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

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

AP42 Section:	9.10.1.2
Background Chapter	4
Reference:	17
Title:	Results of the January 28-31, 1992, Particulate Emission Tests, South Pulp Dryer--American Crystal Sugar Company, Moorehead, Minnesota, Bay West, Inc., St. Paul, MN, March 26, 1992.

APPENDIX Q

REPORT EXCERPTS FROM REFERENCE 17

(American Crystal Sugar Company, March 26, 1992)

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

AMERICAN CRYSTAL SUGAR COMPANY
MOORHEAD, MINNESOTA

Submitted to:

David Walden
American Crystal Sugar Co.

Prepared by

Bay West, Inc.

Roger Martin, CHMM
Department Manager
Air and Waste Management

March 26, 1992

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.

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~~ 0.5052
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
		these are wrong! BLS 3/95	
PARTICULATE CONCENTRATION	0.0877	0.1002	0.1083
ACTUAL (gr/acf)	~~0.0995~~	~~0.0448~~	~~0.0468~~
DRY STANDARD (gr/dscf)	0.0979	0.1119	~~0.1091~~ 0.1213
PARTICLE MASS RATE (lb/hr)	19.291	21.893	~~22.621~~ 25.174

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. 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. 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. 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

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

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: 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

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: 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) * 0.0081 (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	+	0.0517	=	0.4335

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: 3
DATE: 2·13·92
ANALYST: R. Hessler

FILTERS

Lab No.	Final Wt. (g)		Tare Wt. (g)		Gain (g)
18975	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

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

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

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: 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) * 0.0081 (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

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: 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) * 0.0081 (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

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: 2
RUN NO: 3
DATE: 2.13.92
ANALYST: R. Hessler

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

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.'S 1, 2, 3
DATE: 2.13.92
ANALYST: C. 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

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: 1
DATE: 2.13.92
ANALYST: R. Hessler

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

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: 2
DATE: 7/13/92
ANALYST: R. Hessler

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) = -0.0151

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. Hessel

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~~ 0.0762

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

CORRECTED TOTAL ~~0.0117~~ 0.0625

SUMMARY OF CORRECTED TOTALS (g)

RUN NO.	FILTER		PROBE WASH		IMP. CATCH		TOTAL
3	0.2931	+	0.1496	+	~~0.0117~~ 0.0625	=	~~0.4544~~ 0.5052

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.'S 1, 2, 3
DATE: 2/13/92
ANALYST: R. Hessler

SUMMARY OF PARTICULATE ANALYSES

Lab No.	Run No.	Total Corrected Wt. (g)
18932, '951, '952	1	0.6358
18935, '952, '983	2	0.5193
18938, '953, '954	3	0.4658

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

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: 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. Hoskr

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

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: 3
DATE: 2/13/92
ANALYST: K. Hessler

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) = -0.005 (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

COAL FEED _____ TYHOUR _____ EMISSION TEST LOG SHEET 62.[illegible] rpm on pulp [illegible] DATE: 1/[illegible]/92

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	201	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.[illegible]	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	2.18	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

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/24/92

Name

	1 Time of 2 Day	3 1500	4	5 1530	6 1600	7 1630	8 1700	9
1	Slice Rate, Tph	204			204	203	212	
2	Total Pulp Flow, Tph	58.3			50.3	47.4	53.8	
3								
4	NORTH Unit							
5	Grate Speed, %	34.9			49.3			
6	ID Damper, %	94.0			94.6			
7	ID Fan, rpm	701.0			699.7			
8	Pulp Feed Gate, % Open	~~[illegible]~~ rpm			[illegible] rpm			
9	Draft Control, %	-3.3			29.0			
10	FD Air Flow, MPPH	—			10.41			
11	BH Temp. In, °C	115			109			
12	Out, °C	108			107			
13	BH ΔP	6.22			6.33			
14	Multiclone, ΔP	3.80			3.86			
15	Dryer Throat, °C	531			503			
16	Dryer Exit, °C	134			123			
17	Furnace Pressure	-0.73			-0.14			
18	Exit Pressure	-1.84			-1.63			
19	Dryer ΔP	0.60			0.73			
20	Aspiration Flow, acfm	5.4			5.3			
21	Drum, amps.	16.5			16.5			
22	I.D. Fan, amps.	149			149			
23								
24	Wall	= 2 3/4"	29.0/29.0					
25	measured	= 2 5/4"	8" in SEP.					
26	SOUTH Unit							
27	Grate Speed, %	51.7		51.6	54.6	46.0	56.6	
28	ID Damper, %	97.0		97.0	97.0	97.0	97.0	
29	ID Fan, rpm	589.0		590.1	591.9	592.9	590.6	
30	Pulp Feed Gate, % Open	62.3		62.3 rpm	62.3 rpm	do	do	
31	Draft Control, %	38.5		38.1	39.5	30.9	41.4	
32	FD Air Flow, MPPH	17.32		13.31	19.24	0.00	20.07	
33	BH Temp In, °C	115		115	115	117	115	
34	Out, °C	113		113	113	114	114	
35	BH ΔP	2.29		2.28	2.26	2.33	2.35	
36	Multiclone, ΔP	2.33		2.21	2.27	2.29	2.28	
37	Dryer Throat, °C	776		822	837	812	780	
38	Dryer Exit, °C	129		130	131	130	127	
39	Furnace Pressure	-0.23		-0.20	-0.18	-0.26	-0.19	
40	Exit Pressure	-1.09		-1.05	-1.07	-1.13	-1.06	
41	Dryer ΔP	0.46		0.48	0.51	0.49	0.47	
42	Aspiration Flow, acfm	7.9		7.6	7.7	7.6	7.4	
43	Drum, amps	18.0		18.0	17.5	17.5	17.6	
44	I.D. Fan, amps	164		165	165	166	166	
45								
46		50.4/47.9			51.1/48.1			
47		8" in 99 acc			8" in 100 acc.			
48		Wall-Same.						
49								
50								

SOT 1505

COAL FEED _____ TAMOUR

EMISSION TEST LOG SHEET

DATE: 1/ / 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		62.2	62.2														
PULP MOISTURES (%)	PRESSED																
	DRIED																
GRATE SPEED		49.3	58.8														
THROAT TEMP. (°C)		813	781														
EXIT TEMP. (°C)		130	127														
AP 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 ✓
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 Tpd slice 5% Mare 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

COAL FEED _____ T/HOUR No Recycle, 14% Aspiration, 34 Tph Pre. d Pulp

'ISS' 'TE' LOG IEET

ATE: 1/: /.

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 scoll	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	500 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	42.0	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		

800 - 7.6 8:30 - 6.2

900 - 6.5 9:30 - 8.2

10 - 6.4 10:30 - 6.9

110 - 6.5 11:30 - 6.8

120 - 7.8 1:230 - 7.1

[illegible] 9.1

1:30 9.2 230 - 6.4

300. 7.4

330 - 8.9 400 - 6.6

[illegible]

1/23/92

Product Pulp

Moisture

South Dryer

MHD

COAL FEED _____ TAMOUR _____ EMISSION TEST LOG SHEET _____ DATE 1/22/92

PULP DRYER: South

TIME		0830	0900	0930	1000	1030	1100	1130	1200	1230	1300	1330	1400	1430	1500	1530	1600
SLICE (TPH)		191	190	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	32.4	35.5	33.6	35.9	37.1	32.5	33.1	32.3	33.3	36.2	32.4	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	48.9	57.0	52.2	52.3	55.0
THROAT TEMP. (°C)		778	829	816	828	831	801	798	831	830	827	831	840	834	831	811	828
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	2.18
BAGHOUSE ΔP		4.74	4.80	5.70		2.31	2.42	2.51	2.63	2.68	2.80	2.85	2.97	2.99	3.12	3.19	3.23
ASP. AIRFLOW		7.0	6.9	8.1		8.0	8.0	8.0	8.2	8.0	8.2	7.9	8.2	7.9	7.9	8.0	7.7
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

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			24.2		42.7	57.0
6	ID Damper, %	94.0			94.0		94.0	94.0
7	ID Fan, rpm	64[illegible]			700.0		698.9	698.9
8	Pulp Feed Gate, % Open	25.4 [illegible]/37.4 rpm			22.8 [illegible] 34.5 rpm		22.4 [illegible] 37.0 rpm	30 [illegible] 42 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 ~~3.53~~		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			6.1		5.9	5.7
21	Drum, amps	20.0			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		62.2	50 [illegible] 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	865	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 100 sec.		8" in 85 sec.		8" in 95 sec.
48								
49								

EOT 1430

SOT 1515

COAL FEED _____ T/HOUR

'ISS' 'TE' 'OG 'EET

ATE: 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														

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, %	94.0	94.0					
7	ID Fan, rpm	698.9	698.6					
8	Pulp Feed Gate, % Open	42.5 [illegible] 55 rpm	26.0 [illegible] 38.5 rpm					
9	Draft 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, acfm	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~~ speed, %	97.0	97.0					
29	ID Fan, rpm	580.2	581.2					
30	Pulp Feed Gate, % Open	[illegible] rpm	62.2 rpm					
31	Draft 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	128	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, acfm	7.4	7.7					
43	Drum, amps	17.5	18.0					
44	ID Fan, amps	163	164					
45								
46								
47								
48								
49								

Coal Feed _____ Tanjour 1.67 Kerosene EMISSION TEST LOG SHEET DATE: 1/23/92

PULP DRYER:

TIME		0938	1000	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	48.2	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	39.7	30.3	31.2	34.8	41.2	38.0	34.9	32.0	25.8	34.2	37.4
FEEDER RPM		50 to full 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	561.2	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	3.17	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	7.6	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

All condensible PM is condensible organic PM only!!

Filename: BEET17.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum with multiclone and stack filter system
Test date: January 21, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	233.3	232.8	228.8	
South pulp dryer	Pressure	in. HG	28.8	28.8	28.8	
	Moisture	%	32.39	33.09	32.16	
	Oxygen	%	16	15.5	15.25	
	Volumetric flow, actual	acfm	68336	68733	68225	
	Volumetric flow, standard*	dscfm	33857	33726	34139	
	Isokinetic variation	%	109.64	104.7	100.84	
Wet Pulp Feed Rate To Dryer		TPH	27.0	28.6	27.7	
	Pollutant concentrations:					
	Total PM	G/dscf	0.0724	0.0718	0.0757	
	Filterable PM	G/dscf	0.0640	0.0632	0.0625	
	Condensible PM	G/dscf	0.00838	0.00856	0.0132	
	CO2	% dv	4.12	4.08	4.11	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	18.6	18.28	18.29	
	Condensible PM	lb/hr	2.43	2.48	3.86	
	CO2	lb/hr	9560	9430	9616	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.69	0.64	0.66	0.66
	Condensible PM	lb/ton	0.090	0.086	0.14	0.11
	CO2	lb/ton	354	329	348	344
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.34	0.32	0.33	0.33
	Condensible PM	kg/Mg	0.045	0.043	0.070	0.053
	CO2	kg/Mg	177	165	174	172

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Total emission factors for 12 test runs

	controlled	uncontrolled
Filterable PM	0.31 kg/Mg (0.61 lb/ton)	2.2 kg/Mg (4.4 lb/ton)
Condensible organic PM	0.052 kg/Mg (0.10 lb/ton)	No Data
CO_2	151 kg/Mg (302 lb/ton)	155 kg/Mg (310 lb/ton)

Filename: BEET17A.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum with multiclone and stack filter system
Test date: January 22, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	227.8	218.4	219.8	
South pulp dryer	Pressure	in. HG	28.7	28.7	28.7	
	Moisture	%	42.65	42.44	44.09	
	Oxygen	%	14.75	14.25	15.1	
	Volumetric flow, actual	acfm	63134	62566	62962	
	Volumetric flow, standard*	dscfm	26633	26857	26198	
	Isokinetic variation	%	109.19	104.6	104.29	
Wet Pulp Feed Rate To Dryer		TPH	34.7	34.1	33.7	
	Pollutant concentrations:					
	Total PM	G/dscf	0.1001	0.0953	0.1277	
	Filterable PM	G/dscf	0.0847	0.0823	0.102	
	Condensible PM	G/dscf	0.0154	0.0130	0.0259	
	CO2	% dv	5.5	6	5.2	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	19.3	18.94	22.86	
	Condensible PM	lb/hr	3.52	3.00	5.82	
	CO2	lb/hr	10039	11044	9336	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.56	0.56	0.68	0.60
	Condensible PM	lb/ton	0.10	0.088	0.17	0.12
	CO2	lb/ton	290	324	277	297
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.28	0.28	0.34	0.30
	Condensible PM	kg/Mg	0.051	0.044	0.086	0.060
	CO2	kg/Mg	145	162	139	148

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BEET17B.WQ1
Date: 26-Jan-95
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum with multiclone and stack filter system
Test date: January 23, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
3	Stack temperature	Deg F	217.1	213.1	203.3	
South pulp dryer	Pressure	in. HG	28.6	28.6	28.6	
	Moisture	%	46.02	46.74	43.7	
	Oxygen	%	15.1	14.58	15.5	
	Volumetric flow, actual	acfm	57117	57148	56430	
	Volumetric flow, standard*	dscfm	23021	22860	24213	
	Isokinetic variation	%	109.02	108.94	100.6	
Wet Pulp Feed Rate To Dryer		TPH	33.0	32.1	31.7	
	Pollutant concentrations:					
	Total PM	G/dscf	0.0979	0.1119	0.1213	
	Filterable PM	G/dscf	0.0832	0.0999	0.106	
	Condensible PM	G/dscf	0.0147	0.0120	0.0150	
	CO2	% dv	5.02	5.79	4.85	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	16.4	19.6	22.1	
	Condensible PM	lb/hr	2.91	2.35	3.11	
	CO2	lb/hr	7920	9071	8048	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.50	0.61	0.70	0.60
	Condensible PM	lb/ton	0.088	0.073	0.098	0.086
	CO2	lb/ton	240	283	254	259
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.25	0.30	0.35	0.30
	Condensible PM	kg/Mg	0.044	0.037	0.0491	0.043
	CO2	kg/Mg	120	141	127	129

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Run three PM does not match PM in report. Mistake in reporting condensibles in report.

Filename: BEET17C.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum with multiclone and stack filter system
Test date: January 24, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
4	Stack temperature	Deg F	209.5	201.5	190.8	
South pulp dryer	Pressure	in. HG	28.8	28.8	28.8	
	Moisture	%	43.35	44.73	45.34	
	Oxygen	%	14	13.65	13.88	
	Volumetric flow, actual	acfm	58851	58123	58206	
	Volumetric flow, standard*	dscfm	25297	24675	24840	
	Isokinetic variation	%	108.32	108.55	108.92	
Wet Pulp Feed Rate To Dryer		TPH	36.7	33.8	36.6	
	Pollutant concentrations:					
	Total PM	G/dscf	0.1295	0.1134	0.1014	
	Filterable PM	G/dscf	0.1130	0.0973	0.0837	
	Condensible PM	G/dscf	0.0165	0.0161	0.0177	
	CO2	% dv	6.12	6.58	6.58	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	24.5	20.57	17.82	
	Condensible PM	lb/hr	3.58	3.41	3.77	
	CO2	lb/hr	10610	11127	11202	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	0.67	0.61	0.49	0.59
	Condensible PM	lb/ton	0.10	0.10	0.10	0.10
	CO2	lb/ton	289	330	306	308
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	0.33	0.30	0.24	0.29
	Condensible PM	kg/Mg	0.049	0.051	0.051	0.050
	CO2	kg/Mg	145	165	153	154

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BEET17D.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum multiclone inlet
Test date: January 21, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
1	Stack temperature	Deg F	248.8	247.2	244.4	
South pulp dryer multiclone inlet	Pressure	in. HG	29.06	29.06	29.06	
	Moisture	%	31.09	31.76	31.18	
	Oxygen	%	16	15.5	15.25	
	Volumetric flow, actual	acfm	81456	80531	81030	
	Volumetric flow, standard*	dscfm	40609	39847	40596	
	Isokinetic variation	%	109.42	102.8	100.98	
Wet Pulp Feed Rate To Dryer		TPH	27	28.6	27.7	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.3533	0.4167	0.3414	
	CO2	% dv	4.12	4.08	4.11	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	123	142	119	
	CO2	lb/hr	11466	11142	11435	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	4.6	5.0	4.3	4.6
	CO2	lb/ton	425	390	413	409
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	2.3	2.5	2.1	2.3
	CO2	kg/Mg	212	195	206	205

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BEET17E.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum multiclone inlet
Test date: January 22, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
2	Stack temperature	Deg F	243	242.8	242.8	
South pulp dryer multiclone inlet	Pressure	in. HG	28.91	28.91	28.91	
	Moisture	%	39.35	42.06	40.72	
	Oxygen	%				
	Volumetric flow, actual	acfm	88431	87614	86927	
	Volumetric flow, standard*	dscfm	38918	36846	37403	
	Isokinetic variation	%	105.87	105.98	100.77	
Wet Pulp Feed Rate To Dryer		TPH	34.7	34.1	33.7	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.4139	0.4206	0.4494	
	CO2	% dv	5.5	6	5.2	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	138	133	144	
	CO2	lb/hr	14670	15151	13329	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	4.0	3.9	4.3	4.0
	CO2	lb/ton	423	444	396	421
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	2.0	1.9	2.1	2.0
	CO2	kg/Mg	211	222	198	210

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BEET17F.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum multiclone inlet
Test date: January 23, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
3	Stack temperature	Deg F	243.6	243.3	244	
South pulp dryer multiclone inlet	Pressure	in. HG	28.87	28.87	28.87	
	Moisture	%	42.88	44.87	43.13	
	Oxygen	%	15.1	14.58	15.5	
	Volumetric flow, actual	acfm	80713	80381	81039	
	Volumetric flow, standard*	dscfm	33386	32104	33356	
	Isokinetic variation	%	106.05	105.85	101.38	
Wet Pulp Feed Rate To Dryer		TPH	33	32.1	31.7	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.4774	0.4937	0.5692	
	CO2	% dv	5.02	5.79	4.85	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	137	136	163	
	CO2	lb/hr	11486	12739	11087	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	4.1	4.2	5.1	4.5
	CO2	lb/ton	348	397	350	365
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	2.1	2.1	2.6	2.3
	CO2	kg/Mg	174	198	175	182

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

Filename: BEET17G.WQ1
Date: 19-Dec-94
Facility: American Crystal Sugar
Location: Moorhead, Minnesota
Source: South pulp dryer--coal-fired rotary drum multiclone inlet
Test date: January 24, 1992

D. Emission Data/Mass Flux Rates/Emission Factors

Test ID	Parameter	Units	Values reported			
			Run 1	Run 2	Run 3	Run 4
4	Stack temperature	Deg F	246.6	244.2	247.5	
South pulp dryer multiclone inlet	Pressure	in. HG	29.03	29.03	29.03	
	Moisture	%	42.35	43.45	43.48	
	Oxygen	%	14	13.65	13.88	
	Volumetric flow, actual	acfm	90671	88849	90663	
	Volumetric flow, standard*	dscfm	37901	36556	37106	
	Isokinetic variation	%	106.05	105.85	101.38	
Wet Pulp Feed Rate To Dryer		TPH	36.7	33.8	36.6	
	Pollutant concentrations:					
	Filterable PM	G/dscf	0.4687	0.5411	0.4783	
	CO2	% dv	6.12	6.58	6.12	
	Pollutant mass flux rates:					
	Filterable PM	lb/hr	152	170	152	
	CO2	lb/hr	15897	16485	15563	
	Emission factors (ENGLISH UNITS):					AVERAGE
	Filterable PM	lb/ton	4.1	5.0	4.2	4.4
	CO2	lb/ton	433	488	425	449
	Emission factors (METRIC UNITS):					AVERAGE
	Filterable PM	kg/Mg	2.1	2.5	2.1	2.2
	CO2	kg/Mg	217	244	213	224

*DSCFM BASED ON A STANDARD TEMPERATURE OF 68 DEGREES FAHRENHEIT

MIDWEST RESEARCH INSTITUTE

Project/Acct. No. _____ Date/Time _____ Phone Contact ☐
Project Title _____ Meeting Notes ☐
_____ Work Sheet ☐
Signature _____ Verified by _____ (signature/date) Page ___ of ___

PROCESS RATES FOR AMERICAN CRYSTAL SUGAR 1/92 TESTS

TEST #	RUN #	DATE	WET PULP FEED RATE
1	1	1/21 13:15-15:19	$\frac{(29.1+24.9)}{2} = 27.0$ TPH
	2	1/21 16:00-17:45	$\frac{(27.5+28.4+30)}{3} = 28.6$ TPH
	3	1/21 18:15-20:13	$\frac{(30.4+25.4+27.4+27.4)}{4} = 27.7$ TPH
2	1	1/22 10:20-12:12	$\frac{(35.9+37.1+32.5+33.1)}{4} = 34.7$ TPH
	2	1/22 12:50-14:30	$\frac{(33.3+36.2+32.4+34.6)}{4} = 34.1$ TPH
	3	1/22 15:15-16:52	$\frac{(37.3+31.9+31.8)}{3} = 33.7$ TPH
3	1	1/23 10:05-11:45	$\frac{(31.5+35.8+31.8)}{3} = 33.0$ TPH
	2	1/23 12:20-13:55	$\frac{(30.3+31.2+34.8)}{3} = 32.1$ TPH
	3	1/23 14:45-16:30	$\frac{(34.9+32.0+25.8+34.2)}{4} = 31.7$ TPH
4	1	1/24 10:15-12:10	$\frac{(37.2+35.5+35.5+38.5)}{4} = 36.7$ TPH
	2	1/24 12:45-14:20	$\frac{(36.1+35.1+30.1)}{3} = 33.8$ TPH
	3	1/24 15:05-16:55	$\frac{(39.6+36.1+34.2)}{3} = 36.6$ TPH

MRI

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.

South Unit 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
200 - 9.1
2:30 - 3.1
4:00 - 8.4

830 3.7
9:30 10.3
10:30 9.9
1 200 — 8.0
1:00 - 6.1
1:30 6.3
300 - 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	72.61
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 11/24/92

Name _____

	1 Time of 2 Day	3 0730	4	5 0800	6 0930	7 1000	8	9 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					74.46 ft³/37.7 rpm		35.62 ft³/45.2 rpm	
9	Drate Control, %					37.3		6.8	
10	FD Air Flow, MPPH					3.45		~~14.0~~	
11	BH Temp. In, °C					113		116	
12	Out, °C					109		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									
24								35.0/35.0	
25								8" in 49s	
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			62.7	62.2		62.2	62.2
31	Drate Control, %	-1.5			48.5	43.7		38.4	33.9
32	FD Air Flow, MPPH	0.00			24.78	21.91		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		-0.18	-0.20
40	Exit Pressure	-1.08			-1.00	-1.00		-1.03	-1.03
41	Dryer ΔP	~~0.35~~ 0.35			0.49	0.53		0.46	0.49
42	Aspiration Flow, acfm	7.8			7.8	7.2		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				62.7/60.0				49.6/~~[illegible]~~	
47				8" in 81				8" in 98s	
48								wheel age	
49								5½ & 5.6	
50								~~[illegible]~~ Drum [illegible]	

Fired Stroll (exp pulp) minutes, results pulp

Sight Pulp Pulp Quality, results

Want to Slide Gates 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, %	94.0		94.0		94.0		94.0	
7	ID Fan, rpm	699.7		699.7		699.7		706.5	
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		-1.88	
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	ID Fan, amps.	150		149		149		149	
23		25.0/25.0							
24		8" in 55 s							
25		2.95 in wheel							
26	SOUTH Unit								
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	819		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	ID Fan, amps	167	163	164		166	163	164	165
45									
46							56.0/53.9		50.6/53.[illegible]
47							8" in 90 s		8" in 95 s
48							↑		
49							?		
50									

SOT 1245

WET PULP 1/21/92

TIME	% SOUTH
11:00	8.7
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
11:50
12:10
12:30

AMPAD 22-141 50 SHEETS 22-142 100 SHEETS 22-146 200 SHEETS

Pineas 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	78.27
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	78.04
3:50	78.50
4:05	78.00
4:30	78.73
4:50	78.67

Moorhead Factory

Pulp Dryer Data Sheets Constant pulp feed @ 51 rpm

Date 1/21/92

No Recycle / ≈ 14% Aspiration

Name SJC

	1 Time of 2 Day	3 1045	4	5 1100	6	7 1315	8 1330	9	
1	Slice Rate, Tph	190							
2	Total Pulp Flow, Tph	≈							
3									
4	NORTH Unit								
5	Grate Speed, %	~~41.7~~							
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		
28	ID Damper, %	96.0		96.0		96.0	96.0		
29	ID Fan, rpm	588.2		589.8		590.8	589.0	flow device ~~9.0~~	≈ 11.0
30	Pulp Feed Gate, % open	51 rpm		51		outside y = 37.1 REF	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 3/8"	Right → 7 3/4"		
47	Bed Depth Wheel	5 1/2, 5.6"				5.5" 5.6"			
48	Bed Depth Measured	~~[illegible]~~				~~[illegible]~~			
49									
50	Timed Crate, 8" in	110 sec.				113	101		

Start of Test #1

but more pulp than last time

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	57.7
3									
4	NORTH Unit								
5	Grate Speed, %	38.3		34.1		28.0			
6	ID Damper, %	95.2		95.2		95.5			
7	ID Fan, rpm	[illegible]		[illegible]		[illegible]			
8	Pulp Feed Gate, % Open	40.0 [illegible]	53 on VFD	36.6 [illegible] 49 on VFD		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	589.8		589.8	589.8	590.6		590.1	589.3
30	Pulp Feed Gate, % Open	37.1 to VFD	51 on rpm controller	do	do	do 50 on rpm		do	do
31	Draft Control, %	19.7		-3.3	24.3	26.0		11.0	21.2
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	-0.38		-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		18.0	19.0	18.5		18.5	18.0
44	I.D. Fan, amps	162		164	164	164		164	166
45									
46					% Grate Spd				
47					44.2-46.9	42.5-43.5			
48					8" in 708 sec	8" in 110 s			
49									
50									

Baghouse cleaning was turned off to condition bags.

EOT ≈ 1515?

SOT ≈ 1600

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/21/92

Name _____

	[1] Time of [2] Day	[3] 1700	[4] 1730	[5]	[6] 1800	[7]	[8] 1830	[9] 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		716.1					~~575~~	
8	Pulp Feed Gate, % Open		41.0					36.4	
9	Draft Control, %		36.3					57 rpm ~~29.3~~ 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		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		0		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 % 46.9/44.5						Grate % 45.6/44.6	
47									
48		4" in 105#						9" in 109#	
49		setting on wheel = 5 1/2"							

EOT ≈ 1740

SOT ≈ 1825

unplugged, read -0.4" above grate, then pick right part of almost-is almost at Furnace pressure point

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	710.9						
8	Pulp Feed Gate, % Open	? 49 @ FC						
9	Draft 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 bed 3¼" on wheel							
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	Draft 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	8.1	8.1					
43	Drum, amps	17.0	17.0					
44	ID Fan, amps	167	167					
45								
46								
47								
48								
49								

EOT ≈ 2030
Opened Recycle Damper – Front Only

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		40.1	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			657.9		644.2		~~644.2~~
8	Pulp Feed Gate, % open			30.3 ~~to 40 rpm~~		26.7 ~~to~~ 37.3 rpm		26.4 ~~to~~ 42.7 rpm
9	Draft 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	50.6 ~~to~~ 62.7 rpm		62.7 rpm	62.5	62.4	62.4	62.3
31	Draft Control, %	36.2		38.4	36.4	36.7	40.6	39.4
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		2.54	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	163		164	163	164	162	162
45								
46	wheel	5.5" SO			grate spd.	54.3/57.5		
47		5.6" NO				8" in 92 sec.		
48								
49								
50								

SOT ≈ 0945 · above grate pressure -0.15 in.

Flow check 19.5% Fan 57,466 AcFm 13,910 AcFm

SOT #2 ≈ 1220

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/23/92

Name

	[1]Time of [2]Day	[3] 1230	[4] 1300	[5] 1330	[6] 1400	[7] 1430	[8] 1452	[9] 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	699.9		699.4		697.5	698.6	694.0	
8	Pulp Feed Gate, % open	74.1 [illegible]		73.1 [illegible]			30.4 [illegible]	29.5 [illegible]	
9	Draft Control, %	15.4		42.7			18.5	48.2	
10	FD Air Flow, MPPH	-1.40		5.14			108	12.26	
11	BH Temp, In, °C	107		106			108	104	
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	4.02	
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 @ 2.85"					
24				45.9/45.2				55.6/55.6	3¼ x 2
25				8" in 46 sec				8" in 42 sec	2.85 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	36.4	36.7
32	FD Air Flow, MPPH	4.34	21.16	13.15			21.89	0.00	11.22
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			7.6	7.9	7.6
43	Drum, amps	20.0	18.0	18.0			18.0	19.0	17.0
44	ID Fan, amps	163	163	163			167	166	165
45									
46									
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									

Changed part from above, after gate.

acquired at 1 = [illegible] stick, coordinated [illegible] sample and dripping one hundred [illegible] and dripping

Lowered aspiration flow

T ≈ 1450 / flow wet MC ΔP, sample part

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	78.76
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
7:30	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 - 88

1:30 - 8.3

2:30 - 7.9

330 - 9.3

4:30 - 11.4

11:00 - 77

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

David Walker

Moorhead Factory

Pulp Dryer Data Sheets

Date 1/22/92

Name

	1 Time of 2 Day	3 0930	4 0900	5 0930	6	7 ~~1000~~	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	27.2 to vfd 39.5 rpm		25 to vfd 38.1 rpm			22 to vfd 35 rpm		25 to vfd 38
9	Drain 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	ΔP=4.84		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, actfm	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 coal bed wheel from 3¼ → 3"		Impact Scale says			changed wheel back to 3¼		
24									
25				12.5 amp					
26	SOUTH Unit								
27	Grate Speed, %	55.3	49.7	54.1			53.0	53.1	51.1
28	ID Damper, %	97.0	97.0	97.0			97.0	97.0	97.0
29	ID Fan, rpm	593.4	593.4	593.4			593.4	594.5	593.4
30	Pulp Feed Gate, % Open	50 to vfd, 63 rpm	do	do			do	do	do
31	Drain 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, actfm	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							grate spd % = 53.0	51.8/52.7	
46							53.2		
47						on wheel	5.5 5.6		
48							8" in 93 sec	8" in 96 sec	
49									

Changed Asp. air from 7.0 to 8.0

North Dryer Pulp Control on Manual Operator Speed Control

SOT 1020

BH Cleaned out & opened 2.6 to 5.75 from 5.75 to 2.6 BH ΔP

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		94.0	
7	ID Fan, rpm			698.9		699.7		699.2	
8	Pulp Feed Gate, % Open			19 to fd, 32.3 rpm		23 to fd 36.3 rpm		21.3 to fd 34.8 rpm	
9	Draft 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 7/16"		Grate pos = 30.8		lowered coal gate	3" on wheel	3 3/16" measured thick	
24	wheel	3.33"		8" in 54 sec				32.2/32.2 8" in 52 sec	
25									
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	592.9		595.0	593.4	594.5	596.0
30	Pulp Feed Gate, % Open		50 to fd 62.2 rpm	50 to fd 62.4 rpm		62.3 rpm	62.4 rpm	62.4	62.2
31	Draft 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	7.94	20.96
33	BH Temp. In, °C		114	114		114	114	114	113
34	Out, °C		117	117		117	117	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 SO	5 1/2" No	5 1/2"						
47	wheel	5 1/2"	5.4"	56.0				54.9/57.1	
48			Grate pos 52.6/52.1	8" in 91 sec				8" in 91 sec	
49			8" in 93 sec						

SOT ≈ 1200

SOT ≈ 1200

Furnace @ Tube at one end = 0.10 = 0.65 in. H2O above grates

0.45