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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

100 Twin Coves Circle / Lenoir City, TN 37771 / (615) 986-9025 / FAX (615) 986-8810

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AUGUST 9, 1994


REPORT PREPARED BY:
FRANKLIN S. WARD
CONSULTING ENGINEER

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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

CLIENT: FRANKLIN MINERALS
DATE OF TEST: 7-27-94

SOURCE:

60 INCH RAYMOND ROLLER
MILL BAGHOUSE

	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. H2O)	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 1

FRANKLIN.CAL

METHOD 5 CALCULATION

=====

CLIENT: FRANKLIN MINERALS
DATE OF TEST: 7-27-94

SOURCE:

60 INCH RAYMOND ROLLER
MILL BAGHOUSE

DATA

	RUN 1	RUN 2	RUN 3	AVERAGE
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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

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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 2

CLIENT: FIRANKLIN IND. MINERALS
 LOCATION: 66" RAYMOND ROLLER MILL
 RUN #: 1 RGHE. EXH. STACK
 DATE: 7/27/94
 BARO. PRESSURE: 28.82
 OPERATOR: FJW
 METER BOX #: 11
 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

BEGINNING METER READING: 453.263 Ft³ K Factor

POINT	TIME	DRY GAS METER CF	PITOT "H ₂ O Del. P	DELTA H DESIRED	"H ₂ O ACTUAL	TEMPERATURE INLET	OUTLET	PUR 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	467.39	0.55	0.87	0.87			1.0
			7.8549	8.1		1035		
1	2.5	480.01	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
 LOCATION: 66" Raymond Roller Mill
 RUN #: 2
 DATE: 7/27/94
 BARO. PRESSURE: 28.82
 OPERATOR: FW
 METER BOX #: 25
 FILTER: 859

MINERALS
MATERIALS

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

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

BEFORE TEST PITOT CHECK OK @ 4 ''H2
 BEFORE TEST LEAK CHECK 0.6 CFM @ 13 ''
 AFTER TEST LEAK CHECK 0.0 CFM @ 10 ''
 AFTER TEST PITOT CHECK OK @ 2.5 ''H20

BEGINNING METER READING: 488.700 Ft3 K Factor

POINT	TIME	DRY GAS METER CF	PITOT ''H2O Del. P	DELTA H DESIRED	''H2O ACTUAL	TEMPERATURE INLET	OUTLET	PU IN E
1	2.5	491.69	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	2.
B 6	15.0	504.72	1.0	1.60	1.60			2.
7	17.5	505.70	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	0.23	0.23	114	99	1.
12	30.0	509.573	0.19	0.31	0.31			1.
			11.1628	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	0.45	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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CLIENT: FRANKLIN INO. MINERALS
 LOCATION: 86ME EXH. STACK
 RUN #: 3
 DATE: 7/27/94
 BARO. PRESSURE: 28.82
 OPERATOR: FJW
 METER BOX #: 22
 FILTER: 860

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

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

BEFORE TEST PITOT CHECK OK @ 4 "H2O
 BEFORE TEST LEAK CHECK 0.0 CFM @ 13 "
 AFTER TEST LEAK CHECK 0.2 CFM @ 10 "
 AFTER TEST PITOT CHECK OK @ 3 "H2O

BEGINNING METER READING: 524.045 Ft3 K Factor _____

POINT	TIME	DRY GAS METER CF	PITOT "H2O Del. P	DELTA H "H2O DESIRED	DELTA H "H2O ACTUAL	TEMPERATURE INLET	TEMPERATURE OUTLET	PUI 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	101	100	1.6
3	7.5	527.49	0.43	0.68	0.68	110	100	2.0
4	10.0	528.08	0.47	0.75	0.75	114	100	1.2
5	12.5	530.08	0.47	0.75	0.75	114	100	1.2
A 6	15.0	531.15	0.33	0.52	0.52	116	100	1.0
7	17.5	533.16	0.21	0.37	0.37	116	100	1.0
8	20.0	534.20	0.27	0.43	0.43	118	100	1.0
9	22.5	534.20	0.35	0.56	0.56	118	100	1.0
10	25.0	535.43	0.45	0.70	0.70	120	101	1.6
11	27.5	537.43	0.62	0.98	0.98	120	101	1.2
12	30.0	538.375	0.62	0.98	0.98	120	101	1.2
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	122	104	4.0
3	7.5	547.16	2.4	3.8	3.8	130	105	5.0
4	10.0	549.91	2.0	3.2	3.2	132	105	3.0
5	12.5	551.89	1.5	2.4	2.4	132	105	3.0
B 6	15.0	553.65	0.35	1.35	1.35	125	105	1.0
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	121	106	1.0
9	22.5	556.55	0.10	1.6	1.6	121	106	1.0
10	25.0	557.32	0.13	0.21	0.21	120	106	1.0
11	27.5	558.143	0.15	0.24	0.24	120	106	1.0
12	30.0	558.143	0.19	0.30	0.30	120	106	1.0

Vm = 34.048
 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%
CALIBRATION #1	20.9	<u>20.9</u>
CALIBRATION #2	20.9	<u>20.9</u>
CALIBRATION #3	20.9	<u>20.9</u>
CALIBRATION #4	20.9	<u>20.9</u>

TYPE OF FUEL: PROPANE

RUN 1

CO2	<u>0.5</u>	<u> </u>	<u> </u>
O2	<u>20.1</u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

RUN 2

CO2	<u>0.5</u>	<u> </u>	<u> </u>
O2	<u>20.1</u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

RUN 3

CO2	<u>0.5</u>	<u> </u>	<u> </u>
O2	<u>20.2</u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

RUN 4

CO2	<u> </u>	<u> </u>	<u> </u>
O2	<u> </u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

RUN 5

CO2	<u> </u>	<u> </u>	<u> </u>
O2	<u> </u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

RUN 6

CO2	<u> </u>	<u> </u>	<u> </u>
O2	<u> </u>	<u> </u>	<u> </u>
CO	<u> </u>	<u> </u>	<u> </u>

CLIENT: Franklin Minerals SOURCE: _____
DATE: 7/27/94
BARO. PRESSURE: _____RUN # 1
FILTER # 858RUN # 2
FILTER # 859

W3-08 98-									
POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP	POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0	152	248°	62	1	0	156	248°	64
2	2:15		+02-		2	2:15		+02-	
3	4:45	152	10'	62	3	4:45	157	10'	64
4	7:15				4	7:15			
5	9:45	153		62	5	9:45	158		64
6	12:15				6	12:15			
7	14:45	152		62	7	14:45	160		64
8	17:15				8	17:15			
9	19:45	152		64	9	19:45	160		66
10	22:15				10	22:15			
11	24:45	153		64	11	24:45	162		64
12	27:15				12	27:15			
xxxxxx					xxxxxx				
1	0	154		64	1	0	158		66
2	2:15				2	2:15			
3	4:45	154		64	3	4:45	160		66
4	7:15				4	7:15			
5	9:45	155		64	5	9:45	160		66
6	12:15				6	12:15			
7	14:45	155		66	7	14:45	162		64
8	17:15				8	17:15			
9	19:45	158		66	9	19:45	163		64
10	22:15				10	22:15			
11	24:45	158		66	11	24:45	163		64
12	27:15				12	27:15			

AVERAGE STACK TEMP. 153.8AVERAGE STACK TEMP. 159.9

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ mlORSAT
=====BEGINNING LEAK CHECK OK @ _____ 'Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ _____ 'Hg

MOISTURE APPROXIMATION

1 _____ ml
2 _____ ml
3 _____ ml
TOTAL _____ - 200 = _____ mlORSAT
=====BEGINNING LEAK CHECK OK @ _____ 'Hg
PURGE ORSAT _____
CONNECT ORSAT BAG _____
STOP ORSAT _____
ENDING LEAK CHECK OK @ _____ 'Hg

CLIENT:

Franklin Industrial Minerals

SOURCE:

DATE:

7/27/94

BARO. PRESSURE:

RUN #

3

FILTER #

860

RUN #

FILTER #

POINT	TIME	STACK TEMP.	HOT BOX TEMP	IMP. TEMP
1	0	<u>155</u>	<u>248</u>	<u>66</u>
2	2;15		<u>102</u>	
3	4;45	<u>144</u>	<u>10</u>	<u>66</u>
4	7;15	<u>157</u>		
5	9;45	<u>160</u>		<u>66</u>
6	12;15	<u>164</u>		
7	14;45	<u>164</u>		<u>66</u>
8	17;15	<u>165</u>		
9	19;45	<u>165</u>		<u>66</u>
10	22;15	<u>166</u>		
11	24;45	<u>168</u>		<u>66</u>
12	27;15	<u>168</u>		
xxxxxx				
1	0	<u>150</u>		<u>66</u>
2	2;15			
3	4;45	<u>155</u>		<u>66</u>
4	7;15			
5	9;45	<u>163</u>		<u>68</u>
6	12;15			
7	14;45	<u>166</u>		<u>68</u>
8	17;15			
9	19;45	<u>166</u>		<u>68</u>
10	22;15			
11	24;45	<u>168</u>		<u>68</u>
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

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			
xxxxxx				
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

APPENDIX 3

MOISTURE.DOC

SAMPLE RECOVERY AND INTEGRITY DATA SHEET

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

1) 217 ml MOISTURE
 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 # 7CLM-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 7CLM-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

SAMPLE RECOVERY AND INTEGRITY DATA SHEET
=====

Plant Franklin Indus. Minerals Sample Date 9/27/94
Sample Location 66" R.R.M. Run # 2
Sample Recovery Person CPW Recovery Date 7/27/94
Filter Number(s) 859

1) 228 ml MOISTURE
2) 228 ml -----
3) 228 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 # FIL M - 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 FIL M - B Liquid level marked? ✓

Samples stored and locked? ✓

Date of laboratory custody 7/27/94

Laboratory personnel taking custody FSW

Comments:

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

1) 220 ml MOISTURE
2) 220 ml -----
3) 220 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 mostly blue
Description of impinger water clear

RECOVERED SAMPLE

Blank filter container # Film-B Sealed ☒
Filter container # 860 Sealed ☒
Description of particulate on filter nt. visible

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

Acetone blank container number Film-B Liquid level marked? ☒

Samples stored and locked? ☒

Date of laboratory custody 7/27/94

Laboratory personnel taking custody FSW

Comments:

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 CALIBRATION:
3-3-94

73 IN. EFFECTIVE - 6 FT.

120 IN. EFFECTIVE - 10 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/

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

36 IN. EFFECTIVE - 3 FT. #2

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%

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 CALIBRATION:
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 7/27/94CALIBRATED 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. L. 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.).

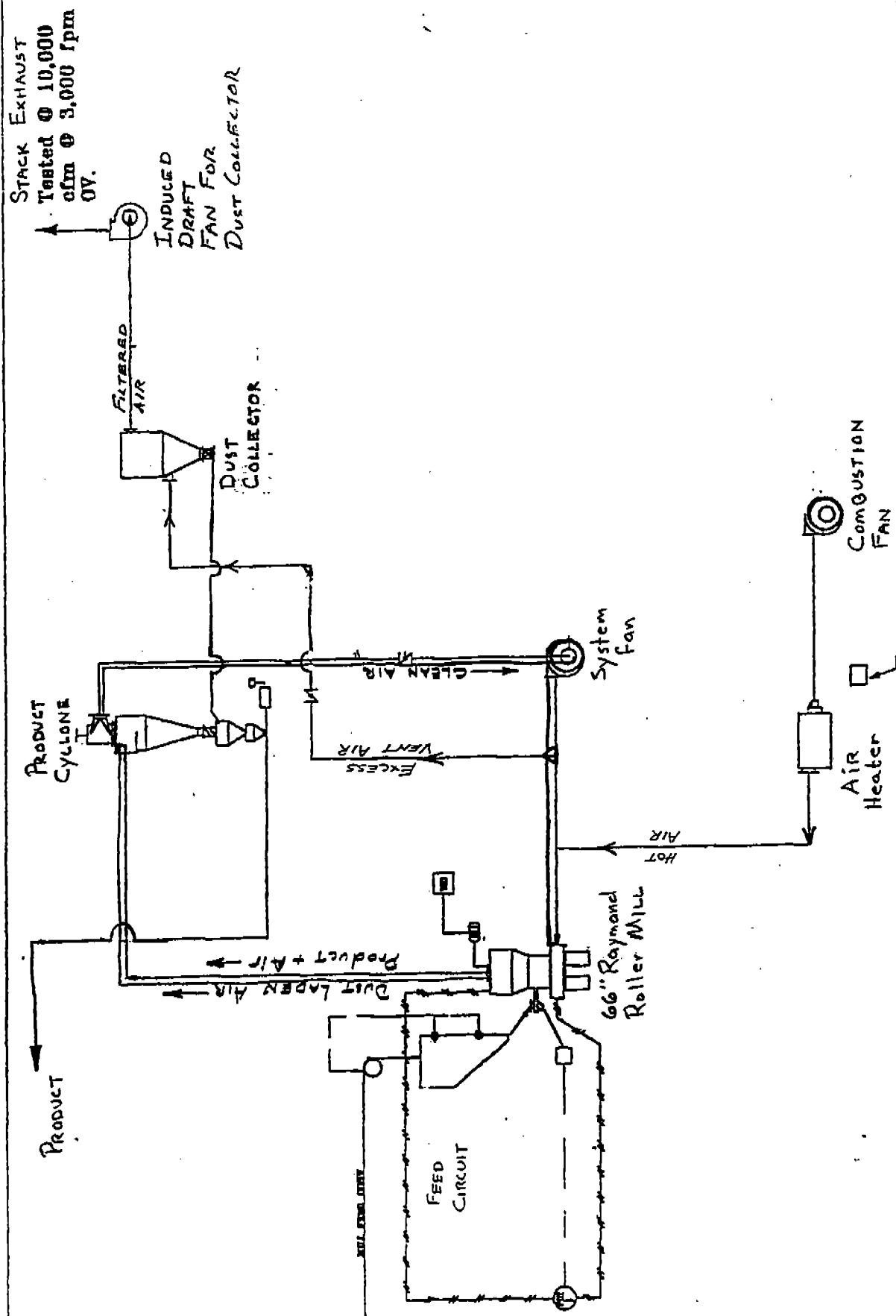
During the actual testing of the exhaust stack, the following parameters were monitored and recorded via the DOS based PC system (see attached print-out *):

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	
DATE	TIME
11/18/58	11:00 PM
ROLLERS MILL LTD	
ANDERSON, BUTLER, WIL	

ALL DP AI	07:30:00	0.04	0.04	PSI	LO LO
MIT GAS TEMP AI	07:30:00	129	129	DEG F	
OT 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			
ALL DP AI	07:35:00	3.66	3.62	PSI	LO LO
MIT GAS TEMP AI	07:35:00	97	-32	DEG F	LO
OT 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	
ALL DP AI	07:40:00	6.21	2.55	PSI	LO
MIT GAS TEMP AI	07:40:00	130	33	DEG F	
OT 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	
ALL DP AI	07:45:00	9.82	3.61	PSI	
MIT GAS TEMP AI	07:45:00	156	26	DEG F	
OT 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	
ALL DP AI	07:50:00	10.70	0.88	PSI	
MIT GAS TEMP AI	07:50:00	153	-3	DEG F	
OT 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	
ALL DP AI	07:55:00	10.63	-0.07	PSI	
MIT GAS TEMP AI	07:55:00	155	2	DEG F	
OT 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	
ALL DP AI	08:00:00	10.61	-0.02	PSI	
MIT GAS TEMP AI	08:00:00	159	4	DEG F	
OT 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	
ALL DP AI	08:05:00	10.71	0.10	PSI	
MIT GAS TEMP AI	08:05:00	162	3	DEG F	
OT 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	
ALL DP AI	08:10:00	10.59	-0.12	PSI	
MIT GAS TEMP AI	08:10:00	165	3	DEG F	
OT 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	
ALL DP AI	08:15:00	10.60	0.01	PSI	
MIT GAS TEMP AI	08:15:00	167	2	DEG F	
OT GAS TEMP AI	08:15:00	416	2	DEG F	LO
STEM FAN-A AI	08:15:00	147	0	AMPS	

SED RATE AI	08:15:00	538.70	529.54	TONS	
ILL DP AI	08:20:00	10.68	0.08	PSI	
XIT GAS TEMP AI	08:20:00	169	2	DEG F	
OT GAS TEMP AI	08:20:00	416	0	DEG F	LO
YSTEM FAN-A AI	08:20:00	146	-1	AMPS	
SED RATE AI	08:20:00	521.86	-16.84	TONS	
ILL DP AI	08:25:00	10.54	-0.14	PSI	
XIT GAS TEMP AI	08:25:00	171	2	DEG F	
OT GAS TEMP AI	08:25:00	417	1	DEG F	LO
YSTEM FAN-A AI	08:25:00	145	-1	AMPS	
SED RATE AI	08:25:00	11.35	-510.51	TONS	
ILL DP AI	08:30:00	10.58	0.04	PSI	
XIT GAS TEMP AI	08:30:00	173	2	DEG F	
OT GAS TEMP AI	08:30:00	417	0	DEG F	LO
YSTEM FAN-A AI	08:30:00	146	1	AMPS	
SED RATE AI	08:30:00	11.35	0.00	TONS	
ILL DP AI	08:35:00	10.61	0.03	PSI	
XIT GAS TEMP AI	08:35:00	173	0	DEG F	
OT GAS TEMP AI	08:35:00	416	-1	DEG F	LO
YSTEM FAN-A AI	08:35:00	146	0	AMPS	
SED RATE AI	08:35:00	8.79	-2.56	TONS	
ILL DP AI	08:40:00	10.71	0.10	PSI	
XIT GAS TEMP AI	08:40:00	175	2	DEG F	
OT GAS TEMP AI	08:40:00	419	3	DEG F	LO
YSTEM FAN-A AI	08:40:00	147	1	AMPS	
SED RATE AI	08:40:00	9.89	1.10	TONS	
ILL DP AI	08:45:00	10.63	-0.08	PSI	
XIT GAS TEMP AI	08:45:00	176	1	DEG F	
OT GAS TEMP AI	08:45:00	416	-3	DEG F	LO
YSTEM FAN-A AI	08:45:00	147	0	AMPS	
SED RATE AI	08:45:00	10.62	0.73	TONS	
ILL DP AI	08:50:00	10.63	0.00	PSI	
XIT GAS TEMP AI	08:50:00	176	0	DEG F	
OT GAS TEMP AI	08:50:00	419	3	DEG F	LO
YSTEM FAN-A AI	08:50:00	146	-1	AMPS	
SED RATE AI	08:50:00	11.35	0.73	TONS	
ILL DP AI	08:55:00	10.57	-0.06	PSI	
XIT GAS TEMP AI	08:55:00	178	2	DEG F	
OT GAS TEMP AI	08:55:00	419	0	DEG F	LO
STEM 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	STATUS
FEED RATE AI	09:05:00	9.16	-0.36	TONS	
MILL DP AI	09:10:00	10.52	0.09	PSI	
EXIT GAS TEMP AI	09:10:00	182	2	DEG F	
ROT GAS TEMP AI	09:10:00	419	-1	DEG F	LO
SYSTEM FAN-A AI	09:10:00	145	-1	AMPS	
FEED RATE AI	09:10:00	8.42	-0.74	TONS	
MILL DP AI	09:15:00	10.54	0.02	PSI	
EXIT GAS TEMP AI	09:15:00	183	1	DEG F	
ROT GAS TEMP AI	09:15:00	421	2	DEG F	LO
SYSTEM FAN-A AI	09:15:00	146	1	AMPS	
FEED RATE AI	09:15:00	11.72	3.30	TONS	
MILL DP AI	09:20:00	10.66	0.12	PSI	
EXIT GAS TEMP AI	09:20:00	183	0	DEG F	
ROT GAS TEMP AI	09:20:00	421	0	DEG F	LO
SYSTEM FAN-A AI	09:20:00	146	0	AMPS	
FEED RATE AI	09:20:00	11.72	0.00	TONS	
MILL DP AI	09:25:00	10.70	0.04	PSI	
EXIT GAS TEMP AI	09:25:00	183	0	DEG F	
ROT GAS TEMP AI	09:25:00	420	-1	DEG F	LO
SYSTEM FAN-A AI	09:25:00	145	-1	AMPS	
FEED RATE AI	09:25:00	11.35	-0.37	TONS	
MILL DP AI	09:30:00	10.63	-0.07	PSI	
EXIT GAS TEMP AI	09:30:00	186	3	DEG F	
ROT GAS TEMP AI	09:30:00	422	2	DEG F	LO
SYSTEM FAN-A AI	09:30:00	144	-1	AMPS	
FEED RATE AI	09:30:00	11.72	0.37	TONS	
MILL DP AI	09:35:00	10.56	-0.07	PSI	
EXIT GAS TEMP AI	09:35:00	186	0	DEG F	
ROT GAS TEMP AI	09:35:00	422	0	DEG F	LO
SYSTEM FAN-A AI	09:35:00	145	1	AMPS	
FEED RATE AI	09:35:00	8.42	-3.30	TONS	
MILL DP AI	09:40:00	10.67	0.11	PSI	
EXIT GAS TEMP AI	09:40:00	188	2	DEG F	
ROT GAS TEMP AI	09:40:00	424	2	DEG F	LO
SYSTEM FAN-A AI	09:40:00	145	0	AMPS	
FEED RATE AI	09:40:00	491.83	483.41	TONS	
MILL DP AI	09:45:00	10.70	0.03	PSI	
EXIT GAS TEMP AI	09:45:00	189	1	DEG F	
ROT GAS TEMP AI	09:45:00	421	-3	DEG F	LO
SYSTEM FAN-A AI	09:45:00	145	0	AMPS	
FEED RATE AI	09:45:00	8.79	-483.04	TONS	
MILL DP AI	09:50:00	10.63	-0.07	PSI	
EXIT GAS TEMP AI	09:50:00	191	2	DEG F	
ROT GAS TEMP AI	09:50:00	423	2	DEG F	LO
SYSTEM FAN-A AI	09:50:00	144	-1	AMPS	
FEED RATE AI	09:50:00	10.99	2.20	TONS	
MILL DP AI	09:55:00	10.56	-0.07	PSI	
EXIT GAS TEMP AI	09:55:00	191	0	DEG F	
ROT GAS TEMP AI	09:55:00	420	-3	DEG F	LO
SYSTEM FAN-A AI	09:55:00	145	1	AMPS	

FEED RATE AI	09:55:00	12.09	1.10	TONS	
WILL 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	
WILL 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	
WILL 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	
WILL 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	
WILL 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	
WILL 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	
WILL 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
WILL 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	
WILL 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	
WILL 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

TAG ID	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	
WILL DP AI	10:50:00	10.61	0.00	PSI	
EXIT GAS TEMP AI	10:50:00	197	2	DEG F	HI
NOT 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	
WILL DP AI	10:55:00	10.63	0.02	PSI	
EXIT GAS TEMP AI	10:55:00	198	1	DEG F	HI
NOT 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
WILL DP AI	11:00:00	10.65	0.02	PSI	
EXIT GAS TEMP AI	11:00:00	199	0	DEG F	HI HI
NOT 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	
WILL DP AI	11:05:00	10.61	-0.04	PSI	
EXIT GAS TEMP AI	11:05:00	200	1	DEG F	HI HI
NOT 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	
WILL DP AI	11:10:00	10.59	-0.02	PSI	
EXIT GAS TEMP AI	11:10:00	200	0	DEG F	HI HI
NOT 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	
WILL DP AI	11:15:00	10.53	-0.06	PSI	
EXIT GAS TEMP AI	11:15:00	202	2	DEG F	HI HI
NOT 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	
WILL DP AI	11:20:00	10.63	0.10	PSI	
EXIT GAS TEMP AI	11:20:00	201	-1	DEG F	HI HI
NOT 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	
WILL DP AI	11:25:00	10.67	0.04	PSI	
EXIT GAS TEMP AI	11:25:00	201	0	DEG F	HI HI
NOT 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	
WILL DP AI	11:30:00	10.59	-0.08	PSI	
EXIT GAS TEMP AI	11:30:00	201	0	DEG F	HI HI
NOT 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	
WILL 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

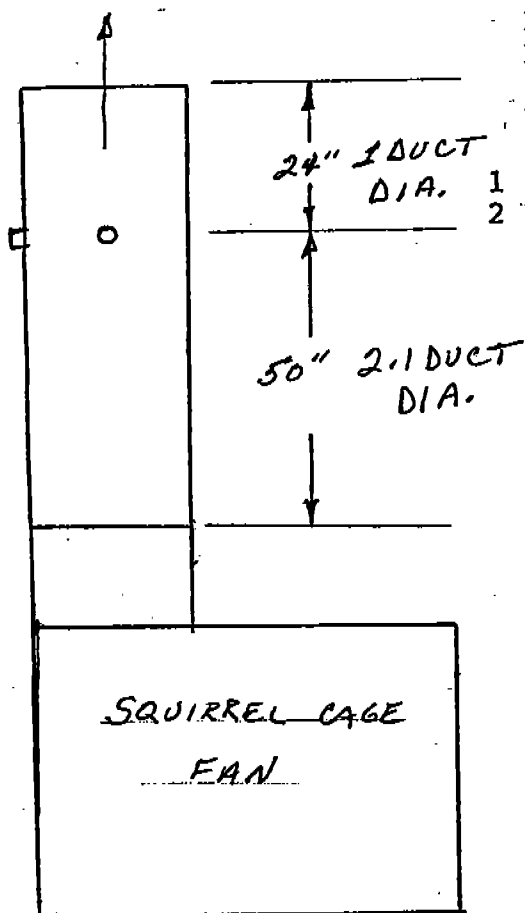
FIELD	TIME	READING	CHANGE	UNIT	ALARM
HOT GAS TEMP AI	12:25:00	429	-1	DEG F	LO
SYSTEM FAN-A AI	12:25:00	144	0	AMPS	
FEED RATE AI	12:25:00	540.54	530.65	TONS	
MILL DP AI	12:30:00	10.40	0.02	PSI	
EXIT GAS TEMP AI	12:30:00	207	0	DEG F	HI HI
HOT GAS TEMP AI	12:30:00	428	-1	DEG F	LO
SYSTEM FAN-A AI	12:30:00	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.) $23/8 = 2.375$
 2 Nipple + Stack Wall (refrac.) +
 Stack I.D. _____

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

% of Point Diameter x I.D. % of Diameter 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

Frank Ward & Co.
 100 Twin Cove Dr.
 Lenoir City, TN 37771

(615)986-9025

APPENDIX 7

FRANKANA.CAL

SAMPLE ANALYTICAL DATA

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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

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

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
-----	-----	-----	-----	-----
<u>1</u>	<u>858</u>	<u>0.3489</u>	<u>0.3494</u>	<u>0.3495</u>
<u>2</u>	<u>859</u>	<u>0.3380</u>	<u>0.3389</u>	<u>0.3388</u>
<u>3</u>	<u>860</u>	<u>0.3388</u>	<u>0.3397</u>	<u>0.3396</u>
<u>4</u>	_____	_____	_____	_____
<u>5</u>	_____	_____	_____	_____
<u>6</u>	_____	_____	_____	_____
<u>7</u>	_____	_____	_____	_____

BEAKERS
=====

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

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APPENDIX 8

