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Title: Results of the January 28-31, 1992, Particulate Emission Tests, South Pulp Dryer- American Crystal Sugar Company, Moorehead, Minnesota

Bay West, Inc.

Bay West, Inc.

March 1992

RESULTS OF THE JANUARY 28 - 31, 1992 PARTICULATE EMISSION TESTS SOUTH PULP DRYER

AMERICAN CRYSTAL SUGAR COMPANY MOORHEAD, MINNESOTA

Submitted to:

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March 26, 1992

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1.0 INTRODUCTION

From January 21-24, 1992, Bay West, Inc. conducted engineering emission testing for particulate matter at the inlet and outlet of the South Pulp Dryer at American Crystal Sugar Company's facility in Moorhead, Minnesota.

The South Pulp Dryer is a rotary drum dryer for drying beet pulp. The dryer has a coal-fired furnace, rotary drum dryer, multiclone control system, and stack filter system. The rotary drum is heated by a coal-fired furnace. Emissions from the dryer are controlled by multiclone and stack filter systems. A portion of the exhaust gas from the multiclone can be returned to the rotary drums. Testing was conducted under various exhaust gas recycle rates.

On-site testing was performed by Dwayne Smith, Scott Bainville Dan Smith and Dennis Littfin of Bay West. Facility personnel present during testing included David Walden of American Crystal Sugar Company.

Evaluations were performed in accordance with EPA Methods 1 - 5, CFR Title 40, Part 60, Appendix A (revised July 1, 1991). Prior to and after each test series, air flowrate determinations were conducted for the source stack, recycle duct, and hopper aspirator duct locations. These flowrate determinations are included in Appendix 1.

The circular stack outlet had four sampling ports, the rectangular multiclone inlet had four sampling ports, and the dryer aspirator duct had one test port.

An ANDERSEN INSTRUMENTS sampling train was used to extract particulate samples by means of a glass-lined pitobe assembly. This test determined the "front-half" and "back-half" portions of the total particulate catch. The "front-half" includes the residue from probe washings and particulate from the dry filter. The "back-half" catch includes the residue extracted from the impingers of the Method 5 train.

2.0 SUMMARY

The results of the January 21 - 24, 1992 inlet/outlet emission tests of the South Pulp Dryer are included in section 3.0 of this report. No difficulties occurred in the field or in the laboratory evaluation of the samples. Based on this fact and a review of all data, it is our opinion that the results reflect the actual emissions from this process at the time the testing was performed. Table 1 below lists the emission concentration determinations and collection efficiency for each test.

Table 1
Summary of Results

Test No.	Run No.	Inlet Concentration (gr/dscf)	Outlet Concentration (gr/dscf)	Collection Efficiency (%)
1	1	0.3533	0.0724	79.5
1	2	0.4167	0.0718	82.8
1	3	0.3414	0.0757	77.8
2	1	0.4139	0.1001	75.8
2	2	0.4206	0.0953	77.3
2	3	0.4494	0.1277	71.6
3	1	0.4774	0.0979	79.5
3	2	0.4937	0.1119	77.3
3	3	0.5692	0.1091	80.8
4	1	0.4687	0.1295	72.4
4	2	0.5411	0.1134	79.0
4	3	0.4783	0.1014	78.8

3.0 RESULTS

Tables 2 through 17 show the results of Method 5 testing for the inlet and outlet of the South Pulp Dryer. Field data, analytical data, testing procedures, calculations, calibration data, and process rates are included in Appendices 2 through 7, respectively.

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

BayWest

TEST NO. 1
SOURCE/SITE: SOUTH DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	21-Jan-92	21-Jan-92	21-Jan-92
RUN START TIME	1315	1600	1815
RUN END TIME	1519	1745	2013
STACK STATIC PRESSURE (in. H2O)	-0.84	-0.84	-0.84
CROSS SECTIONAL AREA (sq. ft.)	19.308	19.308	19.308
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	696.00	676.00	740.00
DESSICCANT (grams)	300.00	302.00	174.00
TOTAL (grams)	996.00	978.00	914.00
SAMPLE GAS MOISTURE CONTENT (%)	32.39	33.09	32.16
TOTAL PARTICULATE COLLECTED (g)	0.4594	0.4335	0.4454
DRY GAS METER COEFFICIENT	1.001	1.001	1.001
BAROMETRIC PRESSURE (in. Hg)	28.85	28.85	28.85
AVG. ORIFICE PRESSURE DROP (in. H2O)	3.65	3.32	3.16
AVG. GAS METER TEMP. (degrees F)	113.3	118.7	117.6
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	109.20	104.93	102.16
STANDARD CONDITIONS (dscf)	97.93	93.16	90.82
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.312	0.312	0.312
AVG. STACK GAS TEMP. (degrees F)	233.3	232.8	228.8
AVG. STACK GAS VELOCITY (ft/sec)	58.99	59.33	58.89
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	68336	68733	68225
DRY STANDARD (dscfm)	33856	33725	34139
ISOKINETIC VARIATION (%)	109.64	104.70	100.84
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0359	0.0352	0.0379
DRY STANDARD (gr/dscf)	0.0724	0.0718	0.0757
PARTICLE MASS RATE (lb/hr)	20.985	20.736	22.121

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 2
SOURCE/SITE: SOUTH DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	22-Jan-92	22-Jan-92	22-Jan-92
RUN START TIME	1020	1250	1515
RUN END TIME	1212	1430	1652
STACK STATIC PRESSURE (in. H2O)	-0.43	-0.43	-0.43
CROSS SECTIONAL AREA (sq. ft.)	19.308	19.308	19.308
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	984.00	1074.00	1018.00
DESSICCANT (grams)	341.00	86.00	189.00
TOTAL (grams)	1325.00	1160.00	1207.00
SAMPLE GAS MOISTURE CONTENT (%)	42.65	42.44	44.09
TOTAL PARTICULATE COLLECTED (g)	0.5441	0.4578	0.5965
DRY GAS METER COEFFICIENT	1.001	1.001	1.001
BAROMETRIC PRESSURE (in. Hg)	28.70	28.70	28.70
AVG. ORIFICE PRESSURE DROP (in. H2O)	2.75	2.14	2.04
AVG. GAS METER TEMP. (degrees F)	122.4	123.5	128.6
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	95.77	84.86	83.29
STANDARD CONDITIONS (dscf)	83.91	74.11	72.09
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.312	0.312	0.312
AVG. STACK GAS TEMP. (degrees F)	227.8	218.4	219.8
AVG. STACK GAS VELOCITY (ft/sec)	54.50	54.01	54.35
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	63134	62566	62962
DRY STANDARD (dscfm)	26632	26857	26199
ISOKINETIC VARIATION (%)	109.19	104.60	104.29
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0422	0.0409	0.0531
DRY STANDARD (gr/dscf)	0.1001	0.0953	0.1277
PARTICLE MASS RATE (lb/hr)	22.816	21.920	28.644

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 3
SOURCE/SITE: SOUTH DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	23-Jan-92	23-Jan-92	23-Jan-92
RUN START TIME	1005	1220	1445
RUN END TIME	1145	1355	1630
STACK STATIC PRESSURE (in. H2O)	-0.45	-0.45	-0.45
CROSS SECTIONAL AREA (sq. ft.)	19.308	19.308	19.308
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	1135.00	1135.00	1036.00
DESSICCANT (grams)	89.00	89.00	23.00
TOTAL (grams)	1224.00	1224.00	1059.00
SAMPLE GAS MOISTURE CONTENT (%)	46.02	46.74	43.70
TOTAL PARTICULATE COLLECTED (g)	0.4289	0.4762	0.4544
DRY GAS METER COEFFICIENT	1.001	1.001	1.001
BAROMETRIC PRESSURE (in. Hg)	28.68	28.68	28.68
AVG. ORIFICE PRESSURE DROP (in. H2O)	1.74	1.64	1.58
AVG. GAS METER TEMP. (degrees F)	107.5	107.8	109.7
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	75.44	73.35	72.00
STANDARD CONDITIONS (dscf)	67.63	65.70	64.26
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.312	0.312	0.312
AVG. STACK GAS TEMP. (degrees F)	217.1	213.1	203.3
AVG. STACK GAS VELOCITY (ft/sec)	49.30	49.33	48.71
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	57117	57148	56430
DRY STANDARD (dscfm)	23021	22860	24213
ISOKINETIC VARIATION (%)	109.02	108.94	100.60
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0395	0.0448	0.0468
DRY STANDARD (gr/dscf)	0.0979	0.1119	0.1091
PARTICLE MASS RATE (lb/hr)	19.291	21.893	22.621

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 4
SOURCE/SITE: SOUTH DRYER STACK

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	24-Jan-92	24-Jan-92	24-Jan-92
RUN START TIME	1015	1245	1505
RUN END TIME	1210	1420	1655
STACK STATIC PRESSURE (in. H2O)	-0.55	-0.55	-0.55
CROSS SECTIONAL AREA (sq. ft.)	19.308	19.308	19.308
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	0.00	0.00	0.00
IMPINGER (ml.)	1109.00	1190.00	1242.00
DESSICCANT (grams)	122.00	24.00	15.00
TOTAL (grams)	1231.00	1214.00	1257.00
SAMPLE GAS MOISTURE CONTENT (%)	43.35	44.73	45.34
TOTAL PARTICULATE COLLECTED (g)	0.6358	0.5193	0.4688
DRY GAS METER COEFFICIENT	1.001	1.001	1.001
BAROMETRIC PRESSURE (in. Hg)	28.83	28.83	28.83
AVG. ORIFICE PRESSURE DROP (in. H2O)	2.17	1.90	1.98
AVG. GAS METER TEMP. (degrees F)	107.8	115.3	126.5
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	84.02	79.47	81.83
STANDARD CONDITIONS (dscf)	75.75	70.66	71.38
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.312	0.312	0.312
AVG. STACK GAS TEMP. (degrees F)	209.5	201.5	190.8
AVG. STACK GAS VELOCITY (ft/sec)	50.80	50.17	50.24
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	58851	58123	58206
DRY STANDARD (dscfm)	25297	24675	24840
ISOKINETIC VARIATION (%)	108.32	108.55	108.92
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.0557	0.0482	0.0433
DRY STANDARD (gr/dscf)	0.1295	0.1134	0.1014
PARTICLE MASS RATE (lb/hr)	28.053	23.961	21.555

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 1
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	21-Jan-92	21-Jan-92	21-Jan-92
RUN START TIME	1315	1600	1825
RUN END TIME	1500	1742	2002
STACK STATIC PRESSURE (in. H2O)	2.80	2.80	2.80
CROSS SECTIONAL AREA (sq. ft.)	53.472	53.472	53.472
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	374.00	342.00	0.00
IMPINGER (ml.)	0.00	0.00	0.00
DESSICCANT (grams)	34.00	46.00	34.00
TOTAL (grams)	408.00	388.00	34.00
SAMPLE GAS MOISTURE CONTENT (%)	31.09	31.76	31.18
TOTAL PARTICULATE COLLECTED (g)	0.9751	1.0606	0.8696
DRY GAS METER COEFFICIENT	1.000	1.000	1.000
BAROMETRIC PRESSURE (in. Hg)	28.85	28.85	28.85
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.84	0.73	0.72
AVG. GAS METER TEMP. (degrees F)	127.0	124.5	126.6
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	49.03	45.02	45.22
STANDARD CONDITIONS (dscf)	42.60	39.27	39.30
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.313	0.313	0.313
AVG. STACK GAS TEMP. (degrees F)	248.8	247.2	244.4
AVG. STACK GAS VELOCITY (ft/sec)	25.39	25.10	25.26
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	81456	80531	81030
DRY STANDARD (dscfm)	40605	39847	40596
ISOKINETIC VARIATION (%)	109.42	102.80	100.98
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.1761	0.2062	0.2388
DRY STANDARD (gr/dscf)	0.3533	0.4167	0.3414
PARTICLE MASS RATE (lb/hr)	122.817	142.180	118.679

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 2
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

RESULTS OF PARTICULATE LOADING DETERMINATIONS - *METHOD* 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	22-Jan-92	22-Jan-92	22-Jan-92
RUN START TIME	1020	1250	1515
RUN END TIME	1200	1430	1655
STACK STATIC PRESSURE (in. H2O)	2.80	2.80	2.80
CROSS SECTIONAL AREA (sq. ft.)	53.472	53.472	53.472
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	381.00	398.00	407.00
IMPINGER (ml.)	0.00	0.00	0.00
DESSICCANT (grams)	206.00	179.00	120.00
TOTAL (grams)	587.00	577.00	527.00
SAMPLE GAS MOISTURE CONTENT (%)	39.35	42.06	40.72
TOTAL PARTICULATE COLLECTED (g)	1.1431	1.0204	1.0523
DRY GAS METER COEFFICIENT	1.000	1.000	1.000
BAROMETRIC PRESSURE (in. Hg)	28.70	28.70	28.70
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.85	0.66	0.62
AVG. GAS METER TEMP. (degrees F)	124.8	125.0	128.2
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	49.12	43.19	41.92
STANDARD CONDITIONS (dscf)	42.62	37.44	36.14
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.313	0.313	0.313
AVG. STACK GAS TEMP. (degrees F)	243.0	242.8	242.8
AVG. STACK GAS VELOCITY (ft/sec)	27.56	27.31	27.09
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	88431	87614	86927
DRY STANDARD (dscfm)	38918	36846	37402
ISOKINETIC VARIATION (%)	105.87	105.98	100.77
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.1822	0.1769	0.1934
DRY STANDARD (gr/dscf)	0.4139	0.4206	0.4494
PARTICLE MASS RATE (lb/hr)	137.931	132.691	143.911

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 3
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	23-Jan-92	23-Jan-92	23-Jan-92
RUN START TIME	945	1220	1450
RUN END TIME	1130	1400	1640
STACK STATIC PRESSURE (in. H2O)	2.60	2.60	2.60
CROSS SECTIONAL AREA (sq. ft.)	53.472	53.472	53.472
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	416.00	423.00	424.00
IMPINGER (ml.)	0.00	0.00	0.00
DESSICCANT (grams)	125.00	140.00	98.00
TOTAL (grams)	541.00	563.00	522.00
SAMPLE GAS MOISTURE CONTENT (%)	42.88	44.87	43.13
TOTAL PARTICULATE COLLECTED (g)	1.0501	1.0421	1.1957
DRY GAS METER COEFFICIENT	1.000	1.000	1.000
BAROMETRIC PRESSURE (in. Hg)	28.68	28.68	28.68
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.53	0.50	0.49
AVG. GAS METER TEMP. (degrees F)	105.6	106.8	108.7
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	37.90	36.45	36.40
STANDARD CONDITIONS (dscf)	33.94	32.58	32.42
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.313	0.313	0.313
AVG. STACK GAS TEMP. (degrees F)	243.6	243.3	244.0
AVG. STACK GAS VELOCITY (ft/sec)	25.16	25.05	25.26
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	80713	80381	81039
DRY STANDARD (dscfm)	33386	32101	33356
ISOKINETIC VARIATION (%)	106.05	105.85	101.38
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.1975	0.1972	0.2343
DRY STANDARD (gr/dscf)	0.4774	0.4937	0.5692
PARTICLE MASS RATE (lb/hr)	136.465	135.681	162.548

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 4
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

RESULTS OF PARTICULATE LOADING DETERMINATIONS - METHOD 5

	RUN 1	RUN 2	RUN 3
DATE OF RUN	24-Jan-92	24-Jan-92	24-Jan-92
RUN START TIME	1015	1245	1505
RUN END TIME	1200	1426	1645
STACK STATIC PRESSURE (in. H2O)	2.75	2.75	2.75
CROSS SECTIONAL AREA (sq. ft.)	53.472	53.472	53.472
PITOT TUBE COEFFICIENT	0.840	0.840	0.840
SAMPLE GAS MOISTURE ANALYSES			
CONDENSER (ml.)	413.00	571.00	563.00
IMPINGER (ml.)	0.00	0.00	0.00
DESSICCANT (grams)	223.00	22.00	30.00
TOTAL (grams)	636.00	593.00	593.00
SAMPLE GAS MOISTURE CONTENT (%)	42.35	43.45	43.48
TOTAL PARTICULATE COLLECTED (g)	1.2384	1.2746	1.1254
DRY GAS METER COEFFICIENT	1.000	1.000	1.000
BAROMETRIC PRESSURE (in. Hg)	28.83	28.83	28.83
AVG. ORIFICE PRESSURE DROP (in. H2O)	0.74	0.59	0.60
AVG. GAS METER TEMP. (degrees F)	116.9	118.7	124.1
VOLUME THROUGH GAS METER			
AT METER CONDITIONS (cf)	46.17	41.30	41.64
STANDARD CONDITIONS (dscf)	40.78	36.35	36.31
TOTAL SAMPLING TIME (min.)	96	96	96
NOZZLE DIAMETER (in.)	0.313	0.313	0.313
AVG. STACK GAS TEMP. (degrees F)	246.6	244.2	247.5
AVG. STACK GAS VELOCITY (ft/sec)	28.26	27.69	28.26
VOLUMETRIC FLOWRATE			
ACTUAL (acfm)	90671	88849	90663
DRY STANDARD (dscfm)	37901	36556	37106
ISOKINETIC VARIATION (%)	104.99	103.72	102.06
PARTICULATE CONCENTRATION			
ACTUAL (gr/acf)	0.1959	0.2227	0.1958
DRY STANDARD (gr/dscf)	0.4687	0.5411	0.4783
PARTICLE MASS RATE (lb/hr)	152.087	169.361	151.958

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 1
SOURCE/SITE: SOUTH DRYER STACK

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	21-Jan-92	21-Jan-92	21-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	4.12	4.08	4.11
OXYGEN	16.00	15.50	15.25
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	80.42	80.64
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.79	2.73	2.79
OXYGEN	10.82	10.37	10.35
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	54.01	53.81	54.71
WATER VAPOR	32.39	33.09	32.16
DRY MOLECULAR WEIGHT	29.30	29.27	29.27
WET MOLECULAR WEIGHT	25.64	25.54	25.64

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 2
SOURCE/SITE: SOUTH DRYER STACK

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	22-Jan-92	22-Jan-92	22-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	5.50	6.00	5.20
OXYGEN	14.75	14.25	15.10
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.75	79.75	79.70
WET BASIS (ORSAT), %			
CARBON DIOXIDE	3.15	3.45	2.91
OXYGEN	8.46	8.20	8.44
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	45.73	45.91	44.55
WATER VAPOR	42.65	42.44	44.10
DRY MOLECULAR WEIGHT	29.47	29.53	29.44
WET MOLECULAR WEIGHT	24.58	24.64	24.39

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 3
SOURCE/SITE: SOUTH DRYER STACK

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	23-Jan-92	23-Jan-92	23-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	5.02	5.79	4.85
OXYGEN	15.10	14.58	15.50
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	79.63	79.65
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.71	3.08	2.73
OXYGEN	8.15	7.76	8.72
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	43.12	42.41	44.83
WATER VAPOR	46.02	46.75	43.71
DRY MOLECULAR WEIGHT	29.41	29.51	29.40
WET MOLECULAR WEIGHT	24.16	24.13	24.41

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 4
SOURCE/SITE: SOUTH DRYER STACK

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	24-Jan-92	24-Jan-92	24-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	6.12	6.58	6.58
OXYGEN	14.00	13.65	13.88
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	79.77	79.54
WET BASIS (ORSAT), %			
CARBON DIOXIDE	3.47	3.64	3.60
OXYGEN	7.93	7.55	7.59
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	45.24	44.10	43.48
WATER VAPOR	43.37	44.71	45.34
DRY MOLECULAR WEIGHT	29.54	29.60	29.61
WET MOLECULAR WEIGHT	24.54	24.41	24.35

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 1
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	21-Jan-92	21-Jan-92	21-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	4.12	4.08	4.11
OXYGEN	16.00	15.50	15.25
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	80.42	80.64
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.84	2.79	2.83
OXYGEN	11.03	10.58	10.50
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	55.05	54.90	55.50
WATER VAPOR	31.09	31.74	31.18
DRY MOLECULAR WEIGHT	29.30	29.27	29.27
WET MOLECULAR WEIGHT	25.79	25.69	25.75

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 2
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	22-Jan-92	22-Jan-92	22-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	5.50	6.00	5.20
OXYGEN	14.75	14.25	15.10
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.75	79.75	79.70
WET BASIS (ORSAT), %			
CARBON DIOXIDE	3.34	3.48	3.08
OXYGEN	8.94	8.26	8.95
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	48.36	46.21	47.25
WATER VAPOR	39.36	42.06	40.72
DRY MOLECULAR WEIGHT	29.47	29.53	29.44
WET MOLECULAR WEIGHT	24.96	24.68	24.78

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 3
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

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

	RUN 1	RUN 2	RUN 3
DATE OF TEST	23-Jan-92	23-Jan-92	23-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	5.02	5.79	4.85
OXYGEN	15.10	14.58	15.50
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	79.63	79.65
WET BASIS (ORSAT), %			
CARBON DIOXIDE	2.87	3.19	2.76
OXYGEN	8.62	8.04	8.82
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	45.62	43.90	45.30
WATER VAPOR	42.89	44.88	43.13
DRY MOLECULAR WEIGHT	29.41	29.51	29.40
WET MOLECULAR WEIGHT	24.51	24.34	24.48

AMERICAN CRYSTAL SUGAR
MOORHEAD, MINNESOTA

TEST NO. 4
SOURCE/SITE: SOUTH DRYER MULTI-CLONE INLET

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

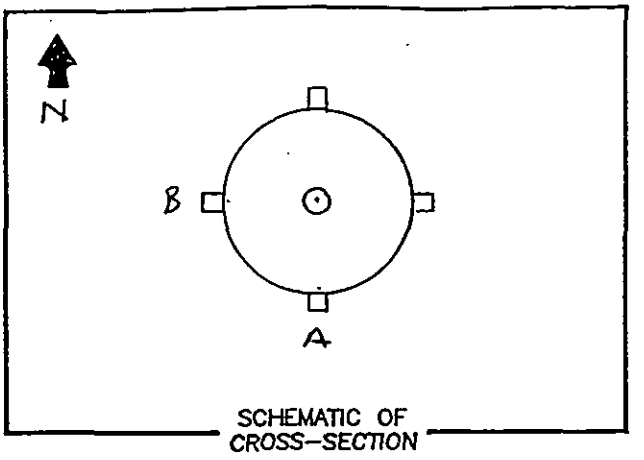
	RUN 1	RUN 2	RUN 3
DATE OF TEST	24-Jan-92	24-Jan-92	24-Jan-92
DRY BASIS (ORSAT), %			
CARBON DIOXIDE	6.12	6.58	6.12
OXYGEN	14.00	13.65	13.88
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	79.88	79.77	80.00
WET BASIS (ORSAT), %			
CARBON DIOXIDE	3.53	3.72	3.46
OXYGEN	8.07	7.72	7.85
CARBON MONOXIDE	0.00	0.00	0.00
NITROGEN	46.05	45.10	45.22
WATER VAPOR	42.35	43.46	43.47
DRY MOLECULAR WEIGHT	29.54	29.60	29.53
WET MOLECULAR WEIGHT	24.65	24.56	24.52

Appendix 1

Preliminary Flowrate Determination

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS / MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH PULP DRYER STACK
TEST 1 RUN 0 DATE 1-21-92
STACK DIA. 59.5 IN.
DRY BULB 242 °F WET BULB 158 °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE -.84 IN WC
OPERATORS S. BAINBRIDGE & D. LITTFIN
PITOT NO. P1-6 Cp .840



SCHEMATIC OF CROSS-SECTION

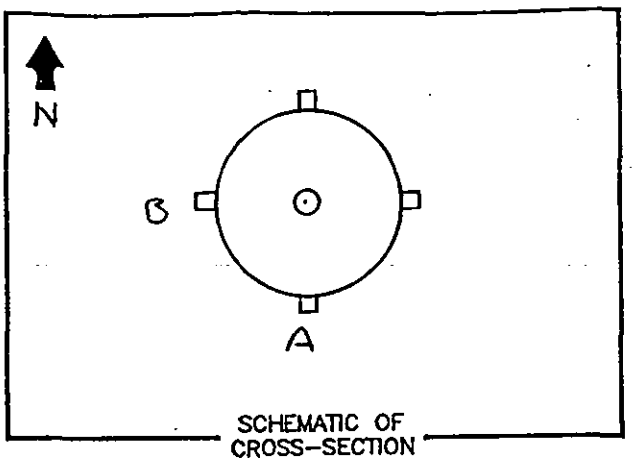
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (°F)
		PORT LENGTH: 7.0 IN.		TIME START: 1115 HRS.	
A 1	.044	2.62	9.62	.60	244
2	.146	8.69	15.69	.83	244
3	.296	17.61	24.61	.85	244
4	.704	41.89	48.89	.80	244
5	.854	50.81	57.81	.78	244
6	.956	56.88	63.88	.68	244
B 1				.61	244
2				.73	244
3				.83	244
4				.80	244
5				.80	244
6				.73	244
	ACFM =	69,052			
	DSCFM =	37,371			
	FT/SEC =	59.60			
	MC =	25 %			
	O_2 =	15 %			
	TS =	244 °F			

TEMP. MEAS. TOOL & S/N: MERCURY THERMOMETER
TIME END: 1122 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS / MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH PULP DRYER STACK
TEST 1 RUN 0 DATE 1-21-92
STACK DIA. 59.5 IN.
DRY BULB 242 °F WET BULB 158 °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE -.65 IN WC
OPERATORS S. BAINBRIDGE ; D. LITTFIN
PITOT NO. P1-6 Cp .840



SCHEMATIC OF CROSS-SECTION

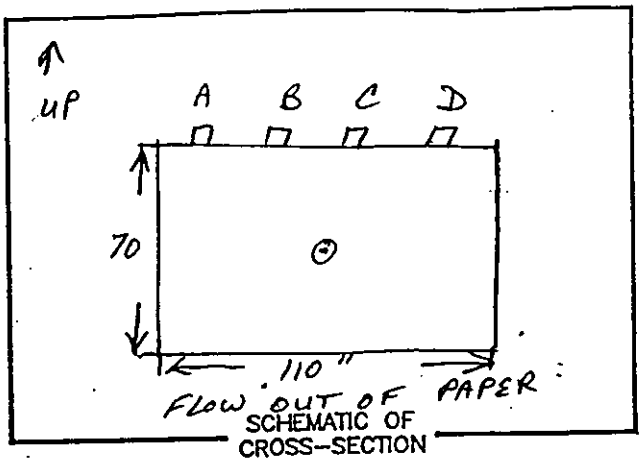
TRAVERSE POINT NO.	FRACTION OF DIAMETER	DISTANCE FROM STACK WALL (IN.)	DISTANCE FROM END OF PORT (IN.)	VELOCITY PRESSURE (IN WC)	TEMPERATURE OF GAS (° F)
		PORT LENGTH: 7.0 IN.		TIME START: 0800 HRS.	
A 1	.044	2.62	9.62	.53	242
2	.146	8.69	15.69	.78	242
3	.296	17.61	24.61	.81	242
4	.704	41.89	48.89	.77	242
5	.854	50.81	57.81	.74	242
6	.956	56.88	63.88	.68	242
B 1				.54	242
2				.75	242
3				.77	242
4				.78	242
5				.78	242
6				.73	242
	ACFM =	67,432			
	DSCFM =	36,617			
	FT/SEC =	58.20			
	MC =	25%			
	TS =	242°F			
	O_2 =	15%			

TEMP. MEAS. TOOL & S/N: MERCURY THERMOMETER
TIME END: 0822 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER MULTI-CLONE INLET
TEST 1 RUN 1 DATE 1-21-92
STACK DIA. 110 X 70 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE +2.80 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1+81 Cp .840

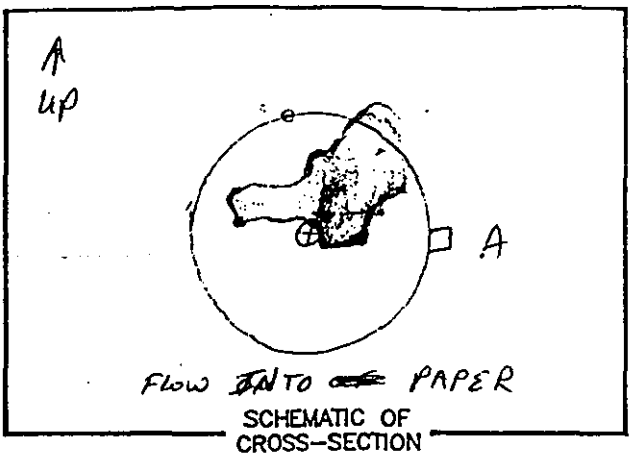


SCHEMATIC OF CROSS-SECTION

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: 4 IN.		TIME START: 1215 HRS.	
A - 1		5.83	9.83	0.45	242
2		17.50	21.50	0.23	
3		29.17	33.17	0.17	
4		40.84	44.84	0.15	
5		52.51	56.51	0.08	
6		64.18	68.18	0.05	
B - 1				0.50	
2				0.36	
3				0.28	
4				0.15	
5				0.10	
6				0.05	
C - 1	FT/SEC. =	25.08		0.32	
2	ACFM =	80,469		0.18	
3	DSCFM =	44,082		0.08	
4	M.C. =	25%		0.06	
5	O_2 =	15%		0.03	
6	Ts =	242 °F		0.02	
D - 1				0.25	
2				0.12	
3				0.08	
4				0.08	
5				0.04	
6				0.02	
TEMP. MEAS. TOOL & S/N:				TIME END: 1230 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. / MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION DUCT
TEST 1 RUN 1 DATE 1-21-92
STACK DIA. 24.5 IN.
DRY BULB 242 °F WET BULB 158 °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE -0.50 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-4 Cp .840

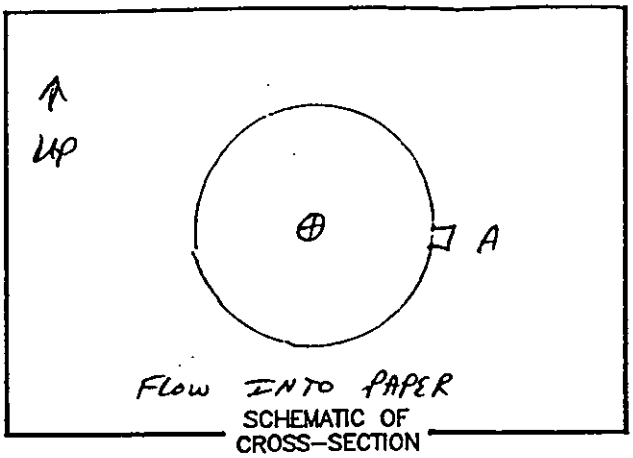


SCHEMATIC OF CROSS-SECTION

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: 4 IN.		TIME START: 1100 HRS.	
A - 1		0.51 → 1.00	5.00	0.08	242
2		1.64	5.64	0.25	242
3		2.89	6.89	0.26	243
4		4.34	8.34	0.31	243
5		6.13	10.13	0.31	242
6		8.72	12.72	0.38	242
7		15.78	19.78	0.89	241
8		18.38	22.38	1.15	241
9		20.16	24.16	1.30	241
10		21.61	25.61	1.80	242
11		22.86	26.86	2.00	242
12		23.99 → 23.50	27.50	1.80	243
	FT/SEC =	58.79			
	ACFM =	11,547			
	DSCFM =	6,273			
	MC % =	25%			
	°FTs =	242			
	O_2 % =	15%			
TEMP. MEAS. TOOL & S/N:				TIME END: 1115 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION DUCT
TEST 1 RUN 1 DATE 1-21-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE -0.47 IN WC
OPERATORS D.SMITH / A. NELSON
PITOT NO. PI-4 Cp .840



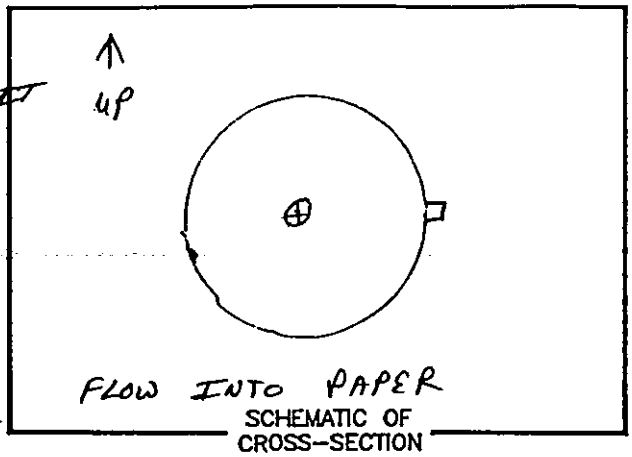
SCHEMATIC OF CROSS-SECTION

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:	4 IN.	TIME START: 1150 HRS.	
A - 1				0.15	242
2				0.13	
3				0.18	
4				0.18	
5				0.20	
6				0.27	
7				0.70	
8				1.05	
9				1.25	
10				1.50	
11				1.70	
12				1.80	
	FT/SEC. =	53.84			
	ACFM =	10,577			
	DSCFM =	5,746			
	M.C. % =	25 %			
	T.S. °F =	242 °F			
	O2 % =	15 %			
TEMP. MEAS. TOOL & S/N:				TIME END: 1205 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER
SOURCE SOUTH DRYER ASPIRATION DUCT
TEST 1 POST RUN 3 DATE 1-21-92
STACK DIA. 24.5 IN.
DRY BULB °F WET BULB °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.85 IN Hg
STATIC PRESSURE -0.55 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-4 Cp .840

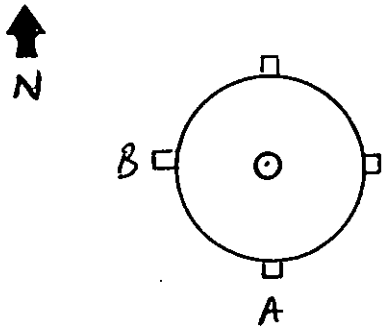


SCHEMATIC OF CROSS-SECTION

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: 4 IN.		TIME START: 2010 HRS.	
A - 1				0.10	244
2				0.13	
3				0.18	
4				0.18	
5				0.21	
6				0.20	
7				0.53	
8				0.78	
9				1.10	
10				1.25	
11				1.30	
12				1.40	
	FT/SEC. =	49.53			
	ACFM =	9,729			
	DSCFM =	4,848			
	M.C. =	31%			
	O2 =	15%			
	T.S. =	244 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 2025 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS / MOOLHAD
PROJECT NUMBER 920014
SOURCE SOUTH BOILER DRYER STACK
TEST 2 RUN 0 DATE 1-22-92
STACK DIA. 59.5" IN.
DRY BULB 220 °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.70 IN Hg
STATIC PRESSURE -.43 IN WC
OPERATORS S. BAINUCCI / D. LITTLE
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: 7.0 IN.		TIME START: 0819 HRS.	
A 1	.044	2.62	9.62	.47	220
2	.146	8.69	15.69	.68	220
3	.296	17.61	24.61	.70	220
4	.704	41.89	48.89	.68	220
5	.854	50.81	57.81	.65	220
6	.956	56.88	63.88	.60	220
B 1				.50	220
2				.65	220
3				.68	220
4				.67	220
5				.66	220
6				.60	220
	ACFM =	62,880			
	DSCFM =	32,748			
	MC =	30			
	TS =	220			
	O_2 =	16			
	FT/SEC =	54.28			
TEMP. MEAS. TOOL & S/N: MERCURY THERMOMETER				TIME END: 0825 HRS.	

EPA METHOD 2 FIELD DATA

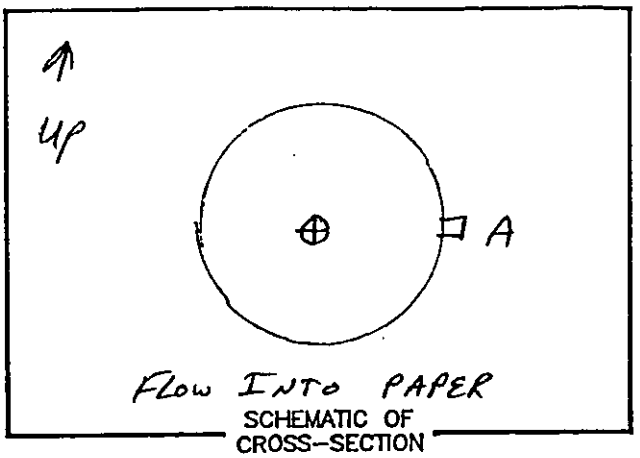
PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER MULTI-CLONE INLET
TEST 2 RUN 1 DATE 1-22-92
STACK DIA. 70 x 110 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE ____ IN Hg
STATIC PRESSURE +2.80 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1-8 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: 4 IN.		TIME START: 0815 HRS.	
A - 1				0.48	
2				0.29	
3				0.14	
4				0.10	
5				0.06	
6				0.05	
B - 1				0.51	
2				0.42	
3				0.28	
4				0.15	
5				0.07	
6				0.04	
C - 1				0.38	
2				0.20	
3				0.15	
4				0.07	
5				0.05	
6				0.02	
D - 1				0.32	
2				0.16	
3				0.11	
4				0.10	
5				0.10	
6				0.08	
TEMP. MEAS. TOOL & S/N:				TIME END: 0835 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 2 RUN 1 DATE 1-22-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE ____ IN Hg
STATIC PRESSURE -0.52 IN WC
OPERATORS D. SMITH / A. NELSON
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:	4 IN.	TIME START: 0800	HRS.
A - 1				0.05	240
2				0.11	
3				0.12	
4				0.14	
5				0.12	
6				0.16	
7				0.40	
8				0.60	
9				0.78	
10				0.98	
11				0.98	
12				1.00	
	FT./SEC. =	42.29			
	ACFM =	8308			
	DSCFM =	4,202			
	M.C. =	30 %			
	O_2 =	16 %			
	T_s =	240 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 0815	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 2 RUN 3 DATE 1-22-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.70 IN Hg
STATIC PRESSURE -.50 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1-4 Cp .840

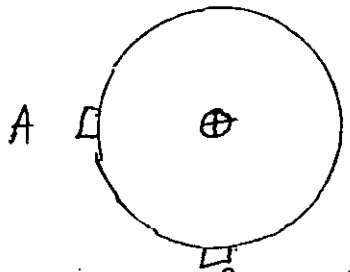
SCHEMATIC OF CROSS-SECTION

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: 4.0 IN.		TIME START: 1710 HRS.	
A - 1				0.10	243
2				0.14	
3				0.15	
4				0.16	
5				0.18	
6				0.19	
7				0.44	
8				0.75	
9				0.89	
10				1.10	
11				1.20	
12				1.20	
	FT/SEC =	47.69			
	ACFM =	9367			
	DSCFM =	4044			
	M.C. =	40 %			
	O2 =	16 %			
	T.S. =	243 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 1725 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. / MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 2 RUN 1 DATE 1-22-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.70 IN Hg
STATIC PRESSURE -0.58 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 3.5 IN.		TIME START: 0905 HRS.	
A - 1		1.00	4.50	0.19	236
2		2.68	6.18	0.27	
3		4.95	8.45	0.29	
4		8.24	11.74	0.28	
5		17.26	20.76	0.27	
6		20.55	24.05	0.28	
7		22.82	26.32	0.29	
8		24.50	28.00	0.29	
B - 1				0.30	
2				0.32	
3				0.34	
4				0.31	
5				0.22	
6				0.20	
7				0.20	
8				0.20	
	FT./SEC. =	35.63			
	ACFM =	7581			
	DSCFM =	3856			
	M.C. =	30 %			
	O_2 =	16 %			
	Ts =	236 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 0920 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 2 RUN 3 DATE 1-22-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.70 IN Hg
STATIC PRESSURE -0.49 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1-4 Cp .840

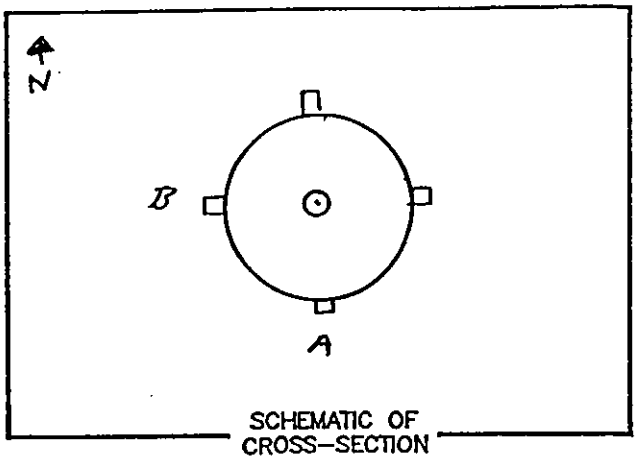
SCHEMATIC OF CROSS-SECTION

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: 3.5 IN.		TIME START: 1720 HRS.	
A - 1				0.21	243
2				0.25	
3				0.26	
4				0.26	
5				0.20	
6				0.19	
7				0.22	
8				0.24	
B - 1				0.27	
2				0.31	
3				0.32	
4				0.29	
5				0.20	
6				0.16	
7				0.17	
8				0.16	
	FT./SEC. =	34.15			
	ACFM =	7267			
	DSCFM =	3,137			
	M.C. =	40 %			
	O_2 =	16 %			
	Ts =	243 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 1745 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS / MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH PULP DRYER STACK
TEST 3 RUN 0 DATE 1-23-92
STACK DIA. 59.5 IN.
DRY BULB 230 °F WET BULB _____ °F
MANOMETER: ☐ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.68 IN Hg
STATIC PRESSURE -.45 IN WC
OPERATORS S. BAINBRIDGE + D. LEFFIN
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: 7.00 IN.		TIME START: 0853 HRS.	
A 1	.044			.32	230
2	.146			.49	232
3	.296			.53	230
4	.704			.55	231
5	.854			.53	231
6	.956			.47	231
B 1				.42	231
2				.53	231
3				.55	231
4				.57	229
5				.53	230
6				.45	230
	ACFM =	57,466			
	DSCFM =	25,262			
	FT/SEC =	49.60			
	TS =	230			
	MC =	40			
	O_2 =	15			
TEMP. MEAS. TOOL & S/N: MERCURY THERMOMETER				TIME END: 0905 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER M.C. INLET
TEST 3 RUN 1 DATE 1-23-92
STACK DIA. 70 X 110 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.68 IN Hg
STATIC PRESSURE +2.60 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1-8 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: 4 IN.		TIME START: 0830 HRS.	
A - 1				0.35	242
2				0.25	
3				0.11	
4				0.08	
5				0.06	
6				0.03	
B - 1				0.47	
2				0.38	
3				0.28	
4				0.17	
5				0.08	
6				0.03	
C - 1				0.35	
2				0.18	
3				0.11	
4				0.08	
5				0.05	
6				0.03	
D - 1				0.25	
2				0.13	
3				0.08	
4				0.07	
5				0.03	
6				0.02	
TEMP. MEAS. TOOL & S/N:				TIME END: 0845 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 3 RUN 1 DATE 1-23-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.68 IN Hg
STATIC PRESSURE -0.41 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 4 IN.		TIME START: 0815 HRS.	
A-1				0.07	242
2				0.08	
3				0.10	
4				0.12	
5				0.12	
6				0.13	
7				0.38	
8				0.55	
9				0.73	
10				0.85	
11				0.93	
12				0.93	
	FT/SEC =	41.47			
	ACFM =	8,146			
	DSCFM =	3,520			
	MC =	40 %			
	O_2 =	16 %			
	Ts =	242 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 0830 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 3 RUN 3 DATE 1-23-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.88 IN Hg
STATIC PRESSURE -0.46 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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:	4 IN.	TIME START:	1645 HRS.
A - 1				0.07	243
2				0.08	
3				0.10	
4				0.11	
5				0.12	
6				0.15	
7				0.40	
8				0.66	
9				0.81	
10				0.95	
11				1.08	
12				1.10	
	FT./SEC. =	43.93			
	ACFM =	8629			
	DSCFM =	3537			
	M.C. =	43 %			
	O2 =	16 %			
	TS =	243 °F			
TEMP. MEAS. TOOL & S/N:				TIME END:	1700 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 3 RUN 1 DATE 1-23-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.68 IN Hg
STATIC PRESSURE -2.00 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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:	3.5 IN.	TIME START: 0800	HRS.
A - 1				0.65	242
2				0.76	
3				0.77	
4				0.70	
5				0.82	
6				0.83	
7				0.85	
8				0.90	
B - 1				0.91	
2				1.10	
3				1.10	
4				1.02	
5				0.74	
6				0.77	
7				0.77	
8				0.78	
	FT/SEC. =	65.37			
	ACFM =	13,910			
	DSCFM =	5,986			
	M.C. =	40 %			
	O2 =	16 %			
	TS =	242 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 0815	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MacRHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 3 RUN 3 DATE 1-23-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.68 IN Hg
STATIC PRESSURE -1.90 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 3.5 IN.		TIME START: 1700 HRS.	
A - 1			0.77	~~1.65~~	243
2			0.83	~~1.70~~	
3			0.80	~~1.75~~	
4			0.80	~~1.80~~	
5			0.87	~~1.85~~	
6			0.95	~~1.80~~	
7			1.00	~~1.75~~	
8			1.03	~~1.85~~	
B - 1				0.90	
2				1.15	
3				1.15	
4				1.10	
5				0.82	
6				0.82	
7				0.87	
8				0.90	
	FT./SEC. =	68.99			
	ACFM =	14,680			
	DSCFM =	5,995			
	M.C. =	43%			
	O2 =	16%			
	T.S. =	243 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 1715 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS/MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER STACK
TEST 4 RUN 0 DATE 1-29-92
STACK DIA. 59.5 IN.
DRY BULB 226 °F WET BULB _____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.82 IN Hg
STATIC PRESSURE -.55 IN WC
OPERATORS S. BAINBRIDGE + D. LITTFIN
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: 7.0 IN.		TIME START: 0725 HRS.	
A 1				.54	226
2				.63	226
3				.66	226
4				.64	226
5				.60	226
6				.54	226
B 1				.43	226
2				.58	226
3				.65	226
4				.66	226
5				.64	226
6				.58	226
	ACFM =	62,645			
	DSCFM =	27,849			
	FT/SEC =	54.11			
	TS =	226			
	O2 =	15%			
	MC =	40%			
TEMP. MEAS. TOOL & S/N: MERCURY THERMOMETER				TIME END:	HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MacRHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER M.C. INLET
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 70 X 110 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE +2.75 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. P1-8 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:	4 IN.	TIME START: 0730 HRS.	
A - 1				0.40	265
2				0.30	
3				0.15	
4				0.12	
5				0.09	
6				0.06	
B - 1				0.47	
2				0.40	
3				0.30	
4				0.16	
5				0.11	
6				0.05	
C - 1				0.48	
2				0.24	
3				0.15	
4				0.10	
5				0.07	
6				0.04	
D - 1				0.26	
2				0.20	
3				0.11	
4				0.10	
5				0.09	
6				0.07	
TEMP. MEAS. TOOL & S/N:				TIME END: 0745 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -0.52 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 4 IN.		TIME START: 0715 HRS.	
A-1				0.14	265
2				0.15	
3				0.19	
4				0.20	
5				0.22	
6				0.25	
7				0.60	
8				0.90	
9				1.10	
10				1.40	
11				1.50	
12				1.60	
	FT./SEC. =	53.94			
	ACFM =	10,596			
	DSCFM =	4827			
	M.C. =	35 %			
	O_2 =	16 %			
	Ts =	265			
TEMP. MEAS. TOOL & S/N:				TIME END: 0730 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER ASPIRATION
TEST 4 RUN 3 DATE 1-24-92
STACK DIA. 24.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -0.55 IN WC
OPERATORS D. SMITH / A. NELSON
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: 4.5 IN.		TIME START: 1700 HRS.	
A - 1				0.18	245
2				0.12	
3				0.13	
4				0.15	
5				0.17	
6				0.20	
7				0.51	
8				0.69	
9				0.96	
10				1.10	
11				1.20	
12				1.25	
	FT/SEC. =	48.19			
	ACFM =	9,466			
	DSCFM =	3,888			
	M.C. =	43 %			
	O2 =	16 %			
	TS =	245 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 1715 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -0.72 IN WC
OPERATORS D. SMITH / A. NELSON
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: 3.5 IN.		TIME START: 0700 HRS.	
A - 1				0.26	265
2				0.31	
3				0.31	
4				0.32	
5				0.25	
6				0.27	
7				0.30	
8				0.32	
B - 1				0.33	
2				0.39	
3				0.40	
4				0.38	
5				0.25	
6				0.24	
7				0.25	
8				0.25	
		FT / SEC. = 39.13			
		ACFM = 8,327			
		DSCFM = 3,791			
		M.C. = 35 %			
		O2 = 16 %			
		T.S. = 265			
TEMP. MEAS. TOOL & S/N:				TIME END: 0715 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -0.89 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 3.5 IN.		TIME START: 0915 HRS.	
A - 1				0.33	240
2				0.37	
3				0.38	
4				0.38	
5				0.33	
6				0.34	
7				0.37	
8				0.42	
B - 1				0.35	
2				0.47	
3				0.50	
4				0.47	
5				0.32	
6				0.28	
7				0.29	
8				0.28	
	FT/SEC. =	42.42			
	ACFM =	9027			
	DSCFM =	4255			
	MC. =	35%			
	O2 =	16%			
	TS =	240 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 0930 HRS.	

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME ACS MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 25.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -1.10 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 3.5 IN.		TIME START: 0945 HRS.	
A - 1				0.39	240
2				0.45	
3				0.44	
4				0.46	
5				0.42	
6				0.43	
7				0.47	
8				0.48	
B - 1				0.50	
2				0.57	
3				0.59	
4				0.55	
5				0.39	
6				0.39	
7				0.42	
8				0.43	
	FT./SEC. =	47.62			
	ACFM =	10,134			
	DSCFM =	4774			
	MC =	35%			
	O_2 =	16 %			

TEMP. MEAS. TOOL & S/N: TIME END: 0955 HRS.

AIR-2

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 4 RUN 1 DATE 1-24-92
STACK DIA. 25.5 IN.
DRY BULB _____ °F WET BULB _____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -1.17 IN WC
OPERATORS D. SMITH /
PITOT NO. PI-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: 3.5 IN.		TIME START: 0955 HRS.	
A - 1				0.43	240
2				0.46	
3				0.50	
4				0.46	
5				0.43	
6				0.48	
7				0.51	
8				0.53	
B - 1				0.56	
2				0.62	
3				0.65	
4				0.63	
5				0.43	
6				0.42	
7				0.42	
8				0.35	
	FT/SEC. =	49.71			
	ACFM =	10,577			
	DSCFM =	4599			
	MC =	40%			
	O2 =	16%			
TEMP. MEAS. TOOL & S/N:				TIME END: 1010 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD
PROJECT NUMBER 920014
SOURCE SOUTH DRYER RECYCLE
TEST 4 RUN 3 DATE 1-24-92
STACK DIA. 25.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: [X] REG. [ ] EXP. [ ] ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -1.20 IN WC
OPERATORS D. SMITH / A. NELSON
PITOT NO. PI-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: 3.5 IN.		TIME START: 1715 HRS.	
A - 1				0.43	242
2				0.47	
3				0.48	
4				0.49	
5				0.47	
6				0.48	
7				0.50	
8				0.55	
B - 1				0.54	
2				0.61	
3				0.65	
4				0.62	
5				0.45	
6				0.41	
7				0.43	
8				0.43	
	FT/SEC =	50.59			
	ACFM =	10,766			
	DSCFM =	4,434			
	MC =	43 %			
	O2 =	16 %			
	TS. =	242 °F			
TEMP. MEAS. TOOL & S/N:				TIME END: 1730 HRS.	

EPA METHOD 2 FIELD DATA

PROJECT NAME A.C.S. MacRHEAD
PROJECT NUMBER 920014
SOURCE NORTH DRYER STACK
TEST #5 RUN 1 DATE 1-24-92
STACK DIA. 59.5 IN.
DRY BULB ____ °F WET BULB ____ °F
MANOMETER: ☒ REG. ☐ EXP. ☐ ELEC.
BAROMETRIC PRESSURE 28.83 IN Hg
STATIC PRESSURE -.5 IN WC
OPERATORS S. BAINVILLE / D. LITKE
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: 4 IN.		TIME START: 1719 HRS.	
A - 1				2.10	200
2				2.25	
3				2.10	
4				2.10	
5				1.40	
6				2.10	
B - 1				1.80	
2				2.00	
3				2.00	
4				1.40	
5				1.40	
6				1.80	
	ACFM =	111,500			
	DSCFM =	51,506			
	FT/SEC =	96.24			
	M.C. =	40 %			
	O2 =	16 %			
	Ts =	200 °F			
TEMP. MEAS. TOOL & S/N:				TIME END:	HRS.

Appendix 2

Field Data Sheets

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOORHEAD METHOD 1-5

PROJECT NUMBER 920019 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-21-92 TEST 1 RUN 1 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1120

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: S.B. + D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	896	700	696
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1424	1275	149
	1459	1308	151
TOTAL			996

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: 00 cc/MIN AT 15 IN. Hg

TIME START: 1315 (HRS) TIME END: 1519 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: S.B.

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.85 IN Hg H20 25 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS / MOOR HEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S.B. / D.L.

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 1 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1315)	(774.17)											
B 6	4	778.30	.72	3.28	8.53	8	240	245	251	40	109	78	15.7
6	8	782.70	.72	3.42	2.68	10	240	246	250	40	117	80	15.7
5	12	787.28	.78	3.77	7.26	12	233	246	251	41	123	83	15.7
5	16	791.85	.78	3.80	1.89	14	233	246	251	41	125	84	15.7
4	20	796.50	.80	3.91	6.57	17	233	247	252	42	129	87	15.2
4	24	801.20	.80	3.93	1.29	17	233	247	252	43	130	90	15.2
3	28	806.00	.81	3.99	6.05	18	234	247	253	43	132	91	15.2
3	32	810.75	.81	4.00	0.82	19	234	247	253	43	132	92	15.2
2	36	815.44	.75	3.72	5.43	20	232	247	254	44	133	94	14.5
2	40	820.00	.75	3.74	0.06	20	230	247	253	44	135	96	14.5
1	44	823.92	.53	2.66	3.97	15	230	246	250	42	136	97	15.0
1	48	827.90	.55	2.76	7.96	15	230	246	251	42	135	98	15.0
A 6	52	832.37	.67	3.36	2.36	16	230	248	250	43	124	97	15.0
6	56	836.70	.68	3.38	3.74	17	230	249	252	42	133	98	15.2
5	60	841.32	.73	3.66	1.33	18	230	250	253	42	137	99	15.2
5	64	845.90	.74	3.72	5.96	20	230	251	253	42	140	100	15.2
4	68	850.61	.77	3.88	0.69	20	236	251	253	42	139	99	16.2
4	72	855.32	.76	3.79	5.37	20	236	252	253	41	139	101	16.0
3	76	860.23	.83	4.14	0.27	21	237	252	253	41	134	101	16.0
3	80	865.10	.83	4.19	5.16	22	237	251	252	41	138	101	15.0
2	84	870.00	.83	4.06	0.00	22	237	251	253	40	137	101	15.0
2	88	874.80	.81	4.06	4.83	22	233	252	253	40	132	100	15.5
1	92	879.10	.63	3.16	9.11	18	237	252	255	40	137	100	15.5
1	96	883.37	.63	3.16	3.38	18	234	252	255	40	137	100	15.5
	(1519)												
	θ = 96	Vm = 109.20		ΔH = 3.65							AVG. =	113	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOORHEAD METHOD 1-5

PROJECT NUMBER 9200 14 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-21-92 TEST 1 RUN 2 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT ____ IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1170

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: S.B. & D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	876	200	676
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1493	1331	162
	1460	1320	140
TOTAL			978

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 Lt

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

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

SAMPLING RATE: 100 cc/MIN OPERATOR: S.B.

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.85 IN Hg H20 30 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS / MOOSEHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S.B. + D.L.

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 2 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1600)	(883.87)											
A 6	4	888.10	.68	3.01	8.02	8	233	251	262	40	108	89	15.5
6	8	892.00	.67	2.89	2.04	7	234	252	262	40	123	90	15.5
5	12	896.36	.76	3.25	6.32	9	249	252	262	40	129	90	15.5
5	16	900.66	.75	3.29	0.65	10	235	253	262	40	136	94	15.5
4	20	905.08	.78	3.45	5.09	11	236	252	264	40	139	96	15.0
4	24	909.50	.77	3.42	9.53	11	236	252	262	40	140	97	15.0
3	28	914.15	.85	3.78	4.20	14	235	252	261	41	142	99	15.0
3	32	918.82	.84	3.75	8.86	15	235	252	261	41	142	100	15.5
2	36	923.41	.81	3.62	3.44	12	235	252	261	41	143	98	15.5
2	40	928.10	.80	3.60	8.00	12	230	252	261	41	143	101	15.5
1	44	932.06	.61	2.76	2.01	10	230	252	261	41	143	101	15.0
1	48	936.01	.63	2.85	6.08	11	230	252	261	41	143	100	15.0
B 6	52	940.32	.68	3.07	0.30	12	230	252	261	41	128	100	15.0
6	56	944.56	.70	3.12	4.53	13	230	252	260	42	136	100	15.0
5	60	949.00	.80	3.58	9.07	15	230	252	260	42	141	101	15.0
5	64	953.58	.80	3.60	3.64	17	231	252	260	42	142	101	15.5
4	68	958.20	.82	3.69	8.26	18	231	252	260	42	143	102	15.5
4	72	962.80	.82	3.69	2.89	19	231	252	260	41	143	102	16.0
3	76	967.27	.76	3.42	7.35	20	232	252	261	40	144	102	16.0
3	80	971.73	.78	3.51	1.87	20	232	252	260	40	143	103	16.0
2	84	976.38	.78	3.52	6.40	20	231	252	260	41	143	103	16.0
2	88	980.81	.76	3.43	0.86	20	231	251	261	42	142	103	15.7
1	92	984.86	.60	2.71	4.84	12	230	251	261	42	141	103	15.7
1	96	988.40	.60	2.71	4.41	13	230	251	261	43	141	103	15.7
	(1746)												
	θ= 96	Vm= 104.43		ΔH=3.32							AVG.= 119		

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/BOOR HEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-21-92 TEST 1 RUN 3 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1172

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: S.B. + D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	940	200	740
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1434	1345	89
	1408	1323	85
TOTAL			914

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 4'4Cr

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1825 (HRS) TIME END: 2013 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. PI-6 Cp .840

BAR. PRESS. 28.85 IN Hg H2O 33 %

NOZZLE NO. N1-4 NOZZLE DIA. .321 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS | MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S.B. + D.L.

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 3 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1815)	(989.34)											
B 6	4	993.20	.68	2.78	3.26	6	230	261	260	38	116	88	15.0
6	8	997.23	.67	2.78	7.21	6	230	261	260	38	118	88	15.0
5	12	1001.51	.79	3.29	1.52	8	228	260	260	38	141	90	15.0
5	16	1005.81	.78	3.31	5.84	8	231	260	260	38	134	92	15.5
4	20	1010.23	.79	3.34	0.25	9	230	260	260	37	136	94	15.5
4	24	1014.69	.80	3.39	4.66	11	231	260	260	37	138	95	15.5
3	28	1019.21	.83	3.54	9.17	11	229	260	260	37	141	97	15.5
3	32	1023.86	.88	3.76	3.83	12	229	260	260	37	141	98	15.5
2	36	1028.15	.75	3.21	8.14	12	229	259	260	36	142	100	16.0
2	40	1032.48	.76	3.26	2.49	12	230	259	260	36	142	100	16.0
1	44	1036.26	.55	2.36	6.20	12	230	259	260	36	141	100	16.0
1	48	1039.87	.54	2.32	9.87	10	230	259	260	36	141	101	16.0
A 6	52	1043.93	.67	2.88	3.95	12	230	259	260	36	127	100	15.5
6	56	1047.86	.64	2.71	7.90	12	230	259	260	36	135	100	15.5
5	60	1052.13	.73	3.14	2.15	14	225	258	260	36	138	101	15.5
5	64	1056.50	.76	3.28	6.50	14	225	258	260	36	141	101	15.5
4	68	1061.00	.92	3.54	1.03	17	225	258	259	36	141	101	16.0
4	72	1065.46	.80	3.46	5.51	18	225	258	259	36	141	102	16.0
3	76	1070.01	.84	3.61	0.08	20	229	258	259	36	141	102	16.0
3	80	1074.60	.85	3.65	4.68	20	229	257	259	36	140	102	15.5
2	84	1079.20	.83	3.56	9.23	21	229	257	259	37	140	101	15.5
2	88	1083.78	.92	3.52	3.74	21	229	257	259	37	139	101	15.5
1	92	1087.63	.60	2.58	7.61	20	229	257	259	38	138	101	15.5
1	96	1091.50	.61	2.62	1.51	18	229	256	259	38	138	101	15.5
	(2013)												
	θ = 96	Vm = 102.16		ΔH = 3.16							AVG. =	118	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-22-92 TEST 2 RUN 1 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: 0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1165

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SB + DC

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1184	200	984
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1655	1341	314
TOTAL			1325

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 cf

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1020 (HRS) TIME END: 1212 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.70 IN Hg H20 30 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS / MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BAINWELL + D. CLIFFORD

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 1 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1020)	(1092.13)											
B 6	4	1095.68	.58	2.45	5.78	5	225	247	255	42	84	85	16.0
6	8	1099.41	.58	2.97	9.46	6	226	248	255	42	124	88	16.0
5	12	1103.40	.64	2.83	3.47	8	227	248	255	42	133	91	16.0
5	16	1107.42	.64	2.85	7.51	8	229	248	255	42	138	92	16.0
4	20	1111.62	.68	3.04	1.70	11	230	248	255	42	144	95	16.0
4	24	1115.86	.68	3.06	5.92	11	231	245	254	47	145	98	15.5
3	28	1120.10	.67	3.02	0.12	12	231	245	254	47	142	98	15.5
3	32	1124.30	.67	3.03	4.32	12	231	245	254	47	146	100	15.5
2	36	1128.30	.61	2.76	8.35	13	231	245	254	47	147	102	15.5
2	40	1132.40	.63	2.87	2.45	12	227	245	254	46	148	103	15.0
1	44	1136.00	.47	2.15	6.01	10	227	245	255	47	148	104	15.0
1	48	1139.46	.44	2.02	9.46	10	227	245	255	47	148	105	15.0
A 6	52	1143.30	.56	2.55	3.34	13	230	245	255	47	145	106	14.7
6	56	1147.30	.57	2.61	7.26	14	227	245	254	47	143	106	15.0
5	60	1151.20	.59	2.69	1.24	15	227	245	254	47	145	106	15.0
5	64	1155.30	.64	2.93	5.39	20	225	245	254	47	146	106	14.5
4	68	1159.53	.66	3.03	9.61	20	225	245	254	47	148	107	14.0
4	72	1163.75	.65	2.98	3.80	20	226	245	255	46	150	108	14.5
3	76	1168.08	.68	3.12	8.10	21	228	244	255	46	150	108	14.8
3	80	1172.32	.68	3.13	2.40	21	225	244	255	46	150	109	14.5
2	84	1176.60	.66	3.03	6.64	20	228	246	255	46	150	109	14.0
2	88	1180.99	.67	3.08	0.90	20	228	246	256	46	150	109	15.5
1	92	1184.39	.45	2.07	4.41	20	228	246	256	45	150	109	15.5
1	96	1187.90	.46	2.12	7.95	19	228	246	255	45	150	109	15.5
	(1212)												
	θ = 96	Vm=95.77		ΔH=2.75							AVG.=	123	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOSCHIPAP METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-22-92 TEST 2 RUN 2 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: 0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1158

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: S.L.B. + D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1274	3200	1074
IMPINGER NO. 3			
CONDENSER			
DESICCANT			
	1449	1363	86
TOTAL			1160

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 CT

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1250 (HRS) TIME END: 1430 (HRS) _____

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.70 IN Hg H20 40 %

NOZZLE NO. N1:4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS / MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BAINBRIDGE / D. LIMFIN

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 2 METER BOX NO. (ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1250)	(1188.44)											
A 6	4	1191.64	.56	1.84	1.65	6	225	250	260	42	106	97	15.7
6	8	1194.94	.58	1.96	4.98	6	225	250	260	42	138	100	15.7
5	12	1198.58	.64	2.23	8.59	8	225	250	260	40	142	101	15.2
5	16	1202.10	.62	2.17	2.15	8	225	250	260	40	142	101	15.5
4	20	1205.73	.65	2.28	5.80	9	225	250	260	40	144	102	15.5
4	24	1209.40	.65	2.29	9.416	9	224	250	260	40	146	104	15.5
3	28	1213.22	.70	2.48	3.28	10	222	250	260	40	147	104	15.5
3	32	1217.00	.69	2.45	7.08	10	220	250	260	40	148	106	15.5
2	36	1220.70	.65	2.32	0.78	11	220	250	260	41	148	106	15.0
2	40	1224.43	.65	2.32	4.48	11	220	251	260	41	149	106	15.0
1	44	1227.65	.48	1.71	7.66	11	220	251	260	41	147	107	15.0
1	48	1230.80	.47	1.68	0.82	11	218	252	261	41	143	107	15.0
B 6	52	1234.17	.54	1.93	4.18	11	218	252	260	40	140	106	15.0
6	56	1237.56	.54	1.93	7.55	13	215	252	261	40	142	106	15.5
5	60	1241.15	.62	2.21	1.15	13	215	252	261	40	142	105	15.5
5	64	1244.75	.62	2.21	4.76	14	215	252	261	40	142	105	15.5
4	68	1248.40	.66	2.35	8.47	15	215	252	260	40	142	105	15.5
4	72	1252.15	.65	2.32	2.16	16	215	252	260	41	141	105	15.5
3	76	1255.88	.66	2.36	5.89	16	215	252	261	41	145	105	15.2
3	80	1259.60	.66	2.37	9.62	16	213	252	261	40	145	105	15.2
2	84	1263.25	.64	2.30	3.30	17	213	252	260	40	145	105	15.2
2	88	1266.50	.64	2.30	6.47	18	213	252	255	39	145	105	15.5
1	92	1270.10	.47	1.69	0.13	17	213	252	255	39	145	105	15.5
1	96	1273.30	.48	1.72	3.32	17	213	252	255	39	145	105	15.5
	(1430)												
	θ= 96	Vm= 84.86		ΔH= 2.14							AVG.= 127		

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/MOOR HEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-22-92 TEST 2 RUN 3 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1171

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SB & DC

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1218	200	1018
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1519	1330	189
TOTAL			1207

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 4/4 CT

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1515 (HRS) TIME END: 1652 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SCB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. PI-6 Cp .840

BAR. PRESS. 28.70 IN Hg H20 42 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/MOOR HEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BANNICK + D. CLIMAN

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 3 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1515)	(1275.15)											
B C	4	1278.40	.54	1.81	8.41	5	220	251	260	39	112	103	14.5
6	8	1281.50	.54	1.76	1.58	5	220	252	260	39	139	104	14.5
5	12	1285.10	.64	2.15	5.12	7	215	252	260	39	143	105	14.0
5	16	1288.67	.64	2.16	8.68	8	215	252	260	39	143	105	14.0
4	20	1292.28	.66	2.22	2.30	8	215	252	260	39	149	107	15.0
4	24	1295.90	.66	2.21	5.91	9	225	252	260	39	149	107	15.0
3	28	1299.54	.67	2.29	9.55	10	226	252	261	39	150	109	14.5
3	32	1303.22	.67	2.25	3.20	10	222	252	260	39	152	109	14.7
2	36	1306.96	.62	2.08	6.72	11	224	252	260	40	152	109	14.7
2	40	1310.20	.62	2.09	0.25	11	222	252	260	40	152	110	14.7
1	44	1313.35	.48	1.63	3.36	11	220	252	260	40	151	111	15.0
1	48	1316.50	.48	1.63	6.47	10	220	252	260	40	151	111	15.0
A 6	52	1319.81	.55	1.86	9.80	10	220	252	260	40	151	110	15.0
6	56	1323.15	.57	1.93	3.19	12	220	252	260	40	147	111	15.0
5	60	1326.70	.62	2.09	6.71	13	220	252	260	40	148	111	15.0
5	64	1330.28	.65	2.19	3.32	14	220	252	260	40	150	112	14.5
4	68	1333.99	.66	2.23	3.96	15	220	252	260	40	150	111	14.5
4	72	1337.66	.68	2.28	7.64	15	225	252	261	40	150	111	14.5
3	76	1341.36	.70	2.37	1.39	18	220	251	261	41	151	112	14.0
3	80	1345.10	.70	2.37	5.15	17	220	251	261	41	151	112	14.0
2	84	1348.80	.67	2.27	8.82	18	220	251	261	41	151	112	14.0
2	88	1352.52	.62	2.29	2.51	20	215	251	261	41	151	111	14.0
1	92	1355.50	.43	1.47	5.47	18	215	251	260	40	151	112	14.5
1	96	1358.44	.43	1.47	8.43	18	215	251	260	40	152	112	14.5
	(1652)												
	θ = 96	Vm = 83.29		ΔH = 2.01							AVG. = 129		

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH POWER BOILER STACK NO. OF TRAVERSE POINTS 12

DATE _____ TEST _____ RUN _____ FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: 000 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1175

RECOVERY SOLVENT(S):

☒ ACETONE _____

☐ OTHER(S) _____

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SCB + D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1335	200	1135
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1419	1330	89
TOTAL			1224

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 LT

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1005 (HRS) TIME END: 1145 (HRS) _____

SAMPLING RATE: 100 cc/MIN OPERATOR: SCB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. PI-6 Cp .840

BAR. PRESS. 28.68 IN Hg H20 40 %

NOZZLE NO. N1-4 NOZZLE DIA. .212 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/ MOORHEAD SOURCE SOUTH POLE DRYER STACK OPERATORS S. BAINWICK + D. LITFIN

PROJECT NUMBER 926014 DATE 1-23-92 TEST 3 RUN 1 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1005)	1359.56											
A 6	4	1362.44	.47	1.53	2.43	6	220	262	260	36	98	72	15.5
6	8	1365.35	.47	1.56	5.36	6	220	260	260	36	120	73	15.5
5	12	1368.52	.54	1.83	8.56	8	220	251	255	38	120	78	15.5
5	16	1371.71	.54	1.83	1.77	8	220	251	255	38	123	80	15.5
4	20	1375.00	.56	1.91	5.06	10	220	250	255	38	125	80	15.5
4	24	1378.38	.56	1.91	8.35	11	220	250	255	38	127	83	15.0
3	28	1381.59	.53	1.82	1.57	12	220	250	255	38	128	85	15.0
3	32	1384.72	.52	1.79	4.77	12	220	249	256	38	128	86	15.0
2	36	1387.96	.50	1.73	7.91	12	218	249	256	38	129	87	15.0
2	40	1391.10	.51	1.76	1.09	12	218	248	256	38	129	87	15.0
1	44	1394.38	.33	1.83	4.33	12	218	249	256	38	129	90	15.0
1	48	1396.52	.33	1.15	6.90	10	218	248	256	38	130	91	15.5
B 6	52	1399.91	.45	1.57	9.90	12	215	250	256	38	130	91	15.5
6	56	1402.97	.45	1.57	2.92	11	215	250	256	38	130	91	15.5
5	60	1406.21	.53	1.85	6.18	11	215	250	256	38	130	91	15.5
5	64	1409.46	.54	1.89	9.47	15	215	250	256	38	131	91	15.5
4	68	1412.26	.54	1.89	2.77	15	215	250	264	38	130	92	15.5
4	72	1416.17	.57	1.99	6.15	16	215	250	263	37	130	92	15.5
3	76	1419.46	.55	1.92	9.48	16	215	250	263	37	132	93	15.5
3	80	1422.88	.55	1.93	2.81	16	215	250	263	37	132	93	15.5
2	84	1426.10	.53	1.86	6.08	16	215	250	261	37	132	93	15.0
2	88	1429.38	.53	1.86	9.36	15	215	250	260	36	132	93	15.5
1	92	1432.26	.40	1.41	2.21	14	214	251	260	36	133	93	15.5
1	96	1435.00	.40	1.41	5.06	13	214	251	260	36	133	93	15.5
	(1145)												
	θ = 96	Vm = 75.44		ΔH = 1.74							AVG. = 107		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-23-92 TEST 3 RUN 2 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: 0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1176

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SCB & DL.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1335	200	1135
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1419	1330	89
TOTAL			1224

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: 00 cc/MIN AT 15 IN. Hg

TIME START: 1220 (HRS) TIME END: 1355 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SCB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.68 IN Hg H20 42 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS / MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BAINUCCI + D. LITFIN

PROJECT NUMBER 9200M DATE 1-23-92 TEST 3 RUN 2 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1220)	(1435.60)											
B 6	4	1438.56	.47	1.55	8.58	6	210	241	250	38	100	83	15.5
6	8	1441.46	.47	1.51	1.48	6	210	241	250	38	106	83	15.5
5	12	1444.62	.54	1.74	4.60	8	210	241	250	38	115	83	15.5
5	16	1447.77	.54	1.76	7.24	8	210	242	249	38	121	83	15.0
4	20	1451.00	.58	1.90	1.02	9	210	242	249	38	123	85	15.0
4	24	1454.30	.59	1.94	4.34	10	210	242	249	38	123	85	15.0
3	28	1457.53	.55	1.80	7.54	10	210	241	249	38	125	86	15.5
3	32	1460.72	.55	1.81	0.75	10	210	241	249	38	125	87	15.5
2	36	1463.94	.53	1.75	3.91	10	210	241	249	38	127	87	14.7
2	40	1467.10	.53	1.74	7.06	10	215	241	249	38	129	89	14.2
1	44	1469.88	.42	1.38	9.87	12	215	242	250	38	130	90	14.7
1	48	1472.66	.42	1.38	2.69	12	215	242	251	39	130	90	14.7
A 6	52	1475.70	.48	1.58	5.71	12	215	243	251	38	130	91	15.0
6	56	1478.73	.48	1.58	8.72	12	215	243	251	38	131	92	15.0
5	60	1481.99	.54	1.78	1.93	12	215	244	250	39	131	91	15.0
5	64	1485.10	.54	1.78	5.13	12	215	244	250	38	132	93	15.0
4	68	1488.42	.56	1.85	8.40	11	215	244	250	39	135	93	15.0
4	72	1491.70	.56	1.86	1.67	11	215	245	252	39	135	93	15.0
3	76	1494.93	.53	1.76	4.86	16	215	245	252	38	131	94	15.0
3	80	1498.10	.53	1.75	8.04	17	215	245	252	38	131	94	15.5
2	84	1500.99	.45	1.49	0.47	17	215	246	252	38	132	94	15.5
2	88	1503.92	.45	1.49	3.91	16	215	246	252	38	129	94	15.5
1	92	1506.38	.32	1.06	6.38	15	215	246	252	37	129	94	15.5
1	96	1508.95	.34	1.12	8.93	15	215	246	252	37	130	94	15.5
	(1355)												
	θ = 96	Vm = 73.35		ΔH = 1.64							AVG. = 108		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOOSHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK NO. OF TRAVERSE POINTS 12

DATE 1-23-92 TEST 3 RUN 3 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: 0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1179

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SLB + DL

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1236	200	1036
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1377	1364	23
TOTAL			1059

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 Lt

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1445 (HRS) TIME END: 1630 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.68 IN Hg H20 44 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BOWLICH & D. LITTIN

PROJECT NUMBER 9200/4 DATE 1-23-92 TEST 3 RUN 3 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1445)	(509.40)											
A 6	4	1512.30	.48	1.49	2.32	6	210	249	250	38	99	81	15.5
6	8	1515.15	.48	1.45	5.16	9	210	249	250	39	99	81	15.5
5	12	1518.22	.55	1.68	8.21	8	200	250	255	38	109	89	15.5
5	16	1521.36	.55	1.71	1.31	10	200	250	255	38	113	88	15.5
4	20	1524.49	.56	1.74	4.45	10	200	250	251	40	115	90	15.5
4	24	1527.66	.56	1.75	7.61	10	200	250	255	40	121	92	15.0
3	28	1530.68	.53	1.67	0.69	10	200	250	255	40	130	92	15.0
3	32	1533.81	.53	1.68	3.81	10	205	251	255	40	134	93	15.0
2	36	1536.88	.52	1.65	6.84	11	205	251	255	40	134	93	15.0
2	40	1539.96	.52	1.65	9.99	12	205	251	255	41	134	93	15.0
1	44	1542.42	.32	1.01	2.40	10	205	251	255	41	134	94	15.5
1	48	1544.78	.31	.98	4.74	10	205	251	255	41	133	94	15.5
B 6	52	1547.70	.45	1.44	7.67	12	200	251	256	41	133	95	15.5
6	56	1550.62	.46	1.47	0.59	12	200	251	256	39	133	95	15.5
5	60	1553.80	.53	1.69	3.71	12	200	251	256	39	133	96	15.5
5	64	1556.88	.53	1.69	6.85	13	200	251	256	39	133	96	15.5
4	68	1560.10	.57	1.82	0.09	13	200	251	256	40	133	96	15.0
4	72	1563.42	.58	1.84	3.35	13	205	251	256	40	133	96	15.0
3	76	1566.52	.55	1.74	6.53	13	205	251	256	40	133	96	15.0
3	80	1569.78	.55	1.74	9.71	13	205	251	254	40	132	95	15.5
2	84	1572.73	.52	1.65	2.79	13	205	250	254	40	132	94	15.5
2	88	1575.16	.52	1.64	5.87	15	205	250	254	40	132	94	15.5
1	92	1578.76	.41	1.30	0.72	15	205	249	254	40	131	94	15.5
1	96	1581.40	.41	1.30	1.35	14	205	249	254	40	131	94	15.5
	(1630)												
	θ = 96	Vm = 72.00		ΔH = 1.57							AVG. = 110		

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS/MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH BLDG PAINT SPACE NO. OF TRAVERSE POINTS 12

DATE 1-24-92 TEST 4 RUN 1 FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

PRETEST: (≤ 0.02 CFM AT 15 IN. Hg (vac) [X]

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) [X]

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1181

RECOVERY SOLVENT(S):

[X] ACETONE

[ ] OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SLB & DL.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1309	3200	1109
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1504	1382	122
TOTAL			1231

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 44 Ltr

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1015 (HRS) TIME END: 1210 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.87 IN Hg H20 40 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. BAINVILLE J.D. GRIFFIN

PROJECT NUMBER 920014 DATE 1-24-92 TEST 4 RUN 1 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)
	(1015)	(581.68)											
A 6	4	584.90	.50	1.89	4.87	5	212	250	260	40	71	69	12.5
6	8	587.99	.47	1.78	7.94	6	203	250	260	40	82	71	12.5
5	12	591.30	.56	2.10	1.31	7	216	250	260	41	93	73	12.0
5	16	594.65	.54	2.07	4.67	9	210	250	260	41	102	74	11.0
4	20	598.19	.58	2.28	8.20	9	201	250	260	41	111	78	11.5
4	24	601.80	.59	2.35	1.81	11	199	251	260	41	115	80	11.5
3	28	605.45	.61	2.38	5.46	9	215	251	260	41	122	82	11.5
3	32	609.08	.61	2.37	9.11	14	225	251	260	41	124	85	12.5
2	36	612.60	.58	2.26	2.69	14	225	251	260	41	127	87	12.7
2	40	616.17	.56	2.19	6.22	14	225	252	260	40	131	88	12.5
1	44	619.18	.38	1.52	9.16	11	217	252	260	40	134	90	12.7
1	48	622.14	.39	1.54	2.14	11	228	252	261	40	135	91	12.7
B 6	52	625.58	.54	2.13	5.63	12	226	252	260	40	132	93	12.7
6	56	629.17	.53	2.17	9.16	13	203	252	261	40	134	95	13.0
5	60	632.99	.60	2.93	2.90	13	210	252	261	40	134	51	13.0
5	64	636.66	.59	2.39	6.61	13	210	252	261	40	133	95	13.0
4	68	640.30	.59	2.41	0.33	16	205	252	260	40	140	97	12.0
4	72	644.17	.61	2.53	4.16	16	199	252	260	41	141	98	12.0
3	76	648.00	.62	2.56	8.02	16	203	252	261	41	142	99	12.0
3	80	651.80	.62	2.58	1.89	16	199	252	261	41	142	100	12.0
2	84	655.53	.57	2.37	5.61	17	199	252	260	40	144	102	12.5
2	88	659.36	.58	2.43	9.38	17	198	252	260	40	141	103	12.5
1	92	662.50	.41	1.72	2.55	15	199	252	260	40	144	103	12.5
1	96	665.70	.41	1.72	5.72	15	199	251	260	40	144	103	12.5
	(1210)												
	θ = 96	Vm = 84.02		ΔH = 2.17							AVG. =	108	

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOORHEAD — METHOD 1-5

PROJECT NUMBER 920014 — FILTER HOLDER GLASS

SOURCE SOUTH BOILER STACK — NO. OF TRAVERSE POINTS 12

DATE 1-24-92 TEST 4 RUN 2 — FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NO.S OF FILTERS USED: 1159

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SLB + D.L.

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1390	200	1190
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1380	1356	24
TOTAL			1214

INTEGRATED GAS SAMPLING DATA:

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

BAG MATERIAL: TEDLAR SIZE: 4416

PRETEST LEAK CHECK: 00 cc/MIN AT 15 IN. Hg

TIME START: 1245 (HRS) TIME END: 1420 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.83 IN Hg H2O 40 %

NOZZLE NO. N1-4 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/MODAMEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S.BAINWRIGHT & D SMITH

PROJECT NUMBER 920014 DATE 1-24-92 TEST 4 RUN 2 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.00

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)
	(4245)	(666.031)											
B 6	4	669.22	.50	1.77	9.21	6	199	250	260	40	89	91	11.5
6	8	672.40	.54	1.85	2.42	7	199	251	261	39	90	93	11.5
5	12	675.80	.61	2.09	5.83	8	200	251	261	38	100	93	11.5
5	16	679.30	.60	2.04	9.24	8	200	251	261	38	106	95	11.5
4	20	682.73	.60	2.09	2.68	9	200	251	261	38	110	97	11.5
4	24	686.15	.60	2.10	6.12	10	200	252	261	37	112	94	11.0
3	28	689.60	.61	2.12	9.59	10	205	252	261	37	119	94	11.0
3	32	693.17	.62	2.19	3.13	11	199	252	261	37	126	94	11.0
2	36	696.60	.58	2.06	6.57	12	199	252	261	37	124	95	11.0
2	40	700.00	.58	2.07	0.02	12	199	252	261	37	132	96	11.0
1	44	702.96	.41	1.42	2.93	10	200	252	260	37	134	96	11.5
1	48	705.90	.41	1.47	5.86	11	200	251	260	37	140	97	12.0
A 6	52	709.20	.52	1.87	9.16	11	200	251	260	37	145	100	12.0
6	56	712.36	.48	1.73	2.35	12	205	251	260	37	145	100	12.0
5	60	715.88	.56	2.01	5.79	12	205	251	260	37	147	105	12.0
5	64	719.23	.55	1.99	9.22	12	205	251	260	37	147	106	11.5
4	68	722.79	.57	2.04	2.71	13	205	250	261	36	147	108	11.5
4	72	726.33	.60	2.18	6.30	13	205	250	261	36	147	108	11.5
3	76	729.88	.59	2.14	9.86	14	205	250	262	36	145	107	11.5
3	80	733.42	.58	2.10	3.38	15	205	250	262	36	145	107	11.5
2	84	736.89	.56	2.04	6.85	15	200	250	260	36	145	107	12.0
2	88	739.72	.37	1.35	9.68	15	200	250	259	36	145	107	12.0
1	92	742.62	.40	1.46	2.62	15	200	250	259	36	144	107	12.0
1	96	745.50	.38	1.39	5.48	14	200	250	259	36	144	107	12.0
	(1420)												
	θ = 96	Vm = 85.47		ΔH = 1.90							AVG. = 115		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME ACS / MOORHEAD — METHOD 1-5

PROJECT NUMBER 920064 — FILTER HOLDER GLASS

SOURCE SOUTH PULP DRYER STACK — NO. OF TRAVERSE POINTS 12

DATE 1-24-92 TEST 4 RUN 2 — FILTER TYPE GLASS FIBER

SAMPLE TRAIN LEAK CHECK:

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

POSTTEST: (0.00 CFM AT 25 IN. Hg (vac) ☒

PARTICULATE CATCH DATA:

NOS OF FILTERS USED: 1160

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: SLB & DS

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2	1442	200	1242
IMPINGER NO. 3			
CONDENSER			
DESICCANT	1399	1384	15
TOTAL			1257

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: 00 cc/MIN AT 15 IN. Hg

TIME START: 1505 (HRS) TIME END: 1658 (HRS)

SAMPLING RATE: 100 cc/MIN OPERATOR: SLB

S/N OF O_2 ANALYZER USED TO MONITOR TRAIN OUTLET: 123828

PITOT NO. P1-6 Cp .840

BAR. PRESS. 28.83 IN Hg H20 41 %

NOZZLE NO. N1-01 NOZZLE DIA. .312 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME ACS/MOORHEAD SOURCE SOUTH PULP DRYER STACK OPERATORS S. RAINEY + D. LITTEN

PROJECT NUMBER 420014 DATE 1-24-92 TEST 4 RUN 3 METER BOX NO. 1 ΔH@ 1.75 IN WC

GASMETER COEFF. 1.001

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)
	(1505)	(745.72)											
A 6	4	748.96	.51	1.77	8.93	6	200	245	260	40	99	81	12.5
6	8	752.70	.46	2.52	2.67	8	200	245	261	40	117	98	12.5
5	12	755.90	.57	1.94	5.99	8	199	245	261	40	126	96	12.0
5	16	759.26	.54	1.87	9.27	9	199	245	260	40	143	105	12.0
4	20	762.74	.58	2.06	2.75	9	195	246	261	40	143	104	12.0
4	24	766.30	.59	2.10	6.77	10	195	246	261	41	143	100	12.0
3	28	769.82	.60	2.12	9.80	10	195	246	261	41	147	109	11.7
3	32	773.41	.60	2.15	3.37	11	195	246	260	41	147	109	11.7
2	36	776.96	.58	2.08	6.88	11	195	246	260	41	146	110	11.7
2	40	780.32	.58	2.09	0.40	11	190	246	260	42	148	111	12.0
1	44	783.36	.39	1.41	3.30	12	190	247	260	42	149	111	12.0
1	48	786.24	.40	1.45	6.24	12	190	248	260	42	150	111	11.7
B 6	52	789.66	.53	1.92	9.62	12	190	248	260	42	151	112	11.7
6	56	793.00	.53	1.92	3.01	12	190	248	260	42	152	113	12.5
5	60	796.59	.59	2.11	6.55	14	190	248	260	42	152	113	12.5
5	64	800.10	.57	2.07	0.07	15	190	248	260	40	153	113	12.5
4	68	803.64	.60	2.18	3.68	16	190	250	260	40	153	113	12.0
4	72	807.32	.60	2.20	7.31	17	185	250	259	40	153	114	12.0
3	76	810.94	.61	2.24	0.92	17	185	251	259	40	153	114	12.0
3	80	814.60	.62	2.27	4.65	18	185	250	259	40	152	114	12.0
2	84	818.20	.59	2.16	8.25	17	185	251	259	40	152	114	12.0
2	88	821.70	.54	1.98	1.69	17	185	250	259	40	149	113	11.5
1	92	824.65	.40	1.48	4.66	16	180	251	259	40	149	113	11.5
1	96	822.55	.40	1.48	7.62	15	180	250	259	40	149	113	11.5
	(1655)												
	θ= 96	Vm= 81.83		ΔH=							AVG.=		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER MULTI-CLONE INLET NO. OF TRAVERSE POINTS 24

DATE 1-21-92 TEST 1 RUN 1 FILTER TYPE GLASS FIBER

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: #1111

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	474	100	374
DESICCANT	1322	1288	34
TOTAL			408

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.85 IN Hg H20 25 %

NOZZLE NO. ~~S-5~~ N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE S. DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 1 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1315	(176.05											
A - 6	4	147.24	0.05	0.25	7.24	1	250	250	250	N/A	108	103	
5	8	148.74	0.08	0.40	8.74	1	249				120	104	
4	12	150.74	0.14	0.71	0.74	1	249	250	250		127	104	
3	16	153.05	0.18	0.93	3.03	1	247				137	106	
2	20	155.64	0.23	1.20	5.65	2	246	252	250		142	108	
1	24	159.35	0.45	2.35	9.32	3	246				146	109	
B - 6	28	160.55	0.05	0.26	0.55	1	248	250	250		139	112	
5	32	162.37	0.11	0.58	2.37	1	248				139	112	
4	36	164.52	0.15	0.78	4.50	1	249	249	250		143	112	
3	40	167.28	0.26	1.36	7.30	2	249				148	113	
2	44	170.66	0.37	1.95	0.66	3	248	250	251		154	114	
1	48	174.57	0.50	2.64	4.58	4	247				158	115	
C - 6	52	175.95	0.02	0.11	5.95	1	247	251	250		150	116	
5	56	180.07	0.04	0.23	0.07	1	249				143	114	
4	60	178.42	0.06	0.32	8.42	1	249	250	250		138	115	
3	64	179.97	0.08	0.42	9.97	1	250				138	116	
2	68	182.42	0.20	1.04	2.43	2	251	250	250		152	116	
1	72	185.46	0.30	1.58	5.46	3	251				156	116	
D - 6	76	186.25	0.02	0.11	6.25	1	252	250	249		130	115	
5	80	187.34	0.04	0.21	7.34	1	253				136	114	
4	84	188.99	0.09	0.47	8.99	1	251	251	249		146	114	
3	88	190.55	0.08	0.42	0.55	1	249				146	114	
2	92	192.47	0.12	0.63	2.47	2	248	251	250		152	115	
1	96	195.08	0.22	1.17	5.08	3	246			↓	158	116	
	(1500												
	θ = 96	Vm = 49.03		ΔH = 0.86							AVG. =	127.0	

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER MULTI-CLONE INLET NO. OF TRAVERSE POINTS 24

DATE 1-21-92 TEST 1 RUN 2 FILTER TYPE GLASS FIBER

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: #1117

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	442	100	342
DESICCANT	1346	1300	46
TOTAL			388

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. PI-8 Cp .840

BAR. PRESS. 28.85 IN Hg H20 30 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MCCORMEAD SOURCE SOUTH DRYER MULTI-CLONE INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 2 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1600)	(195.25)											
A - 6	4	196.42	0.05	0.23	6.41	1	258	248	249	N/A	104	103	
5	8	197.82	0.08	0.36	7.82	1	251				112	103	
4	12	199.77	0.15	0.68	9.76	1	250	250	251		121	103	
3	16	202.02	0.20	0.91	2.02	1	251				131	104	
2	20	204.41	0.22	1.01	4.41	1	249	251	250		139	106	
1	24	207.83	0.45	2.08	7.86	2	248				143	108	
B - 6	28	209.02	0.05	0.23	9.02	1	246	250	250		140	109	
5	32	210.65	0.10	0.47	0.66	1	247				134	110	
4	36	212.65	0.15	0.69	2.65	1	248	249	251		141	111	
3	40	215.24	0.25	1.17	5.24	2	247				150	112	
2	44	218.23	0.33	1.55	8.24	3	246	249	250		153	112	
1	48	221.98	0.51	2.40	1.98	4	246				158	115	
C - 6	52	222.72	0.02	0.10	2.72	1	246	250	250		125	114	
5	56	223.63	0.03	0.14	3.62	1	246				129	115	
4	60	224.88	0.06	0.28	4.88	1	246	250	250		136	114	
3	64	226.37	0.08	0.37	6.35	1	245				139	114	
2	68	228.55	0.18	0.84	8.55	2	245	251	250		147	114	
1	72	231.51	0.32	1.50	1.51	3	246				154	115	
D - 6	76	232.25	0.02	0.09	2.25	1	246	251	249		132	115	
5	80	233.41	0.05	0.23	3.41	1	246				138	115	
4	84	234.79	0.07	0.33	4.79	1	247	250	250		140	115	
3	88	236.26	0.08	0.37	6.26	1	248				142	115	
2	92	237.82	0.09	0.42	7.82	1	246	250	250		144	115	
1	96	240.27	0.23	1.06	0.27	2	245			↓	150	115	
	(1742)												
	θ = 96	Vm= 45.02		ΔH=0.73							AVG.=	123.9	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER MULTI-CLONE INLET NO. OF TRAVERSE POINTS 24

DATE 1-21-92 TEST 1 RUN 3 FILTER TYPE GLASS FIBER

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: # 1116

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	444	100	344
DESICCANT	1358	1324	34
TOTAL			378

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.85 IN Hg H20 31 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. McCRHEAD SOURCE SOUTH DRYER MULTI-CLONE INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-21-92 TEST 1 RUN 3 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1825)	(240.45)											
A - 6	4	241.59	0.05	0.23	1.59	1	250	247	248	N/A	118	105	
5	8	243.09	0.09	0.40	3.09	1	248				130	105	
4	12	244.97	0.14	0.63	4.98	1	246	249	250		136	107	
3	16	247.26	0.20	0.90	7.26	2	246				143	108	
2	20	249.80	0.25	1.14	9.82	2	246	250	251		148	109	
1	24	253.14	0.43	1.97	3.14	3	245				153	111	
B - 6	28	254.35	0.05	0.23	4.35	1	243	250	250		139	112	
5	32	255.96	0.10	0.46	5.97	1	244				138	112	
4	36	257.96	0.15	0.69	7.96	1	243	251	250		143	112	
3	40	260.55	0.25	1.15	0.54	2	243				150	113	
2	44	263.60	0.35	1.61	3.60	3	243	252	251		154	113	
1	48	267.19	0.48	2.21	7.19	4	245				160	115	
C - 6	52	267.93	0.02	0.09	7.93	1	245	251	250		135	115	
5	56	268.95	0.04	0.18	8.95	1	244				131	115	
4	60	270.10	0.05	0.23	0.10	1	244	250	250		134	114	
3	64	271.65	0.09	0.41	1.64	1	242				137	114	
2	68	273.88	0.19	0.87	3.88	2	243	250	249		145	114	
1	72	276.75	0.31	1.42	6.75	3	244				153	114	
D - 6	76	277.48	0.02	0.09	7.48	1	243	250	250		135	114	
5	80	278.63	0.05	0.23	8.63	1	242				132	114	
4	84	280.10	0.08	0.36	0.08	1	243	250	250		137	114	
3	88	281.63	0.09	0.41	1.62	1	244				141	114	
2	92	283.25	0.10	0.46	3.25	1	245	250	251		143	114	
1	96	285.67	0.22	1.01	5.67	2	244			↓	150	114	
	(1902)												
	θ = 96	Vm = 45.22		ΔH = 0.72							AVG. = 126.6		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-22-92 TEST 2 RUN 1 FILTER TYPE GLASS FIBER

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: #1126

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	481	100	381
DESICCANT	1525	1319	206
TOTAL			587

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.70 IN Hg H2O 30 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MacRHEAD SOURCE SOUTH DRYER MULTI-CLONE INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 1 METER BOX NO. 2 ΔH@ 1.77 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1020)	(285.80)											
A - 6	4	286.91	0.05	0.22	6.92	1	248	250	251	N/A	104	98	
5	8	288.24	0.07	0.32	8.24	1	244				109	98	
4	12	289.91	0.11	0.50	9.91	1	244	250	250		115	99	
3	16	291.80	0.14	0.64	1.80	1	245				123	100	
2	20	294.58	0.30	1.37	4.58	2	245	251	250		136	101	
1	24	298.13	0.48	2.22	8.13	3	245				142	103	
B - 6	28	299.19	0.04	0.19	9.17	1	245	252	250		135	105	
5	32	300.44	0.06	0.28	0.44	1	245				132	107	
4	36	302.44	0.15	0.70	2.44	1	243	251	249		134	107	
3	40	305.25	0.30	1.40	5.27	2	243				148	108	
2	44	308.58	0.40	1.88	8.58	3	243	251	249		155	110	
1	48	312.30	0.50	2.37	2.30	4	243				159	112	
C - 6	52	313.05	0.02	0.10	3.05	1	244	250	250		140	114	
5	56	314.22	0.05	0.24	4.22	1	242				134	114	
4	60	315.50	0.06	0.28	5.50	1	242	250	250		139	114	
3	64	317.53	0.15	0.71	7.53	1	242				145	114	
2	68	319.94	0.21	1.00	9.94	1	242	250	250		153	114	
1	72	323.19	0.38	1.81	3.19	2	241				159	116	
D - 6	76	324.70	0.08	0.39	4.70	1	241	250	251		145	116	
5	80	326.28	0.09	0.43	6.29	1	241				146	116	
4	84	327.95	0.10	0.48	7.95	1	243	249	251		148	117	
3	88	329.79	0.12	0.57	9.79	1	243				150	117	
2	92	331.84	0.15	0.72	1.84	1	241	250	250		151	117	
1	96	334.92	0.34	1.62	4.92	3	241			V	155	117	
	(1200)												
	Θ = 96	Vm= 49.12		ΔH= 0.85							AVG.= 124.8		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER MC. INLET NO. OF TRAVERSE POINTS 24

DATE 1-22-92 TEST 2 RUN 2 FILTER TYPE GLASS FIBER

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: RECOVERY SOLVENT(S):

#1100 ☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	498	100	398
DESICCANT	1513	1334	179
TOTAL			577

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.70 IN Hg H2O 39 %

NOZZLE NO. #2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 2 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1250)	(335.10)											
A - 6	4	336.14	0.05	0.19	6.14	1	243	247	249	N/A	111	109	
5	8	337.33	0.07	0.25	7.33	1	244				125	108	
4	12	338.78	0.10	0.37	8.78	1	242	249	251		132	109	
3	16	340.56	0.15	0.55	0.56	1	243				139	109	
2	20	343.10	0.30	1.11	3.10	2	244	250	250		147	110	
1	24	346.30	0.48	1.79	6.32	3	242				153	110	
B - 6	28	347.14	0.03	0.11	7.14	1	243	250	250		132	112	
5	32	348.17	0.05	0.19	8.17	1	241				120	111	
4	36	350.00	0.16	0.59	0.01	2	243	250	250		142	111	
3	40	352.47	0.28	1.04	2.47	3	243				151	111	
2	44	355.47	0.41	1.54	5.47	4	242	251	250		155	112	
1	48	358.75	0.49	1.85	8.75	4	242				157	113	
C - 6	52	359.42	0.02	0.08	9.42	1	243	251	250		130	112	
5	56	360.35	0.04	0.15	0.35	1	244				130	112	
4	60	361.47	0.06	0.22	1.47	1	244	250	249		135	112	
3	64	363.27	0.15	0.56	3.27	2	244				142	111	
2	68	365.49	0.23	0.86	5.49	3	243	250	250		148	111	
1	72	368.25	0.35	1.31	8.25	4	244				152	111	
D - 6	76	369.40	0.06	0.23	9.40	1	244	250	250		135	112	
5	80	370.71	0.08	0.30	0.71	1	244				133	112	
4	84	372.17	0.10	0.37	2.17	1	243	250	250		135	111	
3	88	373.78	0.12	0.45	3.78	1	241				138	110	
2	92	375.58	0.15	0.56	5.58	2	241	250	250		142	110	
1	96	378.29	0.34	1.27	8.29	3	239			√	149	110	
	(1430)												
	θ = 96	Vm = 43.19		ΔH = 0.66							AVG. =	1250	

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-22-92 TEST 2 RUN 3 FILTER TYPE GLASS FIBER

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: # 1169

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	507	100	407
DESICCANT	1460	1340	120
TOTAL			527

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.70 IN Hg H20 41 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-22-92 TEST 2 RUN 3 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1515)	(378.50)											
A - 6	4	379.40	0.04	0.14	9.40	1	247	247	246	N/A	107	105	
5	8	380.47	0.06	0.20	0.47	1	246				113	105	
4	12	381.98	0.12	0.41	1.98	1	246	249	250		122	106	
3	16	383.64	0.15	0.51	3.69	1	246				131	106	
2	20	386.05	0.28	0.97	6.05	2	245	250	250		141	110	
1	24	389.05	0.45	1.58	8.07	3	242				154	111	
B - 6	28	389.86	0.03	0.11	9.86	1	243	251	250		132	113	
5	32	390.87	0.05	0.17	0.87	1	244				133	115	
4	36	392.42	0.12	0.42	2.42	1	243	250	251		145	115	
3	40	394.90	0.30	1.06	4.91	2	243				153	116	
2	44	397.73	0.38	1.35	7.73	3	243	250	250		159	117	
1	48	401.01	0.51	1.82	1.01	4	243				163	119	
C - 6	52	401.82	0.03	0.11	1.82	1	243	250	250		134	120	
5	56	402.83	0.05	0.18	2.83	1	242				137	120	
4	60	403.94	0.06	0.21	3.94	1	242	251	250		141	121	
3	64	405.59	0.13	0.46	5.59	2	240				144	120	
2	68	407.63	0.20	0.71	7.63	2	240	251	250		149	120	
1	72	410.34	0.35	1.25	0.34	3	240				156	120	
D - 6	76	411.57	0.07	0.25	1.57	1	240	250	250		143	119	
5	80	412.94	0.09	0.32	2.94	1	241				141	119	
4	84	414.45	0.11	0.39	4.44	1	243	250	250		143	118	
3	88	416.02	0.12	0.43	6.02	2	242				143	117	
2	92	417.84	0.16	0.57	7.84	2	241	250	250		147	117	
1	96	420.42	0.32	1.14	0.42	3	242			↓	153	117	
	(1655)												
	θ= 96	Vm= 41.92		ΔH=							AVG.=		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-23-92 TEST 3 RUN 1 FILTER TYPE GLASS FIBER

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: #1174

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	516	100	416
DESICCANT	1465	1340	125
TOTAL			541

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.68 IN Hg H20 40 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-23-92 TEST 3 RUN 1 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)
	(0945)	(420.50)											
A - 6	4	421.24	0.03	0.10	1.24	1	249	250	250	N/A	84	83	
5	8	422.18	0.05	0.17	2.18	1	248				90	84	
4	12	423.37	0.08	0.27	3.39	1	246	250	250		98	84	
3	16	424.75	0.10	0.34	4.75	1	245				106	85	
2	20	426.96	0.26	0.89	6.96	2	247	250	250		116	87	
1	24	429.55	0.35	1.21	9.55	3	245				124	89	
B - 6	28	430.25	0.03	0.10	0.25	1	245	250	250		110	90	
5	32	431.32	0.06	0.21	1.32	1	244				117	92	
4	36	433.30	0.20	0.70	3.30	2	243	251	250		126	92	
3	40	435.55	0.26	0.91	5.56	2	244				129	93	
2	44	438.20	0.35	1.23	8.20	3	243	251	249		132	95	
1	48	441.57	0.48	1.84	1.57	4	243				136	95	
C - 6	52	442.35	0.03	0.11	2.35	1	243	250	248		114	97	
5	56	443.43	0.06	0.21	3.43	1	242				118	97	
4	60	444.69	0.08	0.28	4.69	1	241	250	249		120	97	
3	64	446.23	0.12	0.42	6.23	1	242				123	97	
2	68	448.02	0.16	0.56	8.02	1	242	250	250		129	97	
1	72	450.62	0.34	1.20	0.62	3	244				135	97	
D - 6	76	451.26	0.02	0.07	1.26	1	240	250	250		115	98	
5	80	452.15	0.04	0.14	2.15	1	240				112	98	
4	84	453.32	0.07	0.25	3.32	1	241	249	250		118	97	
3	88	454.58	0.08	0.28	4.58	1	241				122	97	
2	92	456.12	0.12	0.42	6.12	1	243	250	250		126	97	
1	96	458.40	0.26	0.91	8.40	2	245			V	135	98	
	(1130)												
	θ = 96	Vm = 37.90		ΔH = 0.53							AVG. =	105.6	

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M-C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-23-92 TEST 3 RUN 2 FILTER TYPE GLASS FIBER

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: #1168

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	523	100	423
DESICCANT	1474	1334	140
TOTAL			563

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.68 IN Hg H2O 42 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-23-92 TEST 3 RUN 2 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1220)	(458.60)											
A - 6	4	459.34	0.03	0.10	9.34	1	244	250	250	N/A	90	86	
5	8	460.28	0.05	0.16	0.28	1	244				94	86	
4	12	461.53	0.09	0.29	1.53	1	244	250	250		102	86	
3	16	462.92	0.11	0.35	2.92	1	246				110	87	
2	20	465.00	0.24	0.78	5.00	2	245	250	250		118	88	
1	24	467.56	0.36	1.18	7.56	3	243				126	90	
B - 6	28	468.31	0.03	0.10	8.31	1	241	250	250		110	92	
5	32	469.66	0.10	0.33	9.66	1	242				116	93	
4	36	471.32	0.15	0.49	1.32	1	243	250	250		119	93	
3	40	473.47	0.25	0.83	3.47	2	241				128	94	
2	44	476.05	0.36	1.20	6.07	3	242	250	250		135	95	
1	48	479.09	0.48	1.61	9.09	4	242				138	96	
C - 6	52	479.70	0.02	0.07	9.71	1	242	250	250		112	98	
5	56	480.67	0.05	0.16	0.67	1	242				115	98	
4	60	481.96	0.09	0.30	1.96	1	242	250	250		123	98	
3	64	483.33	0.10	0.33	3.33	1	241				125	98	
2	68	485.18	0.18	0.60	5.18	2	242	250	250		132	98	
1	72	487.75	0.35	1.17	7.75	3	244				137	99	
D - 6	76	488.38	0.02	0.07	8.38	1	246	250	250		112	100	
5	80	489.12	0.03	0.10	9.12	1	245				113	100	
4	84	490.08	0.05	0.16	0.08	1	244	250	250		116	100	
3	88	491.38	0.09	0.30	1.38	1	244				120	99	
2	92	492.87	0.12	0.40	2.87	1	245	250	250		128	99	
1	96	495.05	0.25	0.83	5.05	3	245			↓	135	99	
	(1400)												
	θ = 96	Vm = 36.45		ΔH = 0.50							AVG. =	106.8	

AIR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-23-92 TEST 3 RUN 3 FILTER TYPE GLASS FIBER

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: # 1161

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	524	100	424
DESICCANT	1439	1341	98
TOTAL			522

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.68 IN Hg H20 43 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-23-92 TEST 3 RUN 3 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1450)	(495.20)											
A - 6	4	495.80	0.02	0.06	5.80	1	243	250	250	N/A	90	88	
5	8	496.81	0.06	0.19	6.81	1	242				95	88	
4	12	497.98	0.08	0.25	7.98	1	242	250	250		103	83	
3	16	499.36	0.11	0.35	9.36	1	243				112	89	
2	20	501.41	0.24	0.76	1.41	2	244	250	250		121	89	
1	24	503.83	0.33	1.05	3.83	3	245				127	90	
B - 6	28	504.57	0.03	0.10	4.57	1	245	250	250		112	92	
5	32	505.75	0.08	0.25	5.75	1	245				116	93	
4	36	507.39	0.15	0.48	7.39	1	245	250	250		126	96	
3	40	509.64	0.28	0.90	9.64	2	245				134	97	
2	44	512.25	0.37	1.20	2.25	3	245	250	250		137	98	
1	48	515.17	0.46	1.49	5.17	4	248				140	99	
C - 6	52	515.92	0.03	0.10	5.92	1	246	250	250		114	100	
5	56	516.96	0.06	0.19	6.96	1	244				119	100	
4	60	518.24	0.09	0.29	8.24	1	243	250	250		124	100	
3	64	519.65	0.11	0.35	9.65	1	246				128	101	
2	68	521.58	0.20	0.65	1.58	2	243	250	250		132	101	
1	72	524.09	0.34	1.11	4.09	3	242				139	101	
D - 6	76	524.84	0.03	0.10	4.84	1	243	250	250		115	102	
5	80	525.69	0.04	0.13	5.69	1	244				117	101	
4	84	526.73	0.06	0.19	6.73	1	244	250	250		120	101	
3	88	528.02	0.09	0.29	8.02	1	242				123	101	
2	92	529.50	0.12	0.39	9.50	1	243	250	250		126	101	
1	96	531.60	0.24	0.78	1.60	2	243			↓	132	101	
	(1640)												
	θ = 96	Vm= 36.40		ΔH=0.48							AVG.= 108.7		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-24-92 TEST 4 RUN 1 FILTER TYPE GLASS FIBER

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: #1162

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	513	100	413
DESICCANT	1593	1370	223
TOTAL			636

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.83 IN Hg H20 35 %

NOZZLE NO. N2- NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-24-92 TEST 4 RUN 1 METER BOX NO. 2 ΔH@ 1.72 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1015)	(531.75)											
A - 6	4	532.89	0.06	0.24	2.89	1	245	250	250	N/A	96	91	
5	8	534.27	0.09	0.35	4.27	1	245				104	91	
4	12	535.80	0.11	0.43	5.81	1	246	250	250		113	92	
3	16	537.63	0.15	0.59	7.63	1	247				121	93	
2	20	540.13	0.28	1.12	0.13	2	247	250	250		129	95	
1	24	543.13	0.40	1.61	3.13	3	247				137	97	
B - 6	28	544.21	0.05	0.20	4.21	1	249	250	250		115	100	
5	32	545.62	0.09	0.36	5.62	1	249				127	101	
4	36	547.41	0.14	0.56	7.41	1	249	250	250		132	101	
3	40	550.04	0.30	1.22	0.04	2	247				141	103	
2	44	553.10	0.40	1.64	3.10	3	247	250	250		145	104	
1	48	556.35	0.45	1.85	6.35	4	247				148	105	
C - 6	52	557.33	0.04	0.17	7.33	1	247	250	250		123	106	
5	56	558.50	0.06	0.24	8.50	1	248				130	106	
4	60	560.03	0.10	0.41	0.03	1	248	250	250		134	106	
3	64	561.90	0.15	0.61	1.90	1	246				138	106	
2	68	564.18	0.22	0.90	4.18	2	245	250	250		143	106	
1	72	567.47	0.46	1.89	7.47	4	245				149	107	
D - 6	76	568.77	0.07	0.29	8.77	1	246	250	250		125	107	
5	80	570.21	0.09	0.37	0.21	1	246				135	108	
4	84	571.75	0.10	0.41	1.75	1	246	250	250		138	108	
3	88	573.36	0.11	0.45	3.36	1	246				140	108	
2	92	575.48	0.19	0.78	5.48	2	245	250	250		144	108	
1	96	577.92	0.25	1.03	7.92	3	245			↓	147	108	
	(1200)												
	Θ = 96	Vm= 46.17		ΔH=0.74							AVG.= 116.9		

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER M.C. INLET NO. OF TRAVERSE POINTS 24

DATE 1-24-92 TEST 4 RUN 2 FILTER TYPE GLASS FIBER

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: # 1167

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	671	100	571
DESICCANT	1384	1362	22
TOTAL			593

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.83 IN Hg H2O 42 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-24-92 TEST 4 RUN 2 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)						OXYGEN
							STACK	PROBE	OVEN	IMPG.	GAS/IN	GAS/OUT	(% v/v)
	(1245)	(578.10)											
A - 6	4	578.97	0.04	0.13	8.97	1	246	250	250	N/A	101	98	
5	8	580.17	0.08	0.26	0.17	1	245				108	98	
4	12	581.52	0.10	0.33	1.52	1	246	250	250		118	98	
3	16	583.13	0.14	0.46	3.13	1	246				124	99	
2	20	585.41	0.28	0.93	5.41	2	243	250	250		132	100	
1	24	588.24	0.42	1.41	8.24	3	242				135	101	
B - 6	28	589.22	0.05	0.17	9.22	1	243	250	250		129	102	
5	32	590.59	0.10	0.33	0.59	1	242				125	102	
4	36	592.10	0.12	0.40	2.10	1	243	250	250		129	103	
3	40	594.36	0.27	0.91	4.36	2	243				136	105	
2	44	597.07	0.38	1.28	7.07	3	242	250	250		144	107	
1	48	600.01	0.44	1.50	0.01	4	243				149	109	
C - 6	52	600.78	0.03	0.10	0.78	1	244	250	250		125	108	
5	56	601.93	0.07	0.23	1.93	1	245				122	110	
4	60	603.32	0.10	0.34	3.32	1	245	250	250		135	110	
3	64	605.03	0.15	0.51	5.03	1	243				139	110	
2	68	607.06	0.21	0.71	7.06	2	244	250	250		143	110	
1	72	610.03	0.45	1.53	0.03	4	243				148	111	
D - 6	76	611.13	0.06	0.21	1.13	1	243	250	250		130	111	
5	80	612.37	0.08	0.27	2.37	1	245				133	111	
4	84	613.83	0.11	0.37	3.83	1	245	250	250		136	111	
3	88	615.30	0.11	0.37	5.30	1	246				140	111	
2	92	617.23	0.19	0.64	7.23	2	247	250	250		144	111	
1	96	619.40	0.24	0.82	9.40	3	246			↓	148	112	
	(1426)												
	Θ = 96	Vm = 41.30		ΔH = 0.59							AVG. = 119.2		

VR 7

EPA METHOD 3/4/5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD METHOD 1-5

PROJECT NUMBER 920014 FILTER HOLDER GLASS

SOURCE SOUTH DRYER NO. OF TRAVERSE POINTS 24

DATE 1-24-92 TEST 4 RUN 3 FILTER TYPE GLASS FIBER

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: #1164

RECOVERY SOLVENT(S):

☒ ACETONE

☐ OTHER(S)

NO. OF PROBE WASH BOTTLES: 1

SAMPLE RECOVERED BY: D. SMITH

CONDENSATE DATA:

ITEM	WEIGHT (g)		
	FINAL	TARE	DIFFERENCE
IMPINGER NO. 1			
IMPINGER NO. 2			
IMPINGER NO. 3			
CONDENSER	663	100	563
DESICCANT	1382	1352	30
TOTAL			593

INTEGRATED GAS SAMPLING DATA:

BAG PUMP NO. _____ BOX NO. _____ BAG NO. _____

BAG MATERIAL: _____ SIZE: _____

PRETEST LEAK CHECK: _____ cc/MIN AT _____ IN. Hg

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

SAMPLING RATE: _____ cc/MIN OPERATOR: _____

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

PITOT NO. P1-8 Cp .840

BAR. PRESS. 28.83 IN Hg H2O 43 %

NOZZLE NO. N2-5 NOZZLE DIA. .313 IN.

EPA METHOD 5 FIELD DATA

PROJECT NAME A.C.S. MOORHEAD SOURCE SOUTH DRYER M.C. INLET OPERATORS D. SMITH / A. NELSON

PROJECT NUMBER 920014 DATE 1-24-92 TEST 4 RUN 3 METER BOX NO. 2 ΔH@ 1.79 IN WC

GASMETER COEFF. 1.0000

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)
	(1505)	619.55											
A-6	4	620.51	0.05	0.16	0.51	1	249	250	250	N/A	106	101	
5	8	621.70	0.08	0.25	1.70	1	250				113	101	
4	12	623.10	0.11	0.35	3.10	1	247	250	250		121	102	
3	16	624.75	0.15	0.48	4.75	1	246				129	103	
2	20	626.93	0.26	0.84	6.93	2	246	250	250		137	104	
1	24	629.63	0.39	1.27	9.63	3	246				143	106	
B-6	28	630.50	0.04	0.13	0.50	1	248	250	250		130	107	
5	32	631.79	0.09	0.29	1.79	1	248				134	108	
4	36	633.58	0.17	0.56	3.58	1	244	250	250		139	109	
3	40	636.00	0.31	1.02	6.00	2	244				146	110	
2	44	638.69	0.38	1.26	8.69	3	246	250	250		150	111	
1	48	641.63	0.45	1.49	1.63	4	247				154	111	
C-6	52	642.52	0.04	0.13	2.52	1	247	250	250		130	112	
5	56	643.66	0.07	0.23	3.66	1	245				134	114	
4	60	645.04	0.10	0.33	5.04	1	247	250	250		139	114	
3	64	646.67	0.14	0.46	6.67	1	250				142	114	
2	68	648.72	0.22	0.73	8.72	2	248	250	250		149	114	
1	72	651.75	0.48	1.59	1.75	4	250				155	114	
D-6	76	652.92	0.07	0.23	2.92	1	250	250	250		135	114	
5	80	654.15	0.08	0.26	4.15	1	250				139	115	
4	84	655.46	0.09	0.30	5.46	1	248	250	250		141	115	
3	88	656.98	0.12	0.40	6.98	1	248				144	115	
2	92	658.99	0.21	0.69	8.99	2	249	250	250		149	115	
1	96	661.19	0.25	0.83	1.19	3	248			↓	154	115	
	(1645)												
	θ= 96	Vm= 41.64		ΔH= 0.60							AVG.= 124.1		

AJR 7

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920014 DATE OF ANALYSIS 1-21-92

SOURCE SOUTH PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK / MULTICLONE INLET TECHNICIAN SCB

CITY/STATE MOORHEAD, 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	4.12	20.12	4.12	16.00	1.19
	2	0.00	4.12	20.12	4.12	16.00	1.19
	3	0.00	4.12	20.12	4.12	16.00	1.19
1/2	1	0.00	4.08	19.58	4.08	15.50	1.13
	2	0.00	4.08	19.58	4.08	15.50	1.13
	3	0.00	4.08	19.58	4.08	15.50	1.13
1/3	1	0.00	4.11	19.36	4.11	15.25	1.16
	2	0.00	4.11	19.36	4.11	15.25	1.16
	3	0.00	4.11	19.36	4.11	15.25	1.16

CO_2	O_2	F_o
AVERAGE RUN 1 4.12	AVERAGE RUN 1 16.00	AVERAGE RUN 1 1.19
AVERAGE RUN 2 4.08	AVERAGE RUN 2 15.50	AVERAGE RUN 2 1.13
AVERAGE RUN 3 4.11	AVERAGE RUN 3 15.25	AVERAGE RUN 3 1.16

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920014 DATE OF ANALYSIS 1-22-92

SOURCE SOUTH PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK / MULTICLONE INLET TECHNICIAN SCB

CITY/STATE MOORHEAD, 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	1156
2/1	1	0.00	5.50	20.25	5.50	14.75	1.12
	2	0.00	5.50	20.25	5.50	14.75	1.12
	3	0.00	5.50	20.25	5.50	14.75	1.12
2/2	1	0.00	6.00	20.25	6.00	14.25	1.11
	2	0.00	6.00	20.25	6.00	14.25	1.11
	3	0.00	6.00	20.25	6.00	14.25	1.11
2/3	1	0.00	5.20	20.30	5.20	15.10	1.12
	2	0.00	5.20	20.30	5.20	15.10	1.12
	3	0.00	5.20	20.30	5.20	15.10	1.12

CO_2	O_2	F_o
AVERAGE RUN 1 5.50	AVERAGE RUN 1 14.75	AVERAGE RUN 1 1.12
AVERAGE RUN 2 6.00	AVERAGE RUN 2 14.25	AVERAGE RUN 2 1.11
AVERAGE RUN 3 5.20	AVERAGE RUN 3 15.10	AVERAGE RUN 3 1.12

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 920014 DATE OF ANALYSIS 1-23-97

SOURCE South Dust Outlet LEAK CHECK PERFORMED Yes

SITE Stack / Multi-Cone Inlet TECHNICIAN SCB

CITY/STATE Braithead, 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	5.02	20.12	5.02	15.10	1.16
	2	0.00	5.02	20.12	5.02	15.10	1.16
	3	0.00	5.02	20.12	5.02	15.10	1.16
3/2	1	0.00	5.79	20.64	5.79	14.85	1.09
	2	0.00	5.79	20.64	5.79	14.85	1.09
	3	0.00	5.79	20.64	5.79	14.85	1.09
3/3	1	0.00	4.85	20.35	4.85	15.50	1.11
	2	0.00	4.85	20.35	4.85	15.50	1.11
	3	0.00	4.85	20.35	4.85	15.50	1.11

CO_2	O_2	F_o
AVERAGE RUN 1 5.02	AVERAGE RUN 1 15.10	AVERAGE RUN 1 1.14
AVERAGE RUN 2 5.79	AVERAGE RUN 2 14.85	AVERAGE RUN 2 1.09
AVERAGE RUN 3 4.85	AVERAGE RUN 3 15.50	AVERAGE RUN 3 1.11

BAY WEST STACK SAMPLING

E.P.A. METHOD 3 ANALYSIS

JOB# 92014 DATE OF ANALYSIS 1-24-92

SOURCE SOUTH PULP DRYER LEAK CHECK PERFORMED YES

SITE STACK / MULTICLONE INLET TECHNICIAN SCB

CITY/STATE MOORHEAD, 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	6.12	20.12	6.12	14.00	1.13
	2	0.00	6.12	20.12	6.12	14.00	1.13
	3	0.00	6.12	20.12	6.12	14.00	1.13
4/2	1	0.00	6.58	20.23	6.58	13.65	1.10
	2	0.00	6.58	20.23	6.58	13.65	1.10
	3	0.00	6.58	20.23	6.58	13.65	1.10
4/3	1	0.00	6.12	20.00	6.12	13.88	1.15
	2	0.00	6.12	20.00	6.12	13.88	1.15
	3	0.00	6.12	20.00	6.12	13.88	1.15

CO_2	O_2	F_o
AVERAGE RUN 1 6.12	AVERAGE RUN 1 14.00	AVERAGE RUN 1 1.13
AVERAGE RUN 2 6.58	AVERAGE RUN 2 13.65	AVERAGE RUN 2 1.10
AVERAGE RUN 3 6.12	AVERAGE RUN 3 13.88	AVERAGE RUN 3 1.15

Appendix 3

Bay West Analytical Data

Bay West Analytical Laboratory

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

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: stack
SITE:
LOCATION:

TEST NO: 1
RUN NO.'S 1,2,3
DATE: 2.13.92
ANALYST: R. Hessler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18908, '942, '973	1	0.4594
18910, '943, '974	2	0.4335
18912, '944, '975	3	0.4454

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.0081

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18941	140.7325	-	140.7303	=	0.0022

Residue(g)		Volume(l)		g/l
0.0022	/	0.200	=	0.011

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

Bay West Analytical Laboratory

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St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 1
RUN NO: 1
DATE: 2-13-92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18973	0.9356	-	0.6204	=	0.3152

TOTAL 0.3152

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18942	21.4289	-	21.3372	=	0.0917

BLANK 0.092 (l) * 0.0081 (g/l) = 0.0007 (g)

CORRECTED TOTAL 0.0910

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18908	141.7641	-	141.7008	=	0.0633

BLANK 0.915 (l) * 0.011 (g/l) = 0.0101

CORRECTED TOTAL 0.0532

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.3152	+	0.0910	+	0.0532	=	0.4594

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LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 1
RUN NO: 2
DATE: 2.13.92
ANALYST: R Hessler

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18974	0.9284	-	0.6217	=	0.3067

TOTAL 0.3067

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18943	21.4370	-	21.3611	=	0.0759

BLANK 0.095 (l) * 0.0008 (g/l) = -0.0008 (g)

CORRECTED TOTAL 0.0751

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18910	137.3848	-	137.3233	=	0.0615

BLANK 0.890 (l) * 0.011 (g/l) = -0.0098

CORRECTED TOTAL 0.0517

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.3067	+	0.0751	+	0.0617	=	0.4335

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St. Paul, Minnesota
55103-1867

612-291-0456
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LAB NO: 2034
SOURCE: stack
SITE:
LOCATION:

TEST NO: 1
RUN NO: 3
DATE: 2.13.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
16975	0.9156	-	0.6261	=	0.2895

TOTAL 0.2895

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18944	21.3925	-	21.3138	=	0.0787

BLANK 0.066 (l) * 0.0081 (g/l) = -0.005 (g)

CORRECTED TOTAL 0.0782

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18912	135.2443	-	135.1561	=	0.0882

BLANK 0.955 (l) * 0.011 (g/l) = -0.005

CORRECTED TOTAL 0.0777

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.2895	+	0.0782	+	0.0777	=	0.4454

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55103-1867

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LAB NO: 2034
SOURCE: stack
SITE:
LOCATION:

TEST NO: 2
RUN NO.'S 1, 2, 3
DATE: 2.13.92
ANALYST: R. Hessel

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18914, '945, '976	1	0.5441
18917, '946, '977	2	0.4578
18920, '947, '978	3	0.5965

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.0081

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18941	140.7325	-	140.7303	=	0.0022

Residue(g)		Volume(l)		g/l
0.0022	/	0.200	=	0.011

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

Bay West Analytical Laboratory

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55103-1867

612-291-0456
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LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 2
RUN NO: 1
DATE: 2.13.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18976	1.0054	−	0.6219	=	0.3835

TOTAL 0.3835

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18945	21.3288	−	21.2513	=	0.0775

BLANK 0.087 (l) * 0.008 (g/l) = −0.0007 (g)

CORRECTED TOTAL 0.0768

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18914	136.8943	−	136.7975	=	0.0968

BLANK 1.180 (l) * 0.011 (g/l) = −0.0130

CORRECTED TOTAL 0.0838

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.3835	+	0.0768	+	0.0838	=	0.5441

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55103-1867

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LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 2
RUN NO: 2
DATE: 2.13.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18977	0.9627	−	0.6341	=	0.3286

TOTAL 0.3286

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18946	21.4229	−	21.3557	=	0.0672

BLANK 0.064 (l) * 0.008 (g/l) = −0.0005 (g)

CORRECTED TOTAL 0.0667

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18917	138.2972	−	138.2205	=	0.0767

BLANK 1.295 (l) * 0.011 (g/l) = −0.0142

CORRECTED TOTAL 0.0625

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.3286	+	0.0667	+	0.0625	=	0.4578

Bay West Analytical Laboratory

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St Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: stack
SITE:
LOCATION:

TEST NO: 2
RUN NO: 3
DATE: 2.13.92
ANALYST: R. Hassler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18978	0.9565	−	0.6244	=	0.3321

TOTAL 0.3321

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18947	21.4479	−	21.3038	=	0.1441

BLANK 0.090 (l) * 0.0081 (g/l) = −0.0007 (g)

CORRECTED TOTAL 0.1434

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18920	137.8898	−	137.7530	=	0.1368

BLANK 1.440 (l) * 0.011 (g/l) = −0.0158

CORRECTED TOTAL 0.1210

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.3321	+	0.1434	+	0.1210	=	0.5965

Bay West Analytical Laboratory

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55103-1667

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: stack
SITE:
LOCATION:

TEST NO: 3
RUN NO.'S 1, 2, 3
DATE: 2.13.92
ANALYST: R. Hessler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18923, '948, '979	1	0.4289
18926, '949, '980	2	0.4762
18929, '950, '981	3	0.4544

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.0081

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18941	140.7325	-	140.7303	=	0.0022

Residue(g)		Volume(l)		g/l
0.0022	/	0.200	=	0.011

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

Bay West Analytical Laboratory

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55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 3
RUN NO: 1
DATE: 2.13.92
ANALYST: C. Hesser

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18979	0.8987	−	0.6095	=	0.2892

TOTAL 0.2892

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18948	21.4469	−	21.3712	=	0.0757

BLANK 0.060 (l) * 0.0081 (g/l) = −0.0005 (g)

CORRECTED TOTAL 0.0752

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18923	137.5262	−	137.4492	=	0.0770

BLANK 1.140 (l) * 0.011 (g/l) = −0.0125

CORRECTED TOTAL 0.0645

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.2892	+	0.0752	+	0.0645	=	0.4289

Bay West Analytical Laboratory

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St. Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 3
RUN NO: 2
DATE: 12/13/92
ANALYST: R. Hossler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18980	0.9048	−	0.6144	=	0.2904

TOTAL 0.2904

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18949	21.5347	−	21.3994	=	0.1353

BLANK 0.077 (l) * 0.0081 (g/l) = −0.0006 (g)

CORRECTED TOTAL 0.1347

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18926	135.4499	−	135.3837	=	0.0662

BLANK 1.370 (l) * 0.011 (g/l) = −0.015

CORRECTED TOTAL 0.0511

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.2904	+	0.1347	+	0.0511	=	0.4762

Bay West Analytical Laboratory

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

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 3
RUN NO: 3
DATE: 2.13.92
ANALYST: R. Hesse

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18981	0.7079	-	0.6148	=	0.0931

TOTAL 0.2931

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18950	21.5119	-	21.3617	=	0.1502

BLANK 0.075 (l) * 0.0081 (g/l) = -0.0006 (g)

CORRECTED TOTAL 0.1496

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18929	136.6045	-	136.5283	=	0.0254

BLANK 1.245 (l) * 0.011 (g/l) = -0.0137

CORRECTED TOTAL 0.0117

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.2931	+	0.1496	+	0.0117	=	0.4544

Bay West Analytical Laboratory

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55103-1867

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LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 4
RUN NO.'S 1, 2, 3
DATE: 2/13/92
ANALYST: R. Hessler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18932, 1951, 1952	1	0.6358
18935, 1952, 1953	2	0.5193
18938, 1953, 1954	3	0.4688

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g).		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.008l

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18941	140.7325	-	140.7303	=	0.0022

Residue(g)		Volume(l)		g/l
0.0022	/	0.200	=	0.011

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

Bay West Analytical Laboratory

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Five Empire Drive
St Paul, Minnesota
55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 4
RUN NO: 1
DATE: 2.13.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18982	0.9505	-	0.6222	=	0.3283

TOTAL 0.3283

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18951	21.6776	-	21.4506	=	0.2270

BLANK 0.076 (l) * 0.0081 (g/l) = -0.0006 (g)

CORRECTED TOTAL 0.2264

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18932	139.6786	-	139.5835	=	0.0951

BLANK 1.275 (l) * 0.011 (g/l) = -0.0140

CORRECTED TOTAL 0.0811

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.3283	+	0.2264	+	0.0811	=	0.6358

Bay West Analytical Laboratory

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

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 4
RUN NO: 2
DATE: 2.13.92
ANALYST: R. Hosker

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18983	0.9165	-	0.6289	=	0.2876

TOTAL 0.2876

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18952	21.4627	-	21.3043	=	0.1584

BLANK 0.076 (l) * 0.0081 (g/l) = -0.0006 (g)

CORRECTED TOTAL 0.1578

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18935	139.1562	-	139.0667	=	0.0895

BLANK 1.415 (l) * 0.011 (g/l) = -0.0156

CORRECTED TOTAL 0.0739

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.2876	+	0.1578	+	0.0739	=	0.5193

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LAB NO: 2034
SOURCE: Stack
SITE:
LOCATION:

TEST NO: 4
RUN NO: 3
DATE: 2/13/92
ANALYST: K. Hasler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18984	0.9261	-	0.6357	=	0.2904

TOTAL 0.2904

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18953	21.3424	-	21.2453	=	0.0971

BLANK 0.062 (l) * 0.0081 (g/l) = -0.0005 (g)

CORRECTED TOTAL 0.0966

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18938	139.9249	-	139.8271	=	0.0978

BLANK 1.455 (l) * 0.011 (g/l) = -0.0160

CORRECTED TOTAL 0.0818

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.2904	+	0.0966	+	0.0818	=	0.4688

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55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 1
RUN NO.'S 1, 2, 3
DATE: 2·17·92
ANALYST: R. Hosler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18955/18961	1	0.9751
18956/18964	2	1.0606
18957/18963	3	0.8696

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.0081

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
		-		=	

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

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

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 1
RUN NO: 1
DATE: 2.17.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18961	1.0590	-	0.6330	=	0.4260
dish	1.3946	-	1.0040	=	0.3906

TOTAL 0.8166

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18955	21.5163	-	21.3571	=	0.1592
		-		=	

BLANK 0.082 (l) * 0.0087 (g/l) = -0.0007 (g)

CORRECTED TOTAL 0.1585

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = -_____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.8166	+	0.1585	+	_____	=	0.9751

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 1
RUN NO: 2
DATE: 2.17.92
ANALYST: R. Hosler

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18964	1.0654	-	0.6219	=	0.4435
dish	1.3830	-	1.0082	=	0.3748

TOTAL 0.8183

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18956	21.5572	-	21.3142	=	0.2430
		-		=	

BLANK 0.092 (l) * 0.0081 (g/l) = -0.0007 (g)

CORRECTED TOTAL 0.2423

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = - _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.8183	+	0.2423	+	_____	=	1.0606

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 1
RUN NO: 3
DATE: 2.17.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18963	0.9445	-	0.6241	=	0.3204
dish	1.3585	-	1.0060	=	0.3525

TOTAL 0.6729

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18957	21.6047	-	21.4075	=	0.1972
		-		=	

BLANK 0.060 (l) * 0.0061 (g/l) = 0.0005 (g)

CORRECTED TOTAL 0.1967

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.6729	+	0.1967	+	_____	=	0.8696

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 2
RUN NO.'S 1, 2, 3
DATE: 2-17-92
ANALYST: R. Hessler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18964/18985	1	1.1431
18965/18986	2	1.0204
18966/18987	3	1.0523

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.0081

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
		-		=	

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

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

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55103-1867

612-291-0456
FAX 291-0099

LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 2
RUN NO: 1
DATE: 2.17.92
ANALYST: R. Hassler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18964	1.1149	-	0.6210	=	0.4939
dish	1.3601	-	1.0043	=	0.3758

TOTAL 0.8697

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18985	21.5465	-	21.2722	=	0.2743
		-		=	

BLANK 0.113 (l) * 0.0081 (g/l) = 0.0009 (g)

CORRECTED TOTAL 0.2734

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.8697	+	0.2734	+	_____	=	1.1431

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 2
RUN NO: 2
DATE: 2.17.92
ANALYST: R. Hesser

FILTERS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18965	1.0471	-	0.6160	=	0.4311
dish	1.3520	-	1.0040	=	0.3480

TOTAL 0.7791

Probe & Front Half Wash

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
18986	21.5417	-	21.2995	=	0.2422
		-		=	

BLANK 0.113 (l) * 0.0081 (g/l) = - 0.0009 (g)

CORRECTED TOTAL 0.2413

IMPINGER CATCH

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = - _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.7791	+	0.2413	+	_____	=	1.0204

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 2
RUN NO: 3
DATE: 2-17-92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18966	1.0760	-	0.6284	=	0.4496
dish	1.3934	-	1.0083	=	0.3851

TOTAL 0.8347

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18987	21.5781	-	21.3601	=	0.2180
		-		=	

BLANK 0.055 (l) * 0.0061 (g/l) = -0.0004 (g)

CORRECTED TOTAL 0.2176

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.8347	+	0.2176	+	_____	=	1.0523

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FAX 291-0099

LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 3
RUN NO.'S 1
DATE: 2.17.92
ANALYST: R. Hassle

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18967/18988	1	1.0501
18986/18989	2	1.0421
16969/16990	3	1.1957

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.008

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
		-		=	

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

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

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 3
RUN NO: 1
DATE: 2.17.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18967	1.0674	−	0.6245	=	0.4429
dish	1.3499	−	1.0012	=	0.3487

TOTAL 0.7916

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18985	21.5450	−	21.2857	=	0.2593
		−		=	

BLANK 0.101 (l) * 0.0081 (g/l) = −0.0008 (g)

CORRECTED TOTAL 0.2585

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		−		=	
		−		=	

BLANK _____ (l) * _____ (g/l) = − _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	0.7916	+	0.2585	+	_____	=	1.0501

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 3
RUN NO: 2
DATE: 2.17.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18968	1.0163	-	0.6279	=	0.3884
dish	1.2660	-	0.9996	=	0.2664

TOTAL 0.6548

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18989	21.5773	-	21.1889	=	0.3884
		-		=	

BLANK 0.131 (l) * 0.0085 (g/l) = -0.0011 (g)

CORRECTED TOTAL 0.3873

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	0.6548	+	0.3873	+	_____	=	1.0421

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 3
RUN NO: 3
DATE: 2-17-92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18969	1.0162	-	0.6323	=	0.3839
dish	1.4663	-	0.9960	=	0.4703

TOTAL 0.8542

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18990	21.6158	-	21.2733	=	0.3425
		-		=	

BLANK 0.124 (l) * 0.0081 (g/l) = -0.0010 (g)

CORRECTED TOTAL 0.3415

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.8542	+	0.3415	+	_____	=	1.1957

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 4
RUN NO.'S 1, 2, 3
DATE: 2-17-92
ANALYST: R. Hesler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18956/18970	1	1.2384
18959/18971	2	1.2746
18960/18972	3	1.1254

BLANK VALUE ANALYSES

ACETONE

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
18954	21.2536	-	21.2525	=	0.0011

Residue(g)		Volume(l)		g/l
0.0011	/	0.135	=	0.008

CONDENSIBLE ORGANICS

Lab No.	Final Wt.(g)		Tare Wt.(g)		Gain (g)(residue)
		-		=	

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

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

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 4
RUN NO: 1
DATE: 2.17.92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18970	1.0837	-	0.6256	=	0.4581
Dish	1.5995	-	1.0015	=	0.5980

TOTAL 1.0561

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18958	21.5365	-	21.3525	=	0.1830
		-		=	

BLANK 0.091 (l) * 0.0081 (g/l) = 0.0007 (g)

CORRECTED TOTAL 0.1823

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
1	1.0561	+	0.1823	+	_____	=	1.2384

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 4
RUN NO: 2
DATE: 2.17.92
ANALYST: R. Hassler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18971	1.9476	-	0.6285	=	0.4191
dish	1.5830	-	1.0003	=	0.5827

TOTAL 1.0018

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18959	21.5487	-	21.2751	=	0.2736
		-		=	

BLANK 0.098 (l) * 0.0081 (g/l) = 0.0008 (g)

CORRECTED TOTAL 0.2728

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
2	1.0018	+	0.2728	+	_____	=	1.2746

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LAB NO: 2034
SOURCE: Inlet
SITE:
LOCATION:

TEST NO: 4
RUN NO: 3
DATE: 2.17.92
ANALYST: R. Hesler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18472	1.0649	-	0.6230	=	0.4419
dish	1.3648	-	1.0000	=	0.3638

TOTAL 0.8057

Probe & Front Half Wash

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18960	21.6891	-	21.3688	=	0.3203
		-		=	

BLANK 0.077 (l) * 0.0051 (g/l) = -0.0006 (g)

CORRECTED TOTAL 0.3197

IMPINGER CATCH

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
		-		=	
		-		=	

BLANK _____ (l) * _____ (g/l) = _____

CORRECTED TOTAL _____

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.8057	+	0.3197	+		=	1.1254

Appendix 4

Procedures

SAMPLING EQUIPMENT AND PROCEDURES

The particulate sampling equipment, referred to as the "Particulate Sampling Train", was designed and constructed by Andersen Instruments, Atlanta, Georgia. This sampling train meets or exceeds all EPA guidelines as directed by CFR Title 40, Part 60. The particulate emission rates are determined by EPA Methods 1-5, CFR Title 40, Part 60, Appendix A (revised July 1, 1988). A preliminary velocity profile of the gases is conducted by a velocity and temperature traverse in order to select an appropriate nozzle to allow isokinetic sampling.

The particulate sampling train is made up of a heated glass-lined sampling probe, Type S pitot, and a thermocouple. The probe is attached to an enclosure which houses an all-glass filter holder in a heated chamber maintained to 250 degrees F. Attached to the enclosure is an ice bath which holds the impingers and dessicant-filled drying column. The particulate sampling train is attached to the control unit by an umbilical cord (vacuum line). The control unit is made up of a dry gas meter, calibrated orifice, a leakless pump, two inclined manometers, and the appropriate valves needed for operation of the particulate sampling train.

The particulate matter is collected by drawing the stack gas through the sampling probe isokinetically and passing it through an 11.0 cm diameter Whatman Type 934-AH glass micofibre filter. The sample gas is then passed through three glass impingers and a dessicant drying column to remove any remaining moisture. The impingers and the drying column are packed in crushed ice and water to maintain $\leq$ 68 degrees F. The stack gas is then transferred to the control unit via an umbilical cord where it travels through the vacuum pump and into a calibrated dry gas meter. The calibrated gas meter provides real time flow rate data throughout the entire test.

The particulate matter sample is acquired by drawing a gas sample for equal time periods at each of the centroids of the required number of equal area sampling points. The sampling rate is adjusted throughout the test in order to maintain isokinetic sampling. A Tandy PC-6 hand held computer is used for determination of the sampling rates.

After sampling is completed, the filter is removed with a set of teflon-coated tweezers and placed in a glass petri dish and sealed. The nozzle and the inlet side of the filter holder are washed with acetone and brushed to remove any deposits. The sampling probe is rinsed with acetone, brushed with a probe brush, and rinsed again. The acetone rinse/washing, called "probe wash",is taken to the laboratory along with the filter to be logged in. A chain of custody accompanies the samples during transport to the laboratory

The volume of the probe wash is recorded to determine if any acetone was lost in transport and then evaporated to near dryness by heating to 62 degrees C. Then it is quanitatively transferred to a tared 40 ml glass evaporation vial. This samnple is evaporated to dryness by heating to 62 degrees C. The acetone-free sample is then dried at 105 degrees C for 30 minutes, cooled in a dessicator, and weighed to the nearest 0.1 mg. The filter is transferred to a 150 mm diameter glass petri dish and dried at 105 degrees C for two hours. It is then cooled in a dessicator and weighed to the nearest 0.1 mg. All sample weighings are done in a balance room were the relative humidity is maintained at less then 50%. The dessicant weight is recorded in the field and added to the collected condensate to give the total amount of water collected.

Modified Method 5 Test Method For Condensible Particulate

Purpose

To describe a test method for particulate which includes the condensible particulate captured in the impingers of the United States Environmental Protection Agency Method 5 (EPA Method 5) as stated in Title 40, Code of Federal Regulations, Part 60, Appendix A or any other test method approved by the Department.

The test method shall be applied to all sources. The Department may grant exemptions to New Source Performance Standard sources, sources to which Best Available Control Technology is applied, and other sources on a case-by-case basis.

Sampling Equipment

The sampling train and sample recovery equipment are the same as listed in par. 2 of EPA Method 5.

Reagents

The reagents are the same as listed in par. 3 of EPA Method 5 with the addition of methylene chloride-reagent grade. At the discretion of the tester, any of the following reagent grade solvents may also be used: chloroform, ethyl ether, 1,1,1-trichloroethane, trichlorotrifluoroethane (freon 113) and any other solvent exhibiting similar properties as the solvents listed.

Procedure

The sampling procedure is the same as listed in par. 4.1 of EPA Method 5. All parts of the sample collection portion of the train (nozzle, probe, cyclone and flask, filter holder, impinger glassware) shall be clean before sample collection. All sample collection portions of the train shall be made free of organic solvent residue before sample collection by rinsing them two or more times with distilled water.

The sample recovery procedure is the same as listed in par. 4.2 of EPA Method 5 with the addition of the following:

1. The filter is placed in Container #1.
2. The probe wash consisting of the probe rinse, the cyclone and flask rinse, the connecting glassware rinse, and the front half of the filter holder rinse is placed in Container #2.
3. The spent silica gel is placed in Container #3.

4. In order not to contaminate the impinger sample during sample recovery, the tester shall wipe off stopcock grease used on any glassware joint, that might come in contact with the impinger catch contained in the first 3 impingers, before recovering the sample.

5. Measure the volume of the impinger catch with a graduated cylinder or by weighing on a balance. The impinger catch is placed in Container #4.

6. Rinse the graduated cylinder, the back half of the filter holder, the first 3 impingers, and the glassware connectors with distilled water and add it to Container #4.

7. Repeat the rinse with acetone, being careful not to contaminate the acetone rinse with stopcock grease, and place it in Container #5.

The sample analysis shall be as follows:

1. The determination of weight gain on the filter in Container #1 is the same as described for Container #1 in par. 4.3 of EPA Method 5 except for the following items.

   a. Desiccate the filter for at least 24 hours and no more than 48 hours in a desiccator and weight to a constant weight. Report the results to the nearest 0.1 mg. For the purposes of this handbook procedure, the term constant weight means a difference of no more than 0.5 mg between 2 consecutive weighings with at least 2 hours of desiccation between weighings.

   b. At the discretion of the tester, the alternate oven drying procedure for the filter, listed in par. 4.3 of EPA Method 5, may be used provided that the tester provides for 2 hours of desiccation between weighings. After the procedure is performed, the initial weight determined may be used as the final weight.

2. The analysis of the probe wash in Container #2 is the same as described for Container #2 in par. 4.3 of EPA Method 5. With appropriate caution, the alternate drying procedure at an elevated temperature, listed in par. 4.3 of EPA Method 5, may be used. The desiccating and weighing procedure listed for the filter in par. 1.a. of this handbook procedure shall be used.

3. The spent silica gel in Container #3 is weighed in the same manner as Container #3 in par. 4.3 of EPA Method 5.

4. The analysis of the impinger catch in Container #4 is performed by transferring the sample to a separatory funnel. Rinse Container #4 with distilled water and add the rinse to the funnel. Repeat the rinse with acetone and add it to Container #5. Add 50 milliliters (ml) of methylene chloride to the funnel and shake for 1 minute. Allow the phases to separate and drain the solvent phase into a tared beaker. Perform the extraction 2 more times and drain the solvent phase into the same beaker.

Drain the remaining liquid in the funnel into another tared beaker. The solvent extract residue beaker is analyzed in the same way as Container #2 in par. 4.3 of EPA Method 5 except that evaporation of the sample to dryness shall be at ambient temperature and pressure. The desiccating and weighing procedure listed for the filter in par. 1.a. of this handbook procedure shall be used.

Only 3 solvent extractions are necessary regardless of the size of the sample. If the size of the sample exceeds the size of the available separatory funnel, the sample may be split and the 2 halves analyzed separately.

5. The liquid residue beaker is analyzed in the same way as Container #2 in par. 4.3 of EPA Method 5 except that evaporation of the sample to dryness may be performed at 220°F ±10°F. As an alternate drying procedure, a 100 ml aliquot of the liquid residue may be evaporated to dryness at 220°F ±10°F. Following the drying procedure, the desiccating and weighing procedure listed for the filter in par. 1.a. of this handbook procedure shall be used. If an aliquot was used, the weight of the sample shall be corrected to reflect the entire sample volume of the liquid residue. For some sources, the exhaust gases being sampled may chemically react with the impinger water to produce artifacts. These artifacts would show up as particulate in the liquid residue. If a source can demonstrate that all or part of the liquid residue particulate is due to artifacts, the source may subtract the weight of the artifacts from the total particulate weight.

   A common artifact found during the testing of sources that emit SO_2 is sulfates. The tester may perform a U.S. EPA Method 8 barium perchlorate titration for H_2SO_4 on the sample and subtract the results.

6. The analysis of the impinger acetone rinse in Container #5 is the same as described for Container #2 in par. 4.3 of EPA Method 5 except that evaporation of the sample to dryness shall be at ambient temperature and pressure. The desiccating and weighing procedure listed for the filter in par. 1.a. of this handbook procedure shall be used.

7. Perform blank weight determinations on the distilled water, the acetone, and the solvent used in the extraction. Solvents, acetone, and distilled water with blank values greater than 0.01 mg/ml should not be used.

8. The filterable particulate weight or front half catch is determined by adding the weight gain of the filter and the probe wash weight and subtracting out the acetone blank weight.

9. The condensible particulate weight or back half catch is determined by summing the weights of the solvent extract residue, the liquid residue, and the impinger acetone rinse and subtracting out the appropriate blank weights. The organic fraction of the back half is equal to the solvent extract weight plus the impinger acetone rinse weight minus the appropriate blank weights. The inorganic fraction of the back half is equal to the liquid residue weight minus the water blank and any artifact correction.

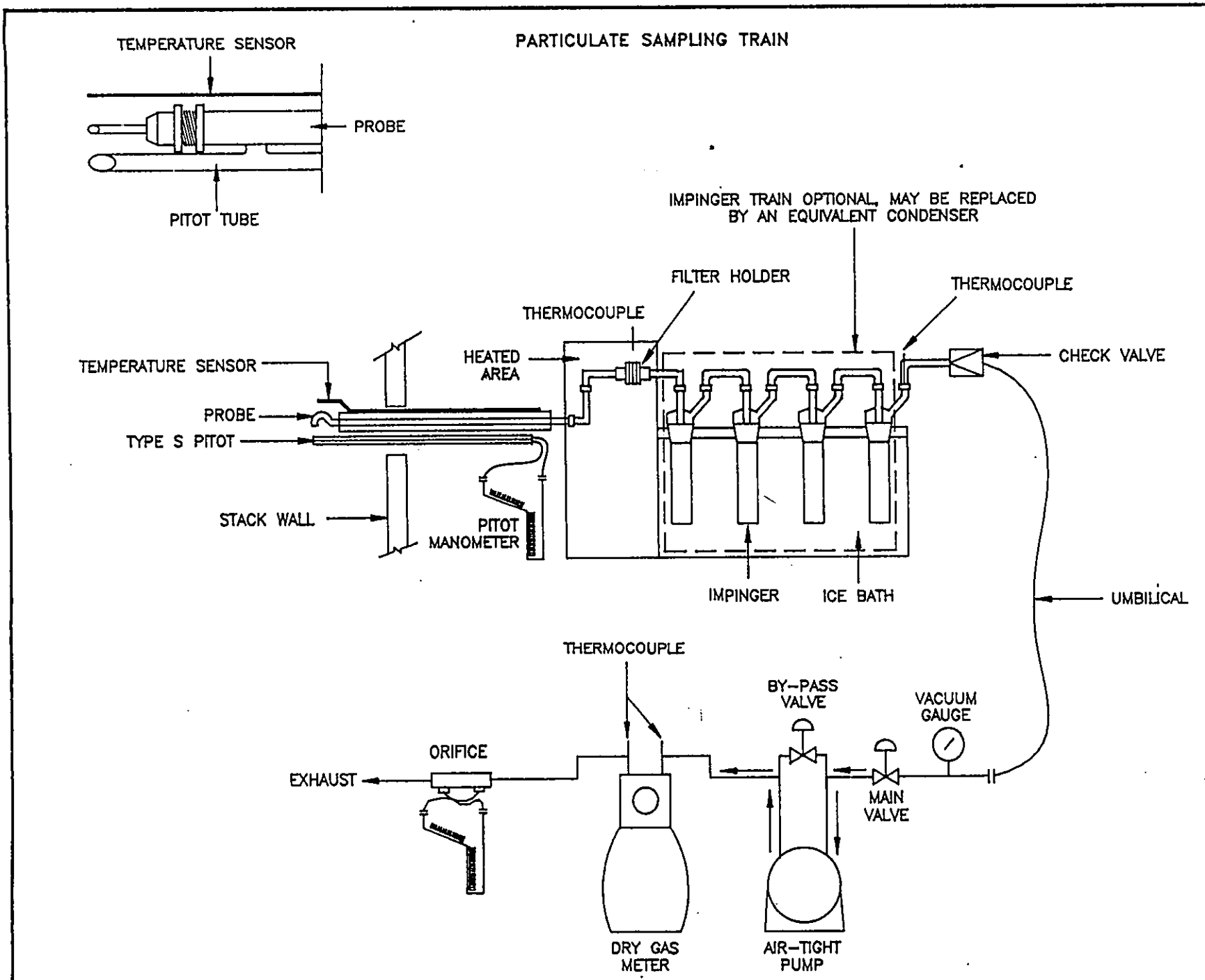
10. The total particulate weight is the sum of the filterable particulate weight and the condensible particulate weight.

Calibrations

The calibrations that need to be performed on the sampling equipment are the same as listed in par. 5 of EPA Method 5.

Calculations

The calculation of results and the criteria for acceptable results is the same as described in par. 6 of EPA Method 5. The total particulate weight shall be used to determine compliance.


PARTICULATE SAMPLING TRAIN
TEMPERATURE SENSOR
PROBE
PITOT TUBE
IMPINGER TRAIN OPTIONAL, MAY BE REPLACED BY AN EQUIVALENT CONDENSER
FILTER HOLDER
THERMOCOUPLE
THERMOCOUPLE
CHECK VALVE
HEATED AREA
TEMPERATURE SENSOR
PROBE
TYPE S PITOT
STACK WALL
PITOT MANOMETER
IMPINGER
ICE BATH
UMBILICAL
THERMOCOUPLE
BY-PASS VALVE
VACUUM GAUGE
ORIFICE
EXHAUST
MAIN VALVE
DRY GAS METER
AIR-TIGHT PUMP

Appendix 5

Calculations and Abbreviations

Symbols

A	Stack Cross Sectional Area, ft^2
A_n	Nozzle Cross Sectional Area, ft^2
B_{ws}	Moisture Content of Stack Gas, Proportion by Volume
C_{actual}	Concentration of Particulate Matter in Stack Gas, gr/acf
C_p	Pitot Tube Coefficient, dimensionless
C_s	Concentration of Particulate Matter in Stack Gas, Dry Basis, Corrected to Standard Conditions, gr/dscf
ΔH	Average Orifice Meter Pressure Drop, in. H_2O
I	Isokinetic Ratio, %
m_n	Mass of Particulate Collected, g
m_r	Mass Loading Rate, #/hour
M_s	Wet Molecular Weight of Stack Gas, g/g-mole
θ	Total Sampling Time, min.
Δp	Velocity Head of Stack Gas, in. H_2O
P_b	Absolute Barometric Pressure, in. Hg
P_s	Absolute Stack Pressure, in. Hg
P_{std}	Standard Absolute Stack Pressure, 29.92 in. Hg
Q_{sd}	Dry Volumetric Stack Flow Rate, scfm
$T_{m(avg)}$	Average Absolute Dry Gas Meter Temperature, °R
$T_{s,avg}$	Average Absolute Stack Gas Temperature, °R
T_{std}	Standard Absolute Temperature, 528 °R
$V_{s,avg}$	Average Stack Gas Velocity, ft/sec
$V_{w(std)}$	Standard Volume of Water Collected from Stack Gas, ml
$V_{m(std)}$	Standard Volume of Gas Measured by the Dry Gas Meter, dscf
V_m	Volume of Gas Measured by the Dry Gas Meter, cf
W_f	Weight of Water Collected in Silica Gel, g
Y	Dry Gas Meter Calibration Factor, dimensionless

ABBREVIATIONS

acfm	actual cubic feet per minute
cc	cubic centimeters
cf	cubic feet
degrees C	degrees Centigrade
degrees F	degrees Fahrenheit
diam	diameter
dscf	dry standard cubic feet
ft/sec	feet per second
g	gram
gr/acf	grains per actual cubic foot
gr/dscf	grains per dry standard cubic foot
hrs	hours
in	inches
in Hg	inches of mercury
in wc	inches of water column
lb/hr	pounds per hour
lb/dscf	pounds per dry standard cubic foot
mg	milligrams
min	minutes
ml	milliliters
standard conditions	20° C and 29.92 inches of mercury
sq ft	square feet
v/v	percent by volume
w/w	percent by weight

Equations Used in this Report

Method 2

$$V_{s(avg)} = 85.48\ C_p\ (\sqrt{\Delta p})_{avg} \sqrt{\frac{T_{s(avg)}}{P_s\ M_s}}$$

$$Q_{sd} = 60\ (1 - B_{ws})\ V_{s(avg)}\ A\ \frac{T_{std}\ P_s}{T_{s(avg)}\ P_{std}}$$

Method 3

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%N_2 + \%CO)$$

$$M_s = M_d\ (1 - B_{ws}) + 0.18(\%B_{ws})$$

Method 4

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

$$V_{w(std)} = 0.04707\ (W_f)$$

Method 5

$$V_{m(std)} = 17.65\ V_m\ Y\ \frac{P_b + \overline{\Delta H}/13.6}{T_{m(avg)}}$$

$$I = 0.0945\ \frac{T_{s(avg)}\ V_{m(std)}}{P_s\ V_{s(avg)}\ A_n\ \theta\ (1 - B_{ws})}$$

$$C_s = \frac{15.43\ m_n}{V_{m(std)}}$$

$$C_{actual} = \frac{272.3\ m_n\ P_s}{T_{s(avg)}\ (V_{w(std)} + V_{m(std)})}$$

$$m_r = 0.008714\ C_s\ Q_{sd}$$

$$m_i = C\ F\ \left(\frac{20.9}{20.9 - \%O_2}\right)$$

Appendix 6

Sampling Equipment Calibration Data

NOZZLE CALIBRATION DATA SHEET

NOZZLE IDENTIFICATION NUMBER: N1-4

FIELD TECHNICIAN: SCOTT BAINVILLE

DATE OF CALIBRATION: 1-21-92

POSITION	DIAMETER (INCHES)
1	.312 IN.
2	.311 IN.
3	.312 IN.
AVERAGE:	.312 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: N2-5

FIELD TECHNICIAN: DWAYNE SMITH

DATE OF CALIBRATION: 1-21-92

POSITION	DIAMETER (INCHES)
1	.313 IN.
2	.312 IN.
3	.313 IN.
AVERAGE:	.313 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: P1-4

DATE OF INSPECTION: 9-9-91

TECHNICIAN: SCOTT BAINVILLE

PITOT TUBE DIMENSIONS:

External tubing diameter (D_t)	.315	IN.
Base to Side A opening plane (P_A)	.450	IN.
Base to Side B opening plane (P_B)	.453	IN.

ALIGNMENT:

a_1	<	10°	0	degrees
a_2	<	10°	0	degrees
B_1	<	5°	0	degrees
B_2	<	5°	0	degrees
Z	<	.125"	.021	IN.
W	<	.0625"	.034	IN.

DISTANCE FROM PITOT TO PROBE COMPONENTS:

Pitot to 0.500" nozzle	.745	IN.
Pitot to probe sheath	4.4567	IN.
Pitot to thermocouple (parallel to probe)	.9668	IN.
Pitot to thermocouple (perpendicular to probe)	3.525	IN.

S-TYPE PITOT TUBE INSPECTION SHEET

PITOT NUMBER: P1-6

DATE OF INSPECTION: 9-9-91

TECHNICIAN: SCOTT BAINVILLE

PITOT TUBE DIMENSIONS:

External tubing diameter (D_t)	.316	IN.
Base to Side A opening plane (P_A)	.450	IN.
Base to Side B opening plane (P_B)	.453	IN.

ALIGNMENT:

a_1	<	10°	0	degrees
a_2	<	10°	0	degrees
B_1	<	5°	0	degrees
B_2	<	5°	0	degrees
Z	<	.125"	.015	IN.
W	<	.0625"	.019	IN.

DISTANCE FROM PITOT TO PROBE COMPONENTS:

Pitot to 0.500" nozzle	.755	IN.
Pitot to probe sheath	4.3298	IN.
Pitot to thermocouple (parallel to probe)	.9328	IN.
Pitot to thermocouple (perpendicular to probe)	3.525	IN.

S-TYPE PITOT TUBE INSPECTION SHEET

PITOT NUMBER: P1-8

DATE OF INSPECTION: 9-9-91

TECHNICIAN: SCOTT BAINVILLE

PITOT TUBE DIMENSIONS:

External tubing diameter (D_t)	.315	IN.
Base to Side A opening plane (P_A)	.450	IN.
Base to Side B opening plane (P_B)	.453	IN.

ALIGNMENT:

a_1 < 10°	2	degrees
a_2 < 10°	3	degrees
B_1 < 5°	3	degrees
B_2 < 5°	0	degrees
Z < .125"	.051	IN.
W < .0625"	.033	IN.

DISTANCE FROM PITOT TO PROBE COMPONENTS:

Pitot to 0.500" nozzle	.745	IN.
Pitot to probe sheath	4.4567	IN.
Pitot to thermocouple (parallel to probe)	.9668	IN.
Pitot to thermocouple (perpendicular to probe)	3.525	IN.

TEMPERATURE MEASUREMENT DEVICE
CALIBRATION DATA

DATE OF CALIBRATION: 10-14-91
MAKE: OMEGA T/C SOURCE CALIBRATOR
MODEL: CL-300-K-2100F
SERIAL NUMBER: 105
RANGE: 0F-2100F
THERMOCOUPLE TYPE: K
TECHNICIAN: DAS
UNIT WAS: IN TOLERANCE

DESIRED TEMP	TEMPURATURE OF SIMULATOR	RESPONSE	DEVIATION (t)	DEVIATION (%)
0	0	-0.6	0.6	0.13
100	100	100.8	0.8	0.14
200	200	202.5	2.5	0.37
300	300	302.1	2.1	0.27
400	400	401.4	1.4	0.16
500	500	503.5	3.5	0.36
600	600	605.1	5.1	0.48
700	700	704.6	4.6	0.39
800	800	806.7	6.7	0.53
900	900	905.9	5.9	0.43
1000	1000	1007	7	0.47
1100	1100	1107	7	0.44
1200	1200	1206	6	0.36
1300	1300	1308	8	0.45
1400	1400	1409	9	0.48
1500	1500	1510	10	0.51
1600	1600	1611	11	0.53
1700	1700	1711	11	0.50
1800	1800	1813	13	0.57
1900	1900	1912	12	0.50
2000	2000	2015	15	0.60
2100	2100	2114	14	0.54
		AVERAGES:	7.1	0.41

% DEVIATION = (t * 100) / (t + 460)
% DEVIATION MUST BE < 1.5

#2

ANDERSEN Samplers INC.

4801 FULTON IND. BLVD., ATLANTA, GA 30336

CONTROL UNIT CALIBRATION

Date 1-2-92 Unit Number 1291-604

Barometric pressure, P_b = 29.49 in Hg. Model Number 90-800

Orifice manometer setting, ΔH in. H_2O	Gas volume, wet test meter V_w, ft^3	Gas volume, dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °R	Temperature: Dry gas meter Inlet t_{di}, °R	Temperature: Dry gas meter Outlet t_{do}, °R	Temperature: Dry gas meter Average t_d, °R	Time θ, min	Y	ΔH@
1.0	5	5.342	75.2/535.2	133.9	93.7/553.7	113.80/573.80	8.76	1.00	1.71
2.0	5	5.362	74.0/534.0	139.5	94.9/554.4	116.95/576.95	6.39	1.00	1.81
4.0	5	5.397	74.8/534.8	142.7	95.8/555.8	119.25/579.25	4.56	.99	1.84
								1.00	1.79

Calculations

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b \left(t_d \right)}{V_d \left(P_b + \frac{\Delta H}{13.6} \right) \left(t_w \right)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b \left(t_{do} \right)} \left[\frac{\left(t_w \right) \theta}{V_w} \right]^2$
1.0	0.0735		
2.0	0.147		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter. Tolerance : ± 0.01

ΔH@ = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O. Tolerance : ± 0.15

Calibrated by: MDC

ANDERSEN Samplers INC.

4801 FULTON IND. BLVD., ATLANTA, GA 30336

CONTROL UNIT CALIBRATION

Date 10-25-91 Unit Number 191-519

Barometric pressure, P_b = 29.72 in Hg. Model Number 20-800

Orifice manometer setting, ΔH in. H_2O	Gas volume, wet test meter V_w, ft^3	Gas volume, dry gas meter V_d, ft^3	Temperature: Wet test Meter t_w, °R	Temperature: Dry gas meter Inlet t_{di}, °R	Temperature: Dry gas meter Outlet t_{do}, °R	Temperature: Dry gas meter Average t_d, °R	Time θ, min	Y	ΔH@
1.0	5	5.279	78.2	123.1	89.5	108.3	8.9	.9976	1.25
2.0	5	5.281	78.4	135.1	91.2	112.6	6.3	1.002	1.79
4.0	5	5.289	77.0	139.6	92.2	115.9	4.5	1.003	1.76
								1.001	1.75

Calculations

ΔH	$\frac{\Delta H}{13.6}$	Y: $\frac{V_w P_b (t_d)}{V_d\left(P_b + \frac{\Delta H}{13.6}\right)(t_w)}$	ΔH@: $\frac{0.0317\ \Delta H}{P_b (t_{do})}\left[\frac{(t_w)\theta}{V_w}\right]^2$
1.0	0.0735		
2.0	0.147		
4.0	0.294		

Y = Ratio of accuracy of wet test meter to dry test meter. Tolerance : ± 0.01

ΔH@ = Orifice pressure differential that gives 0.75 cfm of air at 70°F and 29.92 inches of mercury, in. H_2O. Tolerance : ± 0.15

Appendix 7

Process Rates

1/24/92

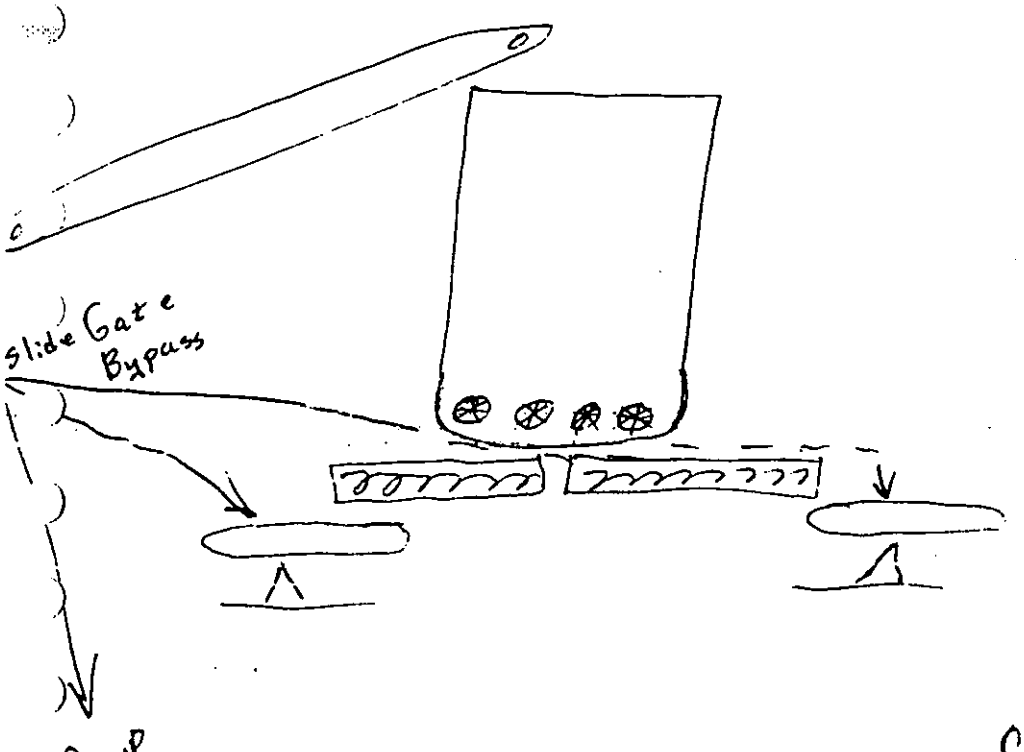
Jim Fates

Stack 62,695
Recycle 8,327
71,022

> 11.72% Rec. Asp. 10,596 before turndown

0715 → 0730

Scrolls having problems with "sticky pulp" — had to go back to slide gates. — Implications For Surge Bin — Need bypass to individual belts if plugs!



"Bypass For Scale Calibration"!!!

0.47 ΔP = 8,327 √ = 0.666

need 10,653

√ = 0.878

Δ = 0.77

1/24/92

SOUTH DRYER FD Air Flow	Time	Draft %	Instrument
South Duct	1051	35.8	10.40
	1054	35.5	11.22
	1057	36.0	11.15
	1105	33.0	7.82
North Duct	1109	33.3	6.82
	1112	35.5	11.35
	1116	38.7	13.39
	1119	41.6	20.32
	1124	41.4	20.26
North Duct	1335	40.9	20.90
	1338	38.4	13.68
	1341	39.6	18.43
South Duct	1344	39.8	16.20
	1348	39.8	19.55
South Duct	1530	39.1	16.29
	1532	37.7	~~16.76~~
	1534	37.3	14.27
North Duct	1536	39.0	17.48
	1538	39.7	17.51
	1540	44.2	21.21
	1542	47.1	23.30

Need FD Duct Diameters & Sample Duct Locations

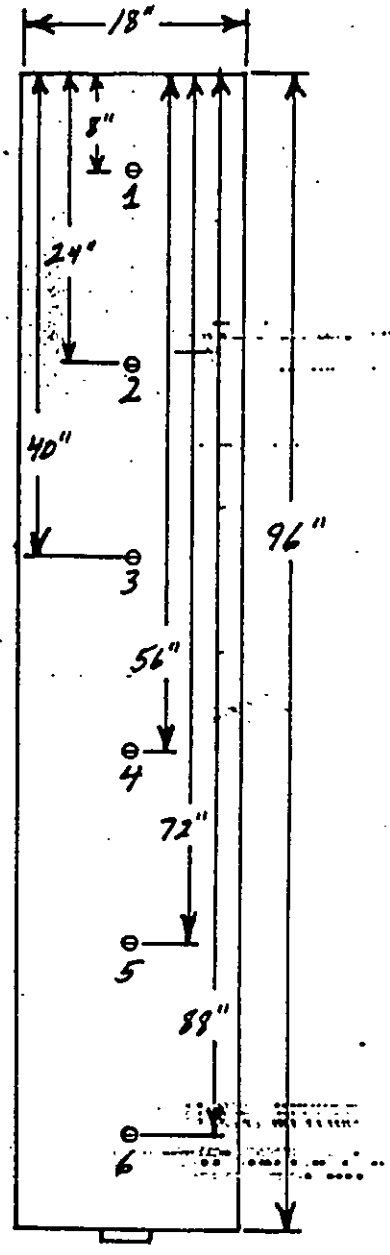
Coke Pan for sampling bottom ash

Forced Draft Air Flow

Unit FD Location South

Static Pressure, in-H_2O .41

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.29	.54	125
2	.25		124
3	.19		123
4	.19		122
5	.14		121
6	.01		
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\ \_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ _____ lb/hr.

Time 11 AM

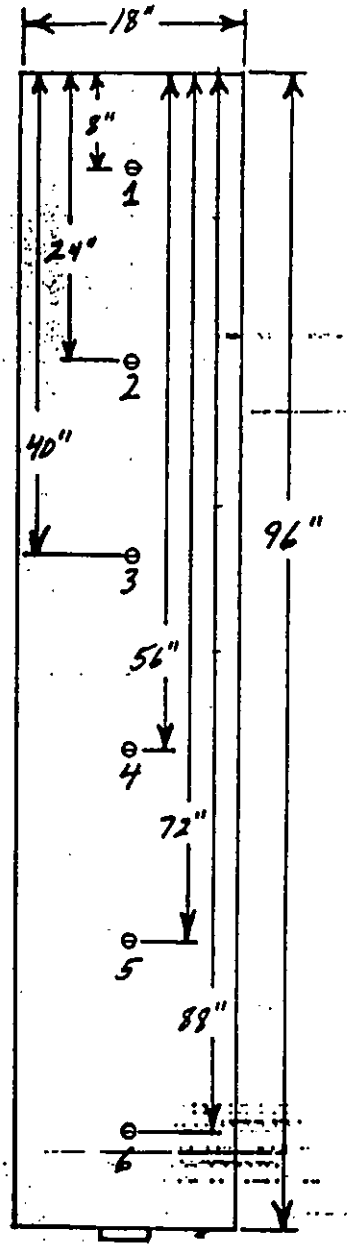
Date 1-25-92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit South Location North Side



Static Pressure, in-H_2O -.51

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.12		124
2	.13		124
3	.36		125
4	.38		126
5	.58		128
6	.59		127
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\ \_\_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ \_\_\_\_\_)/(T_s\ \_\_\_\_\_) =$ _____ lb/hr.

Time 11:15

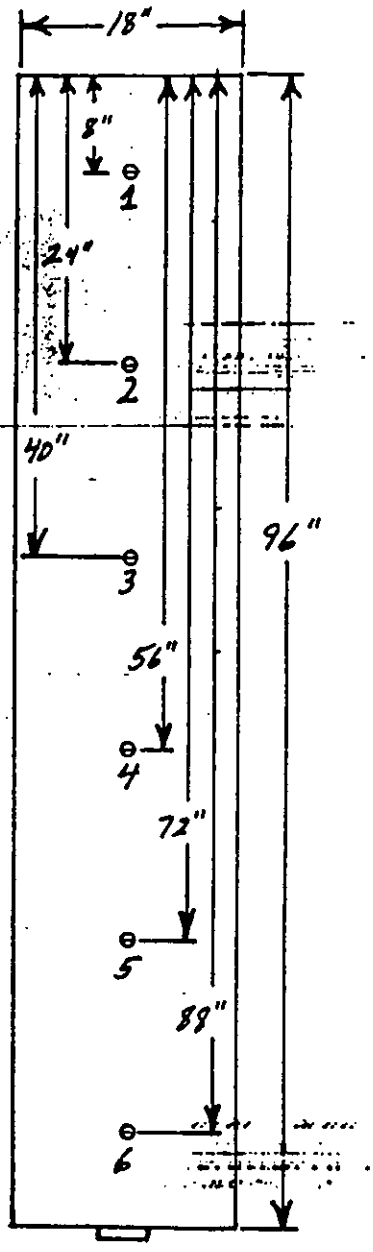
Date 1-25-92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit S. Drier Location N. Duct



Static Pressure, in-H_2O _____

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.06	_____	124.0
2	.07	_____	125.0
3	.09	_____	125.5
4	.14	_____	127.5
5	.34	_____	128.5
6	.41	_____	129.0
Average		_____	_____ + 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}$ _____ $)\sqrt{(T_s$ _____ $)/870.25}$

v_s = _____ Feet/second

Air Flow, $V_F = v_s(A)(60 sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____ $)$ = _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____ $)/(T_s$ _____ $)$ = _____ lb/hr.

Time 1:35 PM

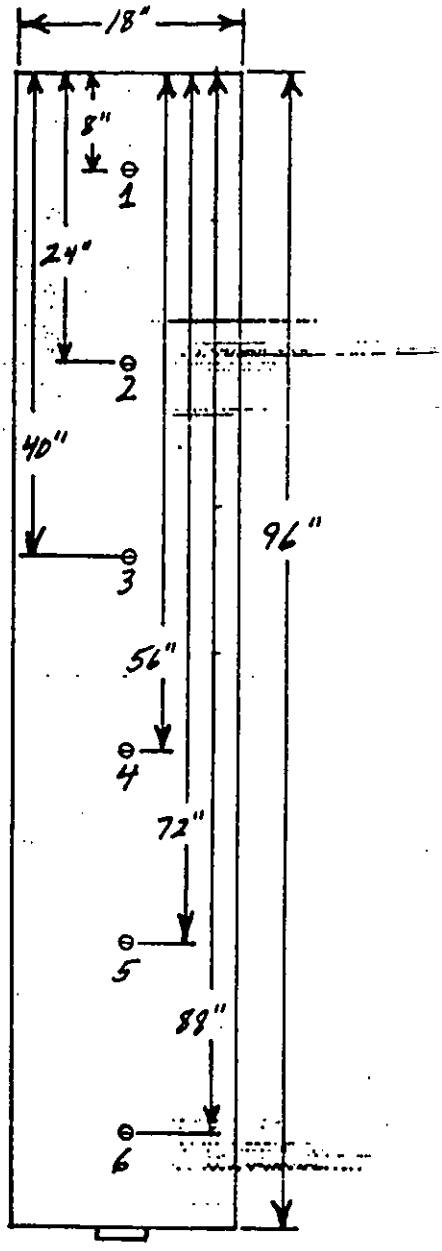
Date 1/24/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit [illegible] Location [illegible]



Static Pressure, in-H_2O [illegible]

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	[illegible]		[illegible]
2	[illegible]		127.2
3	[illegible]		[illegible]
4	.04		125.0
5	0		124.6
6	[illegible]		124.6
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95 (\sqrt{\Delta P}_{avg}) \left(\sqrt{T_s / 870.25}\right)$

$v_s = 70.95 (\sqrt{\Delta P}$ _____ $) \sqrt{(T_s$ _____ $)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s (A) (60 sec/min)$

$A = 12 Ft^2$

$V_F = 720 (v_s$ _____ $) =$ _____ acfm

FD Air Rate, $Q_F = 2381 (V_F)/(T_s)$

$Q_F = 2381 (V_F$ _____ $)/(T_s$ _____ $) =$ _____ lb/hr.

Time 1:45 PM

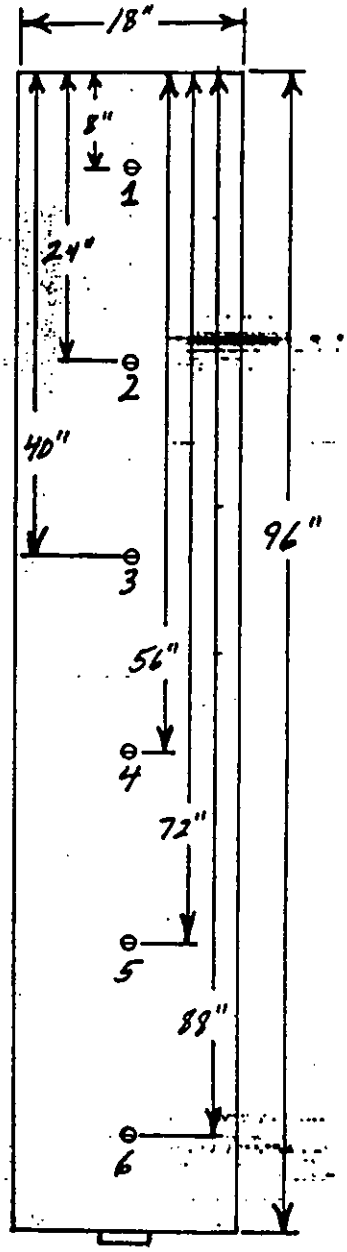
Date 1/24/[illegible]

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit S. Drier Location S [illegible]



Static Pressure, in-H_2O .1

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.[illegible]		[illegible]
2	.21		[illegible]
3	.[illegible]		[illegible]
4	.0[illegible]		30.0
5	0		12[illegible]
6	-.0[illegible]		12[illegible]
	Average		+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____ $) =$ _____ acFm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____ $)/(T_s$ _____ $) =$ _____ lb/hr.

Time 3:30 PM

Date [illegible]

Name _____

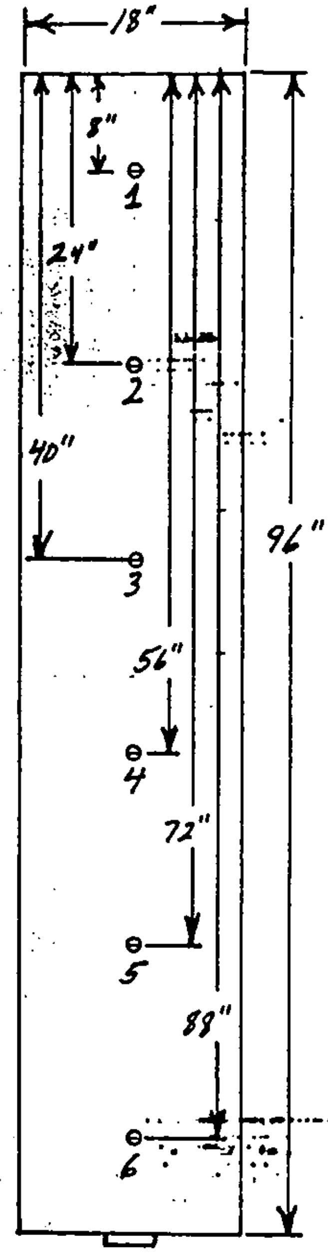
Moorhead Factory

FORCED DRAFT AIR FLOW

Unit [illegible] Location [illegible]

Static Pressure, in-H_2O [illegible]

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	[illegible]		
2	[illegible]		[illegible]
3	[illegible]		[illegible]
4	[illegible]		[illegible]
5	.57		[illegible]
6	.46		[illegible]
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}$ ______ $)\sqrt{(T_s \text{ \_\_\_\_\_\_ })/870.25}$

v_s = ________ Feet/second

Air Flow, $V_f = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_f = 720(v_s$ ______ $)$ = ________ acfm

FD Air Rate, $Q_F = 2381(V_f)/(T_s)$

$Q_F = 2381(V_f$ ______ $)/(T_s$ ______ $)$ = ________ lb/hr.

Time [illegible]

Date [illegible]

Name ________

Moorhead Factory

1/24/92 E of Day

South Stack 58413
58205
58876

Rec 10,766

~~Asp~~ Asp 9,466

North Stack 111,500 ACFM

200°F

15.54% Recycle

13.67% Aspiration

If 60% feed to South Unit = 34 Tph,
40% to North Unit = 23 Tph (60% Turndown = 13.8 Tph)

Maximum = 23 Tph-pulp × 0.15 = 3.45 Tph-coal

@ 45% xs-air = 1.45 (3.45)(2000)(6.9124) = 69,159 lb-air/hr
@ 131°F = 17,166 acfm

to get 50 fps, need Rd Duct = 5.722 ft²

ID = 2.70 feet

in 30-inch Duct, A = 4.909 ft²

@ max, v_a = 59.28 fps

Minimum = 13.8 Tph-pulp × .15 = 2.07 Tph-coal

@ 45% xs-air = 1.45 (2.07)(2000)(6.9124) = 41,495 lb-air/hr
@ 131°F = 10,300 acfm

in 30-inch Duct, v_a = 34.97 fps

Recommend 30-inch ID Duct on North Unit

Maximum Coal Feed Rate = 4.69 Tph on 11/24/92 (1335-1348)

@ 0.15 T-coal/T-pulp ≈, equiv. pulp = 31.27 Tph

@ 34 Tph pulp, need 5.10 Tph-coal

10,200 lb-coal/hr ÷ 60 = 170 lb/min

@ 45% xs-air, 1.45 (110) 6.9124 = 1,704 lb-air/min
= 102,234 lb-air/hr

@ 131°F = 25,376 acfm

To get 50 fps, need 25,376/60(50) = 8.459 ft²

Round Duct ≈ D = 3.28 ft

Minimum Coal Feed Rate = 3.79 Tph on 11/21/92 (1915-1930)

@ 0.15 T-coal/T-pulp, equiv. pulp = 25.27 Tph

60% turndown = 0.60 x 34 = 20.4 Tph

Use 20 Tph

Coal = 3 Tph = 6,000 lb/hr

@ 45% xs-air, 1.45 (6,000) 6.9124 = 60,353 lb-air/hr
= 15,030 acfm

in 3.28 ft duct, v_a = 29.61 fps.

In 3-ft duct, A = 7.069 ft²

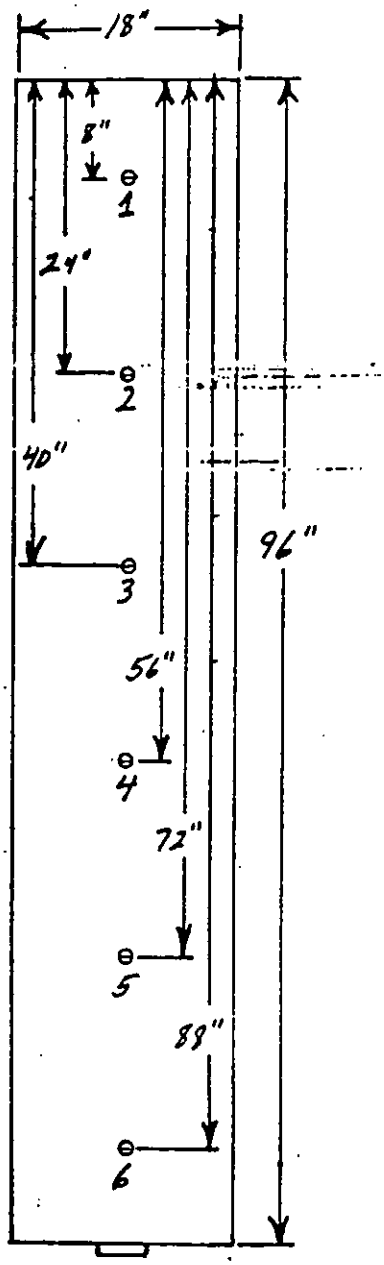
v_a max. = 59.83 fps
min. = 35.44 fps

Recommend 3-foot ID duct on South Unit

1/22/92

FORCED DRAFT AIR FLOW

Unit [redacted] Location [redacted]



Static Pressure, in-H_2O .27

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	[illegible]	0	[illegible]
2	.01	0	120.8
3	.03	0.173	121.2
4	.12	0.346	122.8
5	.27	0.520	125
6	.28	0.529	124.6
Average		0.261	122.6 + 460 = T_s 582.6

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{(T_s)/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ 15.15 Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\_\_\_\_) =$ 10,909 acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\_\_\_\_)/(T_s\_\_\_\_) =$ _____ lb/hr.

Time 3:35 PM

Date _____

Name _____

Moorhead Factory

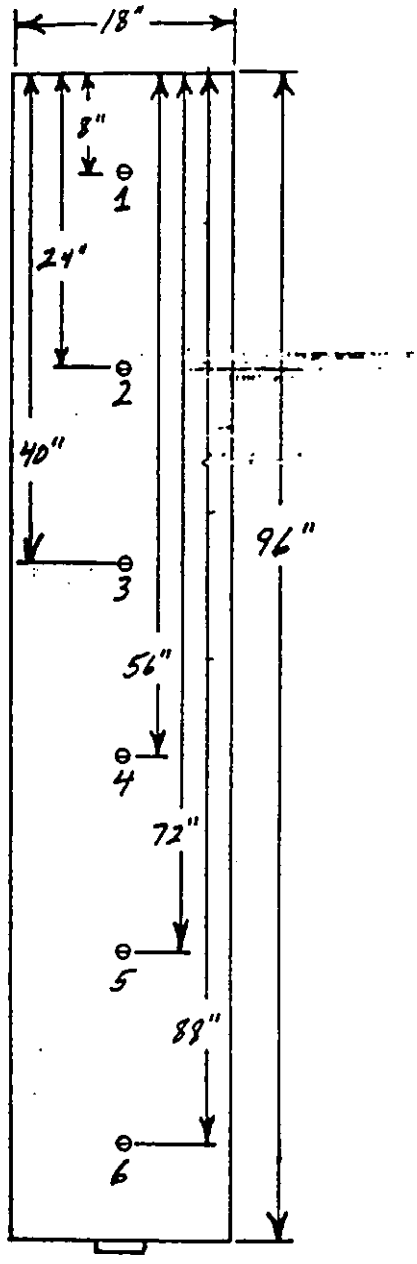
1/22/82

FORCED DRAFT AIR FLOW

Unit North Dryer Location North Duct

Static Pressure, in-H_2O .25

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	^		157.6
2	.05		158.2
3	.07		158.8
4	.08		158.0
5	.07		158.4
6	.08		158.8
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_f = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_f = 720(v_s\ \_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_f)/(T_s)$

$Q_F = 2381(V_f\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ _____ lb/hr.

Time 1648 ~~5:47 PM~~ ?

Date _____

Name _____

Moorhead Factory

Coal Feed Rate Check

Date 1/22/92 Name _____

UNIT South

Grate Speed Controller, 51.2/50.7 %, Time 1530

Elapsed Time, 8" grate section 100 seconds

Grate Speed Controller, _____ %, Time _____

Measured Grate Speed = 2,400/(elapsed time, sec) = 24.00 Feet/hr.

Coal Bed Depth, 5.55 inches

Coal Feed Rate = $\frac{4 (\text{Grate Speed } \_\_\_\_)(\text{Thickness } \_\_\_\_)(W \_\_\_\_)^*}{2000}$

= 4.26 Tph

53

UNIT South

Grate Speed Controller, _____ %, Time _____

Elapsed Time, 8" grate section _____ seconds

Grate Speed Controller, _____ %, Time _____

Measured Grate Speed = 2,400/(elapsed time, sec) = _____ Feet/hr.

Coal Bed Depth, _____ inches

Coal Feed Rate = $\frac{4 (\text{Grate Speed } \_\_\_\_)(\text{Thickness } \_\_\_\_)(W \_\_\_\_)^*}{2000}$

= _____ Tph

* W = Bed Width, Moorhead: North = 12 Ft; South = 16 Ft.

1/22/92

end of day
1/21/92

67,835 69,280 68,753

9,729 Asp

ASP 8308

start 1/22/92

Stack 62,880
Rec 7581
70,461

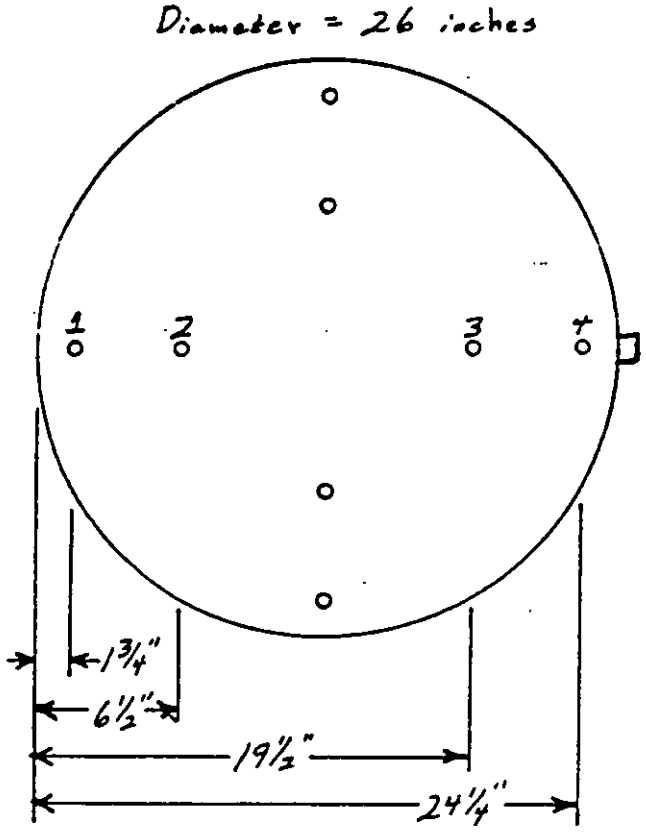
1/22/92
62,008 Rec. 7,267
62,933
63,313 ASP 9,367
62,751 13.38% Asp
7,267
70,018 13.38% Recycle
End of day 1/22/92

RECYCLE GAS FLOW

Unit Solv. Drier

Static Pressure, in·H_2O 4"

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	1.1	1.049	232
2	1.0	1.000	231
3	.75	0.866	238
4	.8	0.894	234
	Average	0.952	236.8 +460 = T_s 696.75



Average Velocity, $v_a = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/761.46}\right) = 70.95(\sqrt{\Delta P}\ 0.952)\sqrt{\frac{(T_s\ \ \ )}{761.46}}$

v_a = 64.61 Feet/second.

Gas Flow, $V_f = v_a\,(A)(60\ sec/min)$ $\quad A = 3.687\ Ft^2$

$V_p = 221.22(v_a$ _____$) =$ 14,293 acfm

Time 6:30 Fill

Date _____

Name _____

Moorhead Factory

1/27/92

1/20/92 Moorhead

34 Tph, = pulp flow

7.18 Tph Dry pulp. —

73.7% H_2O PP H_2O

Read Pulp Feeder Rpm

↑ feeders are identical, so ratios should show split of measured inlet pulp feed.

14% Asp/

1/21/92 MHD

South Unit FD flow

Msmt	Time	Draft Control
So Side ΔP	1629	11.2
	1631	22.2
	~~1633~~	
	1635	18.5
No Side ΔP		
	1639	13.5
	1641	14.3
	1643	16.5
	~~1645~~ 1647	21.0
	1649	21.6
	1651	23.5

North Duct
29,216 lb/hr

South Water Pulp moisture

8:00 - 3.4

9:00 5.5

10:00 7.3

11:00 - 7.6

11:30 - 4.8

12:30 7.8

2:00 - 9.1

2:30 - 3.1

4:00 - 8.2

8:30 3.7

9:30 10.3

10:30 9.9

12:00 - 8.0

1:00 - 6.1

1:30 6.3

3:00 - 7.4

3:30 6.8

4:00 - 8.6

1/24/92

dried pulp

moisture

1-23-92

Press pulp Moisture

8:50	76.41
9:10	76.68
9:30	76.30
9:50	76.56
10:10	78.06
10:30	76.96
10:50	76.83
11:10	76.44
11:30	77.03
11:50	78.17
12:10	78.09
12:30	78.13
12:50	78.06
1:10	76.95
1:30	76.42
1:50	76.11
2:10	79.49
2:30	78.61
2:50	77.10
3:10	78.12
3:30	77.42
3:50	77.83
4:10	

1-24-92

8:10	7885
8:30	7876
8:50	78.49
9:10	78.08
9:30	77.55
9:50	77.29
10:10	77.82
10:30	76.04
10:50	78.02
11:10	79.77
11:30	78.22
11:50	78.59
12:10	79.28
12:30	77.42
12:50	78.62
1:10	78.26
1:30	79.19
1:50	78.56
2:10	78.44
2:30	78.32
2:50	76.85
3:10	78.21
3:30	77.46
3:50	77.89
4:10	76.88
4:30	78.57

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/24/92

Name ______

#	Time of Day	0730	4	0800	0930	1000	8	1030	1100
1	Slice Rate, Tph	210			213	208	?	192	195
2	Total Pulp Flow, Tph	62.5			~~45.1~~ 45.4	55.1		60.0	56.4
3									
4	NORTH Unit								
5	Grate Speed, %					43.7		34.8	
6	ID Damper, %					94.0		94.0	
7	ID Fan, rpm					699.7		699.7	
8	Pulp Feed Gate, % Open					31.46 t/d / 37.7 rpm		35.62 t/d / 42.4 rpm	
9	Draft Control, %					37.3		6.8	
10	FD Air Flow, MPPH					3.45		~~[illegible]~~	
11	BH Temp. In, °C					113		116	
12	Out, °C					108		110	
13	BH ΔP					6.28		6.23	
14	Multiclone, ΔP					3.82		3.76	
15	Dryer Throat, °C					621		586	
16	Dryer Exit, °C					131		135	
17	Furnace Pressure					-0.19		-0.64	
18	Exit Pressure					-1.48		-2.49	
19	Dryer ΔP					0.68		0.92	
20	Aspiration Flow, acfm					5.5		4.9	
21	Drum, amps.					17.5		18.0	
22	ID Fan, amps.					149		150	
23								35.0/35.0	
24									
25								8" in 49+	
26	SOUTH Unit	computer							
27	Grate Speed, %	27.9			60.7	58.0		52.4	46.8
28	ID Damper, %	97.0			97.0	97.0		97.0	97.0
29	ID Fan, rpm	578.1			583.5	586.1		585.4	584.6
30	Pulp Feed Gate, % Open	61.8 rpm			62.2	62.2		62.2	62.2
31	Draft Control, %	-1.5			48.5	43.7		38.4	33.9
32	FD Air Flow, MPPH	0.00			24.78	21.81		16.27	8.87
33	BH Temp. In, °C	116			114	115		116	116
34	Out, °C	112			112	112		113	113
35	BH ΔP	2.07			2.16	2.16		2.18	2.23
36	Multiclone, ΔP	2.52			2.36	2.31		~~2.36~~	~~2.37~~
37	Dryer Throat, °C	696			916	865		862	808
38	Dryer Exit, °C	131			127	129		130	130
39	Furnace Pressure	-0.50			-0.13	-0.12		-0.17	-0.20
40	Exit Pressure	-1.08			-1.00	-1.00		-1.03	-1.03
41	Dryer ΔP	~~0.50~~ 0.75			0.49	0.53		0.46	0.49
42	Aspiration Flow, acfm	7.8			7.8	7.7		7.7	8.0
43	Drum, amps	16.0			20.0	18.5		18.0	18.0
44	ID Fan, amps	166			166	164		167	164
45								49.8	
46				62.7/40.0				49.6/~~[illegible]~~	
47				8" in 81				8" in 98+	
48								wheel says	
49								5½ : 5.6	
50								same as	

Drum ... [illegible]

Notes (written vertically across the columns):

cycled BH cleaning, left min., pulse every 3-minutes

South Dryer Feed Scroll Plugging (experienced) with pH overriding, resulting in sticky pulp)

Went to Slide Gates @ 0910

Back on Scrolls ≈ 0910

SCT 1015

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/24/92

Name ____________

	[1] Time of [2] Day	[3] 1130	[4] 1200	[5] 1230	[6]	[7] 1300	[8] 1330	[9] 1400	1430
1	Slice Rate, Tph	223		202		231	212	203	198
2	Total Pulp Flow, Tph	47.0		53.7		55.5	47.4	56.6	42.7
3									
4	NORTH Unit								
5	Grate Speed, %	25.0		31.0		39.9		25.0	
6	ID Damper, %	97.0		94.0		94.0		94.0	
7	ID Fan, rpm	699.7		699.7		699.7		706.6	
8	Pulp Feed Gate, % Open	27.0 [illegible] 38.3 rpm		[illegible] 45.1 rpm		14.0 [illegible] 26.3 rpm		[illegible] 33.3 rpm	
9	Draft Control, %	-0.2		20.0		28.9		-0.5	
10	FD Air Flow, MPPH	—		-1.05		1.20		—	
11	BH Temp. In, °C	116		111		108		114	
12	Out, °C	111		109		105		111	
13	BH ΔP	6.29		6.29		6.31		6.26	
14	Multiclone, ΔP	3.95		3.90		3.91		3.77	
15	Dryer Throat, °C	503		523		530		510	
16	Dryer Exit, °C	134		124		125		125	
17	Furnace Pressure	-0.52		-0.49		-0.38		-0.71	
18	Exit Pressure	-1.80		-1.76		-1.75		-1.89	
19	Dryer ΔP	0.62		0.72		0.68		0.64	
20	Aspiration Flow, acfm	5.1		5.4		5.7		5.2	
21	Drum, amps.	16.5		16.5		16.5		16.5	
22	I.D. Fan, amps.	150		149		149		149	
23		25.0/25.0							
24		8" in 55 s							
25		2.95 in wheel							
26	SOUTH Unit				SOT 1245				
27	Grate Speed, %	57.3	56.5	47.0		50.1	57.1	53.3	46.5
28	ID Damper, %	97.0	97.0	97.0		97.0	97.0	97.0	97.0
29	ID Fan, rpm	587.2	583.8	586.9		586.7	584.3	588.2	588.2
30	Pulp Feed Gate, % Open	62.2	62.2 rpm	62.2		62.2	62.2	62.2	62.2
31	Draft Control, %	41.2	41.0	31.7		35.1	43.1	38.3	32.2
32	FD Air Flow, MPPH	19.72	20.12	3.07		9.81	22.59	17.23	5.89
33	BH Temp. In, °C	115	115	116		116	115	115	116
34	Out, °C	113	113	114		114	112	113	114
35	BH ΔP	2.23	2.23	2.24		2.34	2.33	2.34	2.30
36	Multiclone, ΔP	2.46	2.38	2.34		2.29	2.25	2.25	2.31
37	Dryer Throat, °C	822	818	818		770	809	823	796
38	Dryer Exit, °C	130	129	131		128	128	130	130
39	Furnace Pressure	-0.15	-0.18	-0.25		-0.26	-0.15	-0.21	-0.27
40	Exit Pressure	-1.01	-1.02	-1.09		-1.09	-1.06	-1.04	-1.13
41	Dryer ΔP	0.47	0.46	0.47		0.45	0.46	0.47	0.43
42	Aspiration Flow, acfm	7.8	7.8	7.9		7.8	7.7	7.7	7.8
43	Drum, amps	20.0	20.0	18.5		18.5	20.0	17.5	18.5
44	I.D. Fan, amps	167	163	164		166	163	164	165
45									
46							56.0/53.9		50.6/53.4
47							8" in 90 s ↑ ?		8" in 55 s
48									
49									
50									

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/24/92

Name

Time of Day	1500		1530	1600	1630	1700	
Slice Rate, Tph	204			204	203	212	
Total Pulp Flow, Tph	58.3			50.3	47.4	53.8	
NORTH Unit							
Grate Speed, %	34.9			49.3			
ID Damper, %	94.0			94.0			
ID Fan, rpm	711.0			699.7			
Pulp Feed Gate, % Open	~~[illegible]~~ rpm			[illegible] 34.9 rpm			
Draft Control, %	-3.3			29.0			
FD Air Flow, MPPH	—			10.41			
BH Temp. In, °C	115			109			
Out, °C	108			107			
BH ΔP	6.22			6.33			
Multiclone, ΔP	3.80			3.86			
Dryer Throat, °C	531			503			
Dryer Exit, °C	134			123			
Furnace Pressure	-0.73			-0.14			
Exit Pressure	-1.84			-1.63			
Dryer ΔP	0.60			0.73			
Aspiration Flow, acfm	5.7	1505		5.3			
Drum, amps.	16.5			16.5			
ID Fan, amps.	149			149			
wheel =	2 3/4"	29.0/29.0					
measured =	2 5/8"	8" in 56 sec.					
SOUTH Unit							
Grate Speed, %	51.7		51.6	54.6	46.6	56.6	
ID Damper, %	97.0		97.0	97.0	97.0	97.0	
ID Fan, rpm	589.0		590.1	591.9	592.9	590.6	
Pulp Feed Gate, % Open	62.3		62.3 rpm	62.3 rpm	do	do	
Draft Control, %	38.5		38.1	39.5	30.9	41.4	
FD Air Flow, MPPH	17.32		13.31	19.24	0.00	20.07	
BH Temp. In, °C	115		115	115	117	115	
Out, °C	113		113	113	114	114	
BH ΔP	2.29		2.28	2.26	2.33	2.35	
Multiclone, ΔP	2.33		2.21	2.27	2.29	2.28	
Dryer Throat, °C	776		822	837	812	780	
Dryer Exit, °C	129		130	131	130	127	
Furnace Pressure	-0.23		-0.20	-0.18	-0.26	-0.19	
Exit Pressure	-1.09		-1.05	-1.07	-1.13	-1.06	
Dryer ΔP	0.46		0.48	0.51	0.49	0.47	
Aspiration Flow, acfm	7.9		7.6	7.7	7.6	7.4	
Drum, amps	18.0		18.0	17.5	17.5	17.6	
ID Fan, amps	164		165	165	166	166	
	50.4/47.9			50.1/48.1			
	8" in 99 sec			8" in 100 sec.			
	wheel same						

COAL FEED ______ T/HOUR

EMISSION TEST LOG SHEET 62.2 rpm on pulp ...

DATE: 1/24/77

South Dryer, 15% Recycle, ≈ 14% Aspiration

PULP DRYER:

TIME		0730	0800	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600
SLICE (TPH)		207	[illegible]	201	204	195	203	205	206	200	201	214	201	204	208	198	198
PULP FLOWS (TPH)	PRESSED	64.1	63.9	63.9	68.8	65.8	60.4	57.8	50.7	54.3	56.7	50.3	48.8	46.2	55.4	62.1	62.5
	DRYER FEED	33.9	38.8	38.3	37.1	37.2	35.5	35.5	38.5	32.3	36.1	35.	30.1	30.5	40.2	39.6	36.1
FEEDER RPM		61.9	62.3	62.3	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2	62.2
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		34.3	~~6~~	60.1	57.5	53.7	49.8	56.3	55.7	47.2	46.2	58.5	55.0	48.1	52.1	53.2	55.8
THROAT TEMP. (°C)		718		809	856	869	812	813	820	819	775	804	823	799	772	814	818
EXIT TEMP. (°C)		133		127	129	130	130	128	129	131	129	128	129	131	129	130	129
ΔP DRUM		0.35		0.50	0.51	0.47	0.49	0.47	0.46	0.44	0.47	0.48	0.47	0.45	0.50	0.51	0.52
I.D. FAN RPM		578.3		584.3	585.4	585.1	584.6	587.2	583.8	587.2	587.2	582.2	588.2	587.5	588.5	590.8	590.8
M.C. ΔP		2.48		2.47	2.41	2.48	2.35	2.39	2.30	2.35	2.36	2.37	2.36	2.37	2.33	2.22	2.31
BAGHOUSE ΔP		2.05		2.17	2.14	2.20	2.19	2.23	2.23	2.23	2.27	2.28	2.27	2.30	2.31	2.30	2.33
ASP. AIRFLOW		8.1		7.9	7.8	8.1	8.1	7.8	7.7	7.7	8.0	7.7	7.9	7.8	7.8	7.7	7.6
RECYCLE AIRFLOW (CFM)		15%		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

EMISSION TEST LOG SHEET

COAL FEED ___ T/HOUR

DATE: 1/24/2

PULP DRYER:

TIME		1630	1700															
SLICE (TPH)		205	213															
PULP FLOWS (TPH)	PRESSED	56.3	53.7															
	DRYER FEED	34.2	34.9															
FEEDER RPM		67.2	67.2															
PULP MOISTURES (%)	PRESSED																	
	DRIED																	
GRATE SPEED		49.3	59.8															
THROAT TEMP. (°C)		813	781															
EXIT TEMP. (°C)		130	127															
ΔP DRUM		0.49	0.47															
[illegible]		[illegible]	[illegible]															
I.C. ΔP		2.25	2.30															
BAGHOUSE ΔP		2.32	2.33															
ASP AIRFLOW		7.5	7.8															
RECYCLE AIRFLOW (CFM)		n/a	n/a															

1/21/92 cont'd

Time		Draft Control V
1915	SO Side ΔP	14.2%
1917		12.3%
1919		11.0%
1921		13.4%
1925	No Side ΔP	20.1%
1928		24.3%
1930		23.6%

Check on pulp feed

5300 Tph slice 5% More 60% South

221 Tph slice 11.04 Tph dry solids = 52.58 Tph wet pulp
@ 79% H_2O

60% = 31.55 Tph

50 = 26 0.52 Tph/rpm

31.55 = 62 rpm

WET PULP 11/21/92

TIME	% SOLIDS
11:00	3.7
11:30	3.2
12:00	4.1
12:30	6.1
1:00	3.3
1:30	3.7
2:00	5.2
2:30	5.7
3:00	3.1
3:30	[illegible]
[illegible]	[illegible]
4:30	4.4
[illegible]	4.4
5:30	6.1
6:00	5.7
6:30	4.3
7:00	6.2
7:30	6.3
8:00	

Time
10:30
10:50
11:10
11:30
11:60
12:10
12:30

Press Pulp Moisture 1/21/92

Sartorius MA30 Moisture Analyzer

1/21/92 Time	% Moisture
8:45	78.01
9:40	79.15
10:30	78.44
10:50	79.15
11:10	78.50
11:30	78.54
11:50	78.37
12:10	78.21
12:30	78.65
12:50	78.50
1:10	77.76
1:30	78.26
1:50	76.88
2:10	78.31
2:30	77.30
2:50	78.46
3:10	78.49
3:30	79.02
3:50	78.26
4:10	78.54
4:30	79.42
4:50	79.44
5:10	79.95
5:30	79.85
5:50	78.18
6:10	78.45
6:30	77.98
6:50	78.56
7:10	79.94
7:30	78.67
7:50	79.50

1/22/92	
8:30	78.21
8:50	78.60
9:10	78.34
9:30	79.00
9:50	77.91
10:10	78.50
10:30	77.42
10:50	78.93
11:10	78.09
11:30	79.64
11:50	79.10
12:10	78.81
12:30	78.44
12:50	78.82
1:10	78.90
1:30	78.07
1:50	76.71
2:10	78.79
2:30	78.45
2:50	79.02
3:10	78.68
3:30	78.04
3:50	78.50
4:05	78.00
4:30	79.73
4:50	78.67

Moorhead Factory

Pulp Dryer Data Sheets Constant pulp feed @ 51 rpm

No Recycle / ≈14% Aspiration

Date 1/21/92

Name S.T.C.

No.	Time of Day	3	4	5	6	7	8	9	
	Time of Day	1045		1100		1315	1330		
1	Slice Rate, Tph	190							
2	Total Pulp Flow, Tph	≈							
3									
4	NORTH Unit								
5	Grate Speed, %	~~[illegible]~~							
6	ID Damper, %								
7	ID Fan, rpm								
8	Pulp Feed Gate, % Open								
9	Draft Control, %								
10	FD Air Flow, MPPH								
11	BH Temp. In, °C								
12	Out, °C								
13	BH ΔP								
14	Multiclone, ΔP								
15	Dryer Throat, °C								
16	Dryer Exit, °C								
17	Furnace Pressure								
18	Exit Pressure								
19	Dryer ΔP								
20	Aspiration Flow, acfm								
21	Drum, amps.								
22	I.D. Fan, amps.								
23									
24									
25									
26	SOUTH Unit								
27	Grate Speed, %	46.1 /	45.8/42.1	37.2		38.4/46.0	45.4/49.5	flow device	
28	ID Damper, %	96.0		96.0		96.0	96.0	sup 7 9.0	≈ 11.0
29	ID Fan, rpm	588.2		589.8		590.8	589.0		
30	Pulp Feed Gate, % Open	51 rpm [illegible]		51		outside Y = 37.1 YFD	do		
31	Draft Control, %	28.6		6.4		8.7	25.4/32.9	33.7/34.2	/34.5
32	FD Air Flow, MPPH	?				0.00	0.00		
33	BH Temp. In, °C	120		120		117	117		
34	Out, °C	117		118		116	115		
35	BH ΔP	2.66		2.55		2.17	2.18		
36	Multiclone, ΔP	2.14		2.13		2.07	2.12		
37	Dryer Throat, °C	789		785		718	737		
38	Dryer Exit, °C	133		135		130	129		
39	Furnace Pressure	-0.39		-0.47		-0.44	-0.40		
40	Exit Pressure	-1.14		-1.26		-1.29	-1.21		
41	Dryer ΔP	6.34		0.34		0.43	0.41		
42	Aspiration Flow, acfm	10.5		10.5		8.3	8.4		
43	Drum, amps	17.0		14.5		18.0	18.5		
44	ID Fan, amps	162		162		163	164		
45									
46						Left → 7 7/8"	Right → 7 3/4"		
47	Bed Depth Wheel	5 1/2 5.6"				5.5" 5.6"			
48	Measured	~~[illegible]~~							
49						~~[illegible]~~			
50	Timed Grate, 6" in	110 sec.				113	101		

[illegible] main pulp [illegible] bypass

Start of Test #1

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/21/92

Name SJS

	[1]Time of [2]Day	[3] 1400	[4]	[5] 1430	[6] 1500	[7] 1530	[8]	[9] 1600	1630
1	Slice Rate, Tph	178		199	198	195		192	199
2	Total Pulp Flow, Tph	58.0		55.9	55.6	61.5		53.7	~~3~~57.7
3									
4	NORTH Unit								
5	Grate Speed, %	38.3		34.1		28.0			
6	ID Damper, %	95.2		95.2		96.5			
7	ID Fan, rpm	[illegible]		[illegible]		[illegible]			
8	Pulp Feed Gate, % Open	40.0	53 rpm VFd	36.6 to VFd 49 rpm		37.86 47.5 rpm?			
9	Draft Control, %	45.6		32.9		10.0			
10	FD Air Flow, MPPH	7.4?		2.3?		-1.4?			
11	BH Temp. In, °C	115		116		117			
12	Out, °C	111		111		113			
13	BH ΔP	6.18		6.17		6.17			
14	Multiclone, ΔP	3.83		3.92		3.86			
15	Dryer Throat, °C	608		595		590			
16	Dryer Exit, °C	128		134		131			
17	Furnace Pressure	-0.32		-0.40		-0.54			
18	Exit Pressure	-1.62		-1.58		-1.75			
19	Dryer ΔP	0.86		0.72		0.67			
20	Aspiration Flow, acfm	6.1		6.1		5.6			
21	Drum, amps.	16.5		16.5		17.0			
22	I.D. Fan, amps.	148		148		148			
23									
24									
25									
26	SOUTH Unit								
27	Grate Speed, %	42.4		26.7	44.5	44.5		38.0	46.2
28	ID Damper, %	96.0		96.0	96.0	96.0		96.0	96.0
29	ID Fan, rpm	589.9		589.9	589.9	590.6		590.1	589.3
30	Pulp Feed Gate, % Open	37.1 to VFd	← 51 rpm to controller	do	do	do 50 rpm		do	do
31	Draft Control, %	19.7		-3.3	24.3	26.0		11.0	21.7
32	FD Air Flow, MPPH	0.60		0.00	0.00	0.00		0.00	0.00
33	BH Temp. In, °C	117		118	116	116		117	116
34	Out, °C	115		116	114	114		114	115
35	BH ΔP	2.12		2.41	2.48	2.54		2.64	2.73
36	Multiclone, ΔP	2.04		2.06	2.10	2.10		—	—
37	Dryer Throat, °C	767		715	720	755		738	706
38	Dryer Exit, °C	130		130	128	129		131	128
39	Furnace Pressure	-0.43		-0.50	-0.40	-0.39		-0.43	-0.39
40	Exit Pressure	-1.24		-1.29	-1.25	-1.23		-1.16	-1.24
41	Dryer ΔP	0.38		0.39	0.40	0.40		0.34	0.42
42	Aspiration Flow, acfm	8.5		8.3	8.5	8.4		8.3	8.0
43	Drum, amps	18.5		19.0	19.0	18.5		18.5	18.0
44	I.D. Fan, amps	162		164	164	164		164	166
45					% Grate Spd				
46					44.2-46.9	42.5-43.5			
47					8" in 708 am	8" in 1104			
48									
49									
50									

Baghouse cleaning was turned off to condition bags.

EOT ≈ 1515?

SOT ≈ 1110

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/21/92

Name ____________

	Time of Day	1700	1730		1800		1830	1900	1930
1	Slice Rate, Tph	194	197		200		191	181	
2	Total Pulp Flow, Tph	59.3	54.7		59.1		63.4	61.6	
3									
4	NORTH Unit								
5	Grate Speed, %		39.9					37.8	
6	ID Damper, %		96.0					96.0	
7	~~ID Fan, rpm~~		[illegible]					~~[illegible]~~	
8	Pulp Feed Gate, % Open		41.0 VFd					36.4 VFd 57 rpm	
9	Draft Control, %		36.3					~~39.9~~ 27.4	
10	FD Air Flow, MPPH		3.04					0.22	
11	BH Temp. In, °C		115					114	
12	Out, °C		110					110	
13	BH ΔP		6.28					6.24	
14	Multiclone, ΔP		3.72					3.94	
15	Dryer Throat, °C		626					625	
16	Dryer Exit, °C		132					131	
17	Furnace Pressure		-0.39					-0.48	
18	Exit Pressure		-1.61					-1.62	
19	Dryer ΔP		0.84					0.72	
20	Aspiration Flow, acfm		6.2					6.0	
21	Drum, amps		17.5					17.2	
22	ID Fan, amps		149					149	
23									
24									
25									
26	SOUTH Unit								
27	Grate Speed, %	46.4	39.9		40.8	~~37~~	39.9	45.0	41.2
28	ID ~~Damper~~ Fan, %	97.0	97.0		97.0		97.0	97.0	97.0
29	ID Fan, rpm	594.2	593.4		593.4		593.3	592.9	593.4
30	Pulp Feed Gate, % Open	same	do		do		do	do 50 rpm	do
31	Draft Control, %	30.4	10.9		12.9		13.2	26.7	21.6
32	FD Air Flow, MPPH	0	0		6		0	0	0
33	BH Temp. In, °C	115	116		115		115	114	114
34	Out, °C	114	114		113		113	112	112
35	BH ΔP	2.84	2.91		3.00		3.07	3.14	3.25
36	Multiclone, ΔP	—	—		2.09		2.03	2.04	2.04
37	Dryer Throat, °C	754	755		720		723	727	737
38	Dryer Exit, °C	129	128		127		128	126	127
39	Furnace Pressure	-0.36	-0.39		-0.61		-0.59	—	-0.64
40	Exit Pressure	-1.15	-1.27		-1.25		-1.21	-1.20	-1.22
41	Dryer ΔP	0.42	0.35		0.39		0.41	0.40	0.40
42	Aspiration Flow, acfm	8.1	8.1		8.2		8.1	8.1	8.1
43	Drum, amps	19.0	18.0		17.5		19.0	19.0	19.0
44	ID Fan, amps	168	168		168		168	168	168
45									
46		Grate % 46.9/46.5						Grate % 45.6/44.6	
47									
48		4" in 105 sec						9" in 109 sec	
49		setting on wheel = 5½"							

(Written vertically in column 5:) EOT ≥ 1740

← unplugged, read -0.4" above grate thru side sight port, checked; got almost -1.0 inch at Furnace pressure pt.

(Written vertically in column 7:) SOT ≥ 1825

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/21/92

Name

	1 Time of	2 Day	3 2000	4 2030	5	6	7	8	9
1	Slice Rate, Tph		177	186					
2	Total Pulp Flow, Tph		51.3	39.7					
3									
4	NORTH Unit								
5	Grate Speed, %		28.0						
6	ID Damper, %		96.0						
7	ID Fan, rpm		716.9						
8	Pulp Feed Gate, % open		? 49% FC						
9	Drate Control, %		18.5						
10	FD Air Flow, MPPH		0						
11	BH Temp. In, °C		113						
12	Out, °C		109						
13	BH ΔP		6.21						
14	Multiclone, ΔP		3.95						
15	Dryer Throat, °C		606						
16	Dryer Exit, °C		127						
17	Furnace Pressure		-0.54						
18	Exit Pressure		-1.67						
19	Dryer ΔP		0.73						
20	Aspiration Flow, acfm		5.7						
21	Drum, amps.								
22	ID Fan, amps.								
23									
24	Coal fed 3 1/4" crushed								
25									
26	SOUTH Unit								
27	Grate Speed, %		39.8	43.2					
28	ID Damper, %		97.0	97.0					
29	ID Fan, rpm		593.4	592.4					
30	Pulp Feed Gate, % open		50 rpm	50.0 rpm					
31	Drate Control, %		10.9	22.4					
32	FD Air Flow, MPPH		0	0					
33	BH Temp. In, °C		115	114					
34	Out, °C		112	112					
35	BH ΔP		3.32	3.38					
36	Multiclone, ΔP		2.15	2.18					
37	Dryer Throat, °C		743	735					
38	Dryer Exit, °C		128	128					
39	Furnace Pressure		-0.71	-0.64					
40	Exit Pressure		-1.20	-1.17					
41	Dryer ΔP		0.42	0.40					
42	Aspiration Flow, acfm		9.1	9.1					
43	Drum, amps		17.0	17.0					
44	ID Fan, amps		167	167					
45									
46									
47									
48									
49									

EOT = 2030
Opened Recycle Damper — Front CH 1/4

'ISS' 'TE' LOG JEET Pre...d

COAL FEED ______ T/HOUR No Recycle, 14% Aspiration, 34 Tph Pulp

ATE: 1/21/92

PULP DRYER: SOUTH

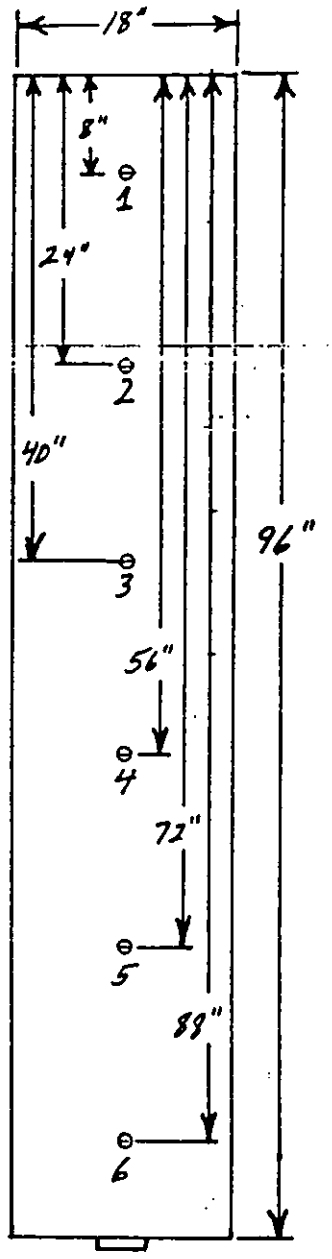
TIME		1400	1430	1500	1530	1600	1630	1700	1730	1800	1830	1900	1930	2000	2030		
SLICE (TPH)		196	200	207	197	195	207	1	197	195	196	186	181	185	175		
PULP FLOWS (TPH)	PRESSED	57.5	55.2	53.6	56.2	54.2	58.3		61.7	58.0	60.7	51.4	51.3	57.6	53.4		
	DRYER FEED	51 RPM on 50	29.1	24.9	27.1	27.5	28.4		30.0	27.8	30.4	25.4	27.4	27.4	26.4		
FEEDER RPM		51	51	51	50 on Y	50 on Y	50 on Y		50 on Y	do	do	do	do	do	do		
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		43.3	33.9	45.3	45.3	40.4	39.6		38.8	40.0	39.5	45.0	42.6	40.0	41.9		
THROAT TEMP. (°C)		778	723	713	745	740	711		759	725	723	727	735	746	737		
EXIT TEMP. (°C)		130	131	127	129	130	129		129	128	128	127	128	128	128		
ΔP DRUM		0.40	0.38	0.42	0.43	0.37	0.38		0.42	0.36	0.41	0.39	0.41	0.41	0.41		
I.D. FAN RPM		589.8	589.8	589.8	590.8	590.6	590.6		593.4	593.4	593.4	592.9	592.8	593.4	592.7		
M.C. ΔP		2.11	2.12	2.12	2.08	--	--		---	2.15	2.15	2.15	2.13	2.1	2.11		
BAGHOUSE ΔP		2.16	2.40	2.49	2.52	2.63	2.73		2.91	3.00	3.08	3.13	3.22	3.30	3.38		
ASP. AIRFLOW		8.4	8.3	8.4	8.2	8.1	8.2		8.5	8.3	8.1	8.1	8.1	8.1	7.9		
RECYCLE AIRFLOW (CFM)		0	0	0	0	0	0		0	0	0	0	0	0	0		

FORCED DRAFT AIR FLOW

Unit S. Dryer Location North Duct

Static Pressure, in-H_2O -.37

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	~		115
2	.03		113
3	.05		114
4	.09		117.6
5	.13		120.6
83½" 6	.13		122.2
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_f = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_f = 720(v_s\ \_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_f)/(T_s)$

$Q_F = 2381(V_f\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ _____ lb/hr.

Time 10:55 AM

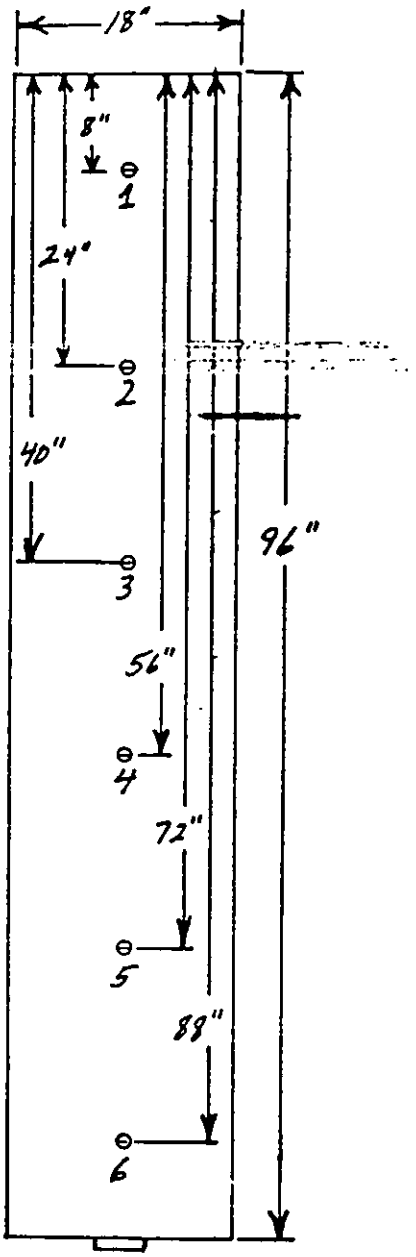
Date 11/21/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit S. Drier Location South Face



Static Pressure, in-H_2O .02

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.1	0.316	127.6
2	.1	0.316	128.8
3	.06	0.245	126.6
4	0	—	124.2
5	0	—	123.5
3½ 6	-.03	—	124.
Average	0.146 ~~0.293~~		126.2 + 460 = T_s = 586.2

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \text{0.146 ~~0.293~~})\sqrt{(T_s\ 586.2)/870.25}$

$v_s =$ ~~17.00~~ 8.50 Feet/second

Air Flow, $V_f = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_f = 720(v_s$ ~~17.00~~ 8.50 $) =$ ~~12,240~~ 6,121 acfm

FD Air Rate, $Q_F = 2381(V_f)/(T_s)$

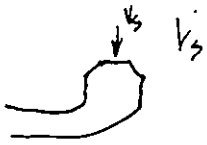
$Q_F = 2381(V_f$ _____ $)/(T_s$ _____ $) =$ ~~49,726~~ 24,863 lb/hr.

Time 1:25 P.M.

Date 1/21/92

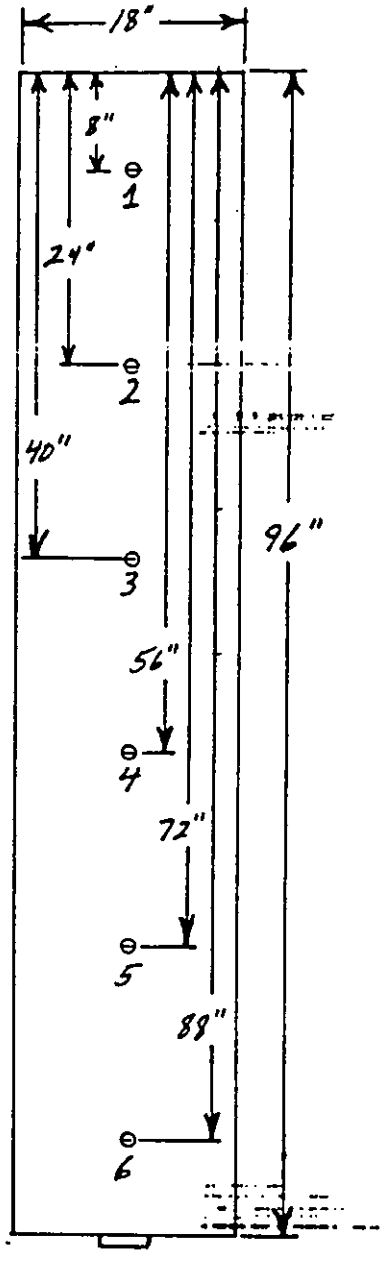
Name _____

Moorhead Factory



FORCED DRAFT AIR FLOW

Unit SPrier Location Inc Duct



Static Pressure, in-H_2O .06

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.05	—	[illegible]
2	.01	—	122.6
3	.02	0.141	122.8
4	.10	0.316	124.4
5	.27	0.520	125.6
6	.34	0.583	125.8
	Average	0.260	124.1 + 460 = T_s 584.1

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ \text{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

v_s = 15.11 Feet/second

Air Flow, $V_f = v_s(A)(60\ \text{sec/min})$

$A = 12\ Ft^2$

$V_f = 720(v_s\ \_\_\_\_) =$ 10,882 acfm

FD Air Rate, $Q_F = 2381(V_f)/(T_s)$

$Q_F = 2381(V_f\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ 44,357 lb/hr.

Time 1:35

Date 1/21/92

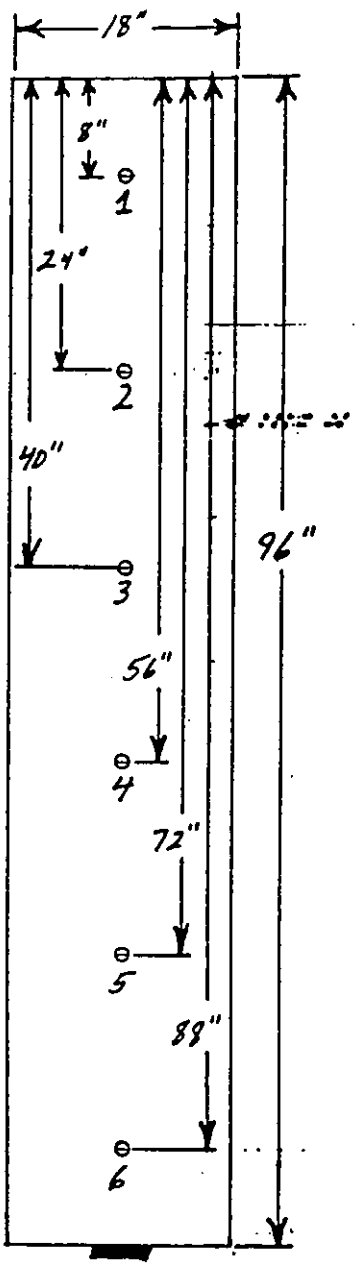
Name _____

Total = 69,220 lb/hr

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit SDrier Location Mor Duct



Static Pressure, in-H_2O -.07

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	-.02	0	127.2
2	-.01	0	126.4
3	0	0	129.2
4	.06	0.245	131.2
5	.13	0.361	131.2
83½" 6	.18	0.424	131.8
Average		0.172	129.2 + 460 = T_s 589.2

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ 10.04 Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\ \_\_\_\_) =$ 7,230 acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ 29,216 lb/hr.

Time 4:25 PM

Date 1/21/92

Name _____

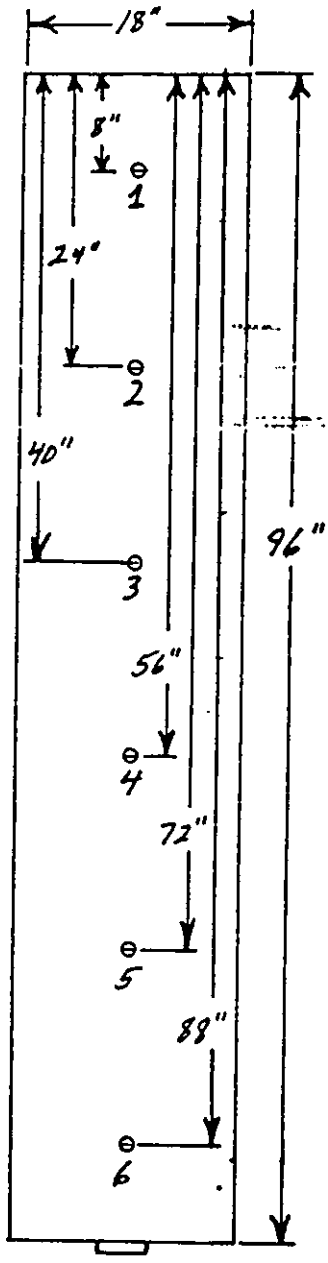
Moorhead Factory

FORCED DRAFT AIR FLOW

Unit SDrier Location S Line

Static Pressure, in-H_2O -.06

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.09	0.300	122.6
2	.09	0.300	123.
3	.06	0.245	123.0
4	.02	0.141	121.4
5	.0	0	120.4
6	-.02	0	120.8
Average		0.164	122.8 + 460 = T_s 582.8



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ 0.164)\sqrt{(T_s\ 582.8)/870.25}$

$v_s =$ 9.52 Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\ 9.52) =$ 6,856 acFm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ 6,856)/(T_s\ 582.8) =$ 28,009 lb/hr.

Time 7:45

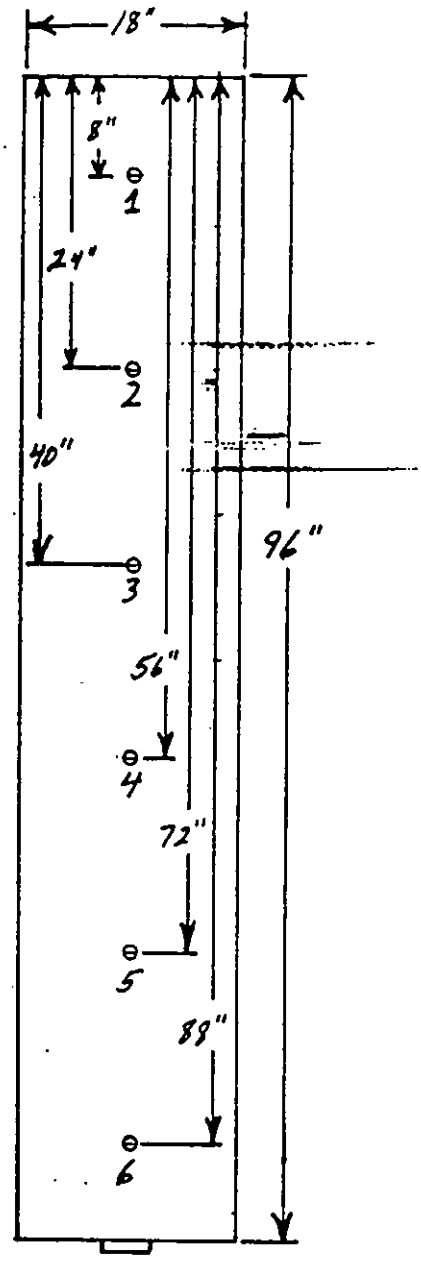
Date 1/21/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit Stack Location S Duct



Static Pressure, in-H_2O -.19

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.08		125.2
2	.04		124.2
3	.04		122
4	0		119.2
5	-.01		119.8
6 (83½")	-.01		120
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____$) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____$)/(T_s$ _____$) =$ _____ lb/hr.

Time 7:15

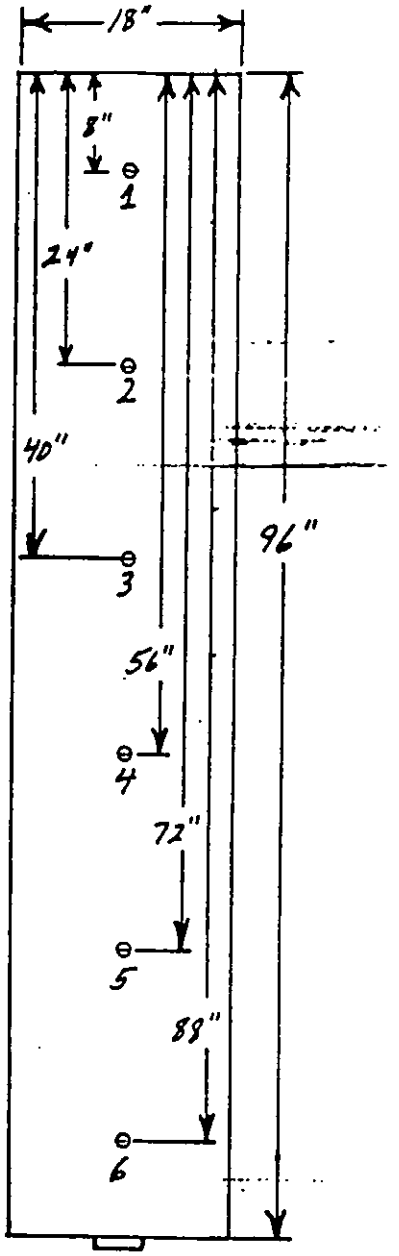
Date 1/21/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit S Dryer Location No Duct



Static Pressure, in-H_2O .13

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.03		127.6
2	0		122.6
3	0		122.6
4	.04		125.8
5	.11		127.4
6	.16		128.2
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____ $) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_p$ _____ $)/(T_s$ _____ $) =$ _____ lb/hr.

Time 7:25

Date 11/21/92

Name _____

Moorhead Factory

1/21/92

end of day
1/21/92

67,835 69,280 68,753

9,729 Asp

ASP 8308

start 1/22/92

Stack 62,880
Rec 7581
70,461

1/22/92
62,008 Rec. 7,267
62,933
63,313 ASP 9,367
62,751 13.38% Asp
7,267
70,018 10.38% Recycle
End of day 1/22/92

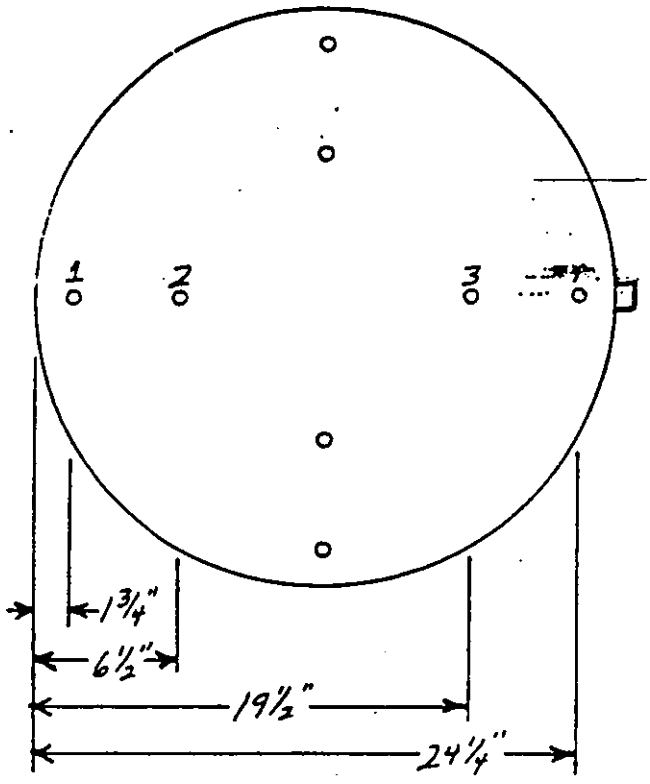
RECYCLE GAS FLOW

Unit S. Dryer

Static Pressure, in-H_2O .06

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.06	0.245	162
2	.06	0.245	162
3	.05	0.224	162
4	.04	0.2	162
	Average	0.229	_____ +460
			= T_s _____

Diameter = 26 inches



Average Velocity, $v_a = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/761.46}) = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s \_\_\_\_)/761.46}$

v_a = _____ Feet/second.

Gas Flow, $V_f = v_a (A)(60 \text{ sec/min})$ $A = 3.687 \text{ Ft}^2$

$V_p = 221.22(v_a \_\_\_\_) =$ _____ acfm

Time 9:20 pm

Date 1/21/92

Name _____

Moorhead Factory

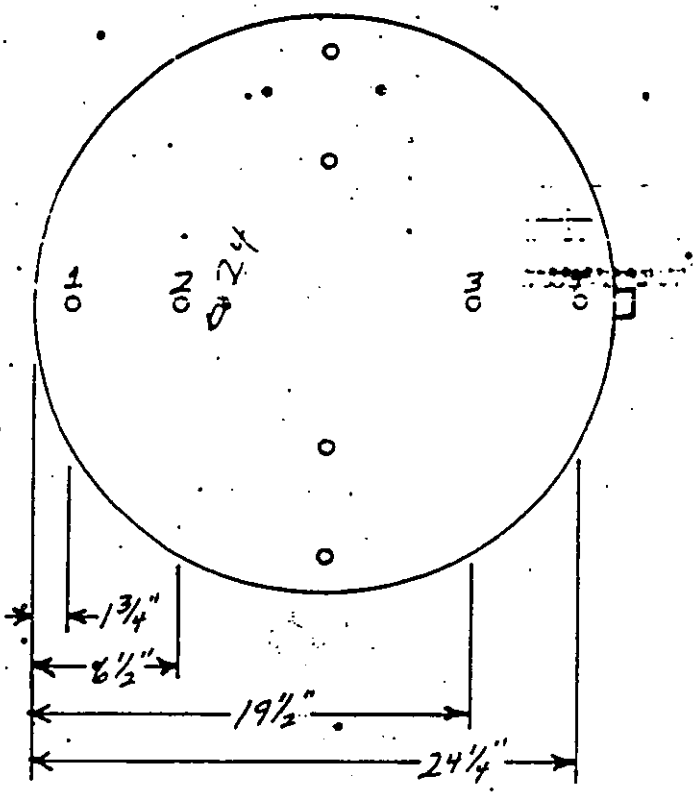
RECYCLE GAS FLOW

Unit S. L. <

Static Pressure, in-H_2O _____

Diameter = 26' inches

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.05	.224	161
2	.04	0.2	161
3	.04	0.2	161
4	.03	.173	160
Average	0.199	161.5 +460	
		$= T_s$ 621.5	



Average Velocity, $v_a = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/761.46}) = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{\frac{(T_s \_\_\_\_)}{761.46}}$

$v_a = \frac{12.76}{31.19}$ Feet/second.

Gas Flow, $V_F = v_a (A_o)(60 \text{ sec/min})$ $\quad A = 3.687 \text{ Ft}^2$

$V_o = 2122(v_a \_\_\_\_) = 2622$ acFm

Time 9:00 PM

Date 1/21/92

Name _____

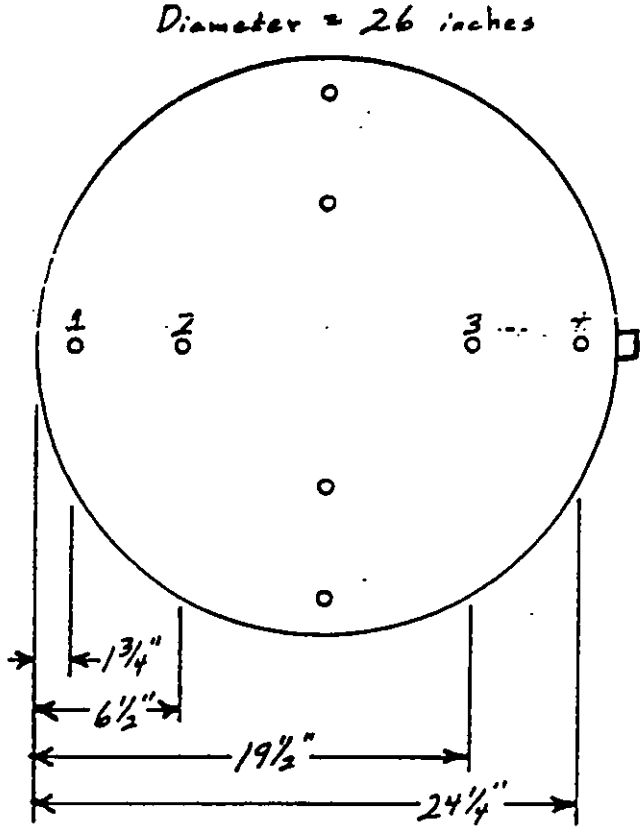
Moorhead Factory

RECYCLE GAS FLOW

Unit S. Drier

Static Pressure, in-H_2O 5.2

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.24	____	166
2	.24	____	167
3	.24	____	167
4	.22	____	167.8
	Average ____		____ +460
			$= T_s$ ____



Average Velocity, $v_a = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/761.46}) = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s \_\_\_\_)/761.46}$

$v_a =$ _____ Feet/second.

Gas Flow, $V_F = v_a (A)(60 \text{ sec/min})$ $A = 3.687$ Ft²

$V_F = 221.22(v_a \_\_\_\_) =$ _____ acfm

Time 10:15

Date _____

Name _____

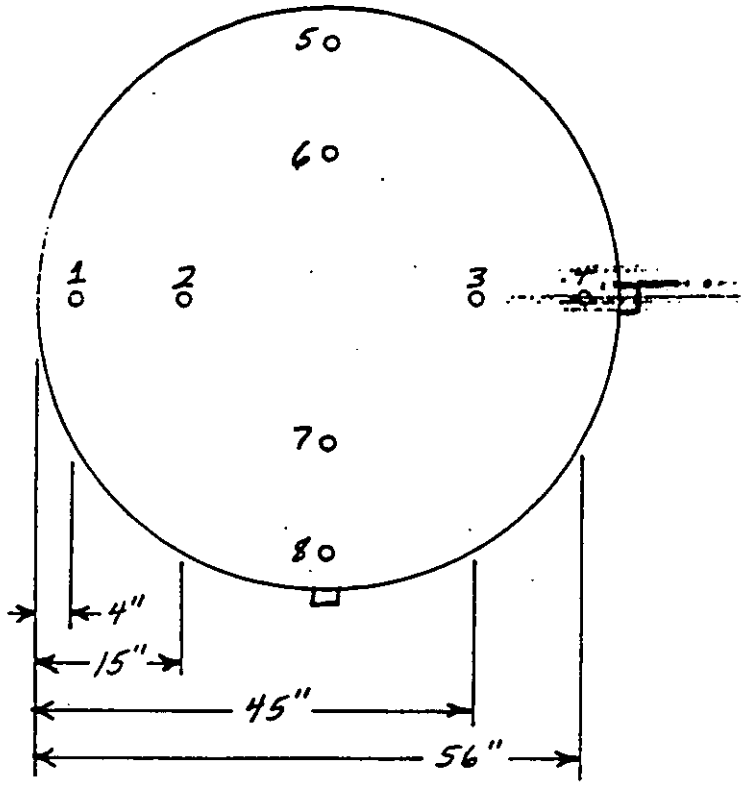
Moorhead Factory

South Pulp Dryer Stack

Static Pressure, in-H_2O _____

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	0.75	0.866	260
2	0.79	0.889	
3	0.73	0.854	
4			
5			
6			
7			
8			
Average	0.8697		+460
			$= T_s$ 720

Diameter = 60 inches



Average Velocity, $v_a = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/761.46}) = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{\frac{(T_s\_\_\_\_)}{761.46}}$

v_a = 60.00 feet/second.

Gas Flow, $V_F = v_a(A)(60\ sec/min)$ $A = 19.635\ Ft^2$

$V_F = 1,178.1(v_a\_\_\_\_) =$ 70,685 acfm

86,000
71,000
15
7,500
71,000
78,500

14% = 10,990

ID Fan
588.2 rpm
96.0% on "V"
160 amps
Moorhead Factory

Time 10:00 p.m.

Date 1/20/92

Name _____

1/23/92

SOUTH DRYER FD Flow

	Time	Damper	Flow Device
So Duct	1013	34.9	11.27
	1015	37.6	13.59
	1017	37.8	14.28
No Duct	1020	39.0	16.25
	1022	38.5	15.18
	1024	38.3	18.81
~~So~~ No Duct	1315	42.7	21.65
	1318	42.9	21.38
So Duct	1323	43.6	21.53
	1326	42.3	21.15

NORTH DRYER FD Flow

1348	34.9	3.73
1350	35.6	3.53
1352	32.4	3.57
1354	32.3	3.48

SOUTH DRYER FD Flow

1530	37.8	12.92
1532	36.0	12.64
1543	39.0	15.57
1546	39.9	16.30

8:00 – 7.6 8:30 – 6.2

9:00 – 6.5 9:30 – 8.2

10 – 6.4 10:30 – 6.9

11:00 – 6.5 11:30 – 6.8

12:00 – 7.8 12:30 – 7.1

1:00 – 9.1

1:30 – 9.2 2:30 – 6.4

3:00 – 7.4

3:30 – 8.9 4:00 – 6.6

1/23/92

Product Pulp

Moisture

South Dryer

MHD

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/23/92

Name ________

	[1] Time of [2] Day	[3] 0938	[4]	[5] 1000	[6] 1030	[7] 1100	[8] 1130	[9] 1200
1	Slice Rate, Tph	202		205	186	195	193	208
2	Total Pulp Flow, Tph	53.1		60.1	48.0	54.3	51.2	59.9
3								
4	NORTH Unit							
5	Grate Speed, %			42.2		34.5		37.0
6	ID Damper, %			94.0		94.0		94.0
7	ID Fan, rpm			652.9		644.2		~~644.?~~
8	Pulp Feed Gate, % Open			30.3 [illegible] 40 rpm		26.7 [illegible] 37.3 rpm		26.4 [illegible] 42. rpm
9	Drain Control, %			27.9		-3.3		5.2
10	FD Air Flow, MPPH			1.28		—		—
11	BH Temp. In, °C			108		108		107
12	Out, °C			104		104		103
13	BH ΔP			6.36		6.38		6.34
14	Multiclone, ΔP			3.90		3.81		3.70
15	Dryer Throat, °C			537		549		550
16	Dryer Exit, °C			126		125		124
17	Furnace Pressure			-0.53		-0.82		-0.81
18	Exit Pressure			-1.67		-2.13		-1.80
19	Dryer ΔP			0.70		0.96		0.64
20	Aspiration Flow, acfm			5.3		5.5		5.3
21	Drum, amps			16.5		16.5		16.5
22	ID Fan, amps			151		149		149
23								
24								
25								
26	SOUTH Unit							
27	Grate Speed, %	50.4		52.3	50.2	50.4	53.0	55.3
28	ID Damper, %	97.0		97.0	97.0	97.0	97.0	97.0
29	ID Fan, rpm	583.8		582.8	584.6	583.9	582.8	579.9
30	Pulp Feed Gate, % Open	50 G 62.? rpm		62.3 rpm	62.5	62.4	62.4	62.3
31	Drain Control, %	36.2		38.4	36.7	36.7	40.6	39.7
32	FD Air Flow, MPPH	13.13		14.14	12.53	14.30	18.99	18.27
33	BH Temp. In, °C	114		114	114	114	113	113
34	Out, °C	112		112	112	112	112	111
35	BH ΔP	3.09		3.15	3.29	3.31	3.41	3.48
36	Multiclone, ΔP	2.46		2.57	2.46	2.44	2.56	2.56
37	Dryer Throat, °C	762		757	765	773	782	761
38	Dryer Exit, °C	128		127	128	128	127	127
39	Furnace Pressure	-0.39		-0.36	-0.37	-0.37	-0.13	-0.16
40	Exit Pressure	-0.91		-0.95	-0.90	-0.96	-1.03	-1.04
41	Dryer ΔP	0.40		0.40	0.36	0.43	-0.53	-0.52
42	Aspiration Flow, acfm	7.6		7.7	7.8	7.2	7.2	7.6
43	Drum, amps	19.0		17.5	17.0	17.5	18.5	17.5
44	ID Fan, amps	16.3		164	163	164	162	162
45								
46	wheel	5.5" SO			grate spd.	54.3/51.5		
47		5.6" NO				8" in 92 sec.		
48								
49								
50								

Vertical notes in column 4: flow check = 19.57 ... 57,466 ACFM; 13,910 ACFM ... Recycle

pressure -0.15 in above grate

SOT ≈ 0945

Right margin: SOT #2 ≈ 1220

[illegible]

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/23/92

Name ______

	Time of Day	1230	1300	1330	1400	1430	1452	1530	1600
1	Slice Rate, Tph	205	195	200		217	202	198	184
2	Total Pulp Flow, Tph	57.7	54.6	56.5		49.4	58.4	58.0	50.7
3									
4	NORTH Unit								
5	Grate Speed, %	37.7		47.1		37.1	38.1	54.6	
6	ID Damper, %	94.0		94.0		94.0	94.0	94.0	
7	ID Fan, rpm	698.9		698.4		698.5	698.6	~~699.0~~	
8	Pulp Feed Gate, % Open	74.1% rpm		33.1% rpm			30.4% @ 39.4 rpm	29.5% / 73 rpm	
9	Draft Control, %	15.4		72.7			18.5	48.2	
10	FD Air Flow, MPPH	-1.40		5.14			~~10.4~~	12.26	
11	BH Temp. In, °C	107		106			108 ~~105~~	107	
12	Out, °C	103		101			105	102	
13	BH ΔP	6.41		6.42			6.47	6.47	
14	Multiclone, ΔP	3.80		3.95			3.75	4.07	
15	Dryer Throat, °C	572		589			572	560	
16	Dryer Exit, °C	125		124			123	117	
17	Furnace Pressure	-0.64		-0.22			-0.46	-0.05	
18	Exit Pressure	-1.82		-1.63			-1.87	-1.73	
19	Dryer ΔP	0.67		0.76			0.71	0.86	
20	Aspiration Flow, acfm	5.7		5.1			5.4	5.2	
21	Drum, amps.	16.0		16.5			17.0	16.0	
22	I.D. Fan, amps.	149		149			149	149	
23				wheel #1 @ 2.85"					3¼ × 2¾
24				45.9/45.2				55.6/55.6	
25				8" in 46 sec				8" in 42 sec	2.85 on wheel
26	SOUTH Unit								
27	Grate Speed, %	48.5	56.7	50.8			58.1	45.2	49.8
28	ID Damper, %	97.0	97.0	97.0			97.0	97.0	97.0
29	ID Fan, rpm	583.5	584.8	583.5			583.5	584.8	584.8
30	Pulp Feed Gate, % Open	62.2 rpm	62.2	62.2			62.2	62.2	do
31	Draft Control, %	34.0	41.7	37.7			44.3	30.4	36.7
32	FD Air Flow, MPPH	7.34	21.16	13.15			21.89	0.00	11.72
33	BH Temp. In, °C	113	112	113			112	114	114
34	Out, °C	111	111	110			110	112	111
35	BH ΔP	3.53	3.62	3.65			4.07	4.12	4.15
36	Multiclone, ΔP	2.49	2.50	2.49			2.53	2.96	2.55
37	Dryer Throat, °C	789	782	812			768	776	760
38	Dryer Exit, °C	128	126	128			126	128	128
39	Furnace Pressure	-0.19	-0.12	-0.17			-0.11	-0.22	-0.16
40	Exit Pressure	-0.98	-0.98	-1.05			-0.99	-0.98	-1.01
41	Dryer ΔP	0.49	0.45	0.52			0.50	0.42	0.49
42	Aspiration Flow, acfm	7.8	7.6	7.5			~~7.4~~ 7.6	7.9	7.6
43	Drum, amps	20.0	18.0	18.0			18.0	19.0	17.0
44	I.D. Fan, amps	163	163	163			167	166	165
45									
46		~~#3~~							
47		48.0/48.8		51.9/49.9			52.5/51.8		
48		8" in 99 sec		8" in 98 sec			8" in 98 sec		
49									

Notes written vertically across the columns:

- (1300 column): changed [illegible] flow [illegible] above grate
- (1400 column): aspiration to ~~stack~~ stack condensation accumulating on both duct and dripping on multiclone skin, leaking; insulation on ~~[illegible]~~ and dripping
- (1430 column): T ≈ 1450 blew out MC ΔP sample ports; increased aspiration flow

1/22/92

SOUTH Dryer FD Flow	Time	Draft %	Flow Device
South Side	1055	39.1	15.55
	1058	37.9	18.19
North Side	1104	37.9	14.63
	1106	39.6	12.49

South Dryer

North Side	1319	40.5	19.91
	1321	39.8	19.73
	1323	40.4	17.27
South Side	1329	36.6	18.60
	1330	36.8	14.34
	1332	39.2	16.32

1436 – Coal to No unit = 8" in 52 sec

46.15 ft/hr 3.1875 in-thick

3.53 Tph

Air required = 6.92 lb/lb-coal × 1.4 × 3.53 × 2000 = 68,406 lb/hr

= 16,003 ACFM = 267 cfs

for 50 fps, need 5.33 ft²

D = 2.606 feet.

$\pi D^2/4$

X 41

11.1 ft²

1/22/92

South Dryer FD Flow

	Time	Drafte %	Flow Device
South Side	1528	35.6	11.29
North Side	1535	36.8	12.70
	1538	36.8	14.00

NORTH DRYER FD Flow

	5.0	?
~~1606~~		
1648	25.7	-0.37
1650	28.9	1.06
1652	29.5	1.24

adjust from 10% to ± 20% Recycle

	~~Pre~~ Adjust	Post
MC AP	2.16	2.20
Throat °C	838	809
Exit °C	126	129
Furnace	-0.40	-0.31
Ex 1	-1.02	-0.99
AP Drum	0.46	0.47

~~-0.31~~ -0.15" above grate

Press Pulp Moisture 1/21/92

Sartorius MA30 Moisture Analyzer

1/21/92 Time	% Moisture
8:45	78.01
9:40	79.15
10:30	78.44
10:50	79.15
11:10	78.50
11:30	78.54
11:50	78.37
12:10	78.21
12:30	78.65
12:50	78.50
1:10	77.76
1:30	78.26
1:50	76.88
2:10	78.31
2:30	77.30
2:50	78.46
3:10	78.49
3:30	79.02
3:50	78.26
4:10	78.54
4:30	79.42
4:50	79.44
[illegible]	79.95
[illegible]	79.85
[illegible]	78.18
[illegible]	78.45
[illegible]	77.98
[illegible]	78.56
[illegible]	79.94
2:30	78.67
[illegible]	79.50

1/22/92	
8:30	78.27
8:50	78.60
9:10	78.34
9:30	79.00
9:50	77.91
10:10	78.50
10:30	77.42
10:50	78.93
11:10	78.09
11:30	79.64
11:50	79.10
12:10	78.81
12:30	78.44
12:50	78.82
1:10	78.90
1:30	78.07
1:50	76.71
2:10	78.79
2:30	78.45
2:50	79.02
3:10	78.68
3:30	79.04
3:50	78.50
4:05	78.00
4:30	78.73
4:50	78.67

8:30 - 11.2 — 800 - 9.3

9:30 - 8.3 — 900 - 6.3

10:30 - 8.9 — 10 - 98

11:30 - 8.9

12:30 - 8.8

1:30 - 8.3

2:30 - 7.9

3:30 - 9.3

4:30 - 11.4

11:00 - 97

1200 - 93

200 - 99

300 - 91

4:00 7.9

5:00 9.74

1-22-91

South

Pulp ——

Drier ——

Dry Pulp Moisture

10% Recycle Rate

Darrell Wahlen

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/22/92

Name ______

	1 Time of 2 Day	3 0830	4 0900	5 0930	6	7	8 1030	9 1100	1130
1	Slice Rate, Tph	198	187	195			192	200	192
2	Total Pulp Flow, Tph	56.5	45.6	56.8			53.2		48.3
3									
4	NORTH Unit								8" in 49 sec
5	Grate Speed, %	19.8		42.9			25.8		41.9/43.0
6	ID Damper, %	96.0		94.0			94.0		94.0
7	ID Fan, rpm	710.1		698.9			699.2		699.2
8	Pulp Feed Gate, % Open	27.20 vfd 35.5 rpm		25 vfd 38.1 rpm			22 vfd 35 rpm		25 vfd 38 rpm
9	Draft Control, %	-0.8		55.7			12.5		56.1
10	FD Air Flow, MPPH	—		8.46			-1.40		10.15
11	BH Temp. In, °C	119		117			118		113
12	Out, °C	113		107			112		111
13	BH ΔP	6.30		6.31			6.22		6.22
14	Multiclone, ΔP	3.74		3.75			3.58		3.83
15	Dryer Throat, °C	494		518			501		520
16	Dryer Exit, °C	135		126			133		123
17	Furnace Pressure	-0.82		-0.38			-0.88		-0.39
18	Exit Pressure	-1.95		-1.49			-1.80		-1.69
19	Dryer ΔP	0.65		0.70			0.57		0.75
20	Aspiration Flow, acfm	5.9		8.1			7.9		7.7
21	Drum, amps.	16.0		16.5			16.5		17.0
22	ID Fan, amps.	149		149			149		150
23		changed cool [illegible] wheel from 3¼ → 3"		Impact Scale says 12.5 [illegible]			changed wheel back to 3¼		
24									
25									
26	SOUTH Unit								
27	Grate Speed, %	55.3	49.7	54.1			53.0	53.1	57.1
28	ID Damper, %	97.0	97.0	97.0			97.0	97.0	97.0
29	ID Fan, rpm	593.4	593.4	592.4			593.4	594.5	593.4
30	Pulp Feed Gate, % Open	30 vfd, 63 rpm	do	do			do	do	do
31	Draft Control, %	39.3	33.1	37.7			37.9	39.1	40.4
32	FD Air Flow, MPPH	17.93	7.24	15.32			13.72	15.37	19.24
33	BH Temp. In, °C	114	115	114			114	114	114
34	Out, °C	111	112	112			112	112	112
35	BH ΔP	4.78	4.79	5.71			2.32	2.42	2.51
36	Multiclone, ΔP	2.25	2.11	2.20			2.22	2.15	2.17
37	Dryer Throat, °C	783	824	822			831	798	813
38	Dryer Exit, °C	127	128	127			127	128	127
39	Furnace Pressure	-0.48	-0.47	-0.44			-0.42	-0.44	—
40	Exit Pressure	-1.15	-1.16	-1.02			-1.02	-1.11	-1.06
41	Dryer ΔP	0.50	0.47	0.47			0.48	0.44	0.48
42	Aspiration Flow, acfm	7.3	6.7	7.9			8.2	7.9	8.1
43	Drum, amps	18.0	18.0	18.5			18.0	20.0	19.0
44	ID Fan, amps	166	164	166			166	168	166
45						grat. spd % =	53.0/53.2	51.9/52.7	
46									
47						on wheel	30: 5.5	20: 5.6	
48							8" in 93 sec	8" in 96 sec.	
49									

Changed Asp. air from 7.0 to 8.0 ΔP = 4.84

North Dryer Pulp Control on Manual Operator Speed Control (arrow to 0930, rows 43–44)

SOT 1020 BH Cleaning [illegible] ΔP dropped from 5.75 to [illegible]

BHΔP 2.26 stopped cleaning

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/22/92

Name

	[1]Time of [2]Day	[3]	[4] 1200	[5] 1230	[6]	[7] 1300	[8] 1330	[9] 1400	1430
1	Slice Rate, Tph		195	198		192	197	200	199
2	Total Pulp Flow, Tph		61.0	50.9		48.9	61.1	54.5	55.4
3									
4	NORTH Unit								
5	Grate Speed, %			30.8		30.8		32.2	
6	ID Damper, %			94.0		94.0		97.0	
7	ID Fan, rpm			698.9		699.7		699.2	
8	Pulp Feed Gate, % Open			19 turns/fd, 32.3 rpm		23 turns/fd 36.3 rpm		21.3 turns/fd 34.8 rpm	
9	Drait Control, %			2.0		-0.9		15.0	
10	FD Air Flow, MPPH			—		—		-1.40	
11	BH Temp. In, °C			116		120		117	
12	Out, °C			111		115		113	
13	BH ΔP			6.24		6.17		6.24	
14	Multiclone, ΔP			3.62		3.68		3.61	
15	Dryer Throat, °C			540		558		561	
16	Dryer Exit, °C			132		134		129	
17	Furnace Pressure			-0.90		-0.87		-0.70	
18	Exit Pressure			-1.80		-1.96		-1.76	
19	Dryer ΔP			0.57		0.65		0.62	
20	Aspiration Flow, acfm			7.3		6.3		6.8	
21	Drum, amps			16.5		16.5		16.5	
22	ID Fan, amps			149		149		149	
23	mod	3 1/16"		Gate open = 30.8		lowered coal gate	3" on chart	3 3/16" measured	
24	wheel	3.33"		8" in 54 sec				32.2/32.2	
25								8" in 52 sec	
26	SOUTH Unit								
27	Grate Speed, %		51.6	55.1		57.0	52.7	48.0	57.1
28	ID Damper, %		97.0	97.0		97.0	97.0	97.0	97.0
29	ID Fan, rpm		593.4	593.9		595.0	593.4	594.5	596.0
30	Pulp Feed Gate, % Open		50 turns/fd 62.2 rpm	50 turns/fd 62.4 rpm		62.3 rpm	62.4 rpm	62.4	62.2
31	Drait Control, %		35.6	38.3		39.0	38.0	31.0	40.5
32	FD Air Flow, MPPH		11.50	17.64		18.21	15.50	4.94	20.96
33	BH Temp. In, °C		114	114		114	114	114	113
34	Out, °C		117	112		112	112	112	111
35	BH ΔP		2.63	2.68		2.79	2.86	2.97	2.98
36	Multiclone, ΔP		2.19	2.12		2.20	2.21	2.14	2.24
37	Dryer Throat, °C		832	848		831	838	833	842
38	Dryer Exit, °C		128	128		128	129	127	128
39	Furnace Pressure		-0.43	-0.46		-0.44	-0.44	-0.46	-0.42
40	Exit Pressure		-1.01	-1.03		-1.04	-1.02	-1.04	-0.98
41	Dryer ΔP		0.43	0.45		0.43	0.43	0.47	0.45
42	Aspiration Flow, acfm		8.2	8.2		8.0	8.0	7.8	7.9
43	Drum, amps		19.5	18.0		18.5	18.5	20.0	18.0
44	ID Fan, amps		165	165		166	164	166	165
45									
46	mod 50	5 1/2" No 5 1/16"							
47	wheel	5 1/2"	54"	56.0				54.9/57.1	
48			control 52.6/52.1					8" in 91 sec	
49			8" in 93 sec						

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/22/92

Name ______

	1 Time of 2 Day	3 1500	4 ~~1500~~	5 1530	6 1600	7 1630	8 1700	9 1730
1	Slice Rate, Tph	219		195	199	194	202	205
2	Total Pulp Flow, Tph	54.3		49.4	45.5	52.7	53.9	50.6
3								
4	NORTH Unit							
5	Grate Speed, %	43.0			24.7		42.7	57.0
6	ID Damper, %	94.1			94.0		94.0	94.0
7	ID Fan, rpm	647.7			700.0		698.9	698.9
8	Pulp Feed Gate, % Open	25.4 open/37 rpm			27.2 ~~[illegible]~~ open. 34.5 rpm		33.4 open 31.0 rpm	30 open 43 rpm
9	Draft Control, %	43.1			4.8		31.6	48.9 ~~60.0~~
10	FD Air Flow, MPPH	5.11			—		2.02	7.60
11	BH Temp. In, °C	114			120		107	108
12	Out, °C	112			115		107	104
13	BH ΔP	3.12			6.12 ~~3.59~~		6.24	6.23
14	Multiclone, ΔP	2.13			3.53		3.80	3.73
15	Dryer Throat, °C	832			544		561	578
16	Dryer Exit, °C	127			133		114	125
17	Furnace Pressure	-0.50			-0.92		-0.57	-0.38
18	Exit Pressure	-1.06			-2.00		-1.74	-1.59
19	Dryer ΔP	0.46			0.59		0.79	0.74
20	Aspiration Flow, acfm	7.8	EOT 1430		6.1		5.9	5.7
21	Drum, amps	20.0	SOT 1515		16.5		17.5	17.0
22	ID Fan, amps	166			149		149	149
23								
24								47.1/45.7
25								8" in 45 sec.
26	SOUTH Unit							
27	Grate Speed, %	50.8		52.3	52.5	56.6	56.6	50.8
28	ID Damper, %	97.0		97.0	97.0	97.0	97.0	97.0
29	ID Fan, rpm	596.3		597.9	597.9	593.4	596.3	595.5
30	Pulp Feed Gate, % Open	62.4 rpm		62.7	50 open 62.2 rpm	same	same	same
31	Draft Control, %	37.0		37.6	36.5	41.1	39.6	35.9
32	FD Air Flow, MPPH	11.65		12.73	13.50	21.3	18.4	10.20
33	BH Temp. In, °C	114		114	114	113	114	115
34	Out, °C	112		112	112	112	112	112
35	BH ΔP	3.12		3.19	3.23	3.29	3.35	3.42
36	Multiclone, ΔP	2.16		2.17	2.11	2.14	2.14	2.16
37	Dryer Throat, °C	830		809	834	845	872	886
38	Dryer Exit, °C	128		127	127	125	129	128
39	Furnace Pressure	-0.49		-0.48	-0.45	-0.43	-0.42	-0.43
40	Exit Pressure	-1.08		-1.12	-1.09	-1.01	-1.05	-1.05
41	Dryer ΔP	0.43	0.46	~~0.43~~	0.46	0.47	0.47	0.45
42	Aspiration Flow, acfm	7.9	7.8	~~[illegible]~~	7.7	7.7	7.7	7.5
43	Drum, amps	18.0		20.0	19.0	20.0	20.5	20.5
44	ID Fan, amps	167		167	166	166	166	164
45								
46				~~[illegible]~~/51.2/50.7		62.7/58.3	~~[illegible]~~	50.4/52.1
47				8" in 101 sec.		8" in 85 sec.		8" in 95 sec.
48								
49								

Coal Flow _____ HOUR _____ EMISSION TEST LOG SHEET DATE 11/__/__

PULP DRYER: South

TIME		0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600
SLICE (TPH)		191	1[illegible]0	202	192	189	169	196	206	204	195	197	208	183	210	233	203
PULP FLOWS (TPH)	PRESSED	49.6	49.3	52.7	53.1	50.5	60.2	56.3	53.7	50.2	48.8	48.9	48.8	50.2	58.3	45.7	54.5
	DRYER FEED	34.3	33.4	35.5	33.6	35.9	37.1	32.5	33.1	32.3	33.3	36.2	32.11	34.6	35.8	37.3	31.9
FEEDER RPM		62.0	62.4	62.2	62.2	62.4	62.1	62.2	62.3	62.2	62.5	62.4	62.3	62.4	62.4	62.3	62.2
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		58.3	49.4	55.9	53.0	52.3	52.7	57.1	52.7	56.7	56.3	54.4	49.9	57.0	52.2	52.3	55.0
THROAT TEMP. (°C)		778	829	816	828	831	801	798	831	830	827	831	[illegible]	834	831	811	824
EXIT TEMP. (°C)		126	128	126	127	128	127	126	128	127	127	128	129	128	127	127	127
ΔP DRUM		0.48	0.49	0.49	0.49	0.44	0.45	0.45	0.45	0.46	0.51	0.49	0.47	0.49	0.49	0.49	0.49
I.D. FAN RPM		593.4	594.2	592.4	593.4	593.4	594.5	593.4	594.5	592.9	594.5	593.7	594.5	596.3	596.0	597.9	597.1
M.C. ΔP		2.25	2.22	2.20	2.16	2.20	2.15	2.11	2.17	2.15	2.17	2.14	2.12	2.21	2.21	2.22	2.19
BAGHOUSE ΔP		4.74	4.88	5.70		2.31	2.42	2.51	2.63	2.68	2.80	2.85	[illegible]	2.99	3.12	3.19	3.23
ASP. AIRFLOW		7.0	6.9	8.1	[illegible]	8.0	8.0	8.0	8.2	8.0	8.2	7.9	[illegible]	7.9	7.9	8.0	7.1
RECYCLE AIRFLOW (CFM)		n/a	n/a	n/a	[illegible]	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

COAL FEED _____ T/HOUR — ISSUE TEST LOG SHEET — DATE: 1/2/

PULP DRYER:

TIME		1630	1700	1730													
SLICE (TPH)		219	203	203													
PULP FLOWS (TPH)	PRESSED	47.8	52.3	56.0													
	DRYER FEED	31.8	32.0	39.5													
FEEDER RPM		62.2	62.2	62.2													
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		57.5	55.3	50.8													
THROAT TEMP. (°C)		863	864	885													
EXIT TEMP. (°C)		127	128	129													
ΔP DRUM		0.44	0.47	0.49													
I.D. FAN RPM		593.4	596.0	595.5													
M.C. ΔP		2.15	2.15	2.12													
BAGHOUSE ΔP		3.30	3.36	3.39													
ASP. AIRFLOW		7.9	7.8	7.6													
RECYCLE AIRFLOW (CFM)		n/a	n/a	n/a													

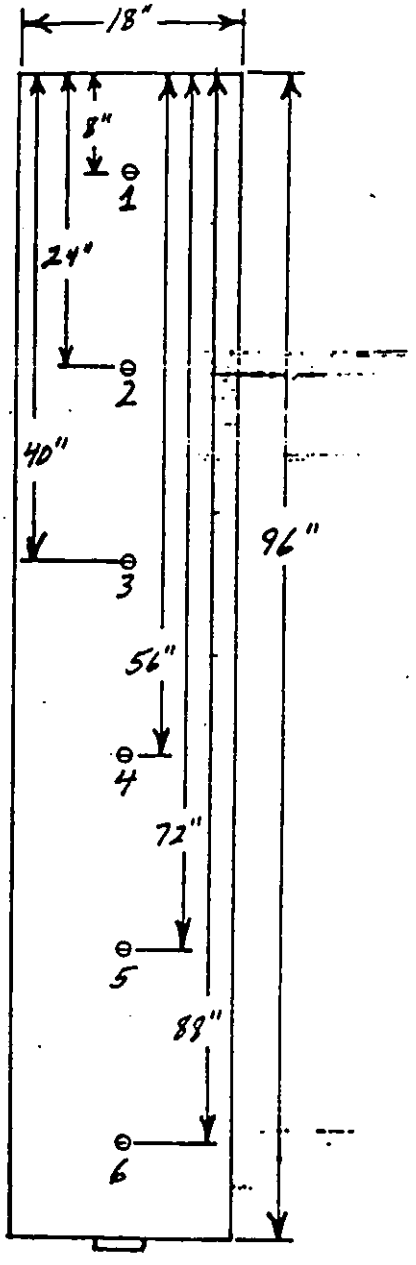
FORCED DRAFT AIR FLOW

Unit 5 Drier Location Sc Duct

Static Pressure, in-H_2O .31

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.25		118.4
2	.19		118.0
3	.12		117.0
4	.03		115.4
5	0		114.8
6	-.04		115.2
	Average		+ 460 = T_s

83½



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____$) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____$)/(T_s$ _____$) =$ _____ lb/hr.

Time 10:50

Date 11/22/92

Name _____

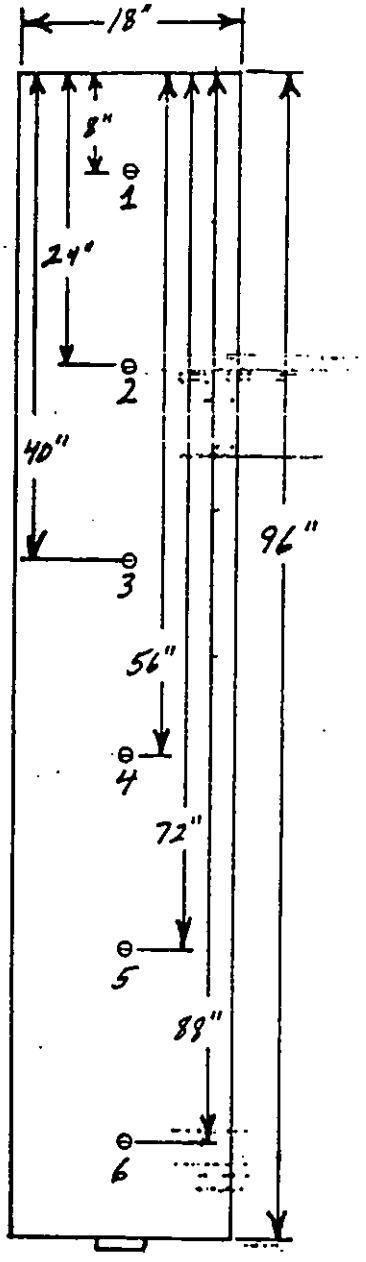
Moorhead Factory

FORCED DRAFT AIR FLOW

Unit Stacker Location No Duct

Static Pressure, in-H_2O .24

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.01		115.0
2	0		115.8
3	0		116.4
4	.12		118.2
5	.23		119.8
6	.34		120.2
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____$) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____$)/(T_s$ _____$) =$ _____ lb/hr.

Time 11:00

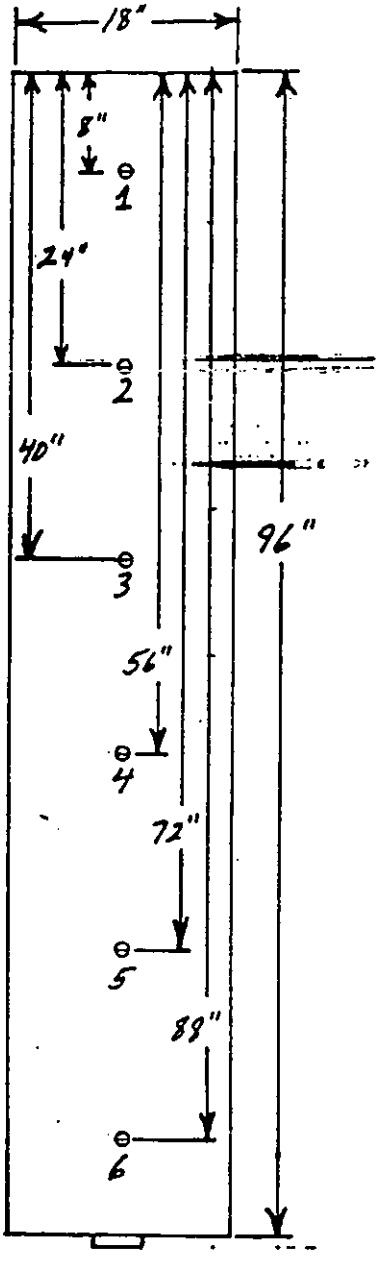
Date 11/22/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit Scrubber Location N.O Duct



Static Pressure, in-H_2O .32

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.04		114
2	.02		113.8
3	.04		113.8
4	.14		115.6
5	.35		116.8
6	.41		117.2
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____$) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____$)/(T_s$ _____$) =$ _____ lb/hr.

Time 1:20 PM

Date 1/22/92

Name _____

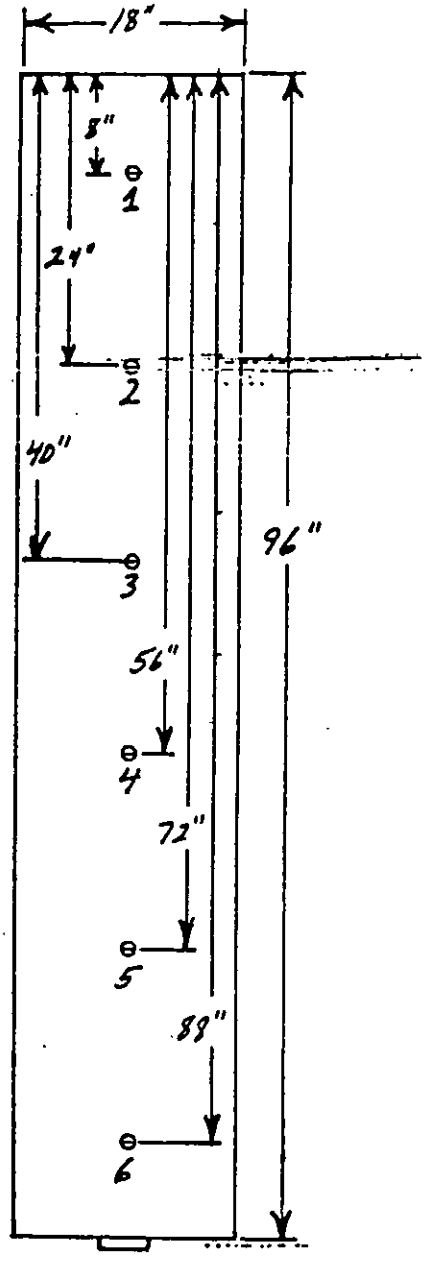
Moorhead Factory

FORCED DRAFT AIR FLOW

Unit S Boiler Location S Duct

Static Pressure, in-H_2O .36

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.20		116.2
2	.21		116.2
3	.14		114.8
4	.04		114.0
5	0		113.2
6	.02		113.0
Average			+ 460 = T_s



Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ \text{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\ \_\_\_\_)\sqrt{(T_s\ \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ \text{sec/min})$

$A = 12\ Ft^2$

$V_F = 720(v_s\ \_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ \_\_\_\_)/(T_s\ \_\_\_\_) =$ _____ lb/hr.

Time 1:25 PM

Date 1/22/92

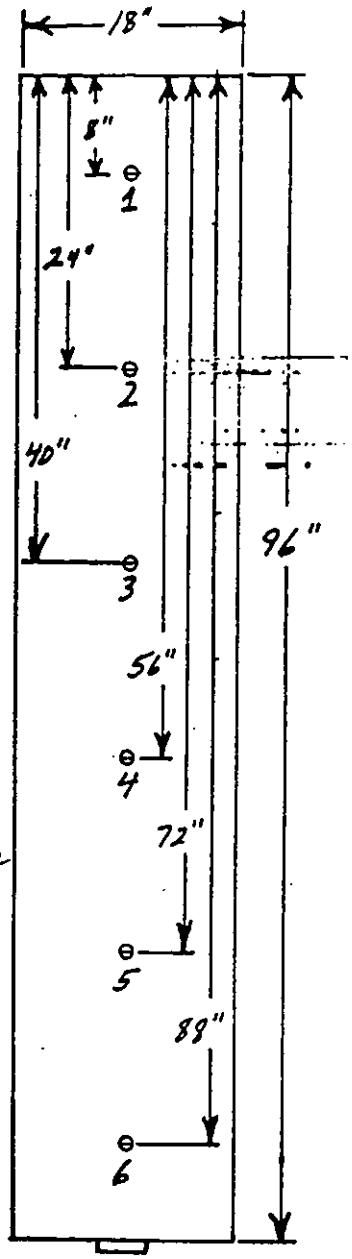
Name _____

Moorhead Factory

1/22/92

FORCED DRAFT AIR FLOW

Unit S Dryer Location S. Duct +



Static Pressure, in-H_2O .22

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.18	0.424	124
2	.2	0.447	124
3	.11	0.332	122.2
4	.04	0.200	121.0
5	0	0	120.6
6	-.02	0	121.0
Average		0.234	122.2 + 460 = T_s 582.2

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\ 0.234)\sqrt{(T_s\ 582.2)/870.25}$

$v_s =$ 13.58 Feet/second

Air Flow $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\ 13.58) =$ 9,777 acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\ 20,686)/(T_s\ 582.2) =$ ~~[illegible]~~ 84,600 lb/hr.

Time 3:27 PM

Date _____

Name _____

Moorhead Factory A/F = 143.65

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/23/92

Name _____

	1 Time of 2 Day	3 1430	4 1700	5	6	7	8	9
1	Slice Rate, Tph	193	206					
2	Total Pulp Flow, Tph	62.8	54.2					
3								
4	NORTH Unit							
5	Grate Speed, %	45.1	32.3					
6	ID Damper, %	94.8	94.0					
7	ID Fan, rpm	698.4	698.6					
8	Pulp Feed Gate, % open	47.5 turns 55 rpm	38.5 rpm					
9	Drate Control, %	16.1	5.5					
10	FD Air Flow, MPPH	-1.40	-1.40					
11	BH Temp. In, °C	108	108					
12	Out, °C	103	102					
13	BH ΔP	6.40	6.44					
14	Multiclone, ΔP	3.87	3.66					
15	Dryer Throat, °C	610	623					
16	Dryer Exit, °C	125	132					
17	Furnace Pressure	-0.46	-0.74					
18	Exit Pressure	-1.66	-1.76					
19	Dryer ΔP	0.70	0.61					
20	Aspiration Flow, actm	5.1	5.3					
21	Drum, amps.	16.5	16.5					
22	ID Fan, amps	149	149					
23								
24								
25								
26	SOUTH Unit							
27	Grate Speed, %	50.2	52.0					
28	ID ~~Damper~~, %	97.0	97.0					
29	ID Fan, rpm	580.2	581.2					
30	Pulp Feed Gate, % open	33.2 rpm	62.2 rpm					
31	Drate Control, %	36.2	38.7					
32	FD Air Flow, MPPH	13.47	15.21					
33	BH Temp. In, °C	114	114					
34	Out, °C	111	111					
35	BH ΔP	4.14	4.28					
36	Multiclone, ΔP	2.44	2.46					
37	Dryer Throat, °C	787	770					
38	Dryer Exit, °C	129	127					
39	Furnace Pressure	-0.16	-0.16					
40	Exit Pressure	-0.89	-1.01					
41	Dryer ΔP	0.40	0.47					
42	Aspiration Flow, actm	7.4	7.7					
43	Drum, amps	17.5	18.0					
44	ID Fan, amps	163	164					
45								
46								
47								
48								
49								

Coal FE[illegible] T[illegible]UR 10% Recircle EMISSION TEST LOG SHEET

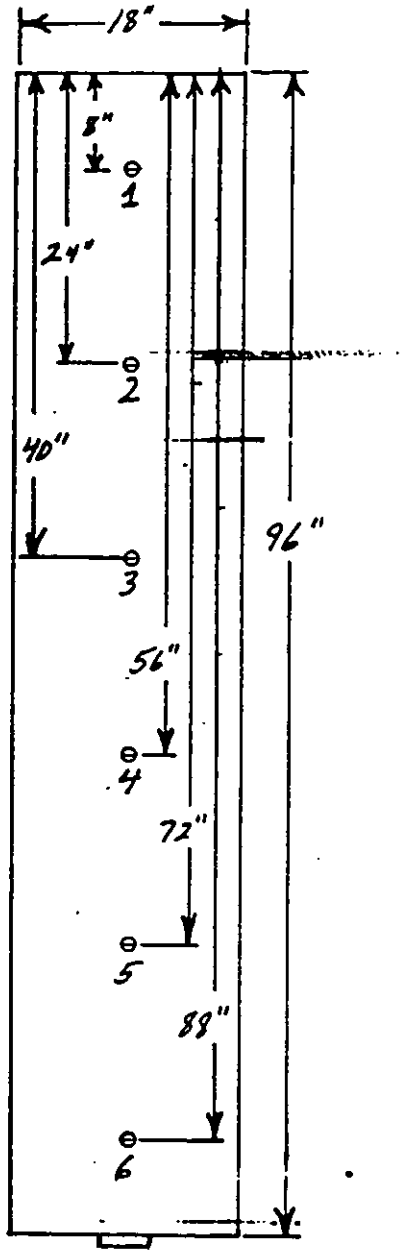
DATE: 1/22/92

PULP DRYER:

		0938	10:00	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700
TIME		0938	10:00	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600	1630	1700
SLICE (TPH)		202	202	186	196	192	202	194	201	204	202	202	194	207	197	199	187
PULP FLOWS (TPH)	PRESSED	53.5	47.7	48.7	44.7	50.5	58.9	46.6	51.7	54.4	56.2	63.3	53.4	56.2	? 35.1	58.5	66.3
	DRYER FEED	31.9	35.7	31.5	35.8	31.8	39.1	30.3	31.2	34.8	41.2	38.0	34.9	32.0	25.8	34.2	37.4
FEEDER RPM		50% vfd 62.3 rpm	62.3 rpm	62.1	62.3	62.3	62.2	62.3	62.3	62.3	62.2	62.2	62.3	62.3	62.2	62.2	62.2
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		54.1	50.1	50.9	52.0	53.4	55.0	50.5	58.3	54.6	47.1	53.3	51.3	47.1	49.5	52.0	53.2
THROAT TEMP. (°C)		763	757	763	768	787	755	785	775	801	781	743	791	783	758	780	772
EXIT TEMP. (°C)		127	127	127	127	127	126	127	125	127	128	125	128	129	128	128	126
ΔP DRUM		0.46	0.50	0.43	0.50	0.41	0.45	0.41	0.44	0.40	0.45	0.47	0.48	0.48	0.55	0.50	0.49
I.D. FAN RPM		583.5	582.8	584.6	583.8	583.5	579.9	582.8	584.3	584.3	583.8	580.9	584.8	585.1	586.1	581.2	580.9
M.C. ΔP		2.49	2.45	2.45	2.49	2.49	2.53	2.56	2.54	2.52	2.42	2.43	2.53	2.49	2.52	2.43	2.51
BAGHOUSE ΔP		3.08	3.[illegible]	3.27	3.29	3.43	3.50	3.54	3.63	3.65	3.74	3.85	3.96	4.08	4.13	4.15	4.28
ASP. AIRFLOW		7.6	7.[illegible]	7.8	7.7	7.5	7.9	7.5	7.8	7.6	7.6	7.5	7.7	7.5	7.4	7.5	7.6
RECYCLE AIRFLOW (CFM)		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a

FORCED DRAFT AIR FLOW

Unit S. Drier Location So Duct



Static Pressure, in-H_2O .34

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.17		122.0
2	.12		121.6
3	.12		120.0
4	.03		118.4
5	0		118.2
6	0		118.2
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{T_s/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s \_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

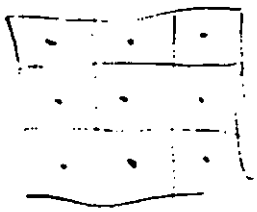
Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s \_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F \_\_\_\_)/(T_s \_\_\_\_) =$ _____ lb/hr.



Moorhead Factory

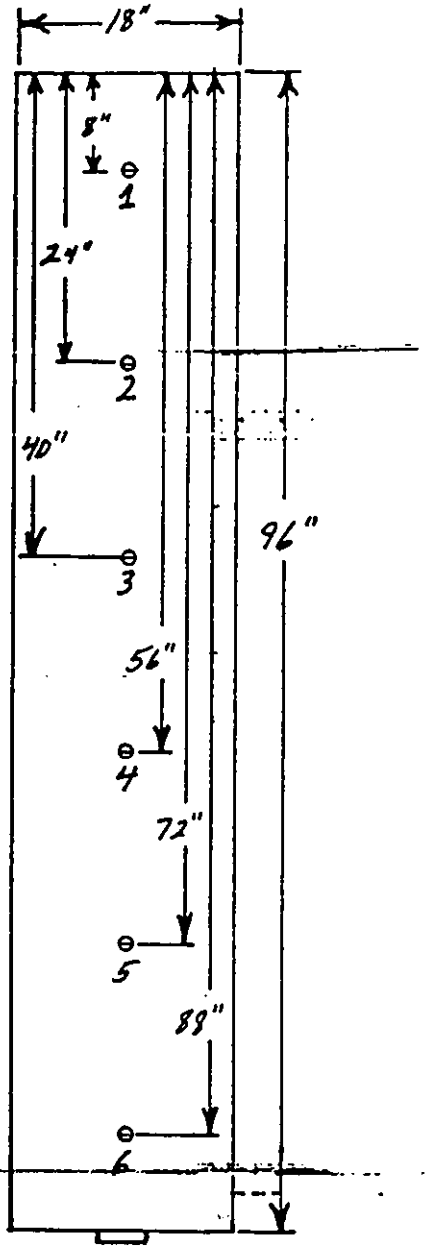
Time 10:15 AM

Date 1/23/92

Name B. A. Bergin

FORCED DRAFT AIR FLOW

Unit S Drier Location North Duct



Static Pressure, in-H_2O .35

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	-.01	____	119.0
2	-.01	____	118.3
3	.02	____	119.0
4	.12	____	121.6
5	.3	____	122.8
83½ 6	.37	____	123.2
8	Average	____	____ + 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\left(\sqrt{T_s/870.25}\right)$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s$ _____$) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ _____$)/(T_s$ _____$) =$ _____ lb/hr.

Time 10:20 AM

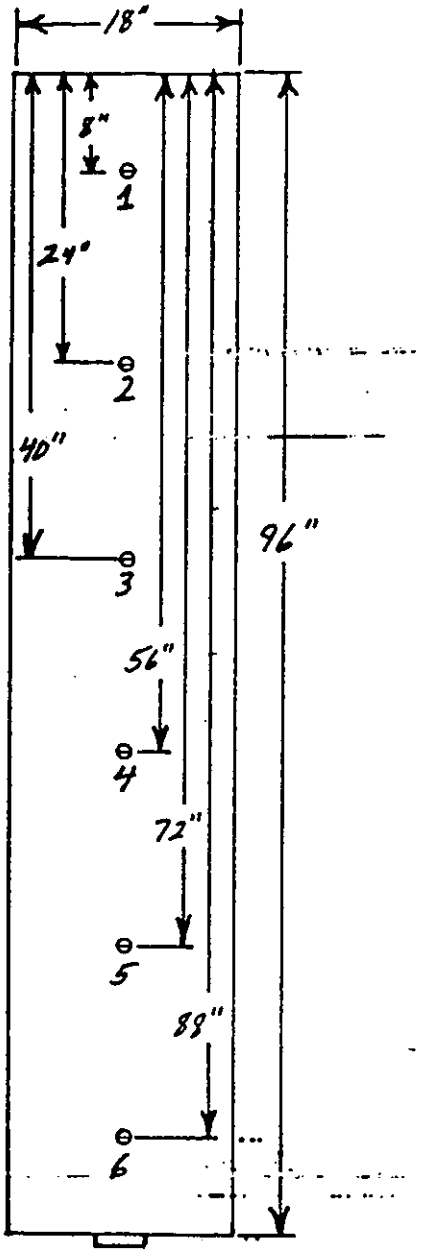
Date 1/23/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit 5 Drier Location No. 1 Duct



Static Pressure, in-H_2O .52

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.11		121.4
2	.02		121
3	.04		120.8
4	.18		122.8
5	.36		124.0
83½" 6	.45		124.4
Average			+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})\sqrt{(T_s)/870.25}$

$v_s = 70.95(\sqrt{\Delta P}\_\_\_\_)\sqrt{(T_s\_\_\_\_)/870.25}$

$v_s =$ _____ Feet/second

Air Flow, $V_F = v_s(A)(60\ sec/min)$

$A = 12\ Ft^2$

$V_F = 720(v_s\_\_\_\_) =$ _____ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F\_\_\_\_)/(T_s\_\_\_\_) =$ _____ lb/hr.

Time 1:15 PM

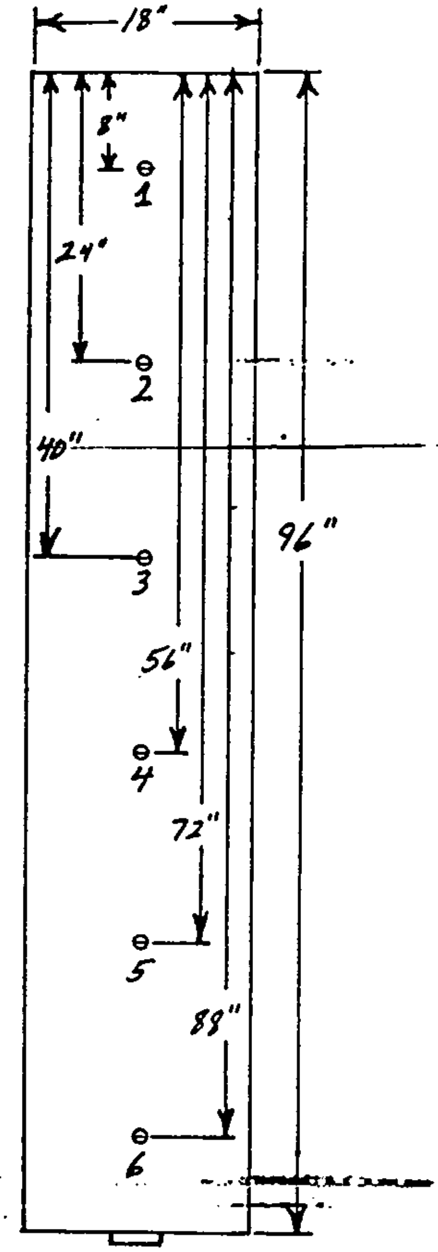
Date 1/23/92

Name _____

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit South Duct Location S. Duct



Static Pressure, in-H_2O .54

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.21	______	122.8
2	.28	______	122.4
3	.16	______	121.2
4	.05	______	120
5	0	______	120
6	-.06	______	120.2
Average		______	______ + 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}$ ______ $)\sqrt{(T_s \text{ ______ })/870.25}$

$v_s =$ ______ Feet/second

Air Flow, $V_F = v_s(A)(60 \text{ sec/min})$

$A = 12 \text{ Ft}^2$

$V_F = 720(v_s$ ______ $) =$ ______ acFm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ ______ $)/(T_s$ ______ $) =$ ______ lb/hr.

Time 1:23 PM

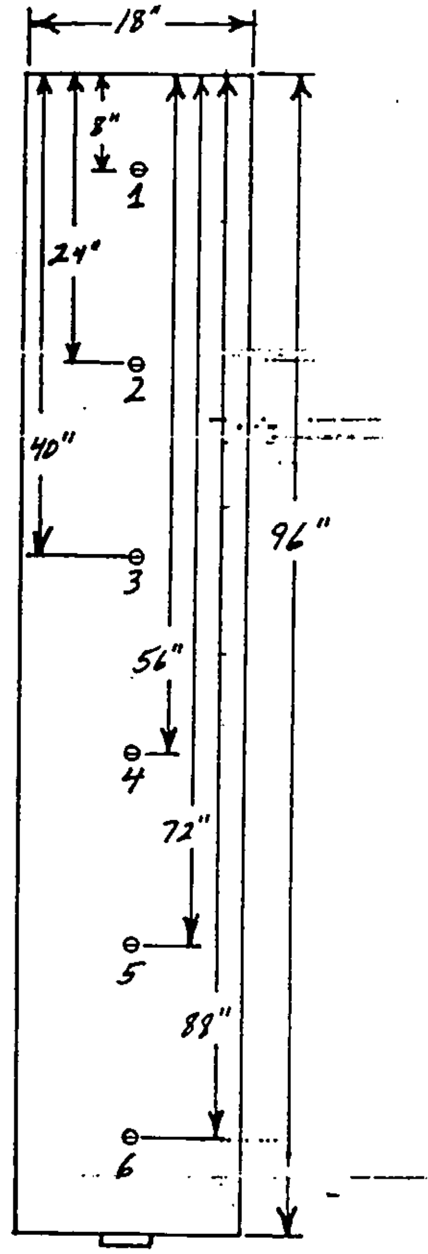
Date 1/23/92

Name ______

Moorhead Factory

FORCED DRAFT AIR FLOW

Unit [illegible] Location [illegible]



Static Pressure, in-H_2O .49

Test Point	Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.0[illegible]		124.6
2	.05		12[illegible]
3	.11		126.4
4	.15		126.6
5	.15		126.4
6	.14		126.6
	Average		+ 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P_{avg}})(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}$ ______ $)\sqrt{(T_s \text{ ______ })/870.25}$

$v_s =$ ______ Feet/second

Air Flow, $V_F = v_s(A)(60 \text{ sec/min})$

$A = 12 \text{ Ft}^2$

$V_F = 720(v_s$ ______ $) =$ ______ acfm

FD Air Rate, $Q_F = 2381(V_F)/(T_s)$

$Q_F = 2381(V_F$ ______ $)/(T_s$ ______ $) =$ ______ lb/hr.

Time 1:32 PM

Date 1/23/92

Name ______

Moorhead Factory

[illegible] Draft Air Flow

Unit [illegible] Location [illegible]

Static [illegible] in-H_2O .19

Test Point	[illegible] Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.06	.	122.6
2	.02		122.0
3	.02		122.6
4	.1		125.2
5	.21		127.2
6	.25		127.6
[illegible] Average			___ + 460 = T_s

Average Velocity, $v_s = 70.95(\sqrt{\Delta P}\ avg)(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}$ ______ $)\sqrt{(T_s\ \text{______})/870.25}$

v_s = ______ Feet/second

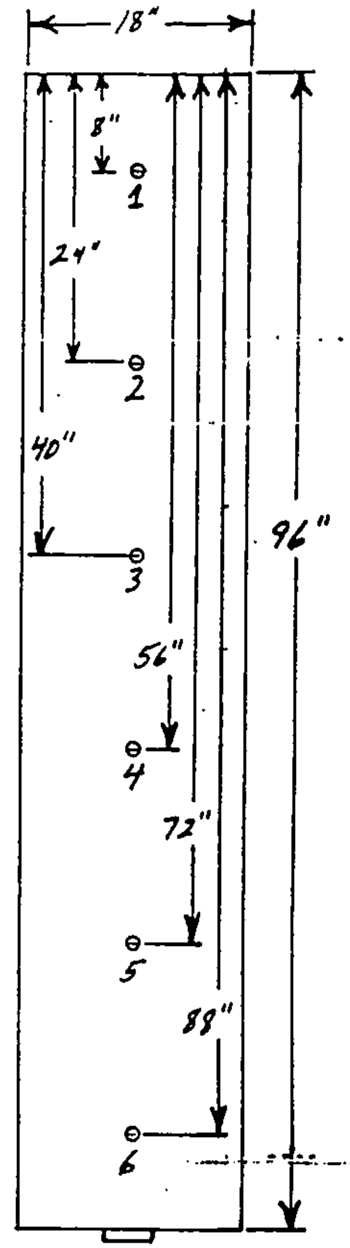
Air [illegible] = v_s (A) (60 sec/min)

$A = 12\ Ft^2$

[illegible] = 720(v_s ______) = ______ acfm

FD [illegible] $Q_F = 2381 (V_p)/(T_s)$

$Q_F = 2381(V_p$ ______ $)/(T_s$ ______ $)$ = ______ lb/hr.



Time 3:35 PM

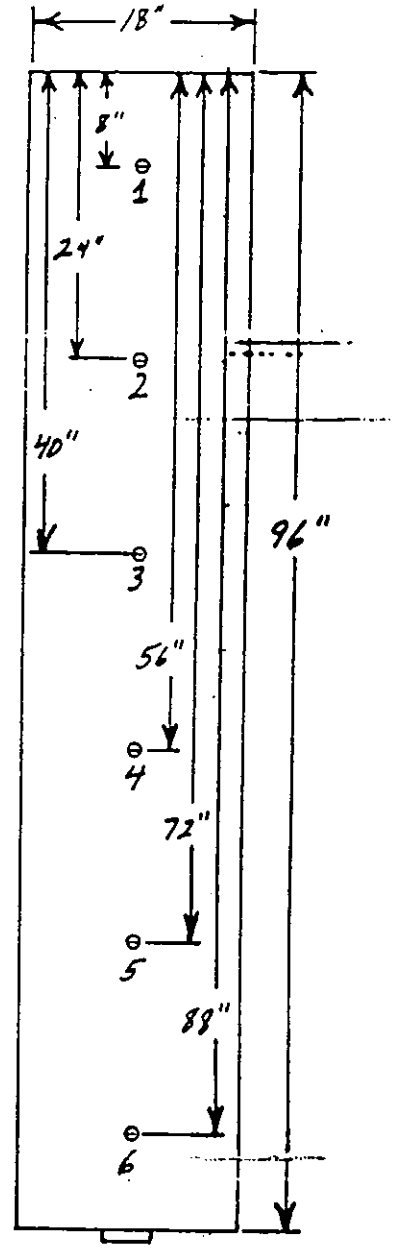
Date 1-[illegible]-92

Name ______

[illegible]tory

[illegible] DRAFT AIR FLOW

Unit South Drier Location S. Duct



Static [illegible] in-H_2O .30

Test Point	[illegible] Differential, ΔP, in-H_2O	$\sqrt{\Delta P}$	Temperature, °F
1	.22	-	125
2	.22		124.4
3	.13		122.8
4	.04		121.6
5	0		121.2
6	-.04		120.8
[illegible] Average			+ 460 = T_s

Average [illegible], $v_s = 70.95(\sqrt{\Delta P}_{avg})(\sqrt{T_s/870.25})$

$v_s = 70.95(\sqrt{\Delta P}$ _____ $)\sqrt{(T_s \text{\_\_\_\_\_})/870.25}$

v_s = ________ Feet/second

Air [illegible] (A) (60 sec/min)

$A = 12\ Ft^2$

[illegible] = 720 (v_s _______) = ________ acfm

FD [illegible] $Q_F = 2381 (V_F)/(T_s)$

Q_F = 2381 (V_F _______) / (T_s ______) = ________ lb/hr.

Time 3:42 P[illegible]

Date [illegible]

Name ________

[illegible] History

11/23/92

End of Day

Stack 57,409
57,155
57,023
57,196

Rec 14,680

Asp 8,629

20.42% Rec.

12.01 Asp