TO THE TESTS ACTUALLY OBSERVED BY THE TAPCD OBSERVER.

PRELIMINARY DETERMINATIONS

Sampling Location	✓
Number of sample points	24
Velocity traverse	✓
Method of moisture determination	est.

SAMPLING

Leak check: pretest (specify Runs 2, 3)	OK, OK
post test (specify 2, 3)	OK, OK
Probe tip orientation	OK
Filter heated to minimum temp.	OK
Time sampled each point	2½
Accurately monitored train temps.	OK
Initial readings recorded	OK
Readings recorded if train shut down	
Final readings recorded	OK
Gas analysis (specify Max 5[redacted] Teledyne analyzer)	OK

PROCESS INFORMATION

Engineer Present (Name Rory Smith)

Pretest Agreement no

SAMPLING TRAIN

Basic Construction	OK
Probe Design	OK
Nozzle Condition	OK
Pitot Condition	OK
Filter	OK
Correct amt. H_2O and Silica Gel in impingers	OK

TRAIN BREAK-DOWN

Probe moved so as to not lose material	OK
Probe washed and brushed	OK
Acceptable container to store washings	OK
Reagent grade acetone used	OK
Blank of solutions taken	OK
Train re-set acceptably	O

CALIBRATION DATA

Proper calibration data available at site OK

Observer Peter Morgan Team Leader F. S. Ward

Original to observer; copy to team leader (to be submitted with test report)

PH-0463

APC 8/79