Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section Number: 9.10.1.2

Reference Number: 21

Title: Unit Nos. 1 and 2 Pulp Dryer Stacks Emission Testing Results for the February 22-26, 1993, Testing of Particulate Conducted at the American Crystal Sugar Company, Crookston, Minnesota

Bay West, Inc.

Bay West, Inc.

April 1993

Bay West

AP-42 Section 9.10.1.2
Reference 21
Report Sect.
Reference

Unit Nos. 1 and 2 Pulp Dryer Stacks
EMISSION TESTING RESULTS
for the
Feburary 22-26, 1993 Testing of
Particulate

conducted at the

American Crystal Sugar Company
Crookston, Minnesota

Submitted to:

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American Crystal Sugar Company
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Crookston, Minnesota 56716

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April 15, 1993
Project No. BW920441

Bay West

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1.0 EXECUTIVE SUMMARY

Bay West, Incorporated (Bay West) was contracted by American Crystal Sugar Company to perform particulate emissions compliance testing on the Unit Nos. 1 and 2 Pulp Dryer Stacks at the American Crystal Sugar Company facility located in Crookston, Minnesota. This series of testing was performed on Feburary 22-26, 1993. The results are summarized in the following table:

TEST RESULTS SUMMARY

SITE	PARAMETER	AVERAGE CONCENTRATION	AVERAGE MASS RATE
*Test No. 1 Unit No. 1 Pulp Dryer Stack	Particulate	0.1072 gr/dscf	21.266 lb/hr 19.057
Test No. 2 Unit No. 1 Pulp Dryer Stack	Particulate	0.0710 gr/dscf	18.047 lb/hr
Test No. 3 Unit No. 2 Pulp dryer Stack	Particulate	0.0747 gr/dscf	15.091 lb/hr
Test No. 4 Unit No. 2 Pulp dryer Stack	Particulate	0.0487 gr/dscf	10.469 lb/hr 12.65
Test No. 5 Unit No. 2 Pulp dryer Stack	Particulate	0.0564 gr/dscf	12.391 lb/hr

* Run No. 3 was not conducted on test No. 1 because of Dryer System failure

2.0 INTRODUCTION

Bay West personnel conducted particulate emission compliance testing on the Unit Nos. 1 and 2 Pulp Dryer Stacks at the American Crystal Sugar Company located in Crookston, Minnesota. On-site testing was performed on Feburary 22-26, 1993 by a two-member Bay West team consisting of Dwayne Smith and Dan Phipps. Coordination between the facility operations and testing activities was provided by Dave Noble of the Crookston facility through direct contact with the test team leader. The testing consisted of multiple independent 96-minute determinations for particulate with concurrent integrated gas sampling for Orsat analyses at each site.

The objectives of this project were to quantify particulate emissions and compare them to applicable air emissions regulations stipulated by state and federal guidelines. Special provisions for this testing included, but were not limited to, operating the facility at or near maximum capacity.

Results are reported in the next section followed by an explanation of the test procedures used and a description of the process under investigation. All supporting information is included in the appendices.

3.0 RESULTS

Results of particulate determinations and gas composition are found in Tables 1 through 10. The results of additional air flow profiles taken at the Dryer Aspiration Ducts and the Recycle Ducts are found in Appendix 6.

Test No. 1, Run No. 3, was cancelled due to dryer disturbances but no problems were encountered in the sampling or analyses of emission samples on the other tests. After complete review of the test results, we believe that the values reported herein are an accurate representation of the actual source conditions during the time of testing.

4.0 TEST PROCEDURES

Testing on the Unit No. 1 Pulp Dryer Stack was performed from two test ports oriented at 90 degrees, approximately four duct diameters downstream of the straightening vanes and approximately eight duct diameters upstream of the duct outlet. The duct dimensions at the point of testing were verified on site and found to be 60 inches in diameter. A 24-point traverse was used to extract the representative gas samples. Each traverse point was sampled for four minutes for a run duration of 96 minutes.

Testing on the Unit No. 2 Pulp Dryer Stack was performed from two test ports oriented at 90 degrees, approximately five duct diameters downstream of the straightening vanes and approximately ten duct diameters upstream of the duct outlet. The duct dimensions at the point of testing were verified on site and found to be 47.5 inches in diameter. A 24-point traverse was used to extract the representative gas samples. Each traverse point was sampled for four minutes for a run duration of 96 minutes. A test port location schematic is included in Figures 1 and 2.

Particulate testing was conducted according to EPA Methods 1-5, 40 CFR 60 Appendix A. Using traverse points determined by EPA Method 1, a preliminary velocity profile was obtained with respect to velocity traverse, gas temperature, gas pressure, and the estimated gas moisture content. From these data, sampling nozzles of the appropriate diameter to ensure isokinetic sampling were selected.

The particulate sampling train consisted of a temperature-controlled glass-lined sampling probe equipped with an S-type pitot tube and Type K thermocouple. The sampling probe was attached to the sampling module which contained the all-glass in-line filter assembly in a temperature-controlled oven. The back half of the sampling train consisted of a series of glass impingers followed by a tared desiccant-packed drying column. The sampling train was connected to an Anderson control module by means of an umbilical cord. The control module housed a temperature-monitored dry gas meter a calibrated orifice, dual-inclined oil manometers, temperature controllers and necessary flow rate control devices.

Particulate samples were collected by isokinetically extracting a sample gas stream by means of the sampling probe and passing the stream through the glass-fiber filter, the ice-cooled impinger assembly, and the packed drying column which collects all of the moisture remaining in the stream. The gas was then passed through a leakless sampling pump and a dry test gas meter

which integrated the sample volume throughout the testing. A calibrated orifice is connected to the gas meter outlet to facilitate sample flow rate adjustment.

Representative particulate samples were collected by sampling the centroid of equal area sections of the duct for equal time periods. The sampling rate at each point was adjusted to maintain isokinetic sampling. Pre-programed hand-held computers were used to facilitate rapid determination of the correct sampling rate.

Integrated gas samples were collected concurrently with the particulate samples to determine gas composition and molecular weight of the flue gas. To accomplish this, gas samples were collected in Tedlar™ bags throughout the duration of testing and later analyzed by chemical adsorption using an Orsat gas analyzer.

At the end of each particulate run, the sampling train was disassembled and the samples were recovered. The sampling filter was transferred from the filter holder to its dedicated petri dish. The nozzle was acetone-rinsed, brushed, and rinsed again while the washings were collected in a labeled container. The probe was similarly cleaned, acetone-rinsed, brushed, and its washings transferred to the same polyethylene container. The filter holder was wiped free of silicone grease, acetone-rinsed, brushed, rinsed again, and these washings were also added to the probe wash container. The probe wash container was capped, and the liquid level was marked for transport. The impinger catch volume was determined to the nearest milliliter using a graduated cylinder. The impinger catch is transferred to a separate polyethylene container, capped, and the liquid level marked. The desiccant-packed drying column was weighed in the field to the nearest 0.5 grams and the weight of the absorbed moisture was determined.

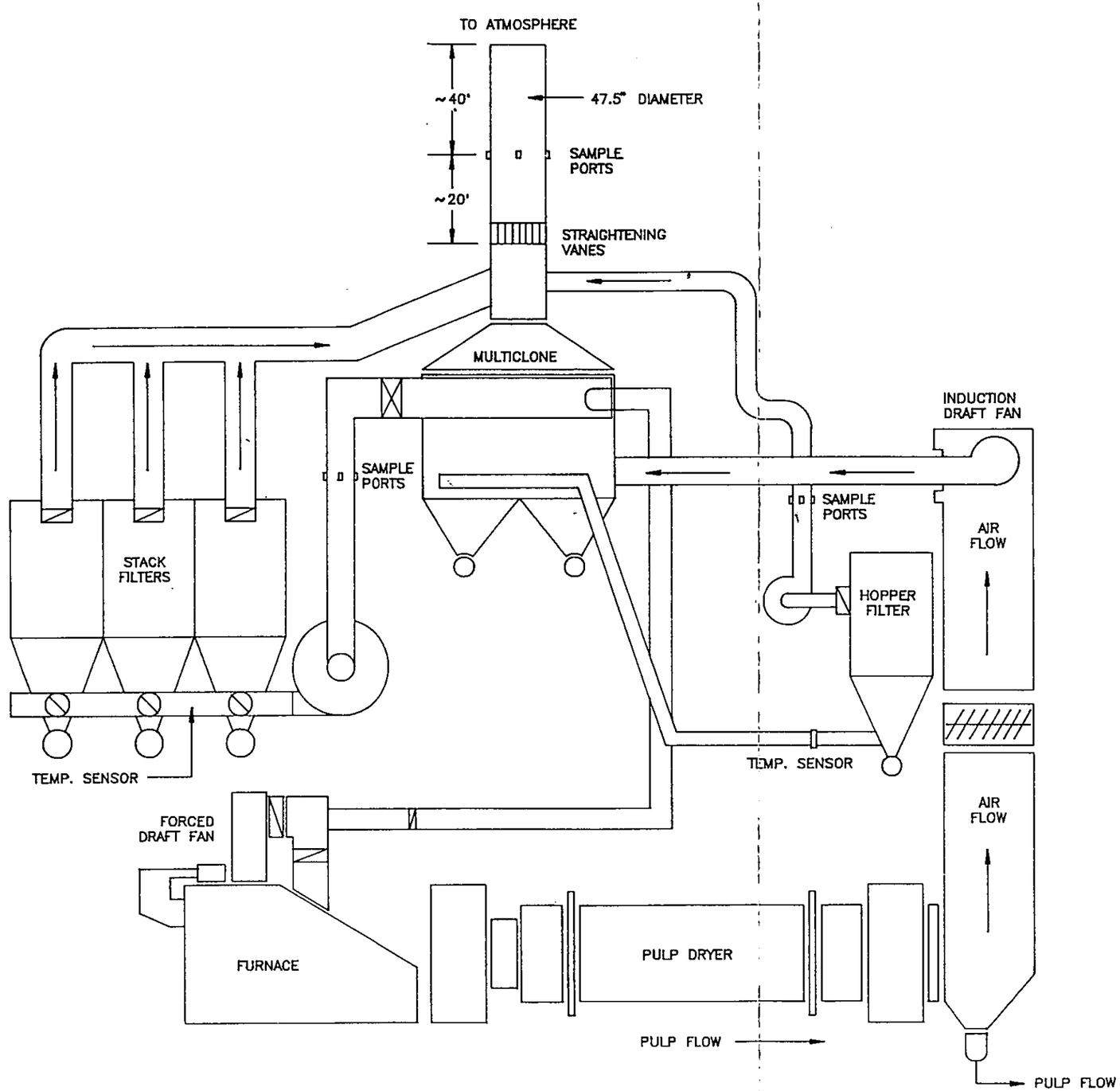
Particulate samples were transported to the laboratory and prepared for analysis. Filters were desiccated for 24 hours and weighted to a constant weight and the results were recorded to the nearest 0.1 mg. Probe wash samples were evaporated at ambient temperatures to dryness in tared evaporating dishes. They were then desiccated for 24 hours and weighed to a constant weight. Results were reported to the nearest 0.1 mg.

Organic condensible particulates were collected in a series of three ice-cooled glass impingers in the back half of the Method 5 sampling train. The first two impingers were prepared with 100 mls of deionized water each while the third impinger was left dry. After sampling, the volume of condensate in the impingers was recorded and the contents transferred to a polyethylene sample container.

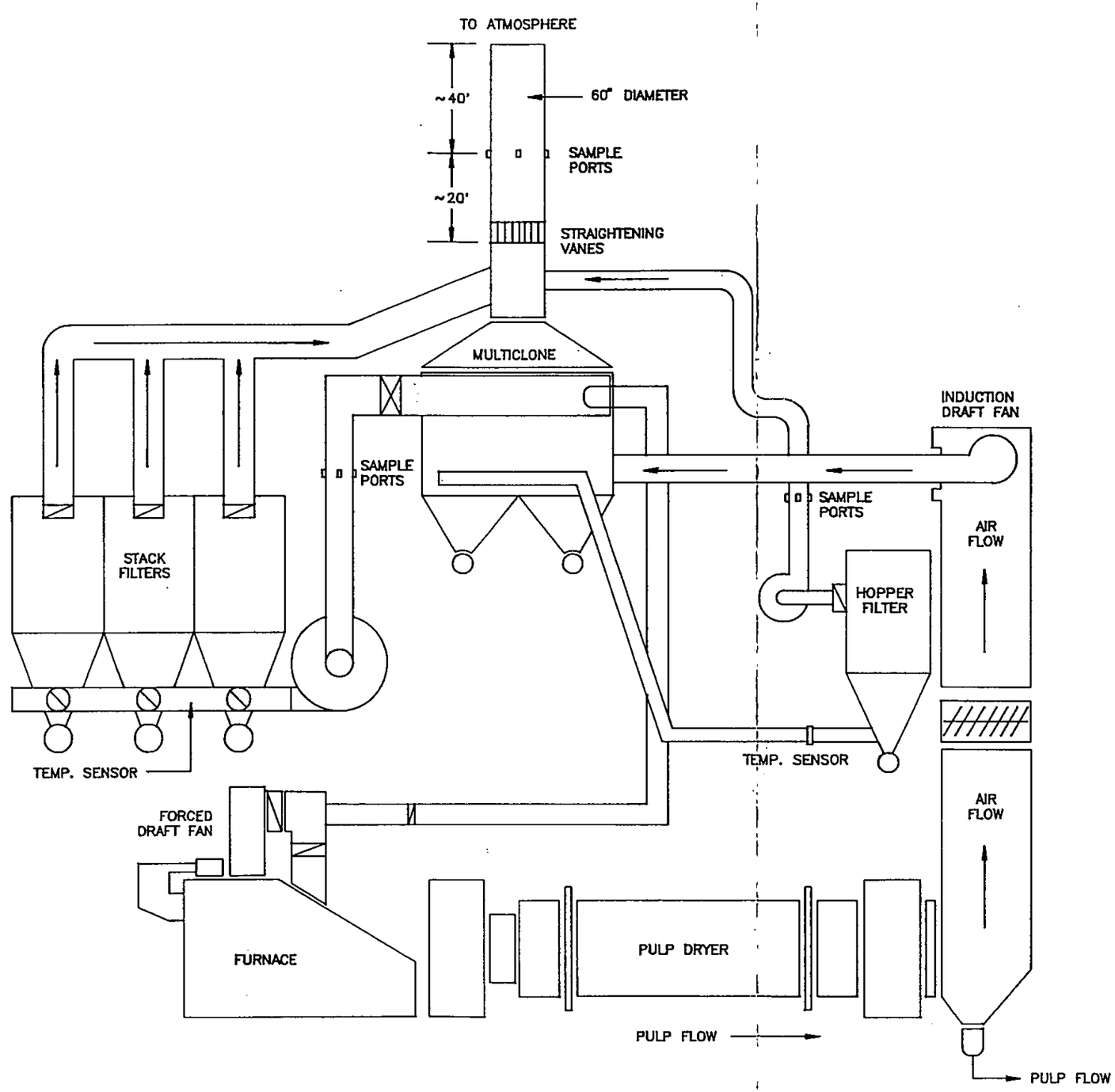
The wet catch was analyzed for condensible organic particulate via a chloroform/diethyl ether extraction. Three 25-ml portions of diethyl ether were used in the extraction which were then evaporated at room temperature and desiccated to a constant weight. Gravimetric results were then added to the dry catch results (filter and probe wash explained above) to calculate the final particulate concentrations.

5.0 PROCESS DESCRIPTION

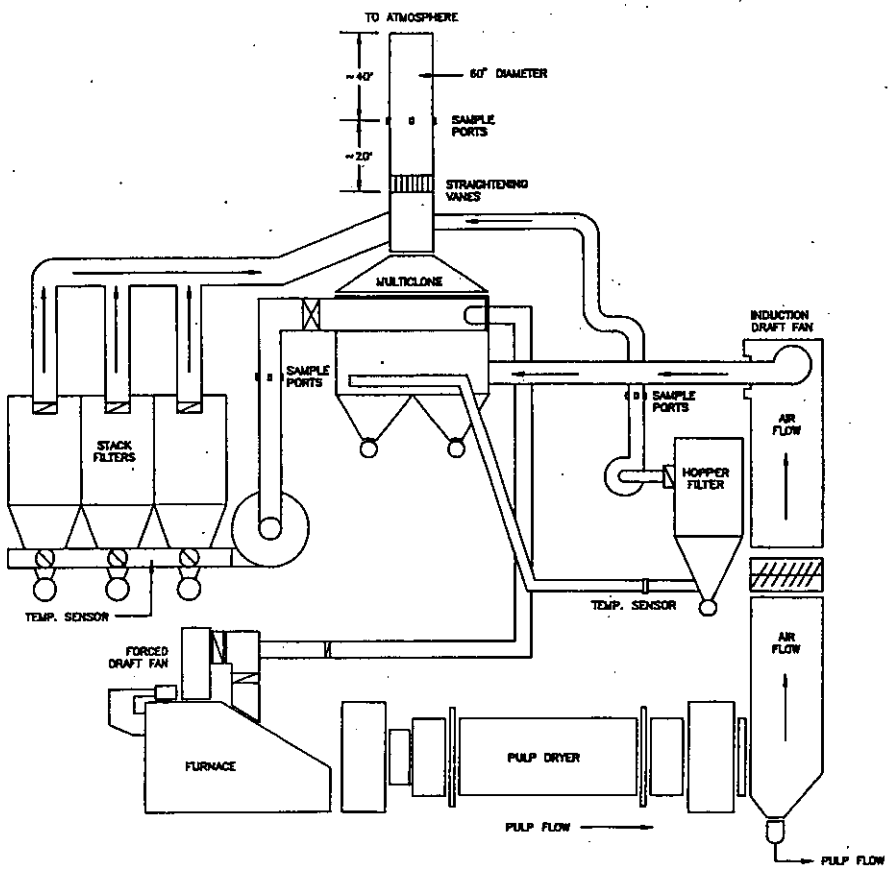
Pulp Dryers Nos. 1 and 2 at the American Crystal Sugar facility in Crookston, Minnesota are of rotary drum design and are used to dry sugar-beet pulp. The drums are heated by coal-fired furnaces. Pollution control is facilitated by multiclones and stack filter systems. A portion of the exhaust gas from the multiclones may be recycled to the rotary drums to maintain proper operating temperatures. Schematics are included in Figures 1 and 2.



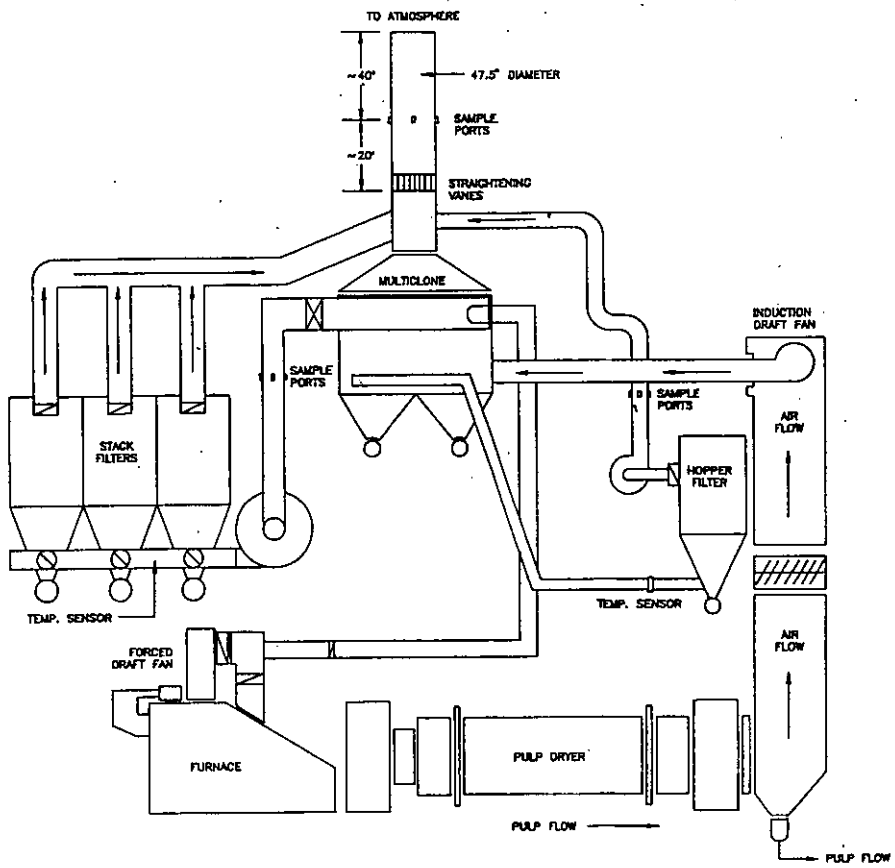
ENGR'G T.N.	DATE		BAY WEST Inc. ENVIRONMENTAL SERVICES St PAUL MN
DRAWN K.M.	11/18/92		
REV.			
PROJECT NAME AMERICAN CRYSTAL SUGAR-- CROOKSTON			
TITLE NO. 2 PULP DRYER			
DWG NO. 920441B1	SCALE NONE	FIGURE #	



ENGR'G T.N.	DATE		BAY WEST Inc. ENVIRONMENTAL SERVICES St. PAUL, MN
DRAWN K.M.	11/18/92		
REV.			
PROJECT NAME AMERICAN CRYSTAL SUGAR– CROOKSTON			
TITLE NO. 1 PULP DRYER			
DWG. NO. 920441B1	SCALE NONE	FIGURE #	



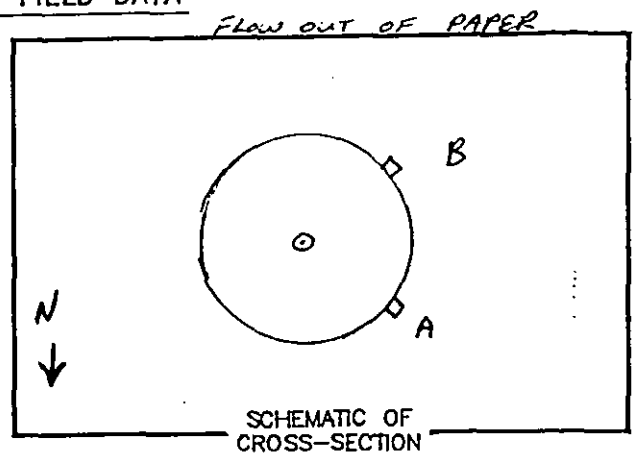
DWG'S T.N.	DATE	BAY WEST Inc.	
DRAWN K.M.	11/18/92		
REV.			
PROJECT NAME AMERICAN CRYSTAL SUGAR- CROOKSTON			
TITLE NO. 1 PULP DRYER			
DWG. NO. 92044181	SCALE NONE	FIGURE #	



DISP'S T.N.	DATE	BAY WEST Inc.	
DRAWN K.M.	11/18/92		
REV.			
PROJECT NAME AMERICAN CRYSTAL SUGAR- CROOKSTON			
TITLE NO. 2 PULP DRYER			
DWG NO. 92044181	SCALE NONE	FIGURE 1	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Pulp Dryer Stack
TEST 1 RUN PRE. DATE 2-22-93
STACK DIA. 60.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.30 IN Hg
STATIC PRESSURE -0.60 IN WC
OPERATORS D. Smith / D. PHIPPS
PITOT NO. P1- 6 Cp .840



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	5.0 IN.	TIME START: 0940 HRS.	
A - 1	.044	2.64	7.64	0.38	210
2	.146	8.76	13.76	0.50	
3	.296	17.76	22.76	0.57	
4	.704	42.24	47.24	0.56	
5	.854	51.24	56.24	0.57	
6	.956	57.36	62.36	0.52	
B - 1				0.32	
2				0.54	
3				0.57	
4				0.57	
5				0.54	
6				0.52	
	Ft./Sec. =	49.98			
	ACFM =	58,850			
	DSCFM =	24,047			
	TS =	210 °F			
	MC =	47 %			
	O2 =	14 %			
TEMP. MEAS. TOOL & S/N: Beckman 500 / Mercury Thermometer				TIME END: 0955 HRS.	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 1 Pulp Dryer Stack DATE 2-22-93 TEST 1 RUN 1

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1306 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	1014	200	814
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1312	1305	7
TOTAL			821

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 1

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 2.0 IN. Hg

TIME START: 1200 (HRS) TIME END: 1340 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.30 IN Hg H20 45 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 1 Pulp Dryer Stack DATE 2-22-93 TEST 1 RUN 1 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1200)	(603.30)											
A - 6	4	605.01	0.52	0.55	5.01	2	210	259	262	33	74	67	10.2
6	8	606.74	0.53	0.56	6.74	2	210	262	264	33	93	69	10.0
5	12	608.55	0.56	0.60	8.55	3	210	263	265	33	104	70	10.0
5	16	610.39	0.57	0.62	0.39	3	209	265	265	34	110	72	10.2
4	20	612.25	0.58	0.64	2.27	3	209	264	265	34	112	74	10.0
4	24	614.12	0.56	0.62	4.12	3	209	263	267	34	114	75	9.8
3	28	615.98	0.56	0.62	5.98	4	209	262	268	34	115	76	10.0
3	32	617.84	0.56	0.62	7.84	4	209	260	267	34	115	78	10.2
2	36	619.63	0.50	0.55	9.60	4	209	262	267	34	114	79	10.4
2	40	621.35	0.49	0.54	1.34	4	209	263	266	34	114	80	10.4
1	44	622.88	0.38	0.42	2.88	3	209	263	265	35	112	82	10.2
1	48	624.37	0.36	0.40	4.37	3	209	262	264	35	111	84	10.4
B - 6	52	626.17	0.52	0.58	6.17	4	209	264	264	35	100	83	10.5
6	56	627.97	0.53	0.58	7.97	4	209	265	265	35	108	83	10.6
5	60	629.80	0.54	0.60	9.79	5	209	266	266	35	112	84	10.8
5	64	631.64	0.55	0.61	1.64	5	209	265	266	36	114	84	10.6
4	68	633.51	0.56	0.62	3.52	5	209	265	267	36	115	84	10.2
4	72	635.41	0.57	0.64	5.41	6	209	264	268	36	116	85	10.4
3	76	637.32	0.59	0.66	7.33	6	209	263	269	36	117	85	10.5
3	80	639.26	0.59	0.66	9.26	6	209	260	270	37	117	85	10.5
2	84	641.13	0.55	0.61	1.12	5	210	261	270	37	118	84	10.2
2	88	642.99	0.56	0.62	2.99	5	210	262	269	37	115	84	10.4
1	92	644.48	0.35	0.39	4.47	4	209	262	268	37	112	84	
1	96	645.97	0.36	0.40	5.97	4	209	263	268	37	110	84	
	(1340)												
	Θ= 96	Vm= 42.67		ΔH= .57							AVG.=	94.9	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 1 Pulp Dryer Stack DATE 2-22-93 TEST 1 RUN 2

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1320 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	993	200	793
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1320	1315	5
TOTAL			798

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 2

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1420 (HRS) TIME END: 1600 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.30 IN Hg H20 48 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 1 Pulp Dryer Stack DATE 7-22-93 TEST 1 RUN 2 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1420)	(646.30)											
B - 6	4	648.00	0.52	0.52	8.00	3	210	262	265	35	75	70	10.2
6	8	649.64	0.52	0.50	9.64	3	210	263	268	35	93	71	10.2
5	12	651.34	0.55	0.54	1.35	4	210	263	269	35	104	72	10.4
5	16	653.08	0.55	0.54	3.08	4	210	264	271	35	110	73	10.4
4	20	654.83	0.57	0.57	4.85	4	210	265	272	35	112	74	10.2
4	24	656.63	0.57	0.57	6.63	4	210	265	272	35	113	75	10.0
3	28	658.43	0.58	0.58	8.43	5	210	267	270	36	114	76	10.2
3	32	660.23	0.59	0.59	0.24	5	210	268	269	36	115	78	10.2
2	36	662.00	0.55	0.55	2.00	5	210	267	268	36	114	78	10.5
2	40	663.74	0.54	0.54	3.74	4	210	266	268	36	114	79	10.4
1	44	665.17	0.35	0.35	5.14	4	209	265	267	36	111	80	10.2
1	48	666.54	0.34	0.34	6.53	3	209	265	265	36	110	80	10.0
A - 6	52	668.21	0.51	0.51	8.21	4	210	266	265	36	97	80	10.0
6	56	669.90	0.52	0.51	9.90	4	210	267	265	36	106	81	9.8
5	60	671.65	0.56	0.56	1.66	5	209	268	266	36	110	81	9.8
5	64	673.45	0.57	0.57	3.45	5	209	269	267	36	112	82	9.6
4	68	675.24	0.57	0.57	5.24	6	210	270	269	36	113	82	9.5
4	72	677.03	0.57	0.57	7.03	6	210	269	270	37	114	82	9.0
3	76	678.83	0.57	0.57	8.83	6	209	268	270	37	114	83	8.6
3	80	680.62	0.56	0.57	0.61	6	209	267	269	37	115	83	8.5
2	84	682.31	0.50	0.50	2.29	5	210	266	267	37	113	83	8.2
2	88	683.98	0.50	0.50	3.97	5	210	266	266	37	112	83	8.2
1	92	685.46	0.39	0.39	5.46	4	210	265	266	37	111	82	8.5
1	96	686.92	0.38	0.38	6.92	4	210	266	265	37	109	82	8.5
	(1600)												
	Θ = 96	Vm= 40.62		ΔH= .52							AVG.= 93.8		

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 1 Pulp Dryer Stack DATE 2-22-93 TEST 1 RUN 3

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1438 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1		200	
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT			
TOTAL			

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BP-1 BAG NO. 3

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 2.0 IN. Hg

TIME START: _____ (HRS) TIME END: _____ (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133728

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.30 IN Hg H20 _____ %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

X SISTON [illegible] Iron → CANCEL 2ND Run

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

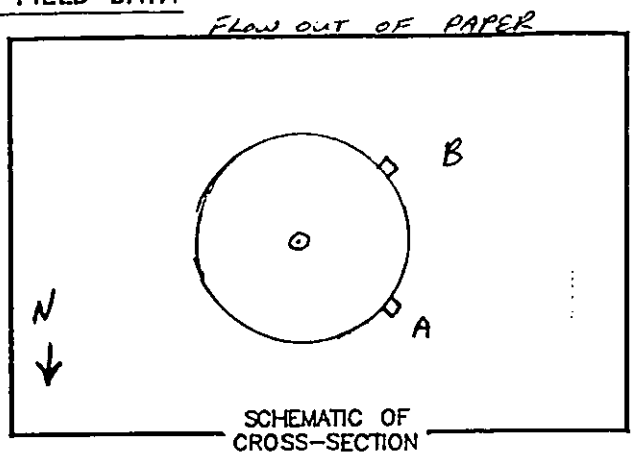
SOURCE No. 1 Pulp Dryer Stack DATE 2-22-93 TEST 1 RUN 3 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	( )	( )											
A - 6	4												
6	8												
5	12												
5	16												
4	20												
4	24												
3	28												
3	32												
2	36												
2	40												
1	44												
1	48												
B - 6	52												
6	56												
5	60												
5	64												
4	68												
4	72												
3	76												
3	80												
2	84												
2	88												
1	92												
1	96												
	( )												
	Θ = 96	Vm=		ΔH=							AVG.=		

AIR 7A

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Pulp Dryer Stack
TEST 2 RUN PRE DATE 2-23-93
STACK DIA. 60.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE -0.65 IN WC
OPERATORS D. Smith / D. PHIPPS
PITOT NO. P1-6 Cp .840



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	5.0 IN.	TIME START: 0750	HRS.
A - 1	.044	2.64	7.64	0.36	210
2	.146	8.76	13.76	0.63	
3	.296	17.76	22.76	0.70	
4	.704	42.24	47.24	0.70	
5	.854	51.24	56.24	0.66	
6	.956	57.36	62.36	0.58	
B - 1				0.32	
2				0.68	
3				0.72	
4				0.70	
5				0.66	
6				0.58	
	Ft./Sec. =	52.60			
	ACFM =	61,966			
	DSCFM =	30,181			
	TS =	210 °F			
	MC =	37 %			
	O2 =	12 %			
TEMP. MEAS. TOOL & S/N:	Beckman 500 / Mercury Thermometer			TIME END: 0805	HRS.

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 1

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1438 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	893	200	693
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1315	1312	3
TOTAL			696

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 1

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 0835 (HRS) TIME END: 1015 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.40 IN Hg H20 37 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 1 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (°F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(0835)	(687.20)											
A - 6	4	689.08	0.50	0.67	9.08	2	207	263	265	34	80	70	13.2
6	8	691.03	0.52	0.70	1.02	2	207	265	267	34	99	72	13.8
5	12	693.28	0.69	0.95	3.30	3	207	266	267	34	105	74	13.9
5	16	695.62	0.71	0.98	5.62	3	207	267	269	34	110	76	14.0
4	20	697.98	0.72	1.00	7.98	4	207	268	271	34	112	78	14.0
4	24	700.34	0.72	1.01	0.34	4	207	268	272	34	114	80	14.0
3	28	702.70	0.71	1.00	2.70	4	207	269	272	35	116	82	14.2
3	32	705.07	0.71	1.00	5.07	5	207	268	271	35	117	83	14.2
2	36	707.38	0.68	0.96	7.38	5	207	267	270	35	117	84	14.2
2	40	709.70	0.67	0.95	9.69	5	207	267	269	35	118	85	14.2
1	44	711.49	0.40	0.57	1.47	4	207	265	268	35	117	86	14.5
1	48	713.21	0.38	0.54	3.21	4	207	264	268	35	116	86	14.5
B - 6	52	715.36	0.58	0.82	5.36	4	207	264	269	35	105	87	14.0
6	56	717.52	0.60	0.84	7.52	4	207	265	270	36	118	87	14.4
5	60	719.84	0.67	0.95	9.84	5	207	266	271	36	119	58	14.5
5	64	722.16	0.68	0.96	2.17	5	208	267	272	36	120	88	14.5
4	68	724.55	0.71	1.01	4.55	5	208	268	272	36	121	88	15.0
4	72	726.94	0.71	1.01	6.94	5	207	269	270	36	121	89	15.0
3	76	729.33	0.73	1.04	9.36	6	207	269	269	37	121	89	15.0
3	80	731.79	0.74	1.05	1.80	6	207	268	267	37	122	89	15.0
2	84	734.20	0.70	1.00	4.18	6	207	267	268	37	122	90	14.8
2	88	736.54	0.69	0.98	6.54	6	207	266	268	37	121	90	14.4
1	92	738.27	0.36	0.51	8.25	4	206	265	269	37	120	90	14.2
1	96	739.93	0.35	0.50	9.93	4	206	265	270	37	116	90	14.5
	(1015)												
	Θ= 96	Vm= 52.73		ΔH=.88							AVG.=	94.3	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 2

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1447 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	852	200	652
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1323	1317	6
TOTAL			658

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 2

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1050 (HRS) TIME END: 1230 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.40 IN Hg H20 39 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No: 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 2 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL (cf)	VAC IN Hg	TEMPERATURE (°F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1050)	(740.30)											
B - 6	4	742.36	0.57	0.76	2.36	2	209	253	265	35	80	79	14.4
6	8	744.38	0.59	0.76	4.38	2	209	259	267	35	93	78	14.4
5	12	746.54	0.67	0.87	6.56	3	209	263	268	35	101	79	14.6
5	16	748.75	0.67	0.88	8.76	3	209	265	268	35	106	79	14.4
4	20	750.98	0.68	0.89	0.98	3	209	266	269	35	109	80	14.2
4	24	753.23	0.69	0.91	3.23	4	209	266	270	35	110	81	14.0
3	28	755.52	0.73	0.97	5.55	4	208	267	271	35	112	82	14.6
3	32	757.87	0.73	0.97	7.87	4	208	268	271	36	114	82	14.2
2	36	760.15	0.69	0.92	0.13	4	208	269	272	36	114	83	14.5
2	40	762.38	0.68	0.90	2.38	4	208	270	271	36	115	84	14.8
1	44	764.04	0.36	0.48	4.02	3	207	270	271	36	113	85	14.5
1	48	765.66	0.36	0.48	5.66	3	207	269	270	36	110	85	14.4
A - 6	52	767.68	0.55	0.73	7.68	4	207	268	269	36	106	86	14.8
6	56	769.68	0.54	0.72	9.68	4	208	267	268	37	114	86	14.2
5	60	771.88	0.66	0.88	1.90	5	208	266	268	37	116	87	14.5
5	64	774.14	0.67	0.90	4.14	5	208	265	268	37	118	87	14.3
4	68	776.45	0.71	0.95	6.46	5	208	264	269	37	119	88	14.3
4	72	778.77	0.71	0.95	8.77	5	209	265	270	37	120	89	14.2
3	76	781.09	0.71	0.95	1.09	5	209	265	271	38	120	89	14.0
3	80	783.40	0.71	0.95	3.41	5	209	266	271	38	119	89	14.2
2	84	785.67	0.66	0.89	5.65	5	209	267	272	38	119	89	14.4
2	88	787.88	0.66	0.89	7.89	5	209	266	271	38	119	89	14.5
1	92	789.66	0.41	0.55	9.65	4	209	265	270	38	117	89	14.4
1	96	791.41	0.41	0.55	1.41	4	209	264	270	39	115	89	14.2
	(1230)												
	Θ = 96	Vm = 51.11		ΔH = .82							AVG. = 98.2		

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5
SOURCE No. 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 3

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1448 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	845	200	645
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1309	1303	6
TOTAL			651

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 3
BAG MATERIAL: Tedlar SIZE: 44 L.
PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg
TIME START: 1315 (HRS) TIME END: 1455 (HRS)
SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith
S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133728

PITOT NO. P1-6 Cp .840
BAR. PRESS. 29.40 IN Hg H20 38 %
NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 1 Pulp Dryer Stack DATE 2-23-93 TEST 2 RUN 3 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1315)	(791.70)											
A - 6	4	793.75	0.55	0.75	3.75	3	210	258	263	35	80	74	14.8
6	8	795.73	0.56	0.73	5.73	3	210	263	265	35	93	74	15.0
5	12	797.85	0.64	0.85	7.88	3	210	264	266	35	99	75	14.9
5	16	800.12	0.67	0.90	0.10	3	210	265	268	35	106	76	14.8
4	20	802.36	0.70	0.94	2.38	3	210	266	269	35	109	78	15.0
4	24	804.67	0.70	0.95	4.67	3	210	266	270	36	113	79	14.5
3	28	806.98	0.70	0.95	6.96	4	210	267	271	36	115	81	14.6
3	32	809.29	0.71	0.97	9.29	4	210	268	272	36	118	84	14.5
2	36	811.53	0.65	0.89	1.52	4	210	269	273	36	118	85	14.2
2	40	813.78	0.66	0.91	3.78	4	210	270	272	36	118	86	15.0
1	44	815.59	0.42	0.58	5.58	3	210	269	271	36	116	86	15.0
1	48	817.38	0.42	0.58	7.38	3	210	268	270	37	115	87	14.5
B - 6	52	819.53	0.60	0.82	9.53	3	210	267	270	37	110	87	14.6
6	56	821.70	0.61	0.83	1.69	4	209	266	269	37	119	88	14.2
5	60	823.95	0.67	0.92	3.97	4	209	265	268	37	120	88	14.5
5	64	826.25	0.67	0.92	6.25	4	209	265	267	37	121	89	14.2
4	68	828.57	0.69	0.95	8.57	4	209	266	267	38	122	90	14.0
4	72	830.90	0.69	0.96	0.90	4	209	267	267	38	122	90	14.0
3	76	833.25	0.70	0.97	3.24	5	209	267	268	38	122	90	13.8
3	80	835.60	0.71	0.98	5.60	5	209	268	269	38	122	90	14.0
2	84	837.93	0.68	0.94	7.91	5	209	267	270	38	123	91	14.5
2	88	840.25	0.69	0.96	0.24	5	209	266	270	39	123	91	14.4
1	92	841.98	0.38	0.53	1.97	4	209	266	269	39	119	91	14.5
1	96	843.69	0.38	0.53	3.69	4	209	264	267	39	117	91	14.6
	(1455)												
	Θ = 96	Vm = 51.99		ΔH = .85							AVG. = 99.6		

AIR 7A

EPA METHOD 2 FIELD DATA

PROJECT NAME A.O.S. CROOKSTON
SOURCE No. 2 PULP DRYER STACK
TEST 3 RUN PRE DATE 2-24-93
STACK DIA. 47.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE -0.85 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-6 Cp .840

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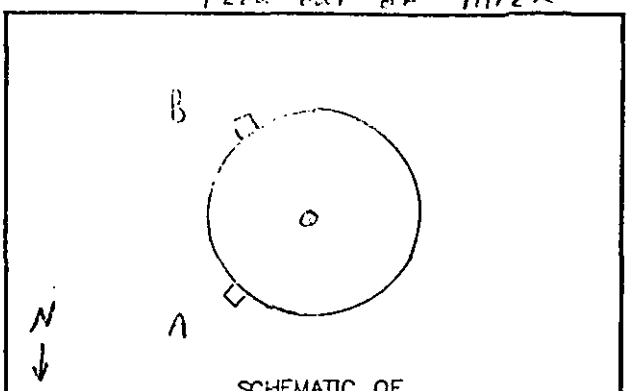


SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH: 5.25 IN.		TIME START: 0830 HRS.	
A - 1	.044	2.09	7.34	0.90	198
2	.146	6.94	12.19	1.15	
3	.246	11.06	19.31	1.18	
4	.704	33.44	38.69	1.15	
5	.854	40.57	45.82	1.10	
6	.956	45.41	50.66	0.97	
B - 1				0.79	
2				1.20	
3				1.20	
4				1.10	
5				1.10	
6				0.99	
	FT./SEC. =	69.10			
	ACFM =	51,019			
	DSCFM =	26,521			
	M.C. =	34 %			
	O_2 =	13 %			
	TS =	198 °F			
TEMP. MEAS. TOOL & S/N: BECKMAN 500				TIME END: 0845 HRS.	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 1

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1443 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	628	200	428
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1305	1303	2
TOTAL			430

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 1

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1010 (HRS) TIME END: 1150 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133729

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.43 IN Hg H20 34 %

NOZZLE NO. N1-2 NOZZLE DIA. .190 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 1 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1010)	(844.00)											
A - 6	4	845.45	0.90	0.39	5.43	2	198	263	268	35	68	62	14.8
6	8	846.93	0.88	0.43	6.93	2	198	264	270	35	82	63	14.8
5	12	848.45	0.90	0.45	8.47	2	196	265	271	35	95	65	15.0
5	16	850.03	0.90	0.45	0.03	2	196	265	271	35	98	66	15.0
4	20	851.62	0.92	0.46	1.62	2	196	266	270	35	100	68	15.2
4	24	853.21	0.92	0.47	3.21	2	196	265	270	35	101	70	15.0
3	28	854.80	0.93	0.47	4.81	2	196	265	269	35	101	72	15.2
3	32	856.41	0.92	0.47	6.41	2	196	266	268	36	102	73	15.2
2	36	858.01	0.92	0.47	8.01	2	196	267	267	36	102	73	15.2
2	40	859.61	0.92	0.47	9.61	2	195	268	267	36	103	74	15.4
1	44	861.04	0.70	0.36	1.01	2	195	269	268	36	102	75	15.5
1	48	862.39	0.68	0.35	2.39	2	195	270	268	36	101	76	15.4
B - 6	52	863.89	0.80	0.41	3.89	2	195	270	269	37	96	77	15.2
6	56	865.40	0.82	0.42	5.40	2	195	269	270	37	103	77	15.0
5	60	866.97	0.90	0.46	6.99	3	195	268	270	37	105	78	14.8
5	64	868.60	0.92	0.47	8.61	3	195	267	271	37	106	79	14.8
4	68	870.23	0.92	0.47	0.23	3	195	265	272	37	107	79	14.6
4	72	871.84	0.92	0.47	1.84	3	195	264	273	37	108	80	14.5
3	76	873.46	0.92	0.47	3.46	3	195	264	272	38	109	81	14.5
3	80	875.10	0.93	0.48	5.10	3	195	265	271	38	110	82	14.4
2	84	876.73	0.92	0.48	6.73	3	195	266	271	38	110	82	14.2
2	88	878.33	0.90	0.47	8.33	3	195	267	270	38	110	83	14.4
1	92	879.75	0.68	0.35	9.74	2	195	268	269	35	109	83	14.5
1	96	881.13	0.68	0.35	1.13	2	195	268	269	35	108	83	14.4
	(1150)												
	Θ = 96	Vm = 37.13		ΔH = .44							AVG. =	88.3	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 2

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1437 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	883	200	683
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1318	1309	9
TOTAL			692

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 2

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1230 (HRS) TIME END: 1410 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.93 IN Hg H20 36 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 2 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1230)	(881.45)											
B - 6	4	883.97	0.80	1.16	3.97	3	195	253	261	35	80	71	15.5
6	8	886.46	0.82	1.16	6.46	3	195	259	265	35	88	71	15.8
5	12	889.04	0.90	1.28	9.09	4	195	263	266	35	94	71	15.6
5	16	891.74	0.91	1.30	1.75	4	195	264	268	35	101	72	15.5
4	20	894.43	0.93	1.34	4.45	4	195	265	269	35	104	73	15.5
4	24	897.15	0.92	1.33	7.15	4	195	266	270	36	107	74	15.4
3	28	899.86	0.92	1.34	9.86	5	196	267	271	36	109	76	15.5
3	32	902.60	0.93	1.36	2.60	5	196	267	271	36	110	78	15.5
2	36	905.32	0.92	1.34	5.32	6	196	268	272	36	111	78	15.2
2	40	908.05	0.91	1.33	8.04	6	195	268	271	36	111	78	15.4
1	44	910.37	0.65	0.95	0.34	5	195	269	270	37	110	79	15.2
1	48	912.65	0.65	0.95	2.64	5	195	268	270	37	110	80	15.5
A - 6	52	915.25	0.84	1.23	5.25	6	195	267	270	37	106	81	15.4
6	56	917.85	0.84	1.23	7.85	6	195	266	269	37	111	81	15.5
5	60	920.56	0.92	1.35	0.59	7	195	265	268	37	114	82	15.6
5	64	923.34	0.93	1.37	3.36	7	195	264	267	38	115	82	15.8
4	68	926.12	0.92	1.36	6.11	7	195	263	267	38	116	83	16.2
4	72	928.86	0.92	1.36	8.86	7	195	264	265	38	117	83	16.5
3	76	931.63	0.93	1.38	1.64	8	195	265	266	38	118	82	16.2
3	80	934.40	0.92	1.36	4.40	8	195	265	267	38	118	83	16.0
2	84	937.15	0.92	1.36	7.15	8	196	266	268	39	118	84	16.2
2	88	939.92	0.92	1.36	9.92	8	195	267	269	39	118	84	16.2
1	92	942.33	0.70	1.04	2.33	7	195	268	270	39	117	84	16.0
1	96	944.70	0.68	1.01	4.70	7	195	269	270	39	116	84	16.0
	(1410)												
	Θ = 96	Vm = 63.25		ΔH = 1.26							AVG. =	94.0	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5
SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 3

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1442 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	837	200	637
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1312	1305	7
TOTAL			644

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 3
BAG MATERIAL: Tedlar SIZE: 44 L.
PRETEST LEAK CHECK: 0 cc/MIN AT 2.0 IN. Hg
TIME START: 1440 (HRS) TIME END: 1620 (HRS)
SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith
S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840
BAR. PRESS. 29.43 IN Hg H20 3.5 %
NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

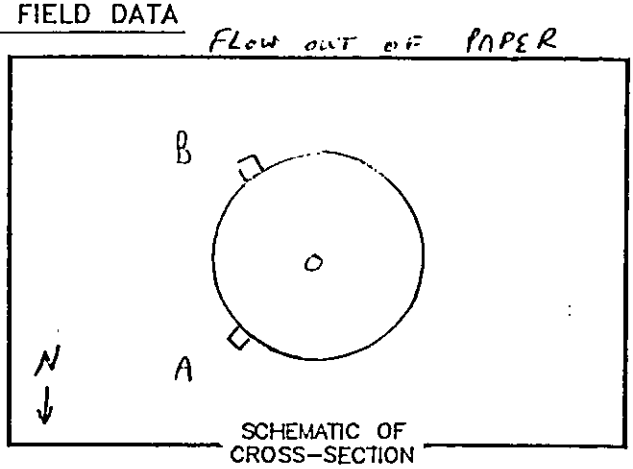
SOURCE No. 2 Pulp Dryer Stack DATE 2-24-93 TEST 3 RUN 3 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1440)	(945.00)											
A - 6	4	947.63	0.83	1.25	7.63	4	196	258	261	35	82	76	15.4
6	8	950.15	0.82	1.20	0.16	4	196	260	264	35	95	76	15.2
5	12	952.86	0.92	1.36	2.88	4	196	263	266	35	102	76	15.2
5	16	955.62	0.92	1.37	5.62	4	196	265	267	35	109	77	15.4
4	20	958.37	0.93	1.39	8.39	4	196	266	269	36	112	79	15.5
4	24	961.17	0.92	1.38	1.16	5	196	266	270	36	115	80	15.6
3	28	963.94	0.92	1.39	3.94	5	196	267	271	36	116	82	15.6
3	32	966.73	0.92	1.39	6.73	5	196	268	272	36	117	83	15.8
2	36	969.53	0.92	1.40	9.53	5	195	269	272	36	118	83	15.8
2	40	972.31	0.90	1.37	2.29	5	195	269	273	37	119	84	16.2
1	44	974.75	0.69	1.05	4.72	5	194	268	272	37	119	85	16.0
1	48	977.17	0.69	1.05	7.16	5	194	267	271	37	117	85	16.2
B - 6	52	979.73	0.78	1.19	9.73	5	195	266	271	36	109	86	16.2
6	56	982.34	0.80	1.21	2.33	5	195	265	270	36	118	86	16.4
5	60	985.13	0.43	1.42	5.15	6	195	265	270	36	120	87	16.2
5	64	987.98	0.93	1.42	7.98	6	195	266	269	37	122	88	16.5
4	68	990.80	0.92	1.41	0.80	6	195	267	268	37	122	88	16.4
4	72	993.63	0.93	1.42	3.63	6	195	268	267	37	123	89	16.5
3	76	996.47	0.93	1.43	6.47	7	195	268	266	37	123	89	16.5
3	80	999.29	0.92	1.41	9.29	7	195	268	265	38	124	89	16.4
2	84	1002.12	0.92	1.41	2.12	7	195	269	265	38	124	89	16.4
2	88	1004.93	0.91	1.40	4.93	7	195	270	267	38	123	90	16.2
1	92	1007.35	0.67	1.03	7.35	6	195	269	268	38	121	90	16.4
1	96	1009.78	0.68	1.04	9.78	6	195	268	270	38	120	89	16.0
	(1620)												
	θ = 96	Vm = 64.78		ΔH = 7.31							AVG. = 99.9		

AIR 7A

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 2 PULP DRYER STACK
TEST 4 RUN PRE DATE 2-25-93
STACK DIA. 47.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE -0.76 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-6 Cp .840



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH: 5.25 IN.		TIME START: 0745 HRS.	
A - 1	.044	2.09	7.34	0.68	194
2	.146	6.94	12.19	0.87	
3	.246	14.06	19.31	0.89	
4	.704	33.44	38.69	0.90	
5	.854	40.57	45.82	0.87	
6	.956	45.41	50.66	0.78	
B - 1				0.62	
2				0.87	
3				0.90	
4				0.85	
5				0.83	
6				0.78	
	FT./SEC. =	60.29			
	ACFM =	44,513			
	DSCFM =	23,967			
	M.C. =	32 %			
	O_2 =	15 %			
	TS =	194 °F			
TEMP. MEAS. TOOL & S/N: BECKMAN 500				TIME END: 0800 HRS.	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5
SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 1

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1429 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	663	200	463
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1316	1308	8
TOTAL			471

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 1
BAG MATERIAL: Tedlar SIZE: 44 L.
PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg
TIME START: 0910 (HRS) TIME END: 1150 (HRS)
SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith
S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840
BAR. PRESS. 29.40 IN Hg H20 32 %
NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 1 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (°F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(0910)	(1010.10)											
A - 6	4	1012.60	0.77	1.20	2.60	4	193	263	265	33	68	57	16.8
6	8	1015.11	0.78	1.21	5.11	4	193	264	266	33	79	58	17.0
5	12	1017.76	0.86	1.34	7.78	4	193	265	268	33	88	59	17.2
5	16	1020.46	0.86	1.36	0.47	4	193	266	268	34	92	61	17.0
4	20	1023.20	0.88	1.40	3.20	4	193	267	269	34	96	62	17.4
4	24	1025.97	0.90	1.43	5.98	5	193	268	270	34	104	64	17.5
3	28	1028.78	0.89	1.43	8.77	5	193	269	270	34	106	68	17.5
3	32	1031.56	0.88	1.42	1.56	5	193	269	271	35	108	70	17.8
2	36	1034.34	0.86	1.40	4.32	5	193	268	272	35	110	72	18.0
2	40	1037.12	0.87	1.42	7.12	5	193	267	271	35	100	74	18.2
1	44	1039.59	0.68	1.11	9.59	4	193	267	270	35	109	75	18.2
1	48	1042.07	0.68	1.10	2.07	4	193	267	269	35	108	75	18.4
B - 6	52	1044.68	0.76	1.24	4.68	4	193	266	268	35	102	76	18.5
6	56	1047.32	0.78	1.27	7.32	5	193	265	267	36	109	76	18.5
5	60	1050.05	0.84	1.37	0.07	5	193	265	265	36	111	77	18.5
5	64	1052.83	0.85	1.39	2.84	5	193	264	266	36	112	77	18.5
4	68	1055.64	0.86	1.41	5.64	5	193	265	267	36	112	78	18.4
4	72	1058.43	0.86	1.41	8.43	5	193	265	268	36	113	78	18.2
3	76	1061.27	0.90	1.48	1.30	6	193	265	268	37	114	79	18.0
3	80	1064.17	0.91	1.50	4.18	6	193	266	269	37	114	79	18.0
2	84	1067.00	0.87	1.43	7.00	6	193	267	270	37	114	79	18.0
2	88	1069.83	0.86	1.41	9.81	6	193	268	271	37	113	80	17.6
1	92	1072.20	0.62	1.02	2.19	5	193	268	270	37	112	80	17.6
1	96	1074.57	0.62	1.02	4.57	5	193	267	269	37	111	80	17.5
	(1150)												
	θ= 96	Vm= 64.47		ΔH=1.32							AVG.= 88.5		

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 2

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1451 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	775	200	575
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1326	1312	14
TOTAL			589

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 2

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1135 (HRS) TIME END: 1315 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.40 IN Hg H20 28 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 2 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1135)	(1075.00)											16.0
B - 6	4	1077.73	0.76	1.36	7.73	4	194	255	261	35	80	72	16.0
6	8	1080.41	0.77	1.34	0.41	4	194	259	264	35	95	72	16.2
5	12	1083.21	0.84	1.48	3.24	5	194	263	267	35	104	73	16.4
5	16	1086.10	0.84	1.50	6.11	5	194	265	265	35	108	75	16.4
4	20	1089.00	0.85	1.52	9.01	5	194	267	269	35	112	77	16.2
4	24	1091.92	0.86	1.55	1.93	5	194	268	270	36	114	78	16.4
3	28	1094.94	0.90	1.63	4.94	5	194	269	271	36	116	80	16.5
3	32	1097.95	0.89	1.61	7.94	5	194	270	272	36	118	82	16.5
2	36	1100.91	0.87	1.58	0.91	5	193	271	273	36	120	83	16.8
2	40	1103.92	0.88	1.61	3.92	5	193	270	272	36	122	84	17.0
1	44	1106.97	0.62	1.14	6.94	5	194	270	270	36	120	85	17.0
1	48	1108.94	0.60	1.10	8.93	4	194	269	270	37	118	86	17.2
A - 6	52	1111.76	0.78	1.43	1.76	4	193	268	269	37	110	86	17.2
6	56	1114.58	0.78	1.42	4.57	5	193	267	268	37	120	87	17.3
5	60	1117.54	0.88	1.61	7.58	5	194	265	267	37	124	88	17.2
5	64	1120.60	0.88	1.62	0.61	5	194	264	266	37	125	89	17.2
4	68	1123.65	0.89	1.64	3.65	5	194	264	268	38	125	89	17.2
4	72	1126.71	0.90	1.66	6.72	5	194	265	268	38	125	89	17.2
3	76	1129.78	0.90	1.66	9.78	5	193	266	268	38	125	89	17.2
3	80	1132.83	0.89	1.64	2.83	5	193	266	269	38	125	89	17.2
2	84	1135.86	0.88	1.62	5.86	5	193	267	269	39	126	90	17.2
2	88	1138.85	0.86	1.59	8.86	5	193	268	270	39	126	90	17.2
1	92	1141.54	0.68	1.26	1.54	5	193	269	271	39	125	90	17.2
1	96	1144.20	0.67	1.24	4.19	5	193	269	271	39	123	91	17.2
	(1315)												
	Θ = 96	Vm = 69.20		ΔH = 1.44							AVG. = 100.4		

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5
SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 3

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1431 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	747	200	547
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1314	1300	14
TOTAL			561

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 3
BAG MATERIAL: Tedlar SIZE: 44 L.
PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg
TIME START: 1350 (HRS) TIME END: 1530 (HRS)
SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith
S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840
BAR. PRESS. 29.40 IN Hg H20 31 %
NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-25-93 TEST 4 RUN 3 GASMETER COEFF. 1.039

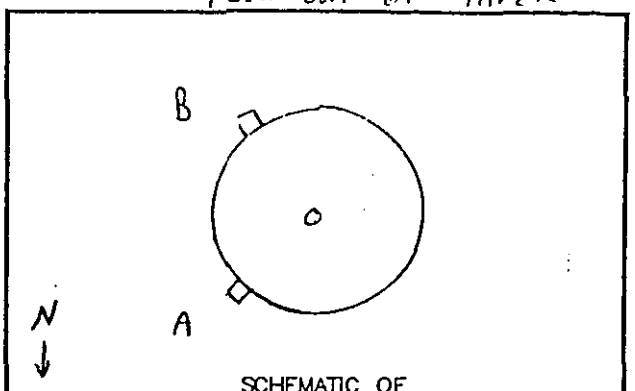
TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1350)	(1144.50)											
A - 6	4	1147.25	0.80	1.36	7.26	4	194	263	262	36	83	79	16.5
6	8	1149.93	0.81	1.33	9.93	4	194	264	265	36	98	79	16.5
5	12	1152.75	0.88	1.46	2.76	4	194	265	266	36	112	80	16.5
5	16	1155.64	0.89	1.50	5.64	4	194	266	267	36	116	81	16.5
4	20	1158.55	0.90	1.52	8.56	5	194	267	268	36	118	82	16.4
4	24	1161.49	0.91	1.54	1.49	5	194	267	268	36	120	83	16.4
3	28	1164.43	0.90	1.53	4.42	5	194	268	269	36	121	84	16.4
3	32	1167.35	0.90	1.53	7.35	5	194	268	270	37	122	85	16.4
2	36	1170.27	0.89	1.52	0.27	5	194	269	271	37	123	86	16.5
2	40	1173.19	0.88	1.50	3.18	5	194	270	271	37	124	87	16.6
1	44	1175.82	0.70	1.20	5.79	4	194	269	270	37	123	88	16.5
1	48	1178.43	0.72	1.23	8.43	4	194	268	270	37	122	89	16.5
B - 6	52	1181.24	0.82	1.40	1.24	5	194	267	269	38	112	90	16.8
6	56	1184.05	0.82	1.39	4.03	5	194	265	269	38	123	91	16.8
5	60	1186.90	0.86	1.47	6.92	5	194	264	270	38	126	92	16.8
5	64	1189.81	0.85	1.46	9.81	5	194	264	270	38	128	92	16.6
4	68	1192.76	0.90	1.55	2.78	5	195	265	271	38	129	92	16.6
4	72	1195.75	0.90	1.55	5.75	5	195	266	269	39	129	93	16.8
3	76	1198.72	0.90	1.55	8.72	5	195	266	268	39	130	93	17.0
3	80	1201.70	0.91	1.57	1.72	5	195	267	267	39	131	94	17.0
2	84	1204.69	0.89	1.54	4.68	5	195	268	268	39	130	94	17.2
2	88	1207.63	0.88	1.52	7.63	5	195	269	269	40	130	94	17.2
1	92	1210.17	0.64	1.11	0.15	4	195	268	270	40	128	93	17.2
1	96	1212.66	0.64	1.10	2.66	4	195	266	271	40	126	93	17.2
	(1530)												
	Θ = 96	Vm = 68.16		ΔH = 1.73							AVG. = 104.5		

AIR 7A

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 2 PULP DRYER STACK
TEST 5 RUN PRE DATE 2-26-93
STACK DIA. 47.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.52 IN Hg
STATIC PRESSURE -0.82 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-6 Cp .840

FLOW OUT OF PAPER



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	5.25 IN.	TIME START: 0735 HRS.	
A - 1	.044	2.09	7.34	0.72	198
2	.146	6.94	12.19	0.92	
3	.246	14.06	19.31	0.95	
4	.704	33.44	38.69	0.96	
5	.854	40.57	45.82	0.93	
6	.956	45.41	50.66	0.84	
B - 1				0.68	
2				0.88	
3				0.92	
4				0.90	
5				0.89	
6				0.80	
	FT./SEC. =	61.58			
	ACFM =	45,469			
	DSCFM =	25,865			
	M.C. =	28 %			
	O_2 =	16 %			
	TS =	198 °F			
TEMP. MEAS. TOOL & S/N: BECKMAN 500				TIME END: 0750 HRS.	

AIR-2

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5
SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 1

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1423 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	781	200	581
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1293	1286	7
TOTAL			588

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 1
BAG MATERIAL: Tedlar SIZE: 44 L.
PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg
TIME START: 0805 (HRS) TIME END: 0945 (HRS)
SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith
S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133728

PITOT NO. P1-6 Cp .840
BAR. PRESS. 29.52 IN Hg H20 28 %
NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 1 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(0805)	(1213.00)											
A - 6	4	1215.74	0.84	1.43	5.74	4	196	258	252	34	69	59	17.5
6	8	1218.48	0.85	1.45	8.48	4	196	262	262	34	92	60	17.5
5	12	1221.38	0.92	1.60	1.41	5	196	263	265	34	100	62	17.6
5	16	1224.35	0.93	1.63	4.37	5	196	265	266	35	103	64	17.6
4	20	1227.40	0.96	1.70	7.40	5	195	266	268	35	105	66	17.7
4	24	1230.44	0.96	1.70	0.44	5	195	266	269	35	107	67	17.8
3	28	1233.46	0.95	1.69	3.47	5	195	267	270	35	108	68	17.7
3	32	1236.51	0.95	1.69	6.51	5	195	268	271	35	110	70	17.8
2	36	1239.52	0.92	1.65	9.51	5	195	268	271	35	112	72	17.6
2	40	1242.49	0.90	1.62	2.49	5	195	268	272	36	114	74	17.6
1	44	1245.31	0.80	1.44	5.31	5	195	269	272	36	115	75	17.5
1	48	1248.13	0.80	1.44	8.13	5	195	270	271	36	118	76	17.5
B - 6	52	1251.13	0.90	1.62	1.12	5	195	269	271	36	105	78	17.5
6	56	1254.10	0.90	1.61	4.10	5	195	268	270	36	115	79	17.4
5	60	1257.07	0.88	1.59	7.07	6	195	267	269	37	116	80	17.2
5	64	1260.06	0.88	1.60	0.05	6	195	266	268	37	117	81	17.2
4	68	1263.03	0.88	1.60	3.03	6	195	265	268	37	118	82	17.0
4	72	1266.04	0.89	1.62	6.04	6	195	264	267	37	118	83	17.0
3	76	1269.05	0.90	1.64	9.06	6	194	264	266	37	119	83	17.0
3	80	1272.07	0.90	1.65	2.09	6	194	265	267	38	119	83	16.9
2	84	1275.09	0.88	1.61	5.09	6	194	266	268	38	119	83	16.8
2	88	1278.06	0.86	1.57	8.05	6	194	266	269	38	119	83	16.6
1	92	1280.78	0.70	1.28	0.73	6	194	267	269	38	118	84	16.5
1	96	1283.42	0.70	1.28	3.40	6	194	266	270	38	116	84	16.2
	(0945)												
	Θ= 96	Vm= 70.42		ΔH=1.57							AVG.=	92.5	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 2

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac)) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac)) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1432 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1		200	547
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1308	1298	10
TOTAL			557

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 2

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1020 (HRS) TIME END: 1200 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.52 IN Hg H20 29 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 2 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1020)	(1283.75)											
B - 6	4	1286.54	0.81	1.42	6.55	4	195	250	263	35	75	70	17.5
6	8	1289.27	0.82	1.39	9.26	4	195	261	265	35	90	70	17.5
5	12	1292.14	0.90	1.54	2.14	5	195	263	266	35	102	71	17.4
5	16	1295.06	0.91	1.58	5.07	5	195	264	268	35	111	73	17.6
4	20	1298.04	0.93	1.63	8.06	5	195	265	270	35	115	75	17.8
4	24	1301.05	0.92	1.62	1.06	5	195	266	271	36	116	76	17.8
3	28	1304.05	0.92	1.63	4.05	5	195	267	272	36	118	78	17.6
3	32	1307.06	0.92	1.63	7.06	5	195	267	271	36	118	79	17.5
2	36	1310.05	0.90	1.60	0.04	5	195	268	271	36	120	79	17.6
2	40	1313.01	0.89	1.58	3.01	5	195	268	271	36	121	80	17.6
1	44	1315.71	0.72	1.28	5.69	5	195	267	270	36	120	81	17.5
1	48	1318.36	0.72	1.28	8.36	5	195	266	270	37	118	82	17.5
A - 6	52	1321.27	0.85	1.51	1.27	5	195	265	270	37	109	82	17.2
6	56	1324.16	0.85	1.50	4.15	5	195	264	269	37	115	83	17.2
5	60	1327.18	0.93	1.65	7.18	6	195	265	268	37	118	83	17.4
5	64	1330.21	0.94	1.67	0.23	6	195	265	266	37	121	84	17.5
4	68	1333.30	0.95	1.70	3.31	6	195	266	266	38	122	85	17.5
4	72	1336.42	0.96	1.72	6.42	6	195	267	267	38	123	85	17.5
3	76	1339.53	0.96	1.72	9.52	6	195	267	268	38	123	85	17.5
3	80	1342.61	0.95	1.70	2.61	6	195	268	268	38	123	85	17.5
2	84	1345.68	0.93	1.67	5.67	6	195	269	269	38	122	85	17.4
2	88	1348.71	0.92	1.65	8.71	6	195	268	270	39	122	85	17.4
1	92	1351.46	0.74	1.33	1.44	5	195	267	271	39	121	84	17.4
1	96	1354.12	0.72	1.29	4.12	5	195	267	271	39	120	84	17.4
	(1200)												
	Θ= 96	Vm= 70.37		ΔH=1.55							AVG.=	97.6	

AIR 7A

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON METHOD 5

SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 3

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤0.02 CFM AT 15 IN. Hg (vac) ☒ POSTTEST: (0.00 CFM AT 10 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1450 Glass Fiber

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1	732	200	532
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1331	1321	10
TOTAL			542

☐ AMBIENT AIR 20.9% O_2 (V/V)

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. BP-1 BOX NO. BB-1 BAG NO. 3

BAG MATERIAL: Tedlar SIZE: 44 L.

PRETEST LEAK CHECK: 0 cc/MIN AT 20 IN. Hg

TIME START: 1230 (HRS) TIME END: 1410 (HRS)

SAMPLING RATE: 200 cc/MIN OPERATOR: D. Smith

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 133778

PITOT NO. P1-6 Cp .840

BAR. PRESS. 29.52 IN Hg H20 28 %

NOZZLE NO. N1-3 NOZZLE DIA. .250 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON OPERATORS D. Smith / D. PHIPPS METER BOX NO. 2 ΔH@ 1.60 IN WC

SOURCE No. 2 Pulp Dryer Stack DATE 2-26-93 TEST 5 RUN 3 GASMETER COEFF. 1.039

TRAVERSE POINT NO.	SAMPLING TIME (MIN.)	SAMPLE VOL. (cf)	VELOCITY HEAD (IN WC)	ORIFICE METER (IN WC)	DES. VOL. (cf)	VAC IN Hg	TEMPERATURE (° F) STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	OXYGEN (% v/v)
	(1230)	(1354.50)											
A - 6	4	1357.42	0.85	1.54	7.42	4	196	263	262	36	86	75	17.0
6	8	1360.27	0.86	1.51	0.27	4	196	264	266	36	97	76	17.2
5	12	1363.26	0.94	1.67	3.28	5	196	265	267	36	109	77	17.4
5	16	1366.33	0.94	1.69	6.33	5	196	265	269	36	112	78	17.5
4	20	1369.41	0.96	1.73	9.42	5	196	267	270	36	114	79	17.5
4	24	1372.52	0.96	1.74	2.52	5	196	268	271	36	116	79	17.5
3	28	1375.61	0.95	1.72	5.61	5	196	269	272	37	120	81	17.5
3	32	1378.72	0.94	1.71	8.70	5	196	270	273	37	122	82	17.5
2	36	1381.76	0.92	1.68	1.76	5	196	269	272	37	124	84	17.6
2	40	1384.84	0.92	1.69	4.84	5	196	268	271	37	126	86	17.8
1	44	1387.62	0.73	1.34	7.59	4	196	268	270	37	125	87	17.8
1	48	1390.33	0.72	1.32	0.32	4	196	267	270	37	123	88	17.8
B - 6	52	1393.19	0.80	1.47	3.19	5	196	265	270	37	110	88	17.8
6	56	1396.05	0.82	1.49	6.07	5	196	266	269	38	120	89	17.8
5	60	1399.10	0.90	1.65	9.12	6	196	267	270	38	124	90	17.6
5	64	1402.18	0.91	1.68	2.19	6	196	268	271	38	126	91	17.5
4	68	1405.29	0.92	1.70	5.29	6	196	268	270	38	130	92	17.4
4	72	1408.40	0.92	1.71	8.40	6	196	269	269	38	131	93	17.4
3	76	1411.52	0.92	1.71	1.52	6	196	270	268	38	132	93	17.2
3	80	1414.62	0.91	1.69	4.62	6	196	271	267	39	133	94	17.2
2	84	1417.73	0.90	1.68	7.72	6	196	270	268	39	133	94	17.2
2	88	1420.80	0.90	1.68	0.81	6	196	269	268	39	133	94	17.0
1	92	1423.58	0.72	1.34	3.58	5	196	267	269	39	131	94	17.0
1	96	1426.38	0.74	1.38	6.38	5	196	266	270	39	130	94	17.0
	(1410)												
	Θ= 96	Vm= 71.88		ΔH=1.60							AVG.=	103.9	

AIR 7A

Bay West Analytical Laboratory

Bay West Inc.
Five Empire Drive
St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099
1-800-279-0456

March 15, 1993

Bay West Environmental Services
5 Empire Drive
St. Paul, MN 55103

Attn: Mr. Tim Nelson

Bay West Environmental Services Project No.: **920441**
(COC: AN-1519, AN-1520, AN-1521, AN-1522, & AN-1523)
Bay West Laboratory Project ID: **5-3425**
Samples Collected: March 1, 1993

The following are results from the samples you submitted for analysis on March 1, 1993.

The data is enclosed in the following report.

Please contact me if you have any questions or comments.

Sincerely,

Peter Hanson
Laboratory Manager

PH/ly

encl.

TABLE 1

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 1 PULP DRYER STACK

RESULTS OF ORSAT & MOISTURE ANALYSES - EPA METHODS 3 & 4 (%V/V)

TEST NO.: 1	RUN 1	RUN 2
DATE OF TEST	22-Feb-93	22-Feb-93
DRY BASIS (ORSAT), %		
CARBON DIOXIDE	9.03	9.67
OXYGEN	10.42	9.76
CARBON MONOXIDE	NM	NM
NITROGEN	80.55	80.57
WET BASIS (ORSAT), %		
CARBON DIOXIDE	4.67	4.95
OXYGEN	5.39	5.00
CARBON MONOXIDE	NM	NM
NITROGEN	41.65	41.26
WATER VAPOR	48.29	48.80
DRY MOLECULAR WEIGHT	29.86	29.94
WET MOLECULAR WEIGHT	24.13	24.11

NM = NOT MEASURED

TABLE 2

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 1 PULP DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - EPA METHOD 5

TEST NO.: 1	RUN 1	RUN 2
DATE OF RUN	22-Feb-93	22-Feb-93
RUN START TIME	1200	1420
RUN END TIME	1340	1600
STACK STATIC PRESSURE (in. H2O)	-0.60	-0.60
CROSS SECTIONAL AREA (sq. ft.)	19.634	19.634
PITOT TUBE COEFFICIENT	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES		
CONDENSER (ml.)	0.00	0.00
IMPINGER (ml.)	814.00	793.00
DESSICCANT (grams)	7.00	5.00
TOTAL (grams)	821.00	798.00
SAMPLE GAS MOISTURE CONTENT (%)	48.29	48.80
DRY GAS METER COEFFICIENT	1.039	1.039
BAROMETRIC PRESSURE (in. Hg)	29.30	29.30
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.57	0.52
AVG. GAS METER TEMP. (degrees F)	94	94
VOLUME THROUGH GAS METER		
AT METER CONDITIONS (cf)	42.67	40.62
STANDARD CONDITIONS (dscf)	41.40	39.44
TOTAL SAMPLING TIME (min.)	96	96
NOZZLE DIAMETER (in.)	0.250	0.250
AVG. STACK GAS TEMP. (degrees F)	209	210
AVG. STACK GAS VELOCITY (ft/sec)	49.58	49.63
VOLUMETRIC FLOWRATE		
ACTUAL (acfm)	58413	58464
DRY STANDARD (dscfm)	23301	23076
ISOKINETIC VARIATION. %	106.67	102.61
PARTICULATE COLLECTED		
FILTER CATCH (g)	0.0752	0.1337
PROBE WASH (g)	0.1101	0.0984
IMPINGER CATCH (g)	0.0703	0.0722
TOTAL PARTICULATE COLLECTED (g)	0.2556	0.3043
PARTICULATE CONCENTRATION		
ACTUAL (gr/acf)	0.0380	0.0470
DRY STANDARD (gr/dscf)	0.0953	0.1191
PARTICULATE MASS RATE (lb/hr)	19.028	23.550

TABLE 3

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 1 PULP DRYER STACK

RESULTS OF ORSAT & MOISTURE ANALYSES - EPA METHODS 3 & 4 (%V/V)

TEST NO.: 2	RUN 1	RUN 2	RUN 3
DATE OF TEST	23-Feb-93	23-Feb-93	23-Feb-93
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	6.71	6.12	6.05
OXYGEN	13.15	13.86	13.93
CARBON MONOXIDE	NM	NM	NM
NITROGEN	80.14	80.02	80.02
WET BASIS (ORSAT), %			
CARBON DIOXIDE	4.08	3.76	3.75
OXYGEN	8.00	8.52	8.65
CARBON MONOXIDE	NM	NM	NM
NITROGEN	48.75	49.19	49.66
WATER VAPOR	39.17	38.53	37.93
DRY MOLECULAR WEIGHT	29.60	29.53	29.53
WET MOLECULAR WEIGHT	25.06	25.09	25.15

NM = NOT MEASURED

TABLE 4

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 1 PULP DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - EPA METHOD 5

TEST NO.: 2	RUN 1	RUN 2	RUN 3
DATE OF RUN	23-Feb-93	23-Feb-93	23-Feb-93
RUN START TIME	835	1050	1315
RUN END TIME	1015	1230	1455
STACK STATIC PRESSURE (in. H2O)	-0.65	-0.65	-0.65
CROSS SECTIONAL AREA (sq. ft.)	19.634	19.634	19.634
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	693.00	652.00	645.00
DESSICCANT (grams)	3.00	6.00	6.00
TOTAL (grams)	696.00	658.00	651.00
SAMPLE GAS MOISTURE CONTENT (%)	39.17	38.53	37.93
DRY GAS METER COEFFICIENT	1.039	1.039	1.039
BAROMETRIC PRESSURE (in. Hg)	29.40	29.40	29.40
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.88	0.82	0.85
AVG. GAS METER TEMP. (degrees F)	99	98	100
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	52.73	51.11	51.99
STANDARD CONDITIONS (dscf)	50.91	49.44	50.17
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.250	0.250	0.250
AVG. STACK GAS TEMP. (degrees F)	207	208	209
AVG. STACK GAS VELOCITY (ft/sec)	52.98	52.86	52.93
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	62418	62273	62355
DRY STANDARD (dscfm)	29486	29663	29946
ISOKINETIC VARIATION. %	103.65	100.06	100.57
PARTICULATE COLLECTED			
FILTER CATCH (g)	0.0478	0.0887	0.0685
PROBE WASH (g)	0.1106	0.0961	0.1198
IMPINGER CATCH (g)	0.0604	0.0567	0.0431
TOTAL PARTICULATE COLLECTED (g)	0.2188	0.2415	0.2314
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0313	0.0359	0.0342
DRY STANDARD (gr/dscf)	0.0663	0.0754	0.0712
PARTICULATE MASS RATE (lb/hr)	16.763	19.166	18.271

TABLE 5

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF ORSAT & MOISTURE ANALYSES - EPA METHODS 3 & 4 (%V/V)

TEST NO.: 3	RUN 1	RUN 2	RUN 3
DATE OF TEST	24-Feb-93	24-Feb-93	24-Feb-93
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	5.57	5.02	4.55
OXYGEN	14.45	15.10	15.63
CARBON MONOXIDE	NM	NM	NM
NITROGEN	79.98	79.88	79.82
WET BASIS (ORSAT), %			
CARBON DIOXIDE	3.58	3.29	3.07
OXYGEN	9.30	9.88	10.53
CARBON MONOXIDE	NM	NM	NM
NITROGEN	51.47	52.29	53.77
WATER VAPOR	35.64	34.54	32.64
DRY MOLECULAR WEIGHT	29.47	29.41	29.35
WET MOLECULAR WEIGHT	25.38	25.47	25.65

NM = NOT MEASURED

TABLE 6

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - EPA METHOD 5

TEST NO.: 3	RUN 1	RUN 2	RUN 3
DATE OF RUN	24-Feb-93	24-Feb-93	24-Feb-93
RUN START TIME	1010	1230	1440
RUN END TIME	1150	1410	1620
STACK STATIC PRESSURE (in. H2O)	-0.85	-0.85	-0.85
CROSS SECTIONAL AREA (sq. ft.)	12.306	12.306	12.306
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	428.00	683.00	637.00
DESSICCANT (grams)	2.00	9.00	7.00
TOTAL (grams)	430.00	692.00	644.00
SAMPLE GAS MOISTURE CONTENT (%)	35.64	34.54	32.64
DRY GAS METER COEFFICIENT	1.039	1.039	1.039
BAROMETRIC PRESSURE (in. Hg)	29.43	29.43	29.43
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.44	1.26	1.31
AVG. GAS METER TEMP. (degrees F)	88	94	100
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	37.13	63.25	64.78
STANDARD CONDITIONS (dscf)	36.57	61.77	62.61
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.190	0.250	0.250
AVG. STACK GAS TEMP. (degrees F)	195	195	195
AVG. STACK GAS VELOCITY (ft/sec)	61.72	61.59	61.38
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	45571	45475	45322
DRY STANDARD (dscfm)	23190	23547	24147
ISOKINETIC VARIATION. %	102.72	98.70	97.55
PARTICULATE COLLECTED			
FILTER CATCH (g)	0.0502	0.0664	0.0647
PROBE WASH (g)	0.1111	0.1714	0.1599
IMPINGER CATCH (g)	0.0296	0.0635	0.0521
TOTAL PARTICULATE COLLECTED (g)	0.1909	0.3013	0.2767
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0410	0.0390	0.0363
DRY STANDARD (gr/dscf)	0.0806	0.0753	0.0682
PARTICULATE MASS RATE (lb/hr)	16.013	15.192	14.116

TABLE 7

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF ORSAT & MOISTURE ANALYSES - EPA METHODS 3 & 4 (%V/V)

TEST NO.: 4	RUN 1	RUN 2	RUN 3
DATE OF TEST	25-Feb-93	25-Feb-93	25-Feb-93
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	3.18	3.74	3.75
OXYGEN	17.25	16.59	16.56
CARBON MONOXIDE	NM	NM	NM
NITROGEN	79.57	79.67	79.69
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.36	2.64	2.67
OXYGEN	12.79	11.72	11.79
CARBON MONOXIDE	NM	NM	NM
NITROGEN	58.98	56.29	56.73
WATER VAPOR	25.88	29.35	28.81
DRY MOLECULAR WEIGHT	29.20	29.26	29.26
WET MOLECULAR WEIGHT	26.30	25.96	26.02

NM = NOT MEASURED

TABLE 8

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - EPA METHOD 5

TEST NO.: 4	RUN 1	RUN 2	RUN 3
DATE OF RUN	25-Feb-93	25-Feb-93	25-Feb-93
RUN START TIME	910	1135	1350
RUN END TIME	1150	1315	1530
STACK STATIC PRESSURE (in. H2O)	-0.76	-0.76	-0.76
CROSS SECTIONAL AREA (sq. ft.)	12.306	12.306	12.306
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	463.00	575.00	547.00
DESSICCANT (grams)	8.00	14.00	14.00
TOTAL (grams)	471.00	589.00	561.00
SAMPLE GAS MOISTURE CONTENT (%)	25.88	29.35	28.81
DRY GAS METER COEFFICIENT	1.039	1.039	1.039
BAROMETRIC PRESSURE (in. Hg)	29.40	29.40	29.40
AVG. ORIFICE PRESSURE DROP (in. H2O)	1.32	1.49	1.43
AVG. GAS METER TEMP. (degrees F)	89	100	105
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	64.47	69.20	68.16
STANDARD CONDITIONS (dscf)	63.54	66.78	65.29
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.250	0.250	0.250
AVG. STACK GAS TEMP. (degrees F)	193	194	194
AVG. STACK GAS VELOCITY (ft/sec)	58.97	59.42	60.19
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	43538	43872	44437
DRY STANDARD (dscfm)	25591	24558	25036
ISOKINETIC VARIATION. %	93.42	102.32	98.12
PARTICULATE COLLECTED			
FILTER CATCH (g)	0.0390	0.0521	0.0430
PROBE WASH (g)	0.1360	0.1017	0.1241
IMPINGER CATCH (g)	0.0440	0.0420	0.0350
TOTAL PARTICULATE COLLECTED (g)	0.2190	0.1958	0.2021
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0313	0.0253	0.0269
DRY STANDARD (gr/dscf)	0.0532	0.0452	0.0478
PARTICULATE MASS RATE (lb/hr)	11.667	9.524	10.251

TABLE 9

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF ORSAT & MOISTURE ANALYSES - EPA METHODS 3 & 4 (%V/V)

TEST NO.: 5	RUN 1	RUN 2	RUN 3
DATE OF TEST	26-Feb-93	26-Feb-93	26-Feb-93
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	3.92	3.60	3.46
OXYGEN	16.37	16.76	16.93
CARBON MONOXIDE	NM	NM	NM
NITROGEN	79.71	79.64	79.61
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.80	2.60	2.53
OXYGEN	11.69	12.10	12.37
CARBON MONOXIDE	NM	NM	NM
NITROGEN	56.93	57.51	58.17
WATER VAPOR	28.58	27.78	26.94
DRY MOLECULAR WEIGHT	29.28	29.25	29.23
WET MOLECULAR WEIGHT	26.06	26.12	26.21

NM = NOT MEASURED

TABLE 10

CLIENT: AMERICAN CRYSTAL SUGAR, CROOKSTON
SOURCE/SITE: NO. 2 PULP DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - EPA METHOD 5

TEST NO.: 5	RUN 1	RUN 2	RUN 3
DATE OF RUN	26-Feb-93	26-Feb-93	26-Feb-93
RUN START TIME	805	1020	1230
RUN END TIME	945	1200	1410
STACK STATIC PRESSURE (in. H2O)	-0.82	-0.82	-0.82
CROSS SECTIONAL AREA (sq. ft.)	12.306	12.306	12.306
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	581.00	547.00	532.00
DESSICCANT (grams)	7.00	10.00	10.00
TOTAL (grams)	588.00	557.00	542.00
SAMPLE GAS MOISTURE CONTENT (%)	28.58	27.78	26.94
DRY GAS METER COEFFICIENT	1.039	1.039	1.039
BAROMETRIC PRESSURE (in. Hg)	29.52	29.52	29.52
AVG. ORIFICE PRESSURE DROP (in. H2O)	1.57	1.49	1.61
AVG. GAS METER TEMP. (degrees F)	93	100	104
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	70.42	70.37	71.88
STANDARD CONDITIONS (dscf)	69.20	68.19	69.25
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.250	0.250	0.250
AVG. STACK GAS TEMP. (degrees F)	195	194	196
AVG. STACK GAS VELOCITY (ft/sec)	61.34	59.12	61.21
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	45293	43647	45191
DRY STANDARD (dscfm)	25677	25072	26167
ISOKINETIC VARIATION. %	101.40	102.33	99.57
PARTICULATE COLLECTED			
FILTER CATCH (g)	0.0480	0.0452	0.0509
PROBE WASH (g)	0.1581	0.1573	0.1656
IMPINGER CATCH (g)	0.0436	0.0412	0.0457
TOTAL PARTICULATE COLLECTED (g)	0.2497	0.2437	0.2622
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0316	0.0317	0.0338
DRY STANDARD (gr/dscf)	0.0557	0.0552	0.0584
PARTICULATE MASS RATE (lb/hr)	12.256	11.852	13.106

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LAB NO: 3425
SOURCE: 1 Pulp Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 1
RUN NO.'S 1, 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: SWP 3/12/93

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
33957-959	1	0.2556
33961-963	2	0.3043

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g) (residue)
34001	21.2239	-	21.2229	=	0.001

Residue (g)		Volume (l)		g/l
0.001	/	0.126	=	0.0079

CONDENSIBLE ORGANICS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g) (residue)
34002	139.5793	-	139.5780	=	0.0013

Residue (g)		Volume (l)		g/l
0.0013	/	1	=	0.0013

NOTE: (l)=Liter
(g)=Gram
(g/l)=gram per liter

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LAB NO: 3425
SOURCE: 1 Pulp Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 1
RUN NO: 1
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33958	0.6985	-	0.6233	=	0.0752

TOTAL 0.0752

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33957	21.5134	-	21.4022	=	0.1112

BLANK 0.141 (l) * 0.0079 (g/l) = -0.0011 (g)

CORRECTED TOTAL 0.1101

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33959	135.7372	-	135.6656	=	0.0716

BLANK 1.020 (l) * 0.0013 (g/l) = -0.0013

CORRECTED TOTAL 0.0703

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.0752	+	0.1101	+	0.0703	=	0.2556

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LAB NO: 3425
SOURCE: 1 Pulp Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 1
RUN NO: 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWD

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33962	0.7806	-	0.6469	=	0.1337

TOTAL 0.1337

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33961	20.7114	-	20.6118	=	0.0996

BLANK 0.154 (l) * 0.0079 (g/l) = -0.0012 (g)

CORRECTED TOTAL 0.0984

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33963	136.8678	-	136.7943	=	0.0735

BLANK 1.010 (l) * 0.0013 (g/l) = -0.0013

CORRECTED TOTAL 0.0722

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.1337	+	0.0984	+	0.0722	=	0.3043

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LAB NO: 3425
SOURCE: 1 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 2
RUN NO.'S 1, 2, 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
33965-967	1	0.2188
33968-970	2	0.2415
33971-973	3	0.2314

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g) (residue)
34001	21.2239	-	21.2229	=	0.001

Residue (g)		Volume (l)		g/l
0.001	/	0.126	=	0.0079

CONDENSIBLE ORGANICS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g) (residue)
34002	139.5793	-	139.5780	=	0.0013

Residue (g)		Volume (l)		g/l
0.0013	/	1	=	0.0013

NOTE: (l)=Liter
(g)=Gram
(g/l)=gram per liter

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LAB NO: 3425
SOURCE: 1 Pulp Dryer Stack
SITE: Crookston
LOCATION: ACS

TEST NO: 2
RUN NO: 1
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33966	0.6240	-	0.5762	=	0.0478

TOTAL 0.0478

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33965	21.6543	-	21.5425	=	0.1118

BLANK 0.154 (l) * 0.0079 (g/l) = -0.0012 (g)

CORRECTED TOTAL 0.1106

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33967	141.6480	-	141.5864	=	0.0616

BLANK 0.910 (l) * 0.0013 (g/l) = -0.0012

CORRECTED TOTAL 0.0604

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.0478	+	0.1106	+	0.0604	=	0.2188

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LAB NO: 3425
SOURCE: 1 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 2
RUN NO: 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWD

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33969	0.6673	-	0.5786	=	0.0887

TOTAL 0.0887

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33968	21.6283	-	21.5309	=	0.0974

BLANK 0.168 (l) * 0.0078 (g/l) = - 0.0013 (g)

CORRECTED TOTAL 0.0961

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33970	138.5096	-	138.4518	=	0.0578

BLANK 0.850 (l) * 0.0013 (g/l) = - 0.0011

CORRECTED TOTAL 0.0567

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.0887	+	0.0961	+	0.0567	=	0.2415

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LAB NO: 3425
SOURCE: 1 Dryer Stack
SITE: Crookston
LOCATION: ACS

TEST NO: 2
RUN NO: 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33972	0.6501	-	0.5816	=	0.0685

TOTAL 0.0685

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33971	21.6865	-	21.5654	=	0.1211

BLANK 0.164 (l) * 0.0079 (g/l) = -0.0013 (g)

CORRECTED TOTAL 0.1198

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33973	140.1096	-	140.0654	=	0.0442

BLANK 0.840 (l) * 0.0013 (g/l) = -0.0011

CORRECTED TOTAL 0.0431

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.0685	+	0.1198	+	0.0431	=	0.2314

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 3
RUN NO.'S 1, 2, 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
33974-976	1	0.1909
33977-979	2	0.3013
33980-982	3	0.2767

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34001	21.2239	-	21.2229	=	0.001

Residue(g)		Volume(l)		g/l
0.001	/	0.126	=	0.0079

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34002	139.5793	-	139.5780	=	0.0013

Residue(g)		Volume(l)		g/l
0.0013	/	1	=	0.0013

NOTE: (l)=Liter
(g)=Gram
(g/l)=gram per liter

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LAB NO: 3425
SOURCE: #2 Dryer Stack
SITE: Crookston
LOCATION: ACS

TEST NO: 3
RUN NO: 1
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33975	0.6330	-	0.5828	=	0.0502

TOTAL 0.0502

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33974	21.1795	-	21.0674	=	0.1121

BLANK 0.126 (l) * 0.0079 (g/l) = -0.0010 (g)

CORRECTED TOTAL 0.1111

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33976	136.6337	-	136.6033	=	0.0304

BLANK 0.640 (l) * 0.0013 (g/l) = -0.0008

CORRECTED TOTAL 0.0296

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.0502	+	0.1111	+	0.0296	=	0.1909

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LAB NO: 3425
SOURCE: #2 Dryer Stack
SITE: Crookston
LOCATION: ACS

TEST NO: 3
RUN NO: 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33978	0.6466	-	0.5802	=	0.0664

TOTAL 0.0664

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33977	21.6810	-	21.5082	=	0.1728

BLANK 0.184 (l) * 0.0079 (g/l) = -0.0014 (g)

CORRECTED TOTAL 0.1714

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33979	140.6425	-	140.5779	=	0.0646

BLANK 0.870 (l) * 0.0013 (g/l) = -0.0011

CORRECTED TOTAL 0.0635

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.0664	+	0.1714	+	0.0635	=	0.3013

Bay West Analytical Laboratory

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55103-1867

612-291-0456
FAX 291-0099

LAB NO: 3425
SOURCE: #2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 3
RUN NO: 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33981	0.6449	-	0.5802	=	0.0647

TOTAL 0.0647

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33980	21.6041	-	21.4429	=	0.1612

BLANK 0.164 (l) * 0.0079 (g/l) = -0.0013 (g)

CORRECTED TOTAL 0.1599

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33982	139.8264	-	139.7732	=	0.0532

BLANK 0.830 (l) * 0.0013 (g/l) = -0.0011

CORRECTED TOTAL 0.0521

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.0647	+	0.1599	+	0.0521	=	0.2767

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 4
RUN NO.'S 1, 2, 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
33983-985	1	0.2190
33986-988	2	0.1958
33989-991	3	0.2021

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34001	21.2239	-	21.2229	=	0.001

Residue(g)		Volume(l)		g/l
0.001	/	0.126	=	0.0079

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34002	139.5793	-	139.5780	=	0.0013

Residue(g)		Volume(l)		g/l
0.0013	/	1	=	0.0013

NOTE: (l)=Liter
(g)=Gram
(g/l)=gram per liter

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LAB NO: 3425
SOURCE: 2 Dryer Stack
SITE: Crookston
LOCATION: ACS

TEST NO: 4
RUN NO: 1
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33984	0.6164	-	0.5774	=	0.0390

TOTAL 0.0390

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33983	21.5310	-	21.3938	=	0.1372

BLANK 0.156 (l) * 0.0079 (g/l) = -0.0012 (g)

CORRECTED TOTAL 0.1360

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33985	137.8034	-	137.7586	=	0.0448

BLANK 0.660 (l) * 0.0013 (g/l) = -0.0008

CORRECTED TOTAL 0.0440

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.0390	+	0.1360	+	0.0440	=	0.2190

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 4
RUN NO: 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33987	0.6317	-	0.5796	=	0.0521

TOTAL 0.0521

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33986	21.1446	-	21.0421	=	0.1025

BLANK 0.106 (l) * 0.0079 (g/l) = -0.0008 (g)

CORRECTED TOTAL 0.1017

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33988	136.5129	-	136.4699	=	0.0430

BLANK 0.770 (l) * 0.0013 (g/l) = -0.0010

CORRECTED TOTAL 0.0420

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.0521	+	0.1017	+	0.0420	=	0.1958

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 4
RUN NO: 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33990	0.6197	-	0.5767	=	0.0430

TOTAL 0.0430

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33989	21.3167	-	21.1917	=	0.1250

BLANK 0.116 (l) * 0.0079 (g/l) = -0.0009 (g)

CORRECTED TOTAL 0.1241

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33991	142.8937	-	142.8577	=	0.0360

BLANK 0.750 (l) * 0.0013 (g/l) = -0.0010

CORRECTED TOTAL 0.0350

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.0430	+	0.1241	+	0.0350	=	0.2021

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 5
RUN NO.'S 1, 2, 3
DATE: 3-9-93
ANALYST: R. Hessler
reviewed: 3-12-93 SWP

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
33992-'994	1	0.2497
33995-'997	2	0.2437
33998-34000	3	0.2622

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34001	21.2239	-	21.2229	=	0.001

Residue(g)		Volume(l)		g/l
0.001	/	0.126	=	0.0079

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
34002	139.5793	-	139.5780	=	0.0013

Residue(g)		Volume(l)		g/l
0.0013	/	1	=	0.0013

NOTE: (l)=Liter
(g)=Gram
(g/l)=gram per liter

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 5
RUN NO: 1
DATE: 3-9-93
ANALYST: R. Hesse
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33993	0.6248	-	0.5768	=	0.0480

TOTAL 0.0480

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33992	21.2666	-	21.1075	=	0.1591

BLANK 0.130 (l) * 0.0079 (g/l) = -0.0010 (g)

CORRECTED TOTAL 0.1581

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33994	134.8221	-	134.7775	=	0.0446

BLANK 0.800 (l) * 0.0013 (g/l) = -0.0010

CORRECTED TOTAL 0.0436

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.0480	+	0.1581	+	0.0436	=	0.2497

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 5
RUN NO: 2
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33996	0.6250	-	0.5798	=	0.0452

TOTAL 0.0452

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33995	21.1627	-	21.0042	=	0.1585

BLANK 0.158 (l) * 0.0079 (g/l) = -0.0012 (g)

CORRECTED TOTAL 0.1573

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33997	140.7792	-	140.7370	=	0.0422

BLANK 0.740 (l) * 0.0013 (g/l) = -0.000

CORRECTED TOTAL 0.0412

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.0452	+	0.1573	+	0.0412	=	0.2437

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LAB NO: 3425
SOURCE: 2 Dryer stack
SITE: Crookston
LOCATION: ACS

TEST NO: 5
RUN NO: 3
DATE: 3-9-93
ANALYST: R. Hessler
Reviewed: 3-12-93 SWP

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33999	0.6313	-	0.5804	=	0.0509

TOTAL 0.0509

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
33998	21.2981	-	21.1313	=	0.1668

BLANK 0.158 (l) * 0.0079 (g/l) = -0.0012 (g)

CORRECTED TOTAL 0.1656

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
34000	135.4257	-	135.3790	=	0.0467

BLANK 0.730 (l) * 0.0013 (g/l) = -0.0010

CORRECTED TOTAL 0.0457

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.0509	+	0.1656	+	0.0457	=	0.2622

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920441 DATE OF ANALYSIS 2-22-93
SOURCE No. 1 PULP DRYER LEAK CHECK PERFORMED YES
SITE STACK TECHNICIAN DUAYNE A. SMITH
CITY/STATE CROOKSTON, MN. TYPE OF FUEL COAL

TEST/ RUN	READING NO.	BURET READING			CONCENTRATION (%v/v,dry)		F_o
		ZERO POINT	AFTER CO 2	AFTER O 2	CO_2	O_2	
AMBIENT AIR		0.00	0.00	20.90	0.00	20.90	1.1565
1 / 1	1	0.00	9.03	19.45	9.03	10.42	1.1606
	2	0.00	9.03	19.45	9.03	10.42	1.1606
	3	0.00	9.03	19.45	9.03	10.42	1.1606
1 / 2	1	0.00	9.67	19.43	9.67	9.76	1.1520
	2	0.00	9.67	19.43	9.67	9.76	1.1520
	3	0.00	9.67	19.43	9.67	9.76	1.1520
	1						
	2						
	3						

CO_2	O_2	F_o
AVERAGE RUN 1 9.03	AVERAGE RUN 1 10.42	AVERAGE RUN 1 1.1606
AVERAGE RUN 2 9.67	AVERAGE RUN 2 19.43	AVERAGE RUN 2 1.1520
AVERAGE RUN 3	AVERAGE RUN 3	AVERAGE RUN 3

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920441 DATE OF ANALYSIS 2-23-93

SOURCE No. 1 PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK TECHNICIAN DWAYNE A. SMITH

CITY/STATE CROOKSTON, MN. TYPE OF FUEL COAL

TEST/ RUN	READING NO.	BURET READING			CONCENTRATION (%v/v,dry)		F_o
		ZERO POINT	AFTER CO 2	AFTER O 2	CO_2	O_2	
AMBIENT AIR		0.00	0.00	20.90	0.00	20.90	1.1565
2/1	1	0.00	6.71	19.86	6.71	13.15	1.1550
	2	0.00	6.71	19.86	6.71	13.15	1.1550
	3	0.00	6.71	19.86	6.71	13.15	1.1550
2/2	1	0.00	6.12	19.98	6.12	13.86	1.1503
	2	0.00	6.12	19.98	6.12	13.86	1.1503
	3	0.00	6.12	19.98	6.12	13.86	1.1503
2/3	1	0.00	6.05	19.98	6.05	13.93	1.1521
	2	0.00	6.05	19.98	6.05	13.93	1.1521
	3	0.00	6.05	19.98	6.05	13.93	1.1521

CO_2	O_2	F_o
AVERAGE RUN 1 6.71	AVERAGE RUN 1 13.15	AVERAGE RUN 1 1.1550
AVERAGE RUN 2 6.12	AVERAGE RUN 2 13.86	AVERAGE RUN 2 1.1503
AVERAGE RUN 3 6.05	AVERAGE RUN 3 13.93	AVERAGE RUN 3 1.1521

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920441 DATE OF ANALYSIS 2-24-93
SOURCE No. 2 PULP DRYER LEAK CHECK PERFORMED YES
SITE STACK TECHNICIAN DWAYNE A. SMITH
CITY/STATE C. ROCKSTON, MN. TYPE OF FUEL COAL

TEST/ RUN	READING NO.	BURET READING			CONCENTRATION (%v/v,dry)		F_o
		ZERO POINT	AFTER CO 2	AFTER O 2	CO_2	O_2	
AMBIENT AIR		0.00	0.00	20.90	0.00	20.90	1.1565
3/1	1	0.00	5.57	20.02	5.57	14.45	1.1580
	2	0.00	5.57	20.02	5.57	14.45	1.1580
	3	0.00	5.57	20.02	5.57	14.45	1.1580
3/2	1	0.00	5.02	20.12	5.02	15.10	1.1554
	2	0.00	5.02	20.12	5.02	15.10	1.1554
	3	0.00	5.02	20.12	5.02	15.10	1.1554
3/3	1	0.00	4.55	20.18	4.55	15.63	1.1582
	2	0.00	4.55	20.18	4.55	15.63	1.1582
	3	0.00	4.55	20.18	4.55	15.63	1.1582

CO_2	O_2	F_o
AVERAGE RUN 1 5.57	AVERAGE RUN 1 14.45	AVERAGE RUN 1 1.1580
AVERAGE RUN 2 5.02	AVERAGE RUN 2 15.10	AVERAGE RUN 2 1.1554
AVERAGE RUN 3 4.55	AVERAGE RUN 3 15.63	AVERAGE RUN 3 1.1582

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920441 DATE OF ANALYSIS 2-25-93

SOURCE No. 2 PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK TECHNICIAN DUAYNE A. SMITH

CITY/STATE CROOKSTON, MN. TYPE OF FUEL COAL

TEST/ RUN	READING NO.	BURET READING			CONCENTRATION (%v/v,dry)		F_o
		ZERO POINT	AFTER CO_2	AFTER O_2	CO_2	O_2	
AMBIENT AIR		0.00	0.00	20.90	0.00	20.90	1.1565
4/1	1	0.00	3.18	20.43	3.18	17.25	1.1478
	2	0.00	3.18	20.43	3.18	17.25	1.1478
	3	0.00	3.18	20.43	3.18	17.25	1.1478
4/2	1	0.00	3.74	20.33	3.74	16.59	1.1524
	2	0.00	3.74	20.33	3.74	16.59	1.1524
	3	0.00	3.74	20.33	3.74	16.59	1.1524
4/3	1	0.00	3.75	20.31	3.75	16.56	1.1573
	2	0.00	3.75	20.31	3.75	16.56	1.1573
	3	0.00	3.75	20.31	3.75	16.56	1.1573

CO_2	O_2	F_o
AVERAGE RUN 1 3.18	AVERAGE RUN 1 17.25	AVERAGE RUN 1 1.1478
AVERAGE RUN 2 3.74	AVERAGE RUN 2 16.59	AVERAGE RUN 2 1.1524
AVERAGE RUN 3 3.75	AVERAGE RUN 3 16.56	AVERAGE RUN 3 1.1573

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920441 DATE OF ANALYSIS 2-26-93

SOURCE No. 2 PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK TECHNICIAN DWAYNE A. SMITH

CITY/STATE CROOKSTON, MN. TYPE OF FUEL COAL

TEST/ RUN	READING NO.	BURET READING			CONCENTRATION (%v/v,dry)		F_o
		ZERO POINT	AFTER CO_2	AFTER O_2	CO_2	O_2	
AMBIENT AIR		0.00	0.00	20.90	0.00	20.90	1.1565
5/1	1	0.00	3.92	16.37	3.92	16.37	1.1556
	2	0.00	3.92	16.37	3.92	16.37	1.1556
	3	0.00	3.92	16.37	3.92	16.37	1.1556
5/2	1	0.00	3.60	16.76	3.60	16.76	1.1500
	2	0.00	3.60	16.76	3.60	16.76	1.1500
	3	0.00	3.60	16.76	3.60	16.76	1.1500
5/3	1	0.00	3.46	16.93	3.46	16.93	1.1474
	2	0.00	3.46	16.93	3.46	16.93	1.1474
	3	0.00	3.46	16.93	3.46	16.93	1.1474

CO_2	O_2	F_o
AVERAGE RUN 1 3.92	AVERAGE RUN 1 16.37	AVERAGE RUN 1 1.1556
AVERAGE RUN 2 3.60	AVERAGE RUN 2 16.76	AVERAGE RUN 2 1.1500
AVERAGE RUN 3 3.46	AVERAGE RUN 3 16.93	AVERAGE RUN 3 1.1474

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Calculation Equations

Nomenclature

A	= Cross-sectional area of duct
A_n	= Cross-sectional area of nozzle
B_{ws}	= Water vapor in gas stream, proportion by volume
C_a	= Particulate concentration, actual, we basis - gr/acf
C_s	= Particulate concentration at dry standard conditions - gr/dscf
%EA	= Excess air, percent by volume
G_d	= Specific gravity relative to air, dimensionless
I	= Isokinetic variation, percent by volume
M_d	= Molecular weight of flue gas, dry, lb/lb-mole
M_g	= Mass flow of wet flue gas, lb/hr
M_n	= Total particulate collected, grams
M_p	= Particulate mass flow, lb/hr
M_s	= Molecular weight of flue gas, wet, lb/lb-mole
P_b	= Barometric pressure, uncompensated, inches of mercury
P_g	= Static pressure of duct, inches of water
P_s	= Absolute gas pressure of duct, inches of mercury
Q	= Actual flue gas volumetric flow rate, acfm
Q_{sd}	= Dry flue gas volumetric flow rate corrected to standard conditions, dscf
T_m	= Average dry gas meter temperature, °R
T_s	= Average stack gas temperature, °R
ϕ	= Total sampling time, minutes
V_{lc}	= Total volume of liquid collected in impingers and desiccant, ml
V_m	= Volume of gas sample measured by gas meter, cubic feet
V_{std}	= Volume of gas sample corrected to standard conditions, dry standard cubic ft
V_w	= Volume of water vapor in gas sample, corrected to standard conditions
V_s	= Linear velocity of flue gas, feet per second
Y	= Dry Gas meter calibration factor
ΔH	= Orifice meter differential pressure, inches of water
ΔP	= Velocity pressure of flue gas, inches of water
ρ	= Actual gas density, pounds per cubic foot

Bay West

Calculation Equations

EPA Method 2

$$V_s = 85.49\ C_p\ (\Delta p_{(avg)})^{1/2} \left[\frac{Ts}{P_s\ M_s} \right]^{1/2}$$

$$Q = 60\ V_s\ A$$

$$Q_{sd} = Q\ (1\text{-}B_{ws}) \left[\frac{528}{T_s} \right] \left[\frac{P_s}{29.92} \right]$$

$$m_g = \frac{4.995\ Q_{sd}\ G_d}{1\text{-}B_{ws}}$$

$$\rho = \frac{0.04585\ P_s\ M_s}{T_s}$$

Calculation Equations

EPA Method 3

$$M_d = (0.44 \times \%CO_2) + (0.32 \times \%O_2) + (0.28\,[\%N_2 + \%CO])$$

$$M_s = M_d\,(1-B_{ws}) + 18\,B_{ws}$$

$$F_o = \frac{20.9 - \%O_2}{\%CO_2}$$

Calculation Equations

EPA Method 5

$$V_{std} = 17.647\ Vm\ Y \left[\frac{P_b + \Delta H/13.6}{T_m} \right]$$

$$V_w = 0.047070\ V_{lc}$$

$$B_{ws} = \frac{V_w}{V_w + V_{std}}$$

$$C_s = 15.432 \left[\frac{M_n}{V_{std}} \right]$$

$$C_a = 272.22 \left[\frac{M_n\ P_s}{T_s\ V_w + V_{std}} \right]$$

$$M_p = 0.00857\ C_s\ Q_{sd}$$

$$I = 0.09450 \left[\frac{T_s\ V_m}{P_s\ V_s\ A_n\ \phi\ (1-B_{ws})} \right]$$

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REPORT NOMENCLATURE

acfm	Actual cubic feet per minute
°C	Degrees Centigrade
C_1	Results reported as carbon
cc(ml)	Cubic centimeter (milliliter)
cfh	Cubic feet per hour
cu. ft.	Cubic feet
dscfm	Dry standard cubic feet per minute
°F	Degrees Fahrenheit
dia	Diameter
ft./sec.	Feet per second
gph	Gallons per hour
gpm	Gallons per minute
gr/acf	Grains per actual cubic foot
gr/dscf	Grains per dry standard cubic foot
gr/dscf @ 12% CO_2	Grains per dry standard cubic foot corrected to 12 percent carbon dioxide
gr/dscf @ 7% O_2	Grains per dry standard cubic foot corrected to 7 percent oxygen
g	Gram
hrs	Hours
in	Inches
in Hg	Inches of mercury
in H_2O	Inches of water
in WC	Inches of water column
Klb/hr	Thousand pounds per hour
lb	Pound
lb/dscf	Pounds per dry standard cubic foot
lb/hr	Pounds per hour
lb/MMBTU	Pounds per million British Thermal Units heat input
MW	Megawatt
mg	Milligram
mg/dscm	Milligrams per dry standard cubic meter
min	Minutes
ppm	Parts per million by volume
ppm w/w	Parts per million by weight
PSIA	Pounds per square inch - actual
PSIG	Pounds per square inch - gauge
°R	Degrees Rankin
sec.	Seconds
sq. ft.	Square Feet
tph	Tons per hour
ug	Microgram
%v/v	percent by volume
%w/w	Percent by weight

NOZZLE CALIBRATION DATA SHEET

NOZZLE IDENTIFICATION NUMBER: N1-3

FIELD TECHNICIAN: DS

DATE OF CALIBRATION: on site

POSITION	DIAMETER (INCHES)
1	.250 IN.
2	.250 IN.
3	.250 IN.
AVERAGE:	0.250 IN.

NOTE: Nozzle is rotated by 60 degree increments and diameter measured to the nearest 0.001 inch.

NOZZLE CALIBRATION DATA SHEET

NOZZLE IDENTIFICATION NUMBER: N1-2

FIELD TECHNICIAN: D. Smith

DATE OF CALIBRATION: On site

POSITION	DIAMETER (INCHES)
1	.190 IN.
2	.190 IN.
3	.190 IN.
AVERAGE:	0.190 IN.

NOTE: Nozzle is rotated by 60 degree increments and diameter measured to the nearest 0.001 inch.

S-TYPE PITOT TUBE INSPECTION SHEET

PITOT NUMBER: P1-6

DATE OF INSPECTION: 6-8-92

TECHNICIAN: Dan Smith

PITOT TUBE DIMENSIONS:

External tubing diameter (D_t)	.370	IN.
Base to Side A opening plane (P_A)	.540	IN.
Base to Side B opening plane (P_B)	.540	IN.

ALIGNMENT:

a_1	< 10°	Ø	degrees
a_2	< 10°	Ø	degrees
B_1	< 5°	Ø	degrees
B_2	< 5°	Ø	degrees
Z	< .125"	.020	IN.
W	< .0625"	Ø	IN.

DISTANCE FROM PITOT TO PROBE COMPONENTS:

Pitot to 0.500" nozzle	.875	IN.
Pitot to probe sheath	4.150	IN.
Pitot to thermocouple (parallel to probe)	.850	IN.
Pitot to thermocouple (perpendicular to probe)	3.920	IN.

Bay West DRY GAS METER CALIBRATION

DGM #	#2	DGM SN.	27233	DATE	6-16-92
Pb (in Hg)	29.52	TECH.	SCB	WTM SN	10AZ-12

ORIFICE MANOMETER SETTING ΔH (in H2O)	WET TEST METER ft 3 (Vs)	DRY GAS METER VOLUME ft 3 (Vdg)	TEMPERATURES WET METER °F (ts)	DRY GAS INLET °F (ti)	METER OUTLET °F (to)	TIME MIN/SEC (Θ)	METER COEFFICIENT (Y)	ΔH @
1.00	START 70.5	640.103	74.5	122.3	88.0	8	1.057	1.49
	5 FINISH 25.5	645.097	74.5	123.4	88.5	16.25		
1.00	START							
	5 FINISH							
2.00	START 14.0	633.540	74.5	121.9	85.9	6	1.036	1.63
	5 FINISH 19.0	638.613	74.5	125.5	84.9	7.63		
2.00	START							
	5 FINISH							
3.00	START 28.0	647.675	74.5	131.3	88.0	5	1.024	1.68
	5 FINISH 33.0	652.846	74.5	132.9	89.8	6.16		
3.00	START							
	5 FINISH							
		AVG 1.00	74.5	123.1	88.25			
		AVG 2.00	74.5	123.7	85.4			
		AVG 3.00	74.5	132.1	88.9			
							Y= 1.039	ΔH= 1.60

TOLERANCES: Y=+/- 0.02 FROM AVERAGE
ΔH@=+/-0.20 FROM AVERAGE

H@

$$\frac{0.0317\ \Delta H}{Pb\ (to+460)} \left[\frac{(ts+460)\ \Theta}{Vs} \right]^2$$

Y

$$\frac{Vs\ Pb}{Vdg} \left[\frac{(ti+td)/2+460}{(Pb+\frac{\Delta H}{13.6})\ (ts+460)} \right]$$

LABORATORY CHAIN-OF-CUSTODY RECORD

BW LAB PROJECT NO.: 1 α S

Bay West

CLIENT: A.C.S. CROOKSTON
SEND RESULTS TO: T.N.
PHONE NO: _____ FAX NO.: _____
CLIENT PROJECT NO. / PO: 920441

TURNAROUND: NORMAL
SAMPLE RETENTION: ___ RETURN ___ DISPOSE

CHAIN-OF-CUSTODY NO: AN- 1519

ITEM NO.	SAMPLE NUMBER (PROJECT NO.-SAMPLE ID)	TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	TEST 1 RUN 1		L	1-250ML	10	PROBE WASH
2	T1 R1		O	1-DISH	10	FILTER
3	T1 R1		W	2-32oz.	10	IMPINGER CATCH
4	T1 R2		L	1-250ML	10	P.W.
5	T1 R2		O	1-DISH	10	FLT.
6	T1 R2		W	2-32oz.	10	IMP.
7	T2 R1		L	1-250ML	10	P.W.
8	T2 R1		O	1-DISH	10	FLT.
9	T2 R1		W	1-32oz.	10	IMP.
10	T2 R2		L	1-250ML	10	P.W.

SAMPLER: DWAYNE A. SMITH
AFFILIATION: BAY WEST
DATE: 3-1-93
TIME: 1000 HRS

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-10	D.A.S.	P. Vanegas	3/1/93	1:00
2					
3					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W = Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify FILTER)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

VOC's (by GC/MS) (EPA 624/8240)	01
Semi-Volatiles (by GC/MS) (EPA 625/8270)	02
Phenols (EPA 604/8040)	03
Phthalates (EPA 606/8060)	04
PCB's (EPA 608/8080)	05
Pesticides (EPA 608/8080)	06
PAH's (EPA 610/8100/8310)	07
Herbicides (EPA 615/8150)	08
BOD, COD (EPA 405.1/410.1)	09
EPA 5	10
	11
	12
	13
	14
	15
	16
	17
	18
	19
	20
	21
	22
	23
	24

BW-AN: 6/90

LABORATORY CHAIN-OF-CUSTODY RECORD

BW LAB PROJECT NO.: 125

Bay West

CLIENT: A.C.S. CROOKSTON
SEND RESULTS TO: T.N.
PHONE NO: FAX NO.:
CLIENT PROJECT NO. / PO: 920411

TURNAROUND: NORMAL
SAMPLE RETENTION: ___ RETURN ___ DISPOSE

CHAIN-OF-CUSTODY NO: AN- 1520

ITEM NO.	SAMPLE NUMBER (PROJECT NO.-SAMPLE ID)	TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	TEST 2 RUN 2		O	1-DISH	10	FILTER
2	T2 R2		W	1-32 oz.	10	IMPINGER CATCH
3	T2 R3		L	1-250ML	10	PROBE WASH
4	T2 R3		O	1-DISH	10	FLT.
5	T2 R3		W	1-32 oz.	10	IMP.
6	T3 R1		L	1-250ML	10	P.W.
7	T3 R1		O	1-DISH	10	FLT.
8	T3 R1		W	1-32oz	10	IMP.
9	T3 R2		L	1-250ML	10	P.W.
10	T3 R2		O	1-DISH	10	FLT.

SAMPLER: DWAYNE A. SMITH
AFFILIATION: BAY WEST
DATE: 3-1-93
TIME: 1000 HRS.

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-10	DAS.	P. Varegas	3/1/93	1:00
2					
3					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W= Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify FILTER)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

VOC's (by GC/MS) (EPA 624/8240)	01
Semi-Volatiles (by GC/MS) (EPA 625/8270)	02
Phenols (EPA 604/8040)	03
Phthalates (EPA 606/8060)	04
PCB's (EPA 608/8080)	05
Pesticides (EPA 608/8080)	06
PAH's (EPA 610/8100/8310)	07
Herbicides (EPA 615/8150)	08
BOD, COD (EPA 405.1/410.1)	09
EPA 5	10
	11
	12
	13
	14
	15
	16
	17
	18
	19
	20
	21
	22
	23
	24

BW-AN: 6/90

LABORATORY CHAIN-OF-CUSTODY RECORD

BW LAB PROJECT NO.: 125

Bay West

CLIENT: A.C.S. CROOKSTON
SEND RESULTS TO: I.W.
PHONE NO: FAX NO.:
CLIENT PROJECT NO. / PO: 920441

TURNAROUND: NORMAL
SAMPLE RETENTION: ___ RETURN ___ DISPOSE

CHAIN-OF-CUSTODY NO: AN- 1521

ITEM NO.	SAMPLE NUMBER (PROJECT NO.-SAMPLE ID)	TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	TEST 3 RUN 2		W	1-32 oz.	10	IMPINGER CATCH
2	T3 R3		L	1-250ML	10	PROBE WASH
3	T3 R3		O	1-DISH	10	FILTER
4	T3 R3		W	1-32 oz	10	IMP.
5	T4 R1		L	1-250ML	10	P.W.
6	T4 R1		O	1-DISH	10	FLT.
7	T4 R1		W	1-32 oz.	10	IMP.
8	T4 R2		L	1-250ML	10	P.W.
9	T4 R2		O	1-DISH	10	FLT.
10	T4 R2		W	1-32 oz.	10	IMP.

SAMPLER: DWAYNE A. SMITH
AFFILIATION: BAY WEST
DATE: 2-1-93
TIME: 1000 HRS.

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-10	DAS	P. Vanegas	3/1/93	1:00
2					
3					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W= Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify FILTER)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

VOC's (by GC/MS) (EPA 624/8240)	01
Semi-Volatiles (by GC/MS) (EPA 625/8270)	02
Phenols (EPA 604/8040)	03
Phthalates (EPA 606/8060)	04
PCB's (EPA 608/8080)	05
Pesticides (EPA 608/8080)	06
PAH's (EPA 610/8100/8310)	07
Herbicides (EPA 615/8150)	08
BOD, COD (EPA 405.1/410.1)	09
EPA 5	10
	11
	12
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	19
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	22
	23
	24

BW-AN: 6/90

LABORATORY CHAIN-OF-CUSTODY RECORD

BW LAB PROJECT NO.: 23

Bay West

CLIENT: A.C.S. CROOKSTON
SEND RESULTS TO: T.N.
PHONE NO: FAX NO.:
CLIENT PROJECT NO. / PO: 920441

TURNAROUND: NORMAL
SAMPLE RETENTION: ___ RETURN ___ DISPOSE

CHAIN-OF-CUSTODY NO: AN- 1522

ITEM NO.	SAMPLE NUMBER (PROJECT NO.-SAMPLE ID)	TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	TEST 4 RUN 3		L	1-250ML	10	PROBE WASH
2	T4 R3		O	1-DISH	10	FILTER
3	T4 R3		W	1-32oz	10	IMPINGER CATCH
4	T5 R1		L	1-250ML	10	P.W.
5	T5 R1		O	1-DISH	10	FLT.
6	T5 R1		W	1-32oz	10	IMP.
7	T5 R2		L	1-250ML	10	P.W.
8	T5 R2		O	1-DISH	10	FLT.
9	T5 R2		W	1-32oz	10	IMP.
10	T5 R3		L	1-250ML	10	P.W.

SAMPLER: DWAYNE A. SMITH
AFFILIATION: BAY WEST
DATE: 3-1-93
TIME: 1000 HRS

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-10	DAS	P. Vanegas	3/1/93	1:00
2					
3					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W = Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify FILTER)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

VOC's (by GC/MS) (EPA 624/8240)	01
Semi-Volatiles (by GC/MS) (EPA 625/8270)	02
Phenols (EPA 604/8040)	03
Phthalates (EPA 606/8060)	04
PCB's (EPA 608/8080)	05
Pesticides (EPA 608/8080)	06
PAH's (EPA 610/8100/8310)	07
Herbicides (EPA 615/8150)	08
BOD, COD (EPA 405.1/410.1)	09
EPA 5	10
	11
	12
	13
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	23
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BW-AN: 6/90

LABORATORY CHAIN-OF-CUSTODY RECORD

BW LAB PROJECT NO.: 1 of 5

Bay West

CLIENT: A.C.S. CROOKSTON
SEND RESULTS TO: T.N.
PHONE NO: FAX NO.:
CLIENT PROJECT NO. / PO: 920441

TURNAROUND: NORMAL
SAMPLE RETENTION: ___ RETURN ___ DISPOSE

CHAIN-OF-CUSTODY NO: AN- 1523

ITEM NO.	SAMPLE NUMBER (PROJECT NO.-SAMPLE ID)	TIME	MATRIX	NUMBER & TYPE OF CONTAINER	ANALYSIS CODE(S)	DESCRIPTION / COMMENTS
1	TEST 5 RUN3		O	1-DISH	10	FILTER
2	T5 R3		W	1-32 oz	10	IMPINGER CATCH
3	T1-5 RO		L	1-250ml	10	R.W. BLANK
4	T1-5 RO		W	1-32 oz	10	IMP. BLANK
5						
6						
7						
8						
9						
10						

SAMPLER: DWAYNE SMITH
AFFILIATION: BAY WEST
DATE: 3-1-93
TIME: 1000 HRS.

TRANS NO.	ITEM NO.	RELINQUISHED BY	ACCEPTED BY	DATE	TIME
1	1-4	DAS	R. Vanegas	3/1/93	1:00
2					
3					

Preservative:

All samples must be preserved on ice (4°C), unless specified otherwise.

Matrix:

W = Water
L = Liquid Sample
S = Soil Sample
SD = Solids Sample
SL = Sludge Sample
O = Other (Specify FILTER)

ANALYSIS CODES

- Cross out any unwanted parameter.
- List any additional parameters in the "Description / Comments" column.

VOC's (by GC/MS) (EPA 624/8240)	01
Semi-Volatiles (by GC/MS) (EPA 625/8270)	02
Phenols (EPA 604/8040)	03
Phthalates (EPA 606/8060)	04
PCB's (EPA 608/8080)	05
Pesticides (EPA 608/8080)	06
PAH's (EPA 610/8100/8310)	07
Herbicides (EPA 615/8150)	08
BOD, COD (EPA 405.1/410.1)	09
EPA 5	10
	11
	12
	13
	14
	15
	16
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	19
	20
	21
	22
	23
	24

BW-AN: 6/90

02/22/93

NUMBER 1 DRYER, NORTH

TIME OF DAY	1030	1130		1200	1230	1300	
SLICE RATE, TPH	198	228		239	238	231	
TOTAL PULP FLOW, TPH	56	57		59	59	64	
GRATE SPEED, %	91.58	77.70		85.41	76.27	76.69	
DRYER EXIT, °C	108.6	108.8		109.1	108.9	109.01	
ID FAN SPEED, %	85	85.0		85.0	85.0	85.0	
PULP FEED SCROLL, %	27.2	27.6	S	25.8	26.1	26.6	
PULP GATE, % CLOSED	40.0	40.0		40.0	40.0	40.0	
FD DAMPER, % OPEN	27.6	24.5	O	35.9	23.3	28.57	
RECYCLE DAMPERS, % OPEN	47.0	47.0		47.0	47.0	47.0	
RATIO SETUP	manual	manual	T	manual	Manual	Manual	
DRYER THROAT	867	864		848	847	839	
DRYER EXIT, °C	105	105	#1	105	105	106	
FURNACE PRESS, IN H20	0	-0.9		-0.6	-0.9	-0.7	
EXIT PRESS, INC H20	-1.6	-1.5	(a)	-1.6	-1.6	-1.5	
DRYER ΔP, IN H20	0.50	0.40		0.4	0.4	0.2	
DRUM AMPS	32	33	1200	35	33	35	
ID FAN, AMPS	168	168		170	169	169	
ID FLOW	61	62		61	62	61	
REC. FLOW	13.6	13.8		13.5	13.7	13.7	
M.C. ΔP	5.8	5.8		5.8	5.75	5.8	
BAGHOUSE ΔP	4.18	4.11		4.10	4.07	4.07	
ASP	8.0	8.0		8.0	8.0	7.9	
FD FLOW, ΔP	0.49	0.50		0.50	0.50	0.49	
#1 PULP FEED, TPH	31	31		31	31	31	@1311/1314
#2 PULP FEED, TPH	27	27		29	32	31	83.48/93.33/95.72
C, %	4.05	4.5		4.1	4.4	4.6	~~[illegible]~~ 16" in 96 sec
Brt [illegible], °C	104.4	104.2		104.7	104.7	104.8	Wheel
[illegible], °C	99.4	99.6		99.4	99.4	99.6	No 50
							3.75 4

time/wp51

02/22/93

NUMBER 1 DRYER, NORTH

TIME OF DAY	1330	1400		1430	1500		1530
SLICE RATE, TPH	246	229		215	151		245
TOTAL PULP FLOW, TPH	63	59		56	55		57
GRATE SPEED, %	86.25	89.14		78.12	81.66		91.48
DRYER EXIT, °C	108.5	108.4		109.1	108.6		108.7
ID FAN SPEED, %	85.0	85.0	S	85.0	85.0		85.0
PULP FEED SCROLL, %	27.8	27.6	~~0~~	27.9	31.2		31.6
PULP GATE, % CLOSED	40.0	40.0	0	40.0	40.0		40.0
FD DAMPER, % OPEN	47.08	37.66		24.92	43.96		44.14
RECYCLE DAMPERS, % OPEN	47.0	47.0	T	47.0	47.0		47.0
RATIO SETUP	—	—		—	—		—
DRYER THROAT	838	818	#2	827	938		888
DRYER EXIT, °C	106	105		106	105		105
FURNACE PRESS, IN H20	-0.1	-0.6	@	-0.8	-0.3		-0.1
EXIT PRESS, INC H20	-1.5	-1.5		-1.6	-1.5		-1.6
DRYER ΔP, IN H20	0.1	0	1420	0	0.1		0.2
DRUM AMPS	32	32		33.5	34	1508/1510	33.5
ID FAN, AMPS	170	170		168	170	82.7/86.69	168
ID FLOW	60	62		60	60	/88.22	59
REC. FLOW	13.8	13.7		13.6	13.4	8" in	13.3
M.C. ΔP	5.8	5.85		5.8	5.8	53	5.7
BAGHOUSE ΔP	4.11	4.09		4.13	4.13		4.21
ASP	8.0	8.0		7.9	8.0	Wheel	7.8
FD FLOW, ΔP	0.49	0.48		0.49	0.50	No 50	0.52
#1 PULP FEED, TPH	31	31		31	31	3.75 4.0	31
#2 PULP FEED, TPH	28	33		27	21	3¾-3¼	25
O_2, %	4.2	4.5		4.5	4.2		3.1
BH in, °C	105.0	104.9		105.0	105.1		105.2
out, °C	99.4	99.6		99.7	100.6		99.7

time/wp51

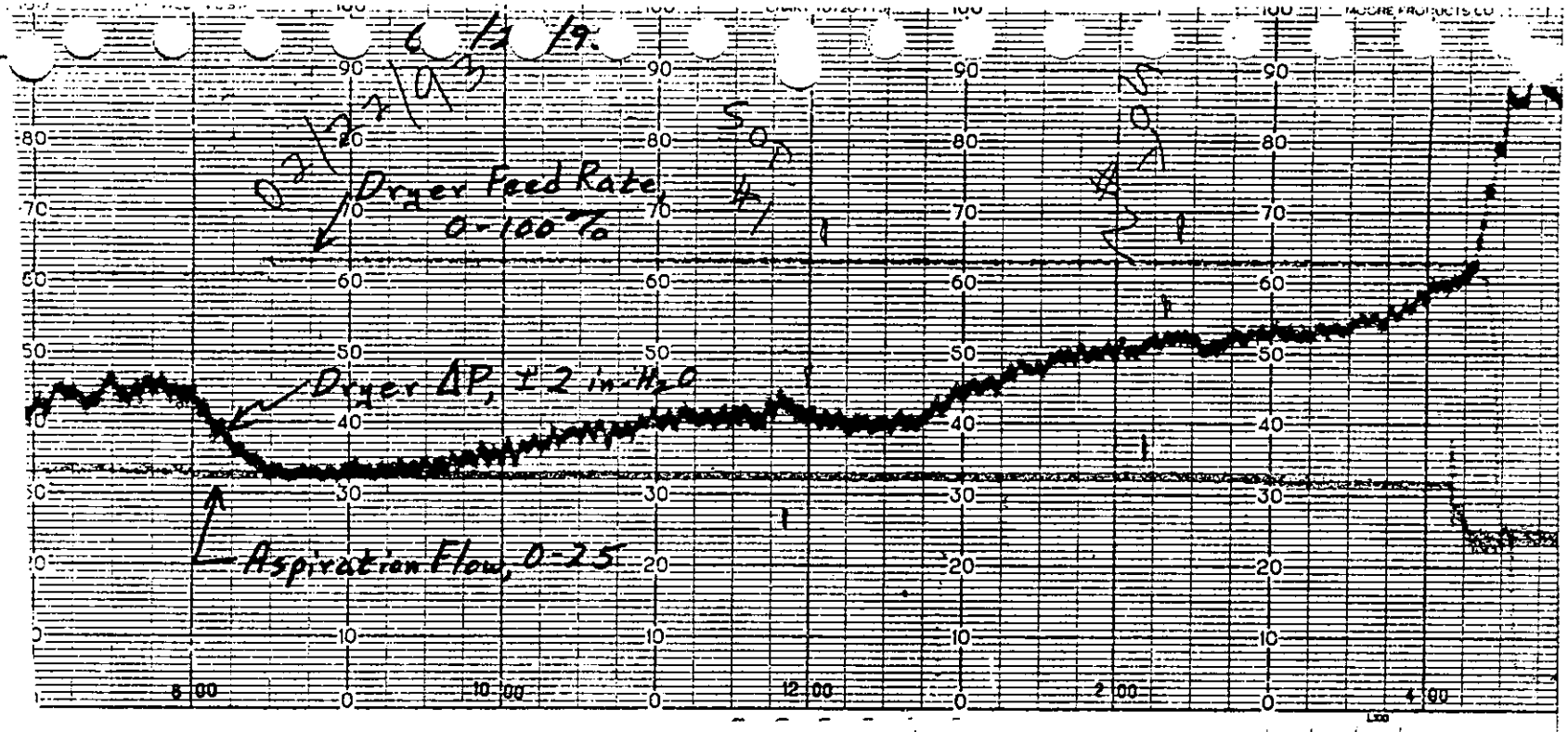
Kennecott

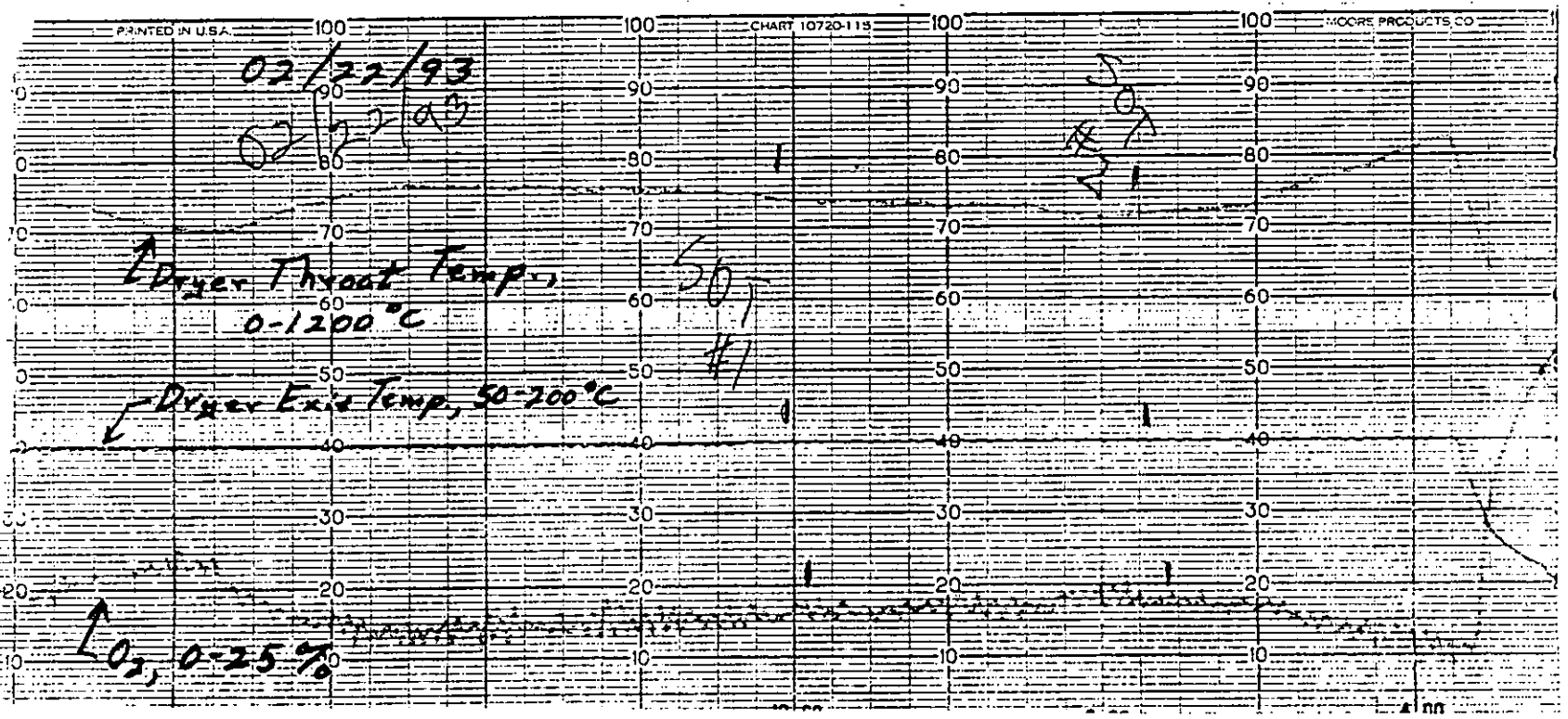
02/22/93

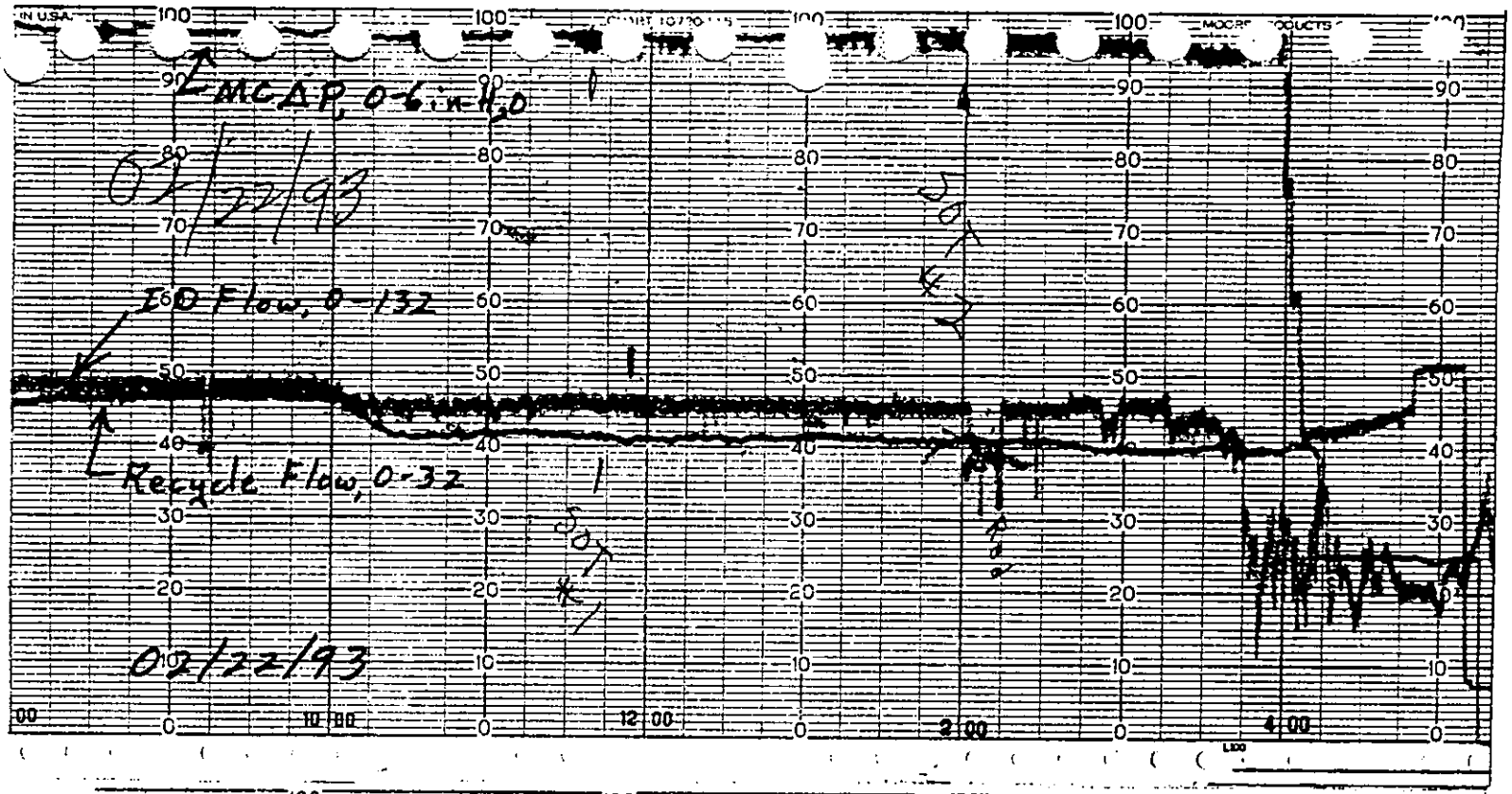
NUMBER 1 DRYER, NORTH

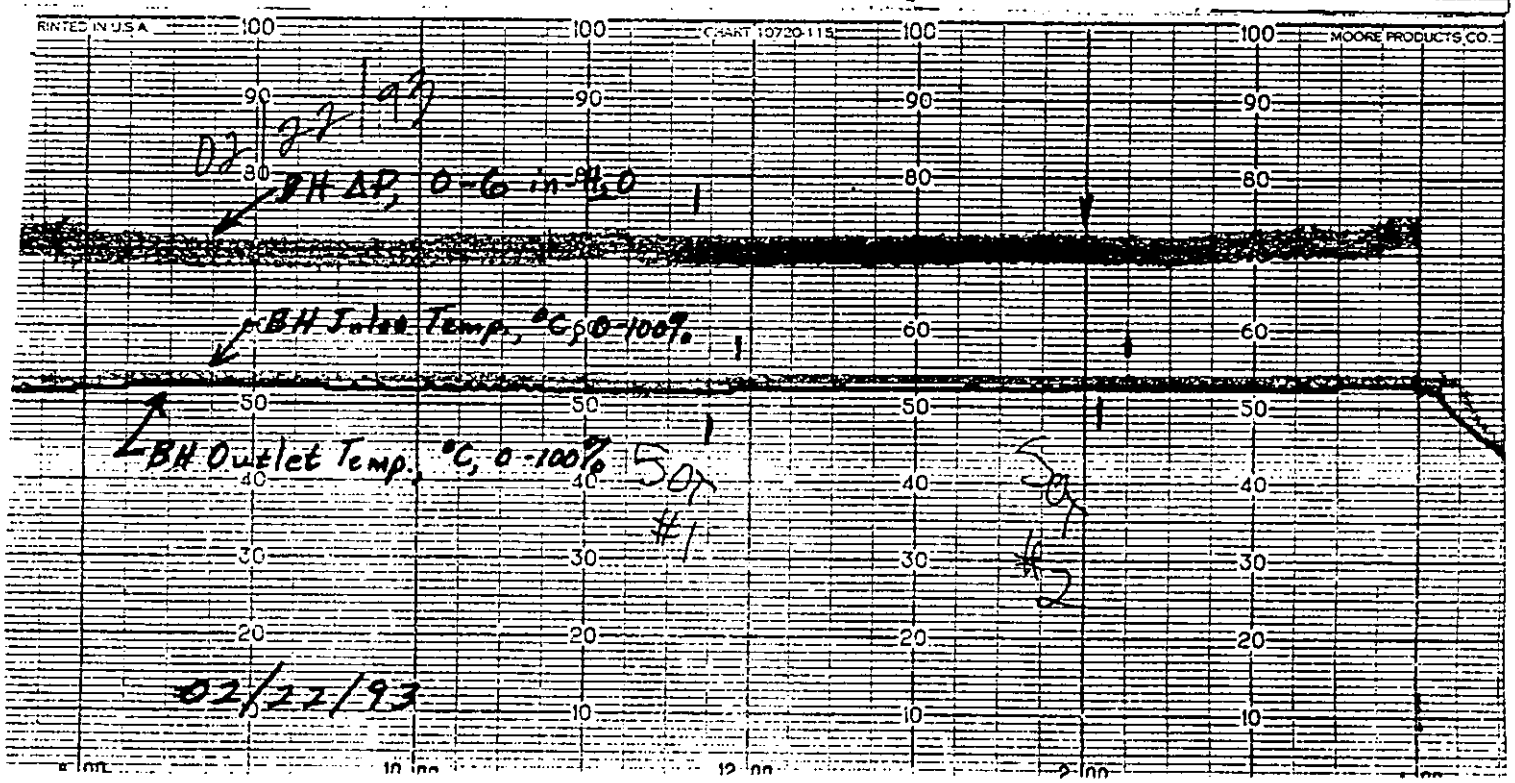
TIME OF DAY	1600						
SLICE RATE, TPH	210						
TOTAL PULP FLOW, TPH	61						
GRATE SPEED, %	82.31						
DRYER EXIT, °C	108.8						
ID FAN SPEED, %	85.0						
PULP FEED SCROLL, %	33.2						
PULP GATE, % CLOSED	40						
FD DAMPER, % OPEN	34.6						
RECYCLE DAMPERS, % OPEN	47.0						
RATIO SETUP	—						
DRYER THROAT	928						
DRYER EXIT, °C	105						
FURNACE PRESS, IN H20	-0.1						
EXIT PRESS, INC H20	-1.6						
DRYER ΔP, IN H20	0.3						
DRUM AMPS	34						
ID FAN, AMPS	167						
ID FLOW	3						
REC. FLOW	13.2						
M.C. ΔP	5.7						
BAGHOUSE ΔP	4.29						
ASP	7.8						
FD FLOW, ΔP	0.52						
#1 PULP FEED, TPH	31						
#2 PULP FEED, TPH	31						
O_2, %...	2.4						
BH in, °C..	105.1						
out, °C..	99.7						

time/wp51


6/1/9
Dryer Feed Rate, 0-100 %
Dryer ΔP, ± 2 in. H2O
Aspiration Flow, 0-25
8:00
10:00
12:00
2:00
4:00


PRINTED IN U.S.A.
CHART 10720-115
MOORE PRODUCTS CO.
02/22/93
Dryer Throat Temp., 0-1200 °C
Dryer Exit Temp, 50-700 °C
O2, 0-25 %


MC ΔP, 0-6 in H2O
02/22/93
ID Flow, 0-132
Recycle Flow, 0-32
Soot #1
Soot #2
02/22/93
10 00
12 00
2 00
4 00


PRINTED IN U.S.A.
CHART 10720-115
MOORE PRODUCTS CO.
02/22/93
BH ΔP, 0-6 in H2O
BH Inlet Temp., °C, 0-100%
BH Outlet Temp., °C, 0-100%
Soot #1
Soot #2
02/22/93
10 00
12 00
2 00

02/23/93

NUMBER 1 DRYER (North)

TIME OF DAY	0830		0900	0930	1000	1030	
SLICE RATE, TPH	234		232	228	234	235	
TOTAL PULP FLOW, TPH	65		64	64	65	55	
GRATE SPEED, %	82.36		68.28	66.79	65.07	71.38	
DRYER EXIT, °C	107.9		108.4	107.8	107.7	108.2	
ID FAN SPEED, %	78.0		78.0	78.0	78.0	78.0	
PULP FEED SCROLL, %	20.5	S	20.1	20.2	19.8	20.5	S
PULP GATE, % CLOSED	40.0		40.0	40.0	40.0	40.0	
FD DAMPER, % OPEN	33.46	O	14.87	17.08	15.39	18.31	O
RECYCLE DAMPERS, % OPEN	47.0		47.0	47.0	47.0	47.0	
RATIO SETUP	Manual	T	Manual	Manual	Manual	Manual	T
DRYER THROAT	597		605	600	594	596	
DRYER EXIT, °C	105	#1	105	104	104	105	#2
FURNACE PRESS, IN H20	-0.6		-0.9	-1.1	-1.0	-1.0	
EXIT PRESS, INC H20	-1.4	@	-1.5	-1.6	-1.6	-1.6	@
DRYER ΔP, IN H20	0.9		0.9	0.9	1.0	0.8	
DRUM AMPS	31.5	0835	30.0	30.0	31.5	31.5	1050
ID FAN, AMPS	157		158	158	159	158	
ID FLOW	61		62	60	61	63	
REC. FLOW	13.5		13.5	13.4	13.5	13.5	
M.C. ▲P	4.8		4.8	4.8	4.8	4.8	
BAGHOUSE ▲P	4.19		4.21	4.29	4.28	4.24	
ASP	8.1		8.1	8.0	8.2	8.2	
FD FLOW	0.46		0.45	0.44	0.43	0.45	
#1 PULP FEED, TPH	26		26	26	26	26	
#2 PULP FEED, TPH	27		26	27	29	25	
O_2, %	6.6		7.2	7.2	6.9	7.2	
BH in, °C	104.5		104.3	104.4	104.5	104.5	
out, °C	98.6		98.3	99.1	99.4	99.6	

time/wp51

02/23/93

NUMBER 1 DRYER (North)

TIME OF DAY	1100	1130	1200	1230	1300		1330
SLICE RATE, TPH	225	224	226	223	202		231
TOTAL PULP FLOW, TPH	60	59	58	60	58		60
GRATE SPEED, %	67.78	81.95	76.69	77.47	63.41		74.50
DRYER EXIT, °C	107.7	108.3	108.2	107.8	108.2		107.5
ID FAN SPEED, %	78.0	78.0	78.0	78.0	78.0		78.0
PULP FEED SCROLL, %	20.3	20.3	20.3	20.9	20.2	S	19.8
PULP GATE, % CLOSED	40.0	40.0	40.0	40.0	40.0		40.0
FD DAMPER, % OPEN	21.15	14.22	16.90	27.58	12.86	O	27.62
RECYCLE DAMPERS, % OPEN	47.0	47.0	47.0	47.0	47.0		47.0
RATIO SETUP	—	—	—	—	—	T	—
DRYER THROAT	595	586	576	587	593		586
DRYER EXIT, °C	105	105	105	105	105	#3	105
FURNACE PRESS, IN H20	-0.9	-1.0	-1.0	-0.7	-1.0		-0.8
EXIT PRESS, INC H20	-1.6	-1.5	-1.5	-1.6	-1.4	@	-1.6
DRYER ΔP, IN H20	0.7	0.6	0.6	0.5	0.5		0.4
DRUM AMPS	32	32	32	32	32	1315	31
ID FAN, AMPS	158	158	158	157	158		158
ID FLOW	62	60	60	60	62		60
REC. FLOW	13.6	13.5	13.5	13.3	13.5		13.5
M.C. ΔP	4.8	4.75	4.8	4.75	4.8		4.8
BAGHOUSE ΔP	4.28	4.25	4.24	4.22	4.22		4.24
ASP	8.1	7.9	8.0	8.0	8.0		7.9
FD FLOW, ΔP	0.44	0.44	0.45	0.45	0.43		0.45
#1 PULP FEED, TPH	26	26	26	26	26		26
#2 PULP FEED, TPH	28	31	24	26	24		25
O_2, %	7.0	7.7	7.7	6.9	7.5		7.4
BH in, °C	104.4	104.4	104.4	104.5	104.3		104.4
out, °C	99.4	99.6	99.4	99.4	99.4		99.6

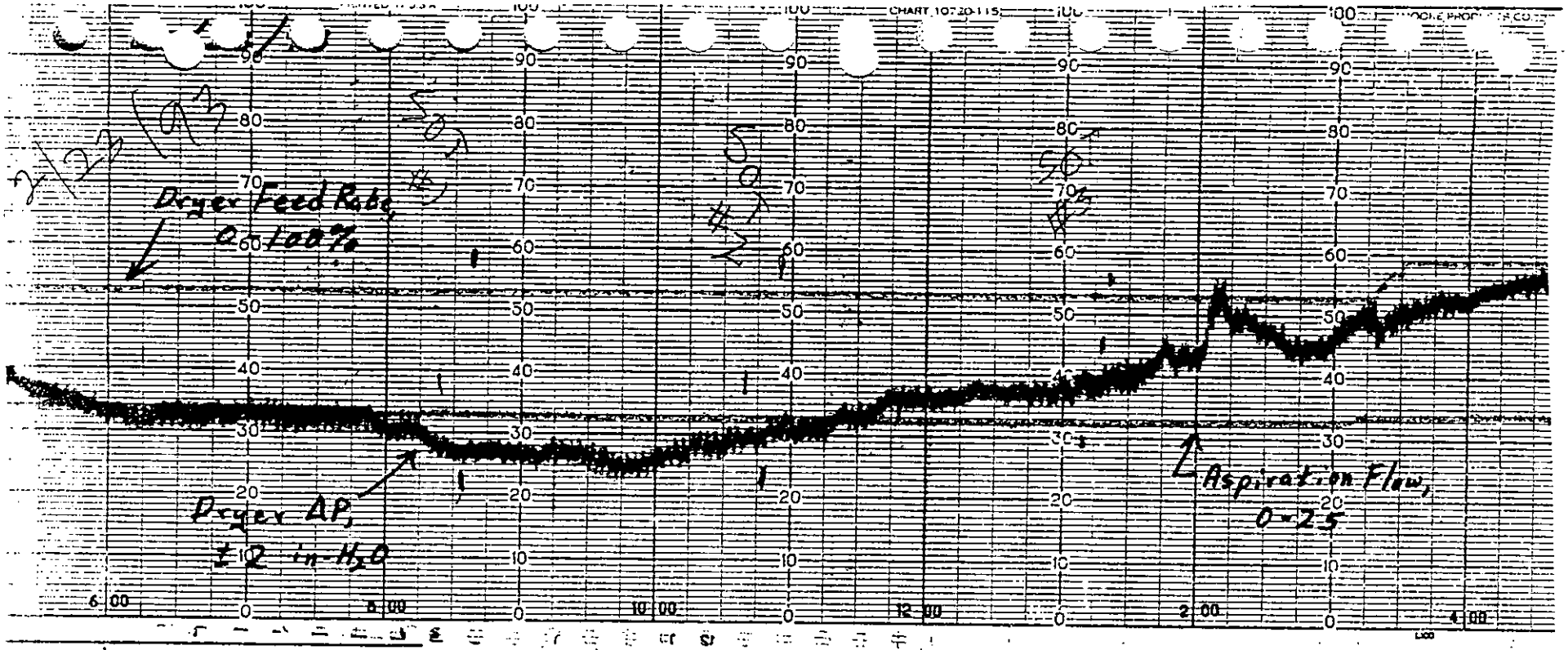
time/wp51

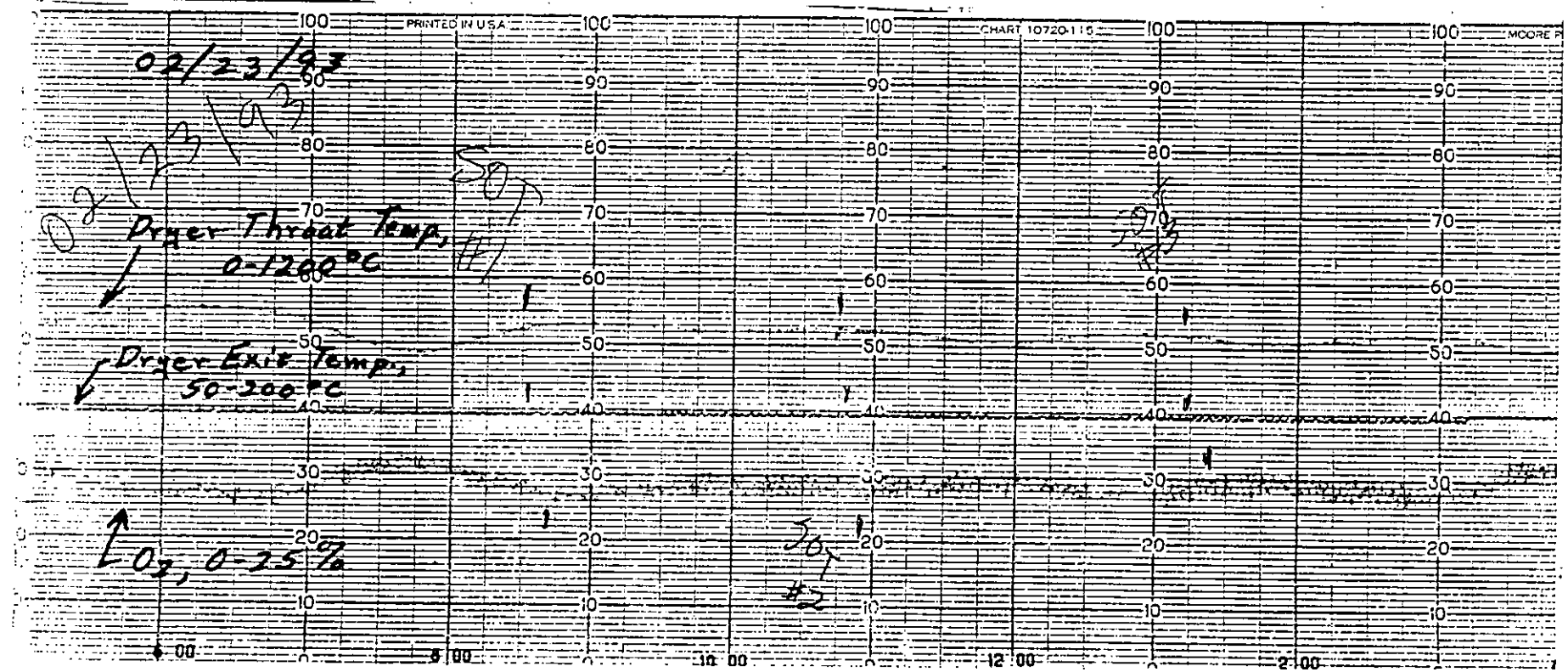
02/23/93

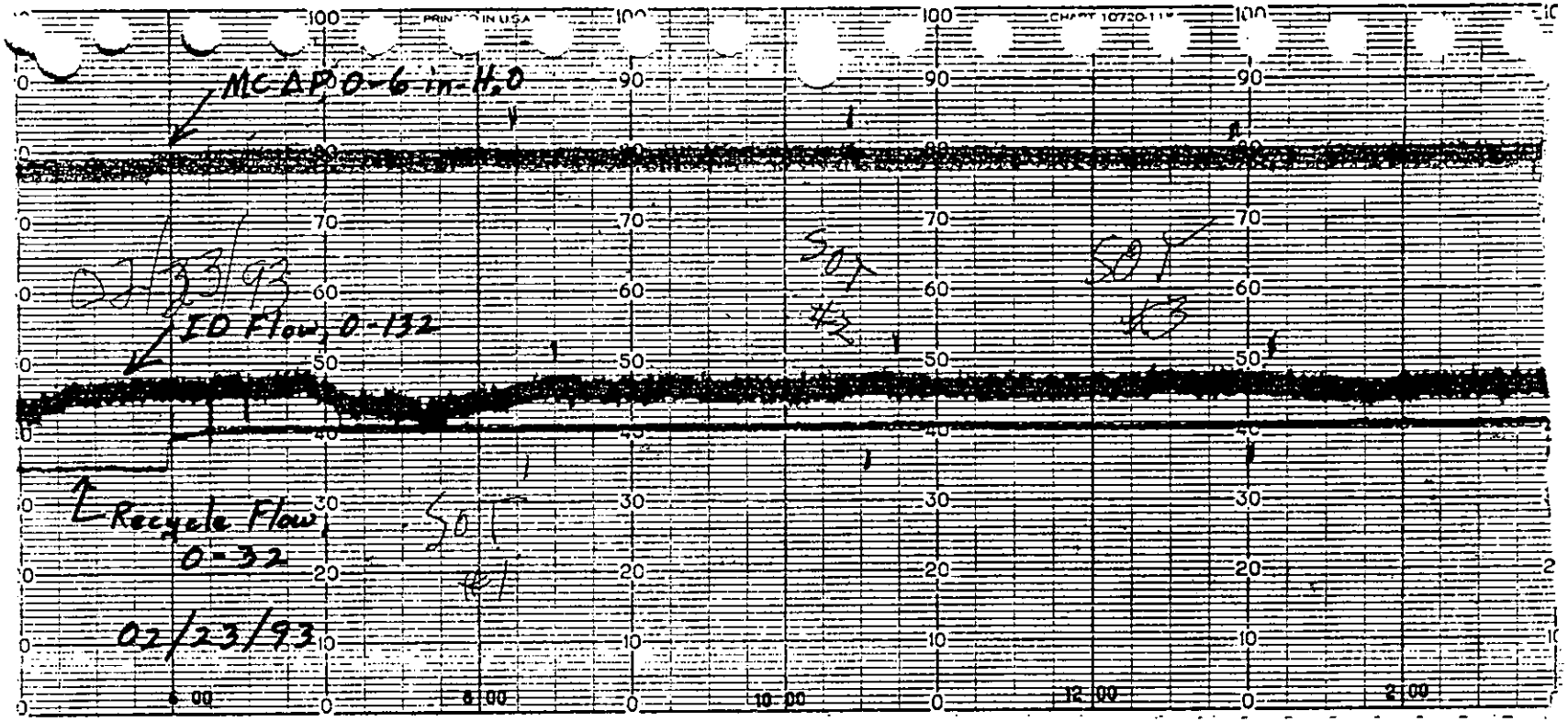
NUMBER 1 DRYER (North)

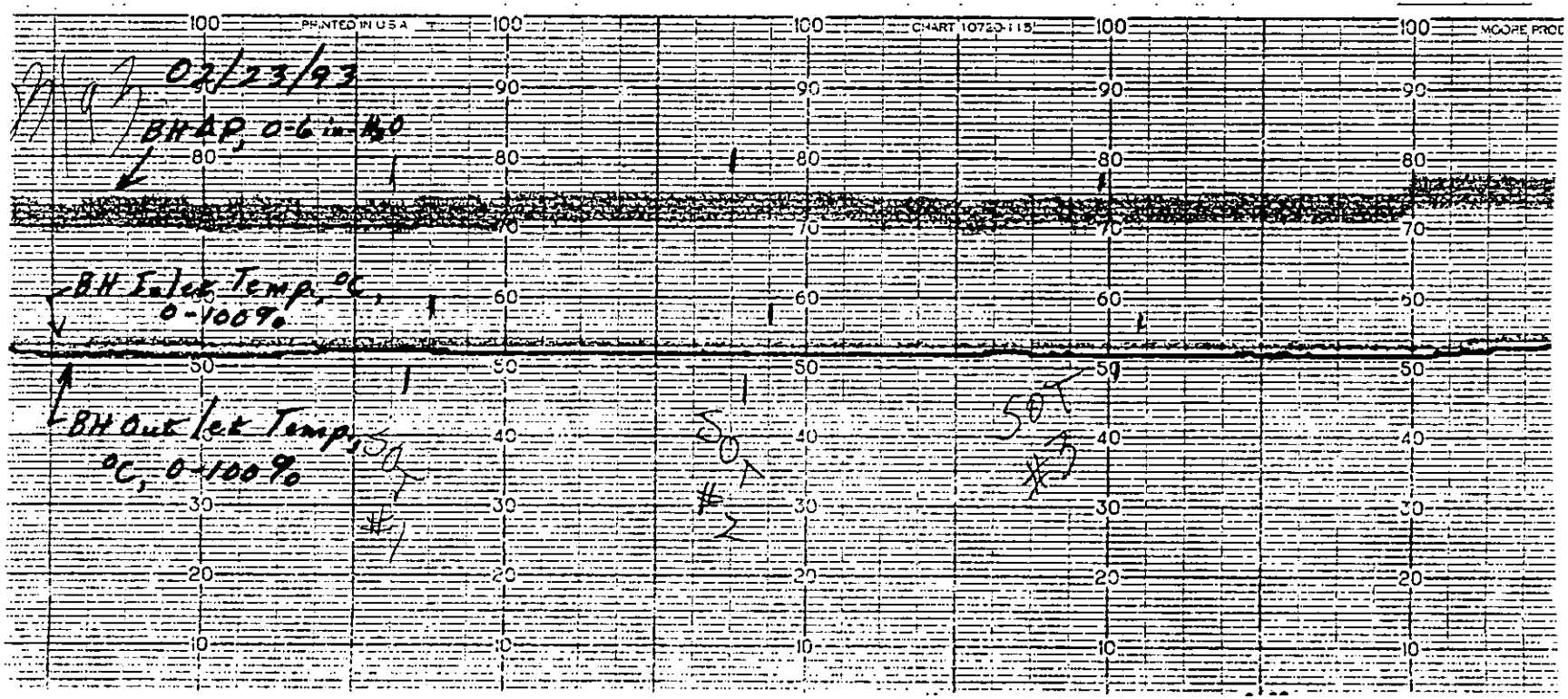
TIME OF DAY		1410		1445			
SLICE RATE, TPH		218		211			
TOTAL PULP FLOW, TPH		58		58			
GRATE SPEED, %		63.75		76.92			
DRYER EXIT, °C		108.2		107.6			
ID FAN SPEED, %		78.0		78.0			
PULP FEED SCROLL, %		20.0		20.3			
PULP GATE, % CLOSED		40.0		40.0			
FD DAMPER, % OPEN		12.06		29.66			
RECYCLE DAMPERS, % OPEN		47.0		47.0			
RATIO SETUP		—		—			
DRYER THROAT		580		591			
DRYER EXIT, °C		105		104			
FURNACE PRESS, IN H20		-1.1		-0.8			
EXIT PRESS, INC H20		-1.6		-1.5			
DRYER ΔP, IN H20		0.1		0.2			
DRUM AMPS		31		31			
ID FAN, AMPS		159		158			
ID FLOW		61		59			
REC. FLOW		13.7		13.6			
M.C. ▲P		4.8		4.75			
BAGHOUSE ▲P		4.29		4.26			
ASP		7.9	1414 – 1416	7.9			
FD FLOW, ΔP		0.43		0.44			
#1 PULP FEED, TPH	Wheel / 50	26	62.00 / 92.16 / 80.0	26			
#2 PULP FEED, TPH	NO / 4.0	25		26			
O_2, %	3.75, 3 3/8, 3 3/4, 3 1/2, 3 3/8, 3 3/4	7.8	8" in 57 sec	6.9			
BH in, °C		104.5		104.4			
out, °C		99.4		99.4			

time/wp51


Dryer Feed Rate, 0-100%
Dryer ΔP, ±12 in-H2O
Aspiration Flow, 0-25
6:00
8:00
10:00
12:00
2:00
4:00


02/23/93
Dryer Throat Temp, 0-1200°C
Dryer Exit Temp, 50-200°C
O2, 0-25%
8:00
10:00
12:00
2:00


MC ΔP, 0-6 in-H2O
02/23/93
IO Flow, 0-132
Recycle Flow, 0-32
02/23/93
SOT #1
SOT #2
SOT #3
6:00
8:00
10:00
12:00
2:00


02/23/93
BH ΔP, 0-6 in-H2O
BH Inlet Temp, °C, 0-100%
BH Outlet Temp, °C, 0-100%
SOT #1
SOT #2
SOT #3

02/24/93

NUMBER 2 DRYER (South)

TIME OF DAY	0830	0910	0935	1000		1030	1106
SLICE RATE, TPH	227	271	228	225		225	234
TOTAL PULP FLOW, TPH	68	55	63	62		63	66
GRATE SPEED, %	70.07	79.50	79.16	73.56 ~~77.27~~		71.66	74.40
DRYER EXIT, °C	100.3	100.5	100.1	99.9		99.9	99.8
ID FAN SPEED, %	70.0	70.0	70.0	70.0		70.0	70.0
PULP FEED SCROLL, %	103.3	103.3	103.3	103.3		103.3	103.3
PULP GATE, % CLOSED	68.25	-3.34	-3.34	60.00	S	61.51	61.35
FD DAMPER, % OPEN	16.20	24.79	28.96	27.73		19.95	27.66
RECYCLE DAMPERS, % OPEN	26.0	65.0	49.0	45.0	O	45.0	45.0
RATIO SETUP	Manual	Manual	Manual	Manual		Manual	Manual
DRYER THROAT	704	608	612	651	T	653	649
DRYER EXIT, °C	101	101	100	100		100	100
FURNACE PRESS, IN H20	-1.3	-1.2	-1.2	-1.2	#1	-1.3	-1.2
EXIT PRESS, INC H20	-1.0	-1.0	-1.1	-1.0		-1.1	-1.1
DRYER ΔP, IN H20	1.2	1.2	1.1	1.1	@	1.2	1.2
DRUM AMPS	28	27.5	26.5	27		27.5	27
ID FAN, AMPS	154	154	154	154	1010	154	154
ID FLOW	32	34	33	32		33	32.5
REC. FLOW	5.0	10.6	9.6	8.7		8.6	8.3
M.C. ΔP	4.05	4.05	4.05	4.05		4.05	3.8
BAGHOUSE ΔP	4.78	4.70	4.69	4.69		4.65	4.67
ASP	7.4	6.9	7.25	7.4		6.7	7.3
FD FLOW, ΔP	1.03	1.03	1.03	1.03		1.03	1.03
#1 PULP FEED, TPH	32	28	33	31		31	32
#2 PULP FEED, TPH	26	27	30	27		27	30
O_2, %	9.5	8.8	8.8	8.8		9.0	8.3
BH in, °C	103.0	102.5	102.4	102.6		102.8	102.5
out, °C	93.7	93.9	93.5	93.3		93.3	93.5

time/wp51

02/24/93

NUMBER 2 DRYER (South) Wheel @ 3.9

TIME OF DAY	1130	1200		1230	South	1300	1330
SLICE RATE, TPH	230	227		236		236	—
TOTAL PULP FLOW, TPH	66	59		60		62	60
GRATE SPEED, %	77.25	68.64		68.17		72.55	72.89
DRYER EXIT, °C	99.8	99.9		100.0		99.7	100.0
ID FAN SPEED, %	70.0	70.0		70.0		70.0	70.0
PULP FEED SCROLL, %	103.3	103.0		103.0		103.0	103.0
PULP GATE, % CLOSED	64.01	60.00	S	60.00		60.0	60.0
FD DAMPER, % OPEN	24.64	16.61		16.12		21.85	17.68
RECYCLE DAMPERS, % OPEN	45.0	45.00	O	45.0		45.0	45.0
RATIO SETUP	Manual	Manual		Manual		Manual	Manual
DRYER THROAT	688	676	T	589		626	621
DRYER EXIT, °C	100	100		100		100	101
FURNACE PRESS, IN H20	-1.2	-1.4	#2	-1.3		-1.3	-1.4
EXIT PRESS, INC H20	-1.1	-1.1		-1.0		-1.0	-1.1
DRYER ΔP, IN H20	1.3	1.3	@	1.2		1.2	1.2
DRUM AMPS	26.5	26.5		26.5		26.5	27
ID FAN, AMPS	154	154	1230	156		154	154
ID FLOW	32.5	32.5		33		34	32
REC. FLOW	9.0	9.1		8.5		9.0	9.4
M.C. ΔP	3.9	3.9		3.9		3.9	3.9
BAGHOUSE ΔP	4.66	4.69		4.67		4.65	4.65
ASP	7.2	7.3		7.2		7.35	7.2
FD FLOW, ΔP	1.03	1.03		1.03		1.03	1.03
#1 PULP FEED, TPH	32	31		30		32	31
#2 PULP FEED, TPH	28	27		28		28	25
O_2, %	8.1	9.3		10.2		9.0	9.6
BH in, °C	102.8	103.1		102.8		103.0	103.3
out, °C	93.5	93.2		93.1		93.6	93.6
	1137 - 1139	Wheel @		Furnace			
	77.36/80.75/	3.9		Static			
	84.76			-0.06" H_2O			
	8" in 70 sec.						

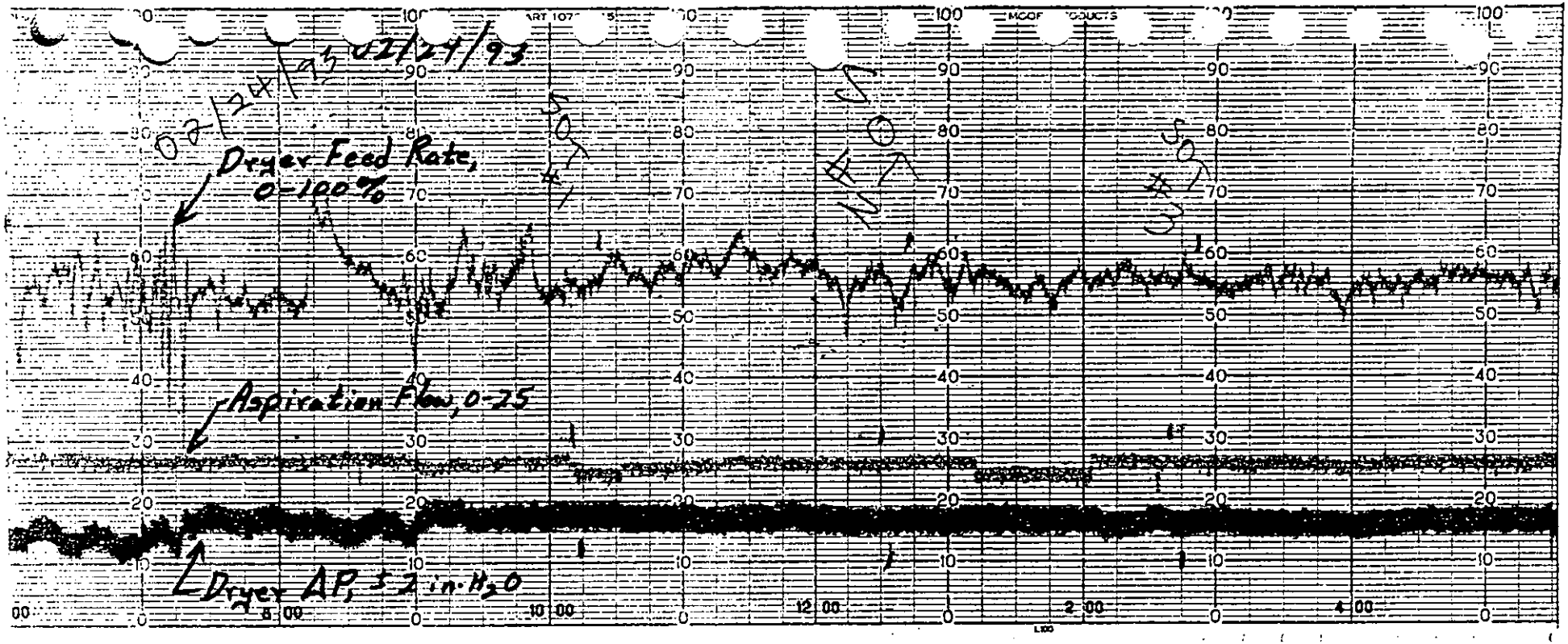
time/wp51

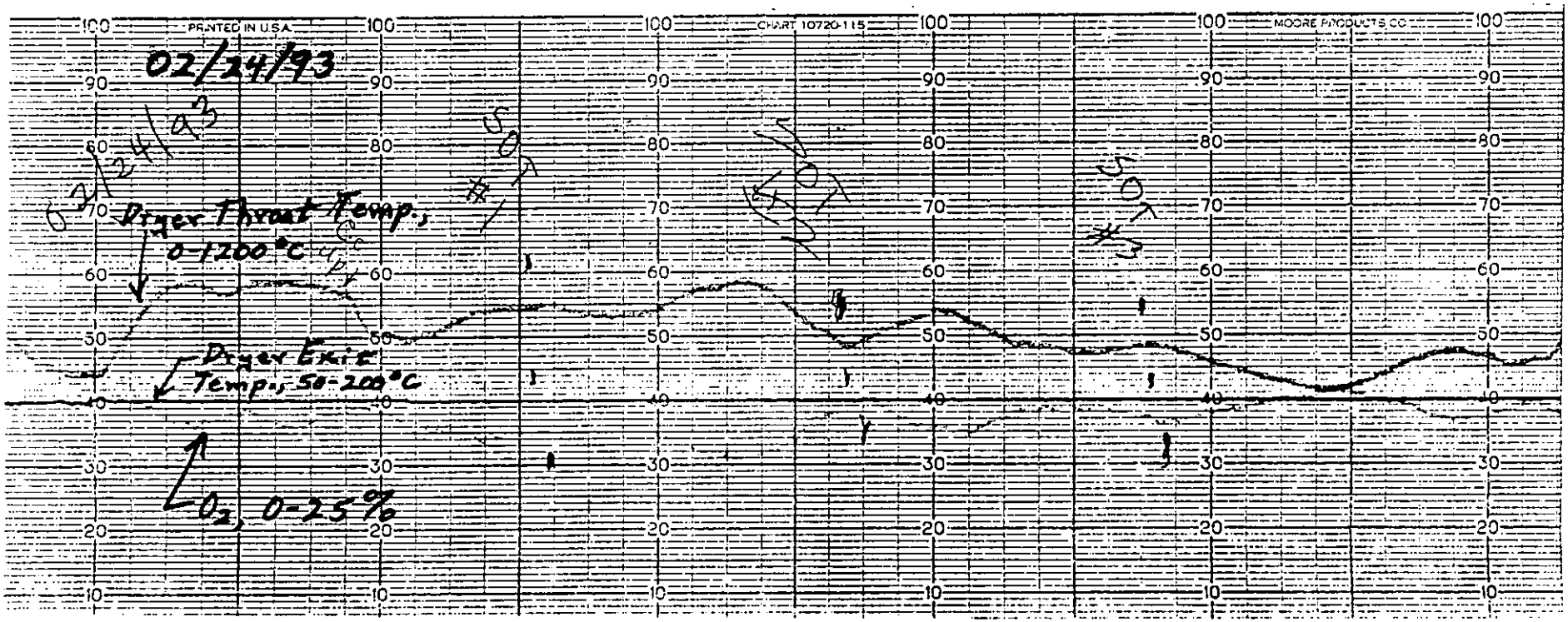
02/24/93

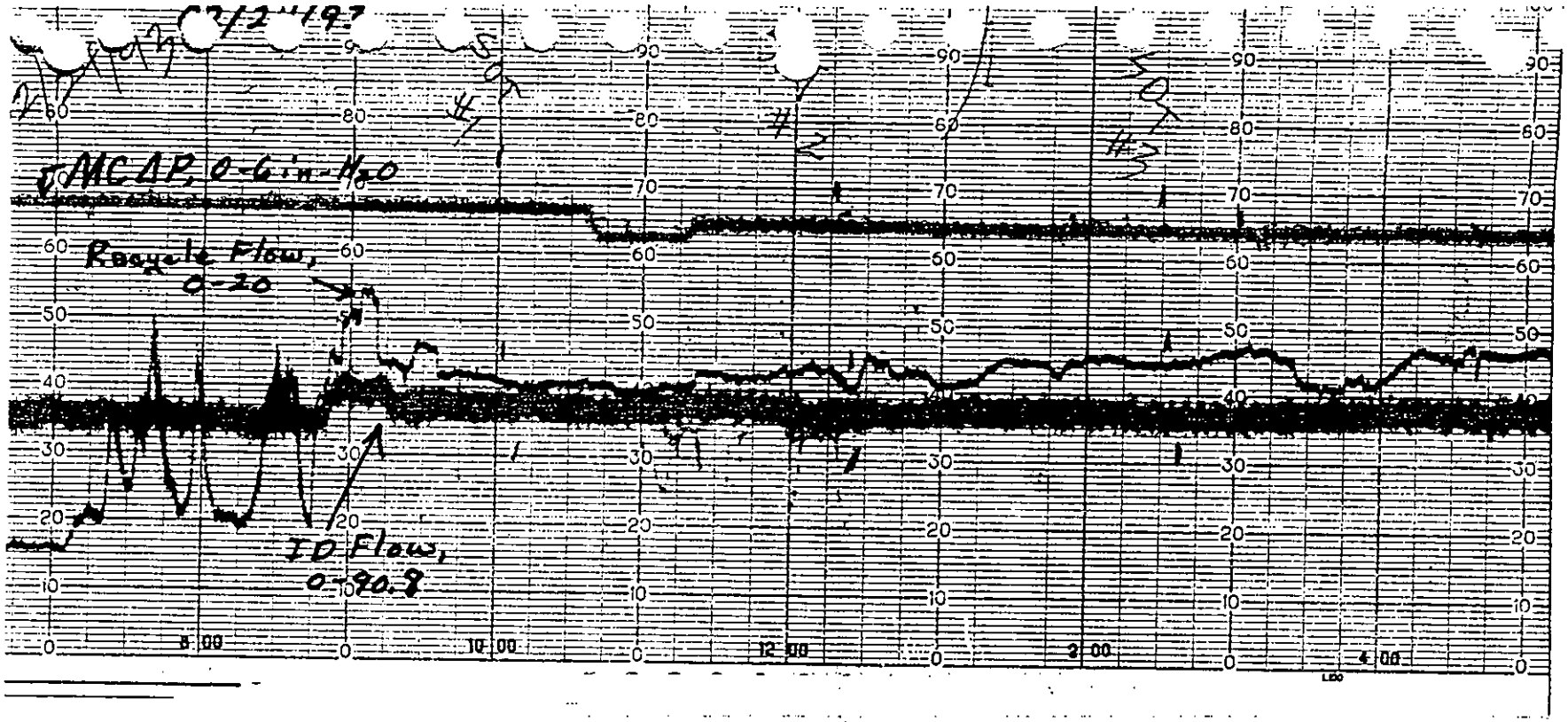
NUMBER 2 DRYER (south)

TIME OF DAY	1400	1430		1500	1530	1600	1630
SLICE RATE, TPH	228	229		230	229	220	217
TOTAL PULP FLOW, TPH	59	58		57	56	55	57
GRATE SPEED, %	75.13	78.22		78.28	67.50	67.26	74.86
DRYER EXIT, °C	100.0	99.8		100.0	100.0	99.8	99.8
ID FAN SPEED, %	70.0	70.0		70.0	70.0	70.0	70.0
PULP FEED SCROLL, %	103.3	103.3		103.3	103.3	103.3	103.3
PULP GATE, % CLOSED	60.0	60.0		60.0	60.0	60.0	60.0
FD DAMPER, % OPEN	22.66	28.96		26.35	22.11	12.58	20.42
RECYCLE DAMPERS, % OPEN	45.0	45.0		45.0	45.0	45.0	45.0
RATIO SETUP	Manual	Manual		Manual	Manual	Manual	Manual
DRYER THROAT	582	577	S	573	523	504	559
DRYER EXIT, °C	100	100		100	100	100	101
FURNACE PRESS, IN H20	-1.2	-1.2	O	-1.3	-1.4	-1.4	-1.3
EXIT PRESS, INC H20	-1.1	-1.1		-1.1	-1.1	-1.1	-1.1
DRYER ΔP, IN H20	1.3	1.3	T	1.3	1.2	1.2	1.3
DRUM AMPS	26.5	27		27	27	27	27
ID FAN, AMPS	155	156	# 3	154	154	154	154
ID FLOW	33	33		32.5	34	34	33.5
REC. FLOW	9.3	9.4	ⓐ	9.6	8.7	9.0	9.6
M.C. ΔP	3.9	3.9		3.9	3.95	3.95	3.45
BAGHOUSE ΔP	4.62	4.62	1440	4.54	4.54	4.62	4.50
ASP	6.9	7.1		7.2	7.0	7.1	7.2
FD FLOW, ΔP	1.03	1.03		1.03	1.03	1.03	1.03
#1 PULP FEED, TPH	30	30		30	30	29	31
#2 PULP FEED, TPH	27	27		27	26	27	27
O_2, %	9.8	9.4		9.5	10.2	10.4	9.4
BH in, °C	103.2	103.2		103.2	103.2	103.2	103.4
out, °C	93.5	93.7		93.4	93.4	93.4	94.0

time/wp51


02/24/93
Dryer Feed Rate, 0-100%
Aspiration Flow, 0-25
Dryer ΔP, ±2 in. H2O
8:00
10:00
12:00
2:00
4:00


PRINTED IN U.S.A.
CHART 10720-115
MOORE PRODUCTS CO.
02/24/93
Dryer Throat Temp., 0-1200°C
Dryer Exit Temp., 50-200°C
O2, 0-25%


02/24/93
SOT #1
SOT #2
SOT #3
MC ΔP, 0-6 in-H2O
Recycle Flow, 0-20
ID Flow, 0-90.8
8 00
10 00
12 00
2 00
4 00

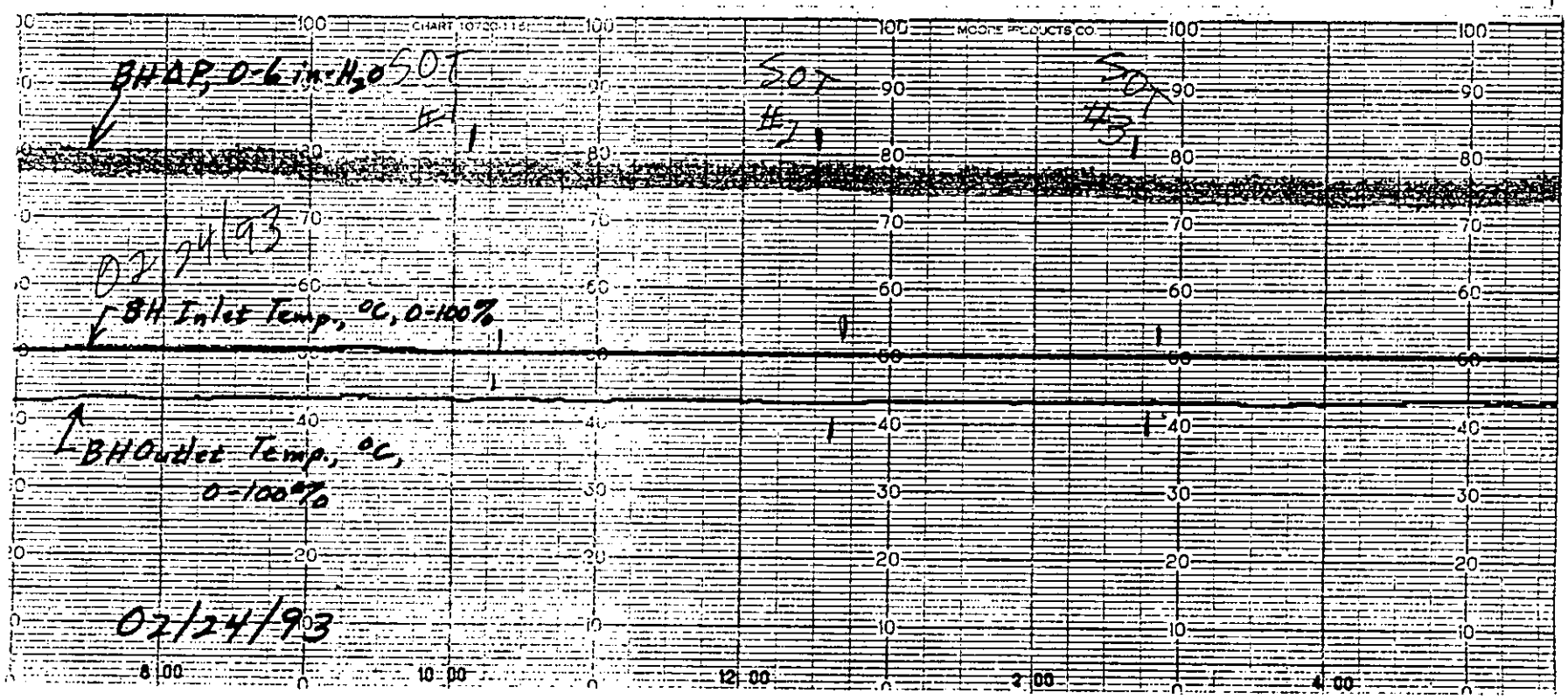


CHART 10720-116
MOORE PRODUCTS CO.
BH ΔP, 0-6 in-H2O
SOT #1
SOT #2
SOT #3
02/24/93
BH Inlet Temp, °C, 0-100%
BH Outlet Temp, °C, 0-100%
02/24/93
8 00
10 00
12 00
2 00
4 00

02/25/93

NUMBER 2 DRYER (~~#~~ South)

TIME OF DAY	0900		0930	1000		1030	1100
SLICE RATE, TPH	233		233	227		160	234
TOTAL PULP FLOW, TPH	61		52	54		55	58
GRATE SPEED, %	67.10		62.42	64.50		67.18	77.83
DRYER EXIT, °C	98.9		98.9	98.8		98.8	98.8
ID FAN SPEED, %	70.0		70.0	70.0		70.0	70.0
PULP FEED SCROLL, %	103.3		103.3	103.3		103.3	103.3
PULP GATE, % CLOSED	65.00	S	60.00	60.00		60.00	60.00
FD DAMPER, % OPEN	17.16		13.23	15.03		17.60	25.96
RECYCLE DAMPERS, % OPEN	45.0	O	45.0	45.0		45.0	45.0
RATIO SETUP	Manual		Manual	Manual		Manual	Manual
DRYER THROAT	473	T	405	356		384	433
DRYER EXIT, °C	99		99	99		99	99
FURNACE PRESS, IN H20	-1.3	#1	-1.4	-1.4		-1.4	-1.3
EXIT PRESS, INC H20	-1.0		-0.8	-0.9		-0.9	-1.1
DRYER ΔP, IN H20	1.1	@	1.3	1.3		1.3	1.3
DRUM AMPS	26.5		26.0	26.5		26.5	27
ID FAN, AMPS	156	0910	156	155		154	154
ID FLOW	34		35	35		35	34
REC. FLOW	10		9.3	9.4		9.5	9.5
M.C. ΔP	4.05		4.05	4.05		4.05	4.05
BAGHOUSE ΔP	~~3~~4.76		4.77	4.78		4.74	4.67
ASP	7.0		7.2	6.9		7.0	7.0
FD FLOW, ΔP	1.03		1.03	1.03		1.03	1.03
#1 PULP FEED, TPH	35		33	33		34	33
#2 PULP FEED, TPH	22		19	22		23	26
O_2, %	10.9		12.6	12.4		11.7	11.0
BH in, °C	102.8		102.8	102.7		102.8	103.0
out, °C	91.6		91.3	91.6		91.8	92.4

Middle 3.5" @ Wheel No 4"

1040 - 1044
68.54/67.69/69.37
8" in 9 min.

time/wp51

02/25/93

NUMBER 2 DRYER (South)

TIME OF DAY	1130		1200	1230	1300	1315	1330
SLICE RATE, TPH	230		226	230	228	228	220
TOTAL PULP FLOW, TPH	60		64	67	66	64	63
GRATE SPEED, %	68.28		79.73	74.92	64.08	73.41	67.89
DRYER EXIT, °C	98.9		98.7	98.9	99.0	98.8	98.8
ID FAN SPEED, %	70.0		70.0	70.0	70.0	70.0	70.0
PULP FEED SCROLL, %	103.3		103.3	103.3	103.3	103.3	103.3
PULP GATE, % CLOSED	62.03		70.75	69.97	70.65	70.65	69.50
FD DAMPER, % OPEN	21.43	S	32.68	24.74	13.02	21.38	19.09
RECYCLE DAMPERS, % OPEN	45.0		45.0	45.0	45.0	45.0	45.0
RATIO SETUP	Manual	O	Manual	Manual	Manual	Manual	Manual
DRYER THROAT	467		482	439	427	429	434
DRYER EXIT, °C	99	T	99	99	99	99	99
FURNACE PRESS, IN H20	-1.4		-1.2	-1.4	-1.5	-1.4	-1.4
EXIT PRESS, INC H20	-0.9	#2	-1.2	-1.1	-1.1	-1.2	-1.0
DRYER ΔP, IN H20	1.3		1.1	1.3	1.3	1.2	1.2
DRUM AMPS	27	@	27	27		27.5	26.5
ID FAN, AMPS	154		154	154		155	154
ID FLOW	35	1135	34	33		33.5	33
REC. FLOW	9.4		9.4	9.6		9.4	9.3
M.C. ΔP	4.05		4.05	4.05		4.05	4.05
BAGHOUSE ΔP	4.66		4.61	4.63		4.57	4.63
ASP	7.0		7.0	7.2		7.0	6.9
FD FLOW, ΔP	1.03		1.03	1.03	1.03	1.03	1.03
#1 PULP FEED, TPH	35		35	35	36	36	36
#2 PULP FEED, TPH	26		22	22	22	21	20
O_2, %	10.4		10.7	11.5		11.3	11.4
BH in, °C	103.2		103.1	103.2		103.4	103.5
out, °C	92.6		92.6	92.6		92.7	92.8
				1230-1234			
				68.17/69.44			
				68.45			

time/wp51

8-in in 94 sec.

02/25/93

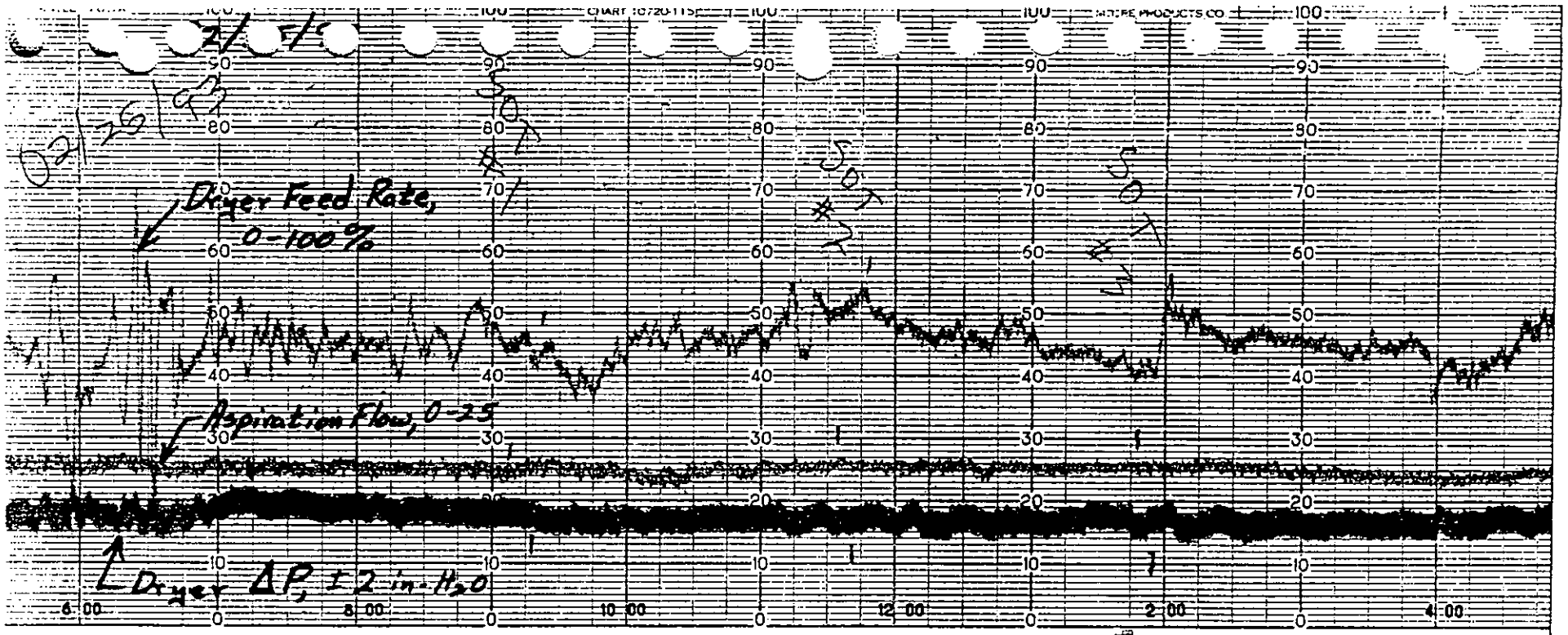
NUMBER 2 DRYER (South)

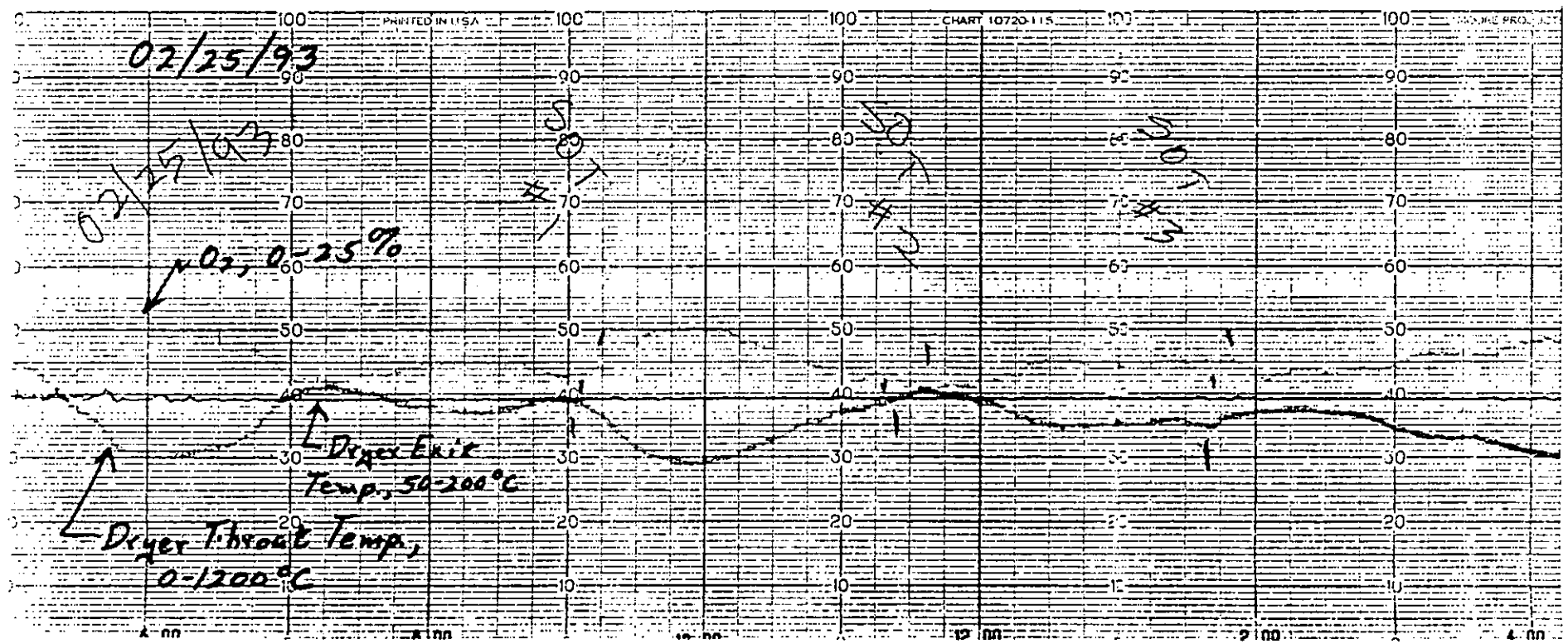
TIME OF DAY		1400	1430	1500	1530		
SLICE RATE, TPH		228	230	226	225		
TOTAL PULP FLOW, TPH		61	61	60	58		
GRATE SPEED, %		78.33	61.30	65.05	65.67		
DRYER EXIT, °C		99.1	98.9	98.9	98.8		
ID FAN SPEED, %		70.0	70.0	70.0	70.0		
PULP FEED SCROLL, %		103.3	103.3	103.3	103.3		
PULP GATE, % CLOSED		67.0	69.76	69.76	69.76		
FD DAMPER, % OPEN	5	30.29	14.04	13.78	16.54		
RECYCLE DAMPERS, % OPEN		45.0	45.0	45.0	45.0		
RATIO SETUP	0	Manual	Manual	Manual	Manual		
DRYER THROAT		440	455	445	404		
DRYER EXIT, °C	T	100	99	99	99		
FURNACE PRESS, IN H20		-1.3	-1.5	-1.5	-1.5		
EXIT PRESS, INC H20	#3	-1.1	-1.1	-1.0	-1.0		
DRYER ΔP, IN H20		1.2	1.3	1.3	1.2		
DRUM AMPS	@	27	26	27	26.5		
ID FAN, AMPS		154	154	154	154		
ID FLOW	1350	35	33.5	34.5	36		
REC. FLOW		9.5	9.4	9.3	9.2		
M.C. ▲P		4.05	4.05	4.05	4.05		
BAGHOUSE ▲P		4.57	4.53	4.54	4.57		
ASP		7.1	7.0	6.9	6.8		
FD FLOW, ΔP		1.03	1.03	1.03	1.03		
#1 PULP FEED, TPH		35	35	35	35		
#2 PULP FEED, TPH		24	27	21	21		
O_2, %		10.7	11.0	11.2	11.7		
BH in, °C		103.5	103.2	103.3	103.3		
out, °C		93.2	93.1	93.0	92.6		
		1406					
		46.53/49.46		Furnace			
		93.85		Pressure:			
		66.53		-0.14 to -0.16			

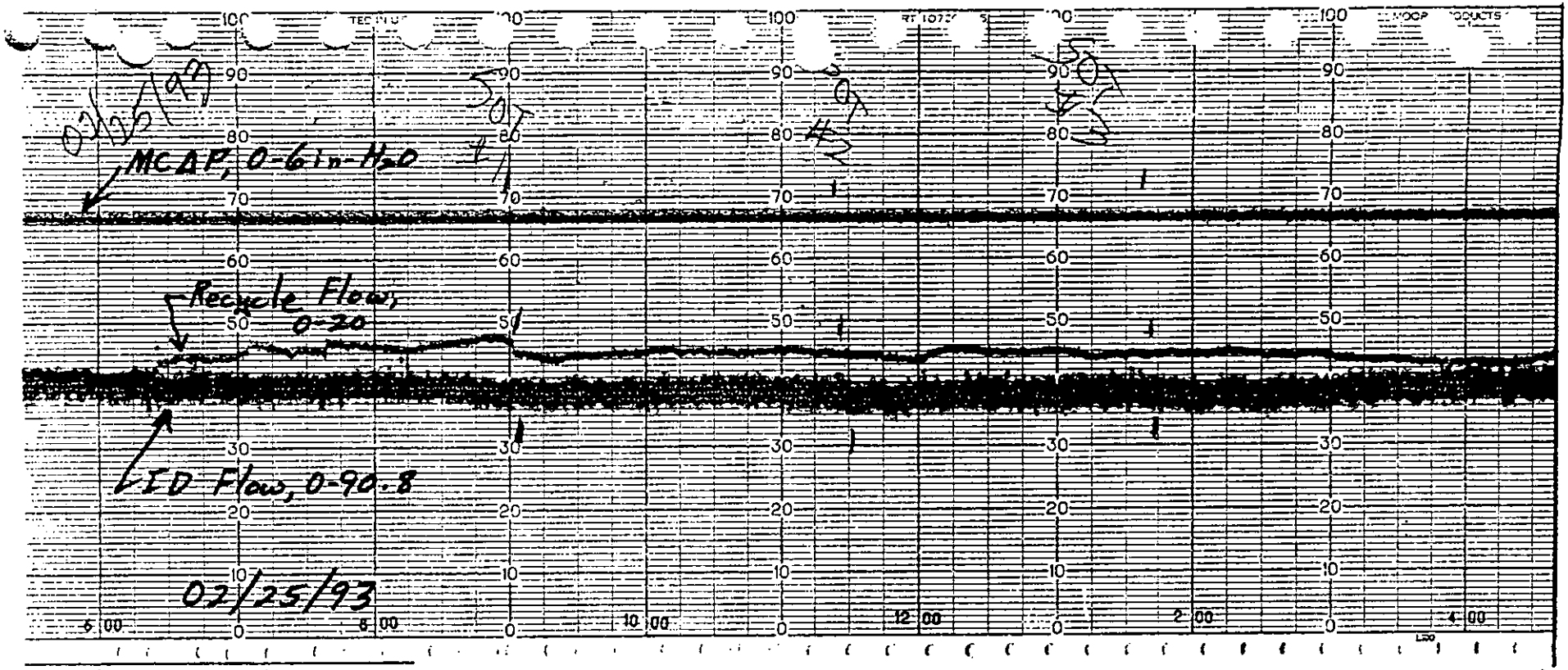
8" in 12 sec.

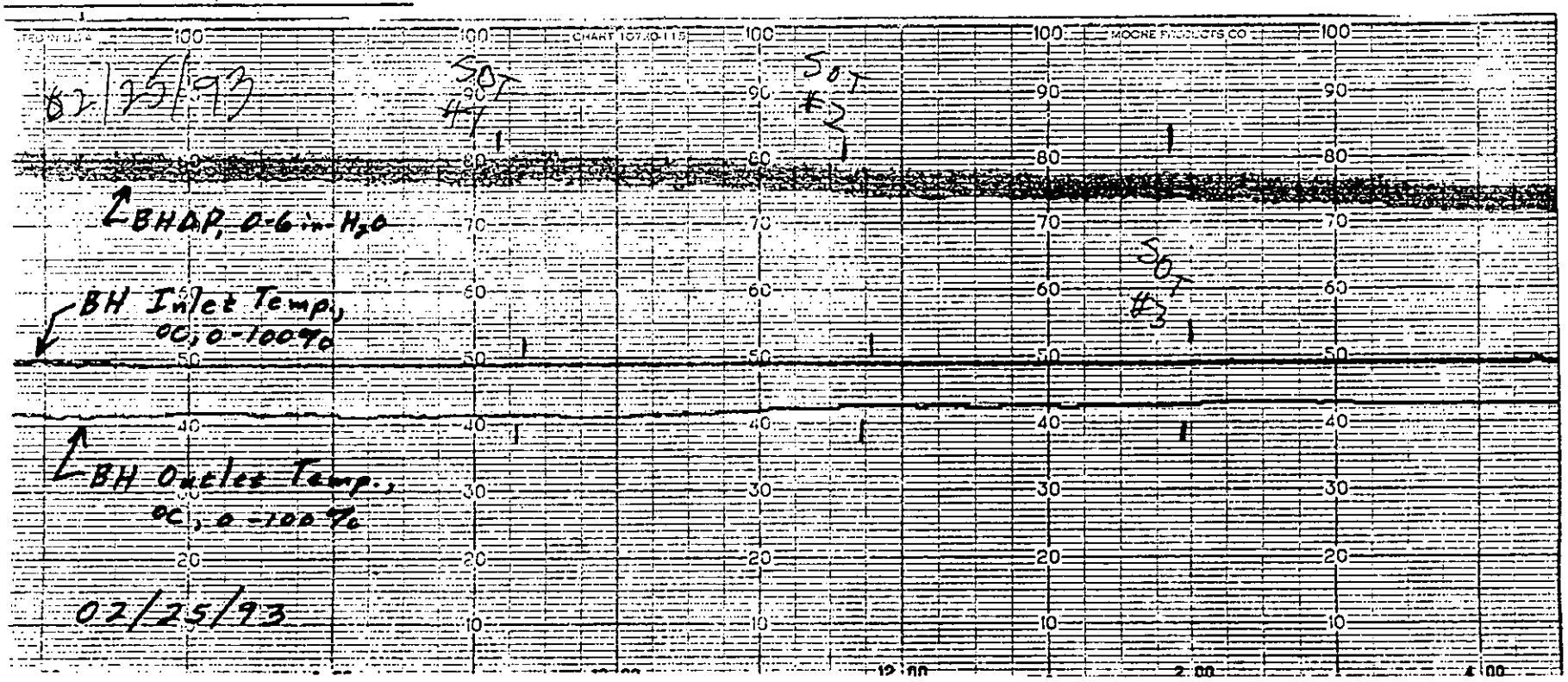
- in -H2O above grate

time/wp51


02/26/93
Dryer Feed Rate, 0-100%
Aspiration flow, 0-25
Dryer ΔP, ±2 in. H2O
6:00
8:00
10:00
12:00
2:00
4:00


02/25/93
O2, 0-25%
Dryer Exit Temp., 50-200°C
Dryer Throat Temp., 0-1200°C
4:00
12:00
2:00
4:00


02/25/93
MCΔP, 0-6 in-H2O
Recycle Flow, 0-20
ID Flow, 0-90.8
02/25/93
6 00
8 00
10 00
12 00
2 00
4 00


02/25/93
BHΔP, 0-6 in-H2O
BH Inlet Temp, °C, 0-100%
BH Outlet Temp., °C, 0-100%
02/25/93
12 00
2 00
4 00

2/26/93

NUMBER 2 DRYER (South)

TIME OF DAY		0830	0900	0930	1000		1030
SLICE RATE, TPH		235	141	247	200		205
TOTAL PULP FLOW, TPH		55	58	61	62		56 ~~[illegible]~~
GRATE SPEED, %		64.21	79.92	83.93	66.09		63.51
DRYER EXIT, °C		99.8	99.9	99.8	100.2		99.6
ID FAN SPEED, %		72.0	72.0	72.0	72.0		72.0
PULP FEED SCROLL, %		44.4	103.0	103.3	103.3		103.3
PULP GATE, % CLOSED		-3.34	60.0	60.0	67.65		60.0
FD DAMPER, % OPEN		16.48	29.17	32.42	17.16		13.57
RECYCLE DAMPERS, % OPEN		45.0	45.0	45.0	45.0		45.0
RATIO SETUP	S	Manual	Manual	Manual	Manual	S	Manual
DRYER THROAT		372	431	486	466		391
DRYER EXIT, °C	O	100	100	100	100	O	100
FURNACE PRESS, IN H2O		-1.4	-1.1	-1.1	-1.3		-1.4
EXIT PRESS, INC H2O	T	-0.9	-1.1	-1.2	-1.1	T	-1.1
DRYER ΔP, IN H2O		1.3	1.1	1.2	1.2		1.3
DRUM AMPS	#1	25.5	26.5	26.5	26.0	#2	26.0
ID FAN, AMPS		156	155	155	156		156
ID FLOW	@	37	36	36	36	@	36.5
REC. FLOW		9.3	9.4	9.3	9.4		9.35
M.C. ΔP	0805	4.05	4.05	4.05	4.05	1020	4.05
BAGHOUSE ΔP		4.76	4.78	4.78	4.77		4.80
ASP		6.9	6.7	7.0	6.7		7.1
FD FLOW, ΔP		1.03	1.03	1.03	1.03		1.03
#1 PULP FEED, TPH		34	33	35	34		33
#2 PULP FEED, TPH		24	25	25	23		23
O_2, %		12.0	10.9	10.2	11.1		12.0
BH in, °C		102.8	102.6	102.8	102.8		102.7
out, °C		92.9	93.4	93.4	93.1		93.1
		0827 Furnace Static above Grate -0.16 to -0.14 in-H_2O		0934/0937 64.02/65.15/66.82 8" in 96 sec.			

Note ID Fan Damper From 10 → 72%

Wheel @ 3.5

time/wp51

02/26/93

NUMBER 2 DRYER (South)

TIME OF DAY	1100		1130	1200		1230	1300
SLICE RATE, TPH	210	50	220	226		183	200
TOTAL PULP FLOW, TPH	55		53	54		58	52
GRATE SPEED, %	71.53		68.67	69.16		75.52	64.65
DRYER EXIT, °C	99.9	3 3/8	99.7	99.8		99.8	99.8
ID FAN SPEED, %	72.0		72.0	72.0		72.0	72.0
PULP FEED SCROLL, %	103.3		103.3	103.3		103.3	103.3
PULP GATE, % CLOSED	60.0	3 3/8	60.0	60.0	S	64.01	60.0
FD DAMPER, % OPEN	22.47		18.96	20.13		22.45	14.84
RECYCLE DAMPERS, % OPEN	45.0		45.0	45.0	O	45.0	45.0
RATIO SETUP	Manual	3 3/8	Manual	Manual		Manual	Manual
DRYER THROAT	404		428	442	T	452	399
DRYER EXIT, °C	100		100	100		100	100
FURNACE PRESS, IN H20	-1.2	3 3/8	-1.3	-1.3	# 3	-1.2	-1.4
EXIT PRESS, INC H20	1.1		-1.1	-1.0		-1.0	-1.0
DRYER ΔP, IN H20	1.3		1.2	1.3	@	1.2	1.4
DRUM AMPS	26.5	3 3/8	26.5	26		26.5	26.0
ID FAN, AMPS	157		156	156	1230	157	156
ID FLOW	36.5		37	36.5		36.5	37
REC. FLOW	9.3	Middle 3	9.2	9.3		9.6	9.3
M.C. ▲P	4.05		4.05	4.05		4.05	4.05
BAGHOUSE ▲P	4.80		4.74	4.75		4.79	4.73
ASP	6.9	3 3/8	6.8	6.8		6.8	6.6
FD FLOW, ΔP	1.03		1.03	1.03		1.03	1.03
#1 PULP FEED, TPH	31	5 3 1/4	30	32		34	31
#2 PULP FEED, TPH	24	3.	24	25		23	23
O_2, %	11.4	@ 12" 3 1/4	11.3	11.1		11.3	12.1
BH in, °C	102.7	Wheel 3 3/8	102.7	102.8		103.1	103.0
out, °C	93.1		93.4	93.5		93.5	93.4
	1123/1126	3 1/4					
	69.27/72.47/73.48						1305/1308
	4" in 92 gal.	Now 3 3/8					63.25/67.16/65.15
							8" in 95 gal.

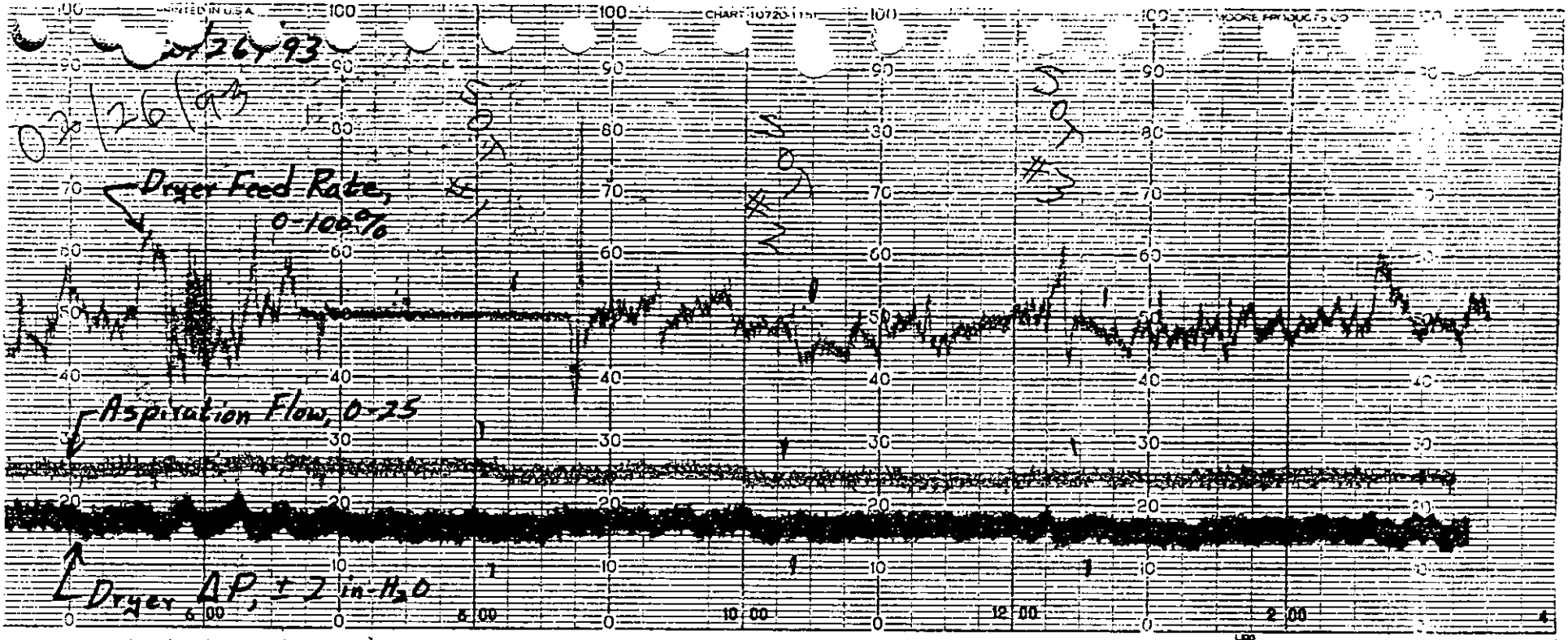
Time/wp51

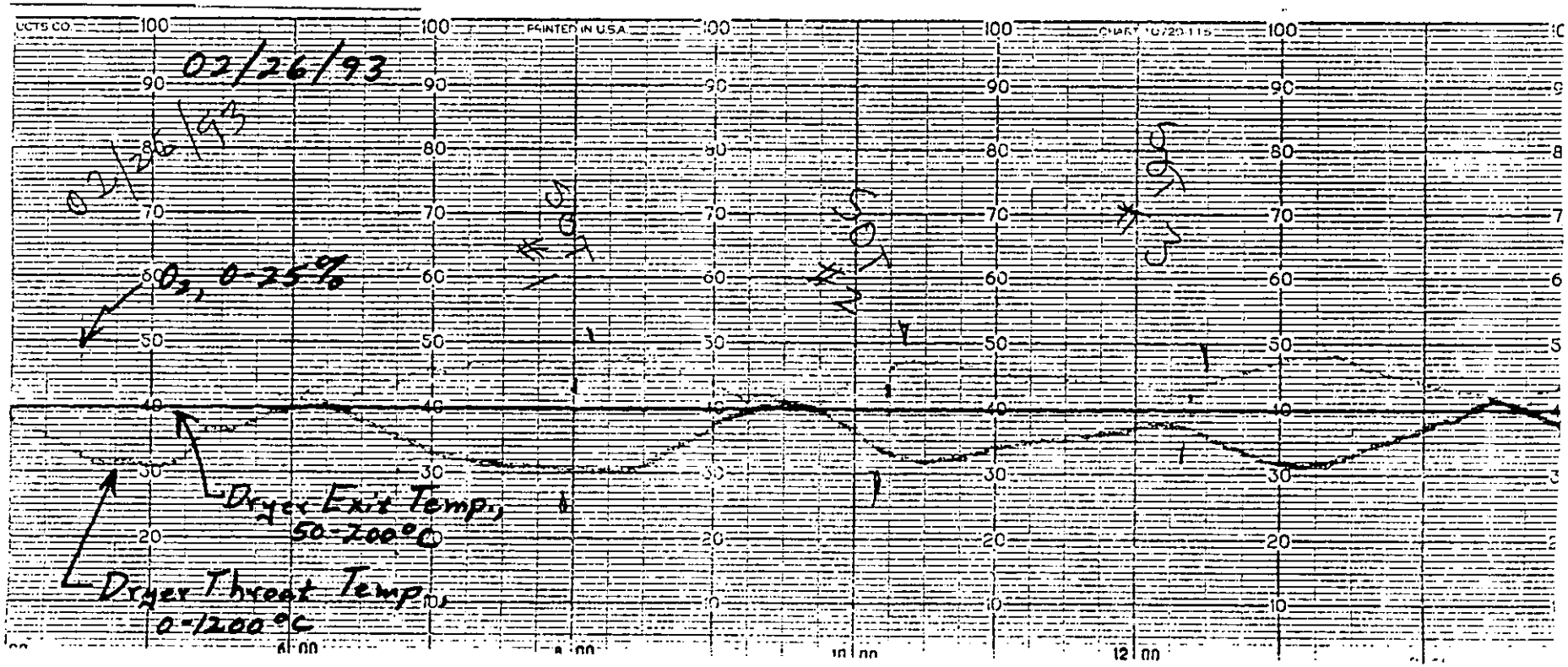
02/26/93

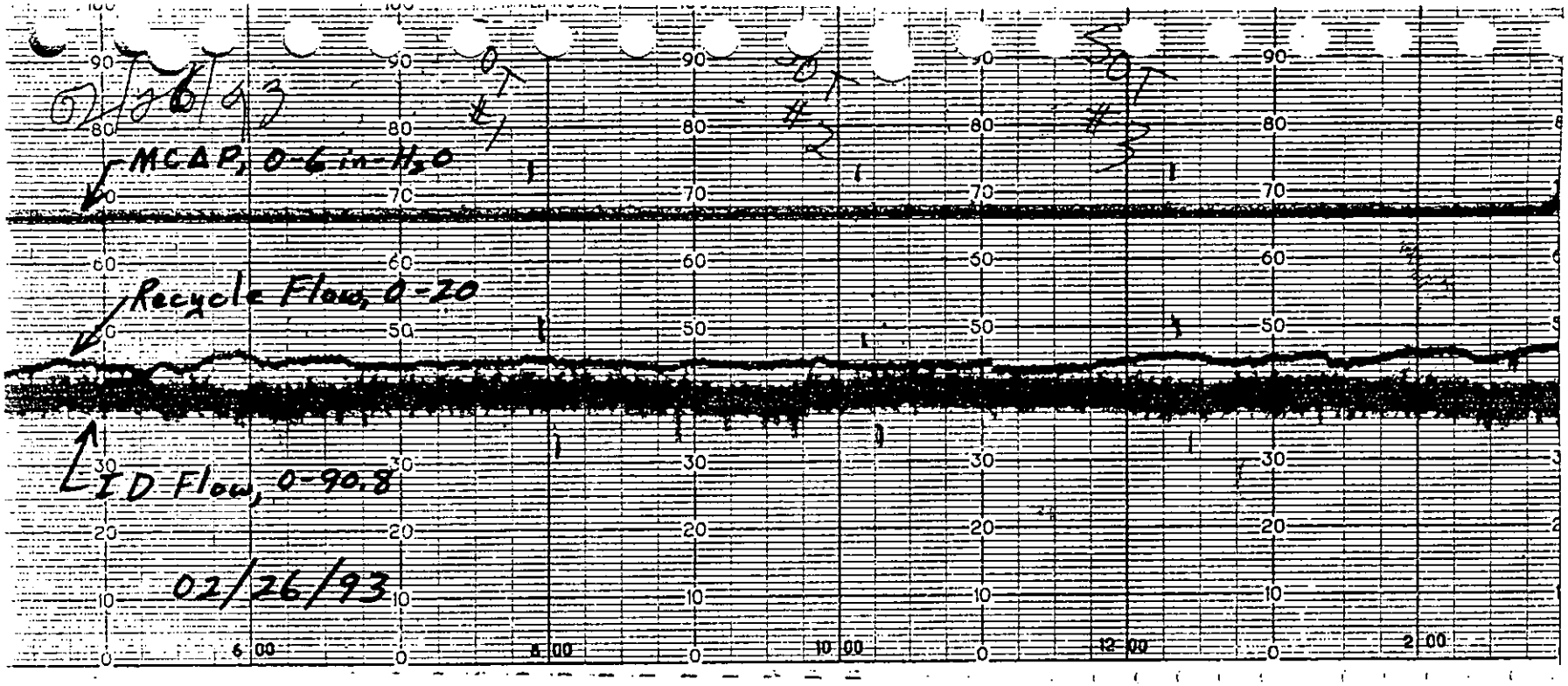
NUMBER 2 DRYER (South)

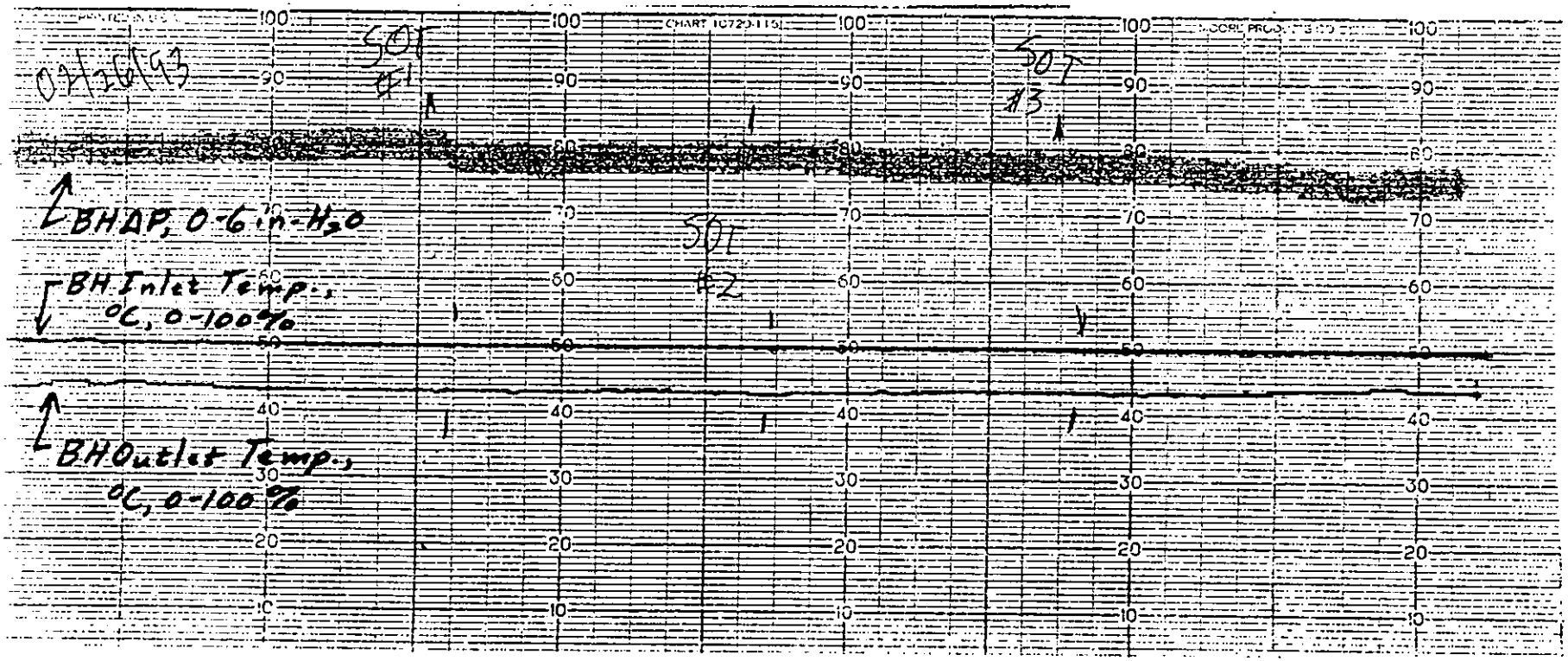
TIME OF DAY	1330	1400	1430	1500			
SLICE RATE, TPH	200	204	218	215			
TOTAL PULP FLOW, TPH	56	51	57	57			
GRATE SPEED, %	71.19	72.03	92.89	80.72			
DRYER EXIT, °C	99.8	99.9	100.0	99.9			
ID FAN SPEED, %	72.0	72.0	72.0	72.0			
PULP FEED SCROLL, %	103.3	103.3	103.3	103.3			
PULP GATE, % CLOSED	60.0	60.0	60.0	60.0			
FD DAMPER, % OPEN	20.96	19.11	42.76	28.59			
RECYCLE DAMPERS, % OPEN	45.0	45.0	45.0	45.0			
RATIO SETUP	Manual	Manual	Manual	Manual			
DRYER THROAT	385	427	485	478			
DRYER EXIT, °C	100	100	100	100			
FURNACE PRESS, IN H20	-1.3	-1.3	-1.0	-1.2			
EXIT PRESS, INC H20	-1.1	-1.1	-1.3	-1.2			
DRYER ΔP, IN H20	1.3	1.2	1.2	1.2			
DRUM AMPS	26.5	26.5	27	26.5			
ID FAN, AMPS	156	156	155	156			
ID FLOW.	34.5	36.5	33	33.5			
REC. FLOW	9.6	9.5	9.5	9.6			
M.C. ΔP	4.05	4.05	4.05	4.05			
BAGHOUSE ΔP	4.71	4.66	4.60	4.61			
ASP	6.8	6.9	6.8	7.0			
FD FLOW, ΔP	1.03	1.03	1.03	1.03			
#1 PULP FEED, TPH	29	30	33	34			
#2 PULP FEED, TPH	24	24	27	24			
O_2, %	11.9	11.2	10.0	11.0			
BH in, °C	102.8	103.2	103.6	103.6			
out, °C	93.5	93.8	94.2	93.9			
	Furnace Static -0.04" above grate						

time/wp51


02/26/93
Dryer Feed Rate, 0-100%
Aspiration Flow, 0-25
Dryer ΔP, ±2 in-H2O
Soy #1
Soy #2
Soy #3
6:00
8:00
10:00
12:00
2:00


02/26/93
O2, 0-25%
Dryer Exit Temp, 50-200°C
Dryer Throat Temp, 0-1200°C
Soy #1
Soy #2
Soy #3
6:00
8:00
10:00
12:00

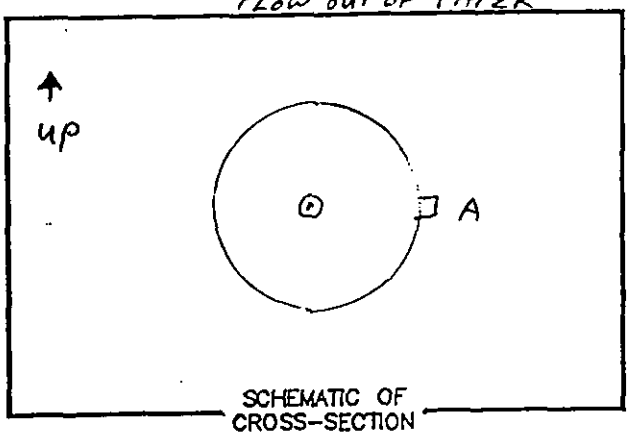

02/26/93
SOT #1
SOT #2
SOT #3
MCΔP, 0-6 in-H2O
Recycle Flow, 0-20
ID Flow, 0-90.8
02/26/93
6 00
8 00
10 00
12 00
2 00


02/26/93
SOT #1
SOT #2
SOT #3
BHΔP, 0-6 in-H2O
BH Inlet Temp., °C, 0-100%
BHOutlet Temp., °C, 0-100%

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Dryer Recycle
TEST 1 RUN PRE DATE 2-22-93
STACK DIA. 30.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.30 IN Hg
STATIC PRESSURE +4.70 IN WC
OPERATORS D. Smith/ D. PHIPPS
PITOT NO. P1-4 Cp .840

FLOW OUT OF PAPER



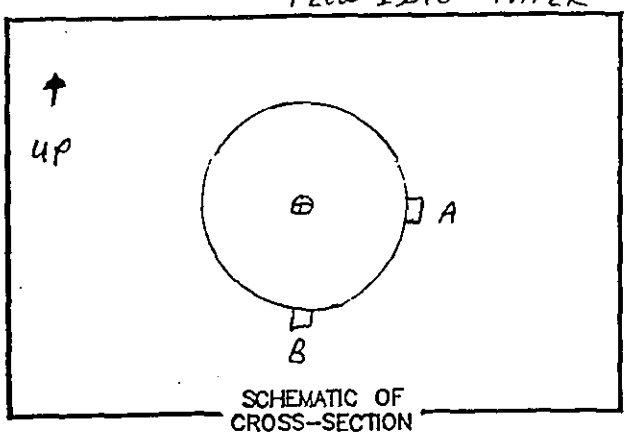
SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	3.5 IN.	TIME START: 0900 HRS.	
A - 1	.032	1.00	4.50	0.52	220
2	.105	3.15	6.65	0.65	
3	.194	5.82	9.32	0.67	
4	.323	9.69	13.19	0.64	
5	.677	20.31	23.81	0.66	
6	.806	24.18	27.68	0.70	
7	.895	26.85	30.35	0.69	
8	.968	29.00	32.50	0.64	
	Ft./Sec. =	56.17			
	ACFM =	16,544			
	DSCFM =	6,746			
	MC =	47 %			
	O2 =	14 %			
	TS =	220 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 0915 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Dryer Aspiration
TEST 1 RUN PRE DATE 2-22-93
STACK DIA. 24.0 IN.
DRY BULB 220 °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.30 IN Hg
STATIC PRESSURE -0.72 IN WC
OPERATORS D. Smith / D. PHIPPS
PITOT NO. P1-4 Cp .840



SCHEMATIC OF CROSS-SECTION

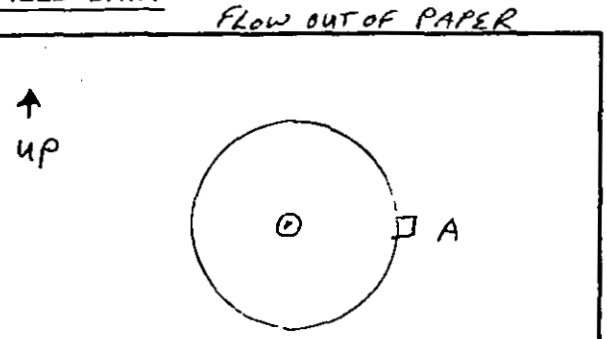
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	2.5 IN.	TIME START: 0915 HRS.	
A - 1	.032	1.00	3.50	0.56	220
2	.105	2.52	5.02	0.67	
3	.194	4.66	7.16	0.68	
4	.323	7.75	10.25	0.68	
5	.677	16.25	18.75	0.84	
6	.806	19.34	21.84	0.90	
7	.895	21.48	23.98	0.94	
8	.968	23.00	25.00	0.95	
B -	not accessable				
	Ft./Sec. =	61.83			
	ACFM =	11,655			
	DSCFM =	4689			
	MC =	47 %			
	O2 =	14 %			
	TS =	220 F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 0930 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No 1 Dryer Recycle
TEST 1 RUN PRE DATE 2-22-93
STACK DIA. 30.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.30 IN Hg
STATIC PRESSURE +5.00 IN WC
OPERATORS D. Smith/ D. PHIPPS
PITOT NO. P1- 4 Cp .840

FLOW OUT OF PAPER



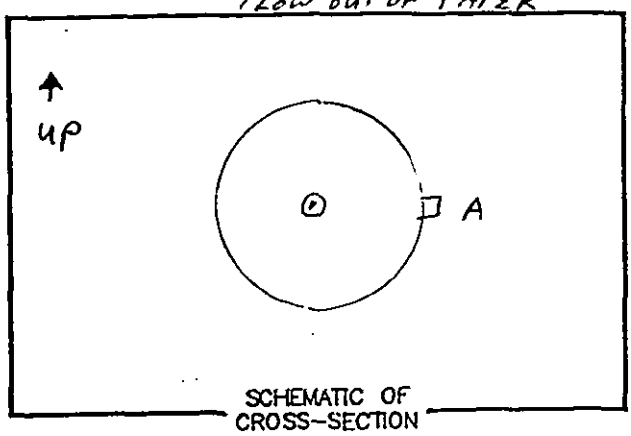
SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	3.5 IN.	TIME START:	1055 HRS.
A - 1	.032	1.00	4.50	0.34	220
2	.105	3.15	6.65	0.47	
3	.194	5.82	9.32	0.52	
4	.323	9.69	13.19	0.49	
5	.677	20.31	23.81	0.50	
6	.806	24.18	27.68	0.51	
7	.895	26.85	30.35	0.50	
8	.968	29.00	32.50	0.47	
	Ft./Sec. =	48.09			
	ACFM =	14165			
	DSCFM =	5750			
	MC =	17 %			
	O2 =	17 %			
	TS =	220 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END:	1110 HRS.

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No 1 Dryer Recycle
TEST 2 RUN PRE DATE 2-23-93
STACK DIA. 30.0 IN.
DRY BULB 223 °F WET BULB 169 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE +5.50 IN WC
OPERATORS D. Smith/ D. PHIPPS
PITOT NO. P1-4 Cp .840

FLOW OUT OF PAPER



SCHEMATIC OF CROSS-SECTION

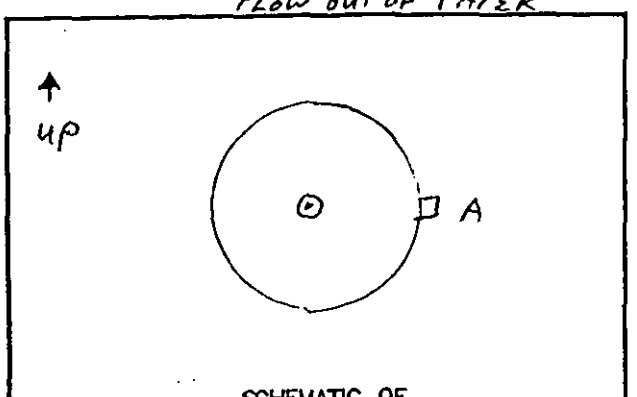
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	3.5 IN.	TIME START:	0715 HRS.
A - 1	.032	1.00	4.50	0.41	223
2	.105	3.15	6.65	0.53	
3	.194	5.82	9.32	0.58	
4	.323	9.69	13.19	0.54	
5	.677	20.31	23.81	0.55	
6	.806	24.18	27.68	0.57	
7	.895	26.85	30.35	0.58	
8	.968	29.00	32.50	0.54	
	Ft./Sec. =	49.84			
	ACFM =	14,680			
	DSCFM =	7122			
	MC =	37 %			
	O2 =	12 %			
	TS =	223 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END:	0730 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Dryer Recycle
TEST 2 RUN Post DATE 2-23-93
STACK DIA. 30.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE _____ IN WC
OPERATORS D. Smith/ D. PHIPPS
PITOT NO. P1- 4 Cp .840

FLOW OUT OF PAPER



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	3.5 IN.	TIME START:	HRS.
A - 1	.032	1.00	4.50		
2	.105	3.15	6.65		
3	.194	5.82	9.32		
4	.323	9.69	13.19		
5	.677	20.31	23.81		
6	.806	24.18	27.68		
7	.895	26.85	30.35		
8	.968	29.00	32.50		
	Ft./Sec. =				
	ACFM =				
	DSCFM =				
	MC =	%			
	O2 =	%			
	TS =	°F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END:	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Dryer Aspiration
TEST 2 RUN PRE DATE 2-23-93
STACK DIA. 24.0 IN.
DRY BULB 223 °F WET BULB 169 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE -0.73 IN WC
OPERATORS D. Smith / D. SHIPPS
PITOT NO. P1- 4 Cp .840

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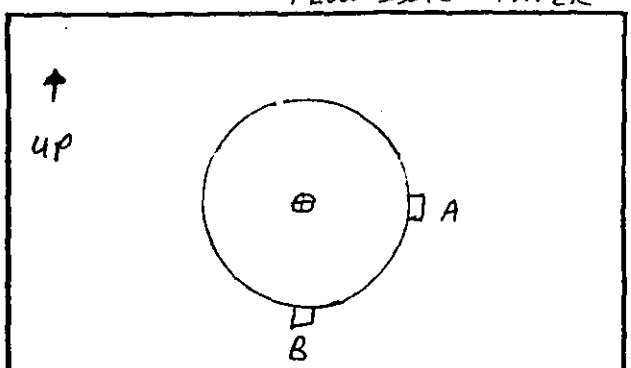


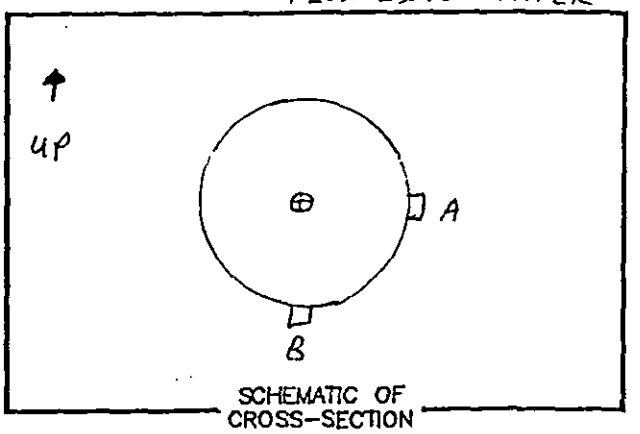
SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	2.5 IN.	TIME START: 0730 HRS.	
A - 1	.032	1.00	3.50	0.65	223
2	.105	2.52	5.02	0.82	
3	.194	4.66	7.16	0.80	
4	.323	7.75	10.25	0.78	
5	.677	16.25	18.75	0.97	
6	.806	19.34	21.84	1.03	
7	.895	21.48	23.98	1.08	
8	.968	23.00	25.00	1.06	
B -	not accessable				
	Ft./Sec. =	64.81			
	ACFM =	12,216			
	DSCFM =	5,836			
	MC =	37 %			
	O2 =	12 %			
	TS =	223 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 0745 HRS.	

EPA METHOD 2 FIELD DATA

FLOW INTO PAPER

PROJECT NAME A.C.S. CROOKSTON
SOURCE No. 1 Dryer Aspiration
TEST 2 RUN POST DATE 2-23-93
STACK DIA. 24.0 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE _____ IN WC
OPERATORS D. Smith / D. PHIPPS
PITOT NO. P1- 4 Cp .840



SCHEMATIC OF CROSS-SECTION

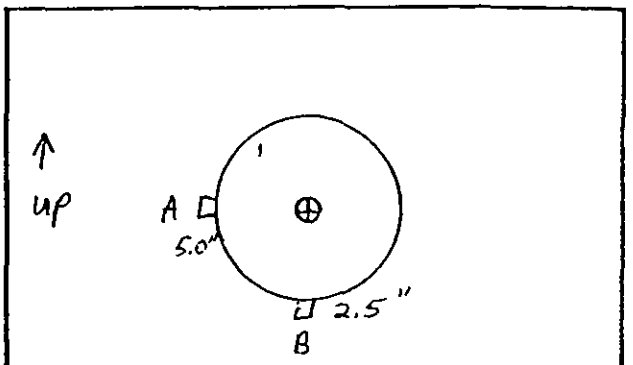
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	2.5 IN.	TIME START:	HRS.
A - 1	.032	1.00	3.50		
2	.105	2.52	5.02		
3	.194	4.66	7.16		
4	.323	7.75	10.25		
5	.677	16.25	18.75		
6	.806	19.34	21.84		
7	.895	21.48	23.98		
8	.968	23.00	25.00		
B -	not accessable				
	Ft./Sec. =				
	ACFM =				
	DSCFM =				
	MC =	%			
	O2 =	%			
	TS =	°F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END:	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 3 RUN PRE DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE + 6.25 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

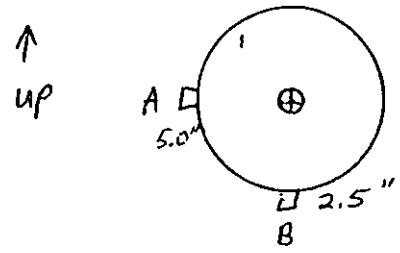
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH: 5.0/2.5 IN.		TIME START: 0715 HRS.	
A - 1	.044	1.03	6.03	0.07	216
2	.146	3.43	8.43	0.09	
3	.246	6.96	11.96	0.09	
4	.704	16.54	21.54	0.09	
5	.854	20.07	25.07	0.11	
6	.956	22.47	27.47	0.10	
B - 1				0.08	
2				0.09	
3				0.08	
4				0.09	
5				0.09	
6				0.09	
	FT./SEC. =	20.06			
	ACFM =	3,625			
	DSCFM =	1,867			
	MC =	34 %			
	O_2 =	13 %			
	TS =	216 °F			
TEMP. MEAS. TOOL & S/N:		Mercury Thermometer		TIME END: 0730 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 3 RUN POST DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE + 4.75 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	5.0/2.5 IN.	TIME START: 1630	HRS.
A - 1	.044	1.03	6.03	0.53	215
2	.146	3.43	8.43	0.69	
3	.246	6.96	11.96	0.68	
4	.704	16.54	21.54	0.64	
5	.854	20.07	25.07	0.64	
6	.956	22.47	27.47	0.60	
B - 1				0.58	
2				0.67	
3				0.68	
4				0.67	
5				0.69	
6				0.64	
	FT./SEC. =	53.86			
	ACFM =	9,733			
	DSCFM =	5,153			
	MC =	32 %			
	O_2 =	15 %			
	TS =	215 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 1645	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 3 RUN PRE DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB 216 °F WET BULB 165 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE +0.58 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

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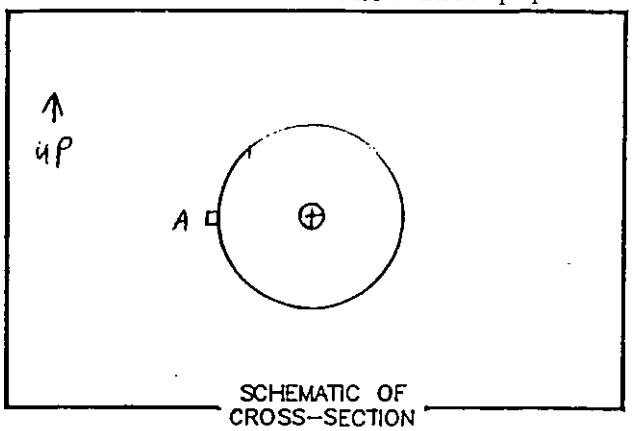


SCHEMATIC OF CROSS-SECTION

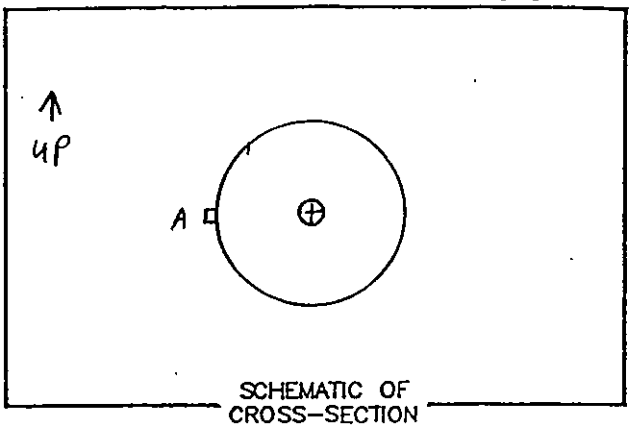
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	2.5 IN.	TIME START: 0730 HRS.	
A - 1	.032	0.75	3.25	0.37	216
2	.105	2.47	4.97	0.25	
3	.194	4.56	7.06	0.15	
4	.323	7.59	10.09	0.18	
5	.677	15.91	18.41	0.34	
6	.806	18.94	21.44	0.22	
7	.895	21.03	23.53	0.15	
8	.968	22.75	25.25	0.19	
	FT./Sec. =	32.13			
	ACFM =	5807			
	DSCFM =	2,949			
	MC =	34 %			
	O2 =	13 %			
	Ts =	216 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 0745 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 3 RUN POST DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE +0.35 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	2.5 IN.	TIME START: 1645	HRS.
A - 1	.032	0.75	3.25	0.39	215
2	.105	2.47	4.97	0.27	
3	.194	4.56	7.06	0.18	
4	.323	7.59	10.09	0.20	
5	.677	15.91	18.41	0.37	
6	.806	18.94	21.44	0.24	
7	.895	21.03	23.53	0.21	
8	.968	22.75	25.25	0.20	
	FT./Sec. =	33.97			
	ACFM =	6,139			
	DSCFM =	3,215			
	MC =	32 %			
	O2 =	15 %			
	Ts =	215 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 1700	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 3 RUN PRE DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE +2.80 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

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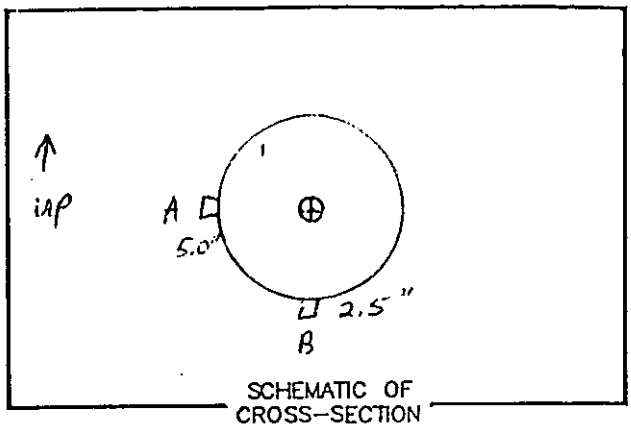

SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH: 5.0/2.5 IN.		TIME START: 0900 HRS.	
A - 1	.044	1.03	6.03	1.03	216
2	.146	3.43	8.43	1.35	
3	.246	6.96	11.96	1.30	
4	.704	16.54	21.54	1.25	
5	.854	20.07	25.07	1.25	
6	.956	22.47	27.47	1.15	
B - 1				1.15	
2				1.35	
3				1.35	
4				1.30	
5				1.30	
6				1.20	
	FT./SEC. =	75.41			
	ACFM =	13,629			
	DSCFM =	6,959			
	MC =	34 %			
	O_2 =	13 %			
	TS =	216 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 0915 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 3 RUN PRE DATE 2-24-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.43 IN Hg
STATIC PRESSURE + 4.25 IN WC
OPERATORS D. Smith / D. Phipps
PITOT NO. P1-4 Cp .840

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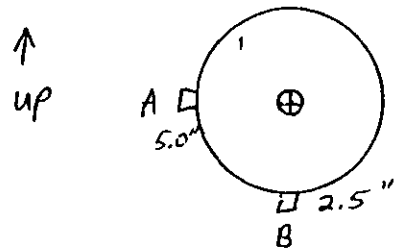

SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	5.0/2.5 IN.	TIME START:	0925 HRS.
A - 1	.044	1.03	6.03	0.65	216
2	.146	3.43	8.43	0.82	
3	.246	6.96	11.96	0.82	
4	.704	16.54	21.54	0.78	
5	.854	20.07	25.07	0.75	
6	.956	22.47	27.47	0.70	
B - 1				0.83	
2				0.88	
3				0.84	
4				0.77	
5				0.80	
6				0.75	
	FT./SEC. =	59.60			
	ACFM =	10,771			
	DSCFM =	5519			
	MC =	34 %			
	O_2 =	13 %			
	TS =	216 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END:	0940 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 4 RUN PRE DATE 2-25-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE +0.39 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

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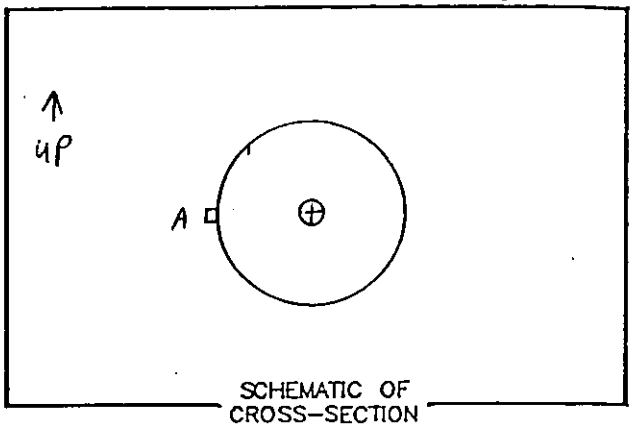

SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	2.5 IN.	TIME START: 0810	HRS.
A - 1	.032	0.75	3.25	0.42	212
2	.105	2.47	4.97	0.32	
3	.194	4.56	7.06	0.20	
4	.323	7.59	10.09	0.21	
5	.677	15.91	18.41	0.36	
6	.806	18.94	21.44	0.25	
7	.895	21.03	23.53	0.20	
8	.968	22.75	25.25	0.22	
	FT./Sec. =	34.89			
	ACFM =	6,305			
	DSCFM =	3,313			
	MC =	32 %			
	O2 =	15 %			
	Ts =	212 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 0825	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 4 RUN POST DATE 2-25-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE +0.46 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

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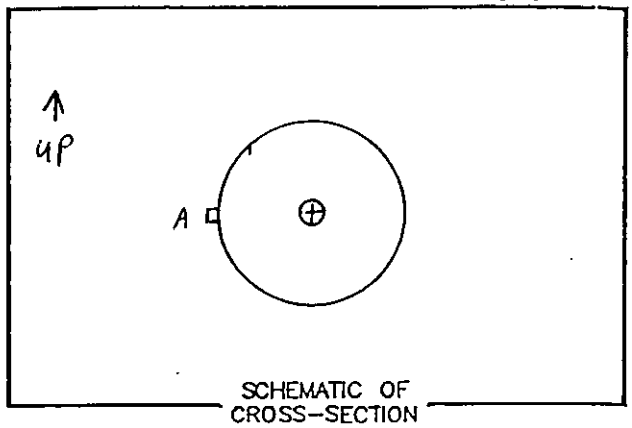


SCHEMATIC OF CROSS-SECTION

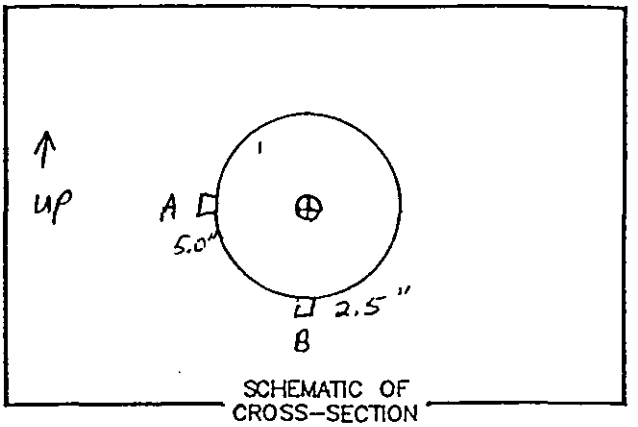
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	2.5 IN.	TIME START: 1615 HRS.	
A - 1	.032	0.75	3.25	0.35	214
2	.105	2.47	4.97	0.32	
3	.194	4.56	7.06	0.18	
4	.323	7.59	10.09	0.20	
5	.677	15.91	18.41	0.33	
6	.806	18.94	21.44	0.20	
7	.895	21.03	23.53	0.17	
8	.968	22.75	25.25	0.20	
	FT./Sec. =	32.87			
	ACFM =	5,940			
	DSCFM =	3,250			
	MC =	29 %			
	O2 =	16 %			
	Ts =	214 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 1630 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 4 RUN PRE DATE 2-25-93
STACK DIA. 23.5 IN.
DRY BULB 212 °F WET BULB 162 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE + 4.70 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

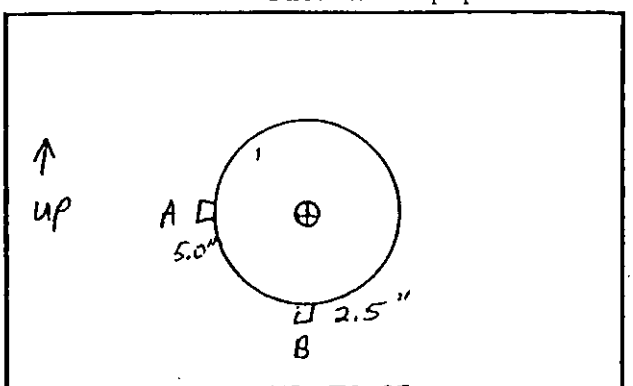
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH: 5.0/2.5 IN.		TIME START: 0825 HRS.	
A - 1	.044	1.03	6.03	0.54	212
2	.146	3.43	8.43	0.70	
3	.246	6.96	11.96	0.68	
4	.704	16.54	21.54	0.64	
5	.854	20.07	25.07	0.65	
6	.956	22.47	27.47	0.64	
B - 1				0.60	
2				0.68	
3				0.68	
4				0.67	
5				0.69	
6				0.67	
	FT./SEC. =	54.23			
	ACFM =	9,803			
	DSCFM =	5,206			
	MC =	32 %			
	O_2 =	15 %			
	TS =	212 °F			
TEMP. MEAS. TOOL & S/N:		Mercury Thermometer		TIME END: 0835 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 4 RUN POST DATE 2-25-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.40 IN Hg
STATIC PRESSURE +4.80 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

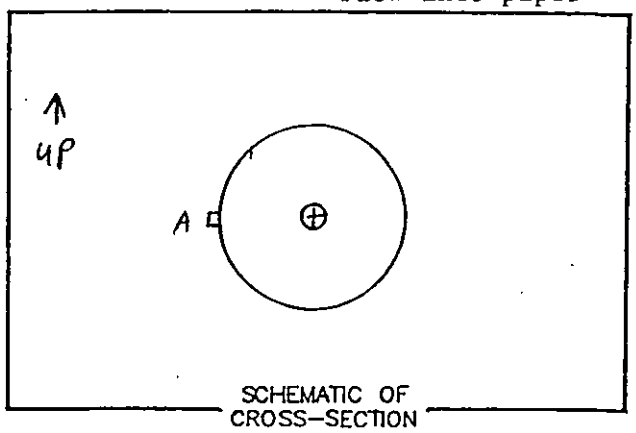
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH: 5.0/2.5 IN.		TIME START: 1600 HRS.	
A - 1	.044	1.03	6.03	0.53	214
2	.146	3.43	8.43	0.70	
3	.246	6.96	11.96	0.68	
4	.704	16.54	21.54	0.65	
5	.854	20.07	25.07	0.66	
6	.956	22.47	27.47	0.61	
B - 1				0.68	
2				0.74	
3				0.69	
4				0.68	
5				0.69	
6				0.64	
	FT./SEC. =	54.40			
	ACFM =	9831			
	DSCFM =	5437			
	MC =	29 %			
	O_2 =	16 %			
	TS =	214 °F			
TEMP. MEAS. TOOL & S/N:		Mercury Thermometer		TIME END: 1615 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 5 RUN POST DATE 2-26-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.52 IN Hg
STATIC PRESSURE +0.44 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH:	2.5 IN.	TIME START: 1450	HRS.
A - 1	.032	0.75	3.25	0.41	215
2	.105	2.47	4.97	0.33	
3	.194	4.56	7.06	0.17	
4	.323	7.59	10.09	0.19	
5	.677	15.91	18.41	0.33	
6	.806	18.94	21.44	0.22	
7	.895	21.03	23.53	0.15	
8	.968	22.75	25.25	0.22	
	FT./Sec. =	33.12			
	ACFM =	5,986			
	DSCFM =	3,376			
	MC =	27 %			
	O2 =	16 %			
	Ts =	215 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 1505	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Aspiration
TEST 5 RUN PRE DATE 2-26-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.52 IN Hg
STATIC PRESSURE +0.37 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

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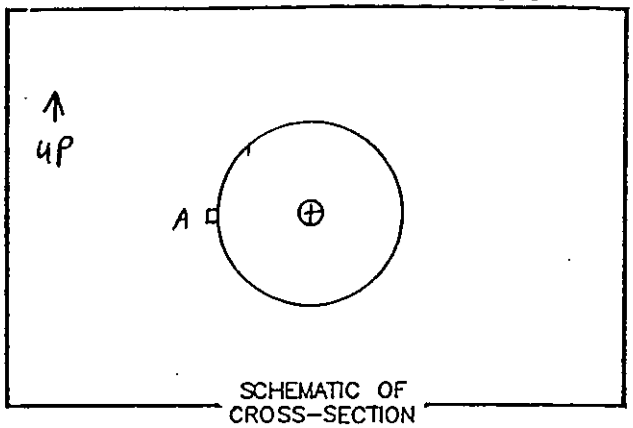


SCHEMATIC OF CROSS-SECTION

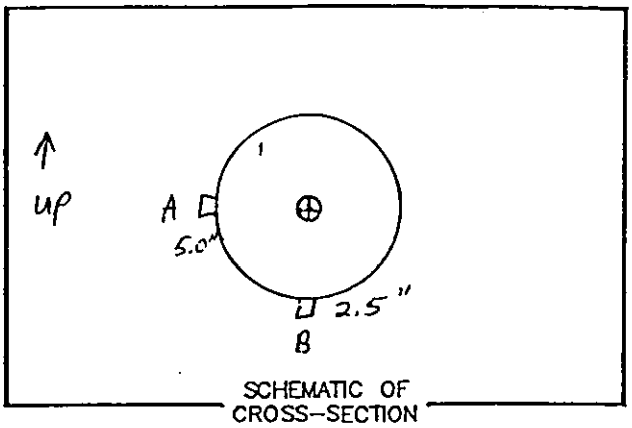
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	2.5 IN.	TIME START: 0700 HRS.	
A - 1	.032	0.75	3.25	0.44	216
2	.105	2.47	4.97	0.34	
3	.194	4.56	7.06	0.19	
4	.323	7.59	10.09	0.20	
5	.677	15.91	18.41	0.34	
6	.806	18.94	21.44	0.21	
7	.895	21.03	23.53	0.17	
8	.968	22.75	25.25	0.21	
	FT./Sec. =	33.88			
	ACFM =	6123			
	DSCFM =	3,401			
	MC =	28 %			
	02 =	16 %			
	Ts =	216 °F			
TEMP. MEAS. TOOL & S/N: Mercury Therometer				TIME END: 0715 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 5 RUN PRE DATE 2-26-93
STACK DIA. 23.5 IN.
DRY BULB 216 °F WET BULB 158 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.52 IN Hg
STATIC PRESSURE + 5.00 IN WC
OPERATORS D. Smith / D. Phipps
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

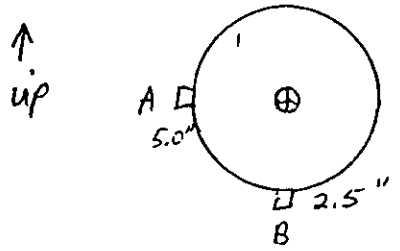
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH: 5.0/2.5 IN.		TIME START: 0715 HRS.	
A - 1	.044	1.03	6.03	0.53	216
2	.146	3.43	8.43	0.67	
3	.246	6.96	11.96	0.66	
4	.704	16.54	21.54	0.63	
5	.854	20.07	25.07	0.66	
6	.956	22.47	27.47	0.63	
B - 1				0.56	
2				0.65	
3				0.68	
4				0.67	
5				0.67	
6				0.60	
	FT./SEC. =	53.07			
	ACFM =	9,591			
	DSCFM =	5,388			
	MC =	28 %			
	O_2 =	16 %			
	TS =	216 °F			
TEMP. MEAS. TOOL & S/N:		Mercury Thermometer		TIME END: 0730 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. Crookston
SOURCE #2 Dryer Recycle
TEST 5 RUN POST DATE 2-26-93
STACK DIA. 23.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 29.52 IN Hg
STATIC PRESSURE +5.00 IN WC
OPERATORS D. SMITH / D. PHIPPS
PITOT NO. P1-4 Cp .840

Flow into paper



SCHEMATIC OF CROSS-SECTION

TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH:	5.0/2.5 IN.	TIME START: 1435	HRS.
A - 1	.044	1.03	6.03	0.52	215
2	.146	3.43	8.43	0.65	
3	.246	6.96	11.96	0.66	
4	.704	16.54	21.54	0.62	
5	.854	20.07	25.07	0.64	
6	.956	22.47	27.47	0.60	
B - 1				0.65	
2				0.68	
3				0.67	
4				0.67	
5				0.67	
6				0.56	
	FT./SEC. =	52.84			
	ACFM =	9550			
	DSCFM =	5447			
	MC =	27 %			
	O_2 =	16 %			
	TS =	215 °F			
TEMP. MEAS. TOOL & S/N:	Mercury Thermometer			TIME END: 1450	HRS.

AIR-2