Background Report Reference

AP-42 Section Number: 10.6.1

Background Report Section: 4

Reference Number: 100

Title: Emissions Testing of a Thermal Oil Heater, Louisiana-Pacific Corp. Houlton, Maine

TRC Environmental Corporation

January 1996

TRC Environmental Corporation

4-100)

TRC 624

REPORT

EMISSIONS TESTING OF A THERMAL OIL HEATER

Presented to

Louisiana-Pacific Corporation
Houlton, Maine

Prepared by

TRC Environmental Corporation
Windsor, Connecticut

January, 1996

TRC Environmental Corporation

5 Waterside Crossing
Windsor, Connecticut 06095
Telephone 860-289-8631
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January 24, 1996

Ms. Sue Somers
Louisiana-Pacific Corporation
Engineering Office
Route 8, Box 8263 - Gehrts Road
Hayward, Wisconsin 54843

Re: Engineering Report of Particulate Emissions from the Two Thermal Oil Heaters
TRC Project No. 19624

Dear Sue:

This letter report presents the results of the compliance and engineering emissions testing conducted on December 13, 1995 on the common exhaust of the two thermal oil heaters at the Louisiana-Pacific facility in Houlton, Maine. The purpose of this program was to measure emissions of particulate matter (PM) and condensable particulate matter (CPM) from the thermal oil heaters. Emissions measurements for PM were conducted to demonstrate compliance with Maine DEP emissions limits. These results were previously reported in a separate compliance report submitted to Louisiana-Pacific earlier this month. The CPM emissions measurements were conducted for engineering purposes. The following sections present the combined results of the compliance and engineering measurements.

Thermal Oil Heater Emissions

Triplicate 60-minute emissions tests were conducted in the common exhaust of the two thermal oil heaters to measure emissions of particulate matter (PM), condensable particulate matter (CPM), and total particulate matter (TPM). The measurements were conducted in accordance with EPA Methods 1-5 and 202. The results of these tests are presented in **Table 1.** All associated field data and analytical data are presented in **Appendices A and B.**

Particulate Matter Emissions

Particulate matter was measured in accordance with EPA Methods 1-5. PM represents particulate matter that was collected in the front half of the particulate train which includes particulate matter collected on the filter media and on the probe liner. The results indicated that the average PM emission concentration was 0.0227 grains per dry standard cubic foot and that the average emission rate was 2.83 pounds per hour. The average emission rate, based on heat input and the published Fd factor for wood/bark of 9600 dry standard cubic feet per million BTU (40 CFR 60, Appendix A, Method 19), was 0.0664 pounds per million BTU (lb/mmBTU).

Condensable Particulate Matter Emissions

Condensable particulate matter was measured in accordance with EPA Method 202. CPM represents particulate matter that was collected in the impinger solutions of the particulate train and includes both organic and inorganic material. The results indicated that the average CPM emission concentration was 0.0040 grains/DSCF and the average emission rate was 0.49 lb/hr.

Total Particulate Matter Emissions

Total particulate matter was measured in accordance with EPA Methods 1-5, and 202. TPM represents the sum of the PM and CPM. The results indicated that the average emission concentration was 0.0267 grains per dry standard cubic foot (gr/DSCF) and the average emission rate was 3.32 lb/hr.

It has been a pleasure for TRC to provide these services to Louisiana-Pacific and we look forward to working with you in the future. Should you have any questions please do not hesitate to contact me at (860) 289-8631.

Sincerely,

TRC ENVIRONMENTAL CORPORATION

Raymond Potter
Manager, Emissions Measurement Group

attachments

Table 2-1

Summary of Particulate Loading
EPA Methods 5 and 202

Louisiana-Pacific Corporation
New Limerick, Maine
December 13, 1995

Test Number Time Location	Comp-1 0910-1015 Stack	Comp-2 1109-1212 Stack	Comp-3 1306-1408 Stack	Average
Stack Conditions				
Stack Temperature (oF)	507	507	529	514
CO_2 (%)	8.90	9.10	8.00	8.67
O_2 (%)	10.6	10.8	11.9	11.1
Moisture (%)	13.20	14.26	13.78	13.75
Volumetric Flowrate, Actual (ACFM)	32000	30000	30900	31000
Volumetric Flowrate, Dry Std. (DSCFM)a	15100	14000	14200	14400
Sample Conditions				
Sample Volume Dry (DSCF)	51.07	46.70	47.11	48.29
Isokinetic Ratio (%)	103.4	101.9	101.6	102.3
Particulate Emissions (EPA Method 5)				
Particulate Catch (mg)	87.3	61.7	65.6	71.5
Concentration (grains/DSCF)	0.0264	0.0204	0.0215	0.0227
Mass Emission Rate (lb/hr)	3.42	2.45	2.62	2.83
Mass Emission Rate (lb/mmBTU)b	0.0733	0.0577	0.0683	0.0664
Condensable Particulate Emissions (EPA Method 202)				
Organic PM Catch (mg)	3.4	5.2	2.1	3.6
Concentration (grains/DSCF)	0.0010	0.0017	0.0007	0.0011
Mass Emission Rate (lb/hr)	0.13	0.21	0.08	0.14
Inorganic PM Catch (mg)	3.9	12.1	10.3	8.8
Concentration (grains/DSCF)	0.0012	0.0040	0.0034	0.0029
Mass Emission Rate (lb/hr)	0.15	0.48	0.41	0.35
Total Condensable PM Emission Rate (lb/hr)	0.29	0.69	0.50	0.49
TOTAL PM EMISSIONS	3.71	3.14	3.11	3.32
Concentration (grains/DSCF)	0.0286	0.0261	0.0256	0.0267
Mass Emission Rate (lb/hr)	3.71	3.14	3.11	3.32

42.6²

a - DSCFM Dry Standard Conditions at 68oF and 29.92 in. Hg
b - lb/mmBTU calculated using an Fd factor of 9600 DSCF/mmBTU, as published in 40 CFR 60 Method 19

APPENDIX A

FIELD DATA

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Thermal Dryer	1-5 202	comp-1	12/13/95	

OPERATORS	Barometric (In Hg)	Static P. (In H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (In.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
Rae2 / Boyle	29.9	-0.50	30	4½ Glass	51	0.84	6' Glass	3-3	0.378

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (In Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (In Hg)	Leak Check (Fin.) cfm	K Factor
✓	80823	1.88	1.0	13%	b			15	0.000	10	0.000	9.5

$CO_2 = 8.9\%$

$O_2 = 10.6\%$

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (In H2O)	ΔH Orifice (In H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (In Hg)	XAD Trap Temp. (°F)
1	0910	0	870.00	0.16	1.52	354	250	250	18		44	38	2	
2	0913	3	871.81	0.16	1.52	371	250	250	18		46	38	2	
3	0916	6	873.87	0.20	1.90	450	250	250	21		48	39	2	
4	0919	9	876.01	0.23	2.19	534	250	250	24		49	39	2	
5	0922	12	878.47	0.26	2.47	551	250	250	28		52	40	2	
6	0925	15	880.92	0.27	2.57	554	250	250	28		52	40	2	
7	0928	18	883.01	0.27	2.57	559	250	250	28		54	42	3	
8	0931	21	886.41	0.27	2.57	553	250	250	28		54	42	3	
9	0934	24	889.12	0.27	2.57	559	250	250	28		54	42	3	
10	0937	27	891.61	0.27	2.57	554	250	250	28		55	43	3	
1	0945	30	894.314	0.17	1.62	409	250	250	28		51	43	3	
2	0948	33	896.81	0.18	1.76	387	250	250	28		53	44	3	
3	0951	36	898.40	0.20	1.90	450	250	250	29		53	44	3	
4	0954	39	900.61	0.24	2.28	538	250	250	29		56	44	3	
5	0957	42	903.21	0.25	2.38	547	250	250	29		56	44	3	
6	1000	45	905.69	0.27	2.57	550	250	250	29		56	45	4	
7	1003	48	908.25	0.27	2.57	554	250	250	29		57	45	4	
8	1006	51	910.91	0.27	2.57	552	250	250	29		57	46	4	
9	1009	54	913.55	0.26	2.47	552	250	250	29		57	46	4	
10	1012	57	916.20	0.26	2.47	552	250	250	29		58	46	4	
	1015	60	918.849											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp
60	48.849	0.4844	2.252	507.0

Ave. DGM Temp.
47.8

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Lousiana Pacific	Thermal Oxidizer	1-5 202	Comp-2	12/13/95	

OPERATORS	Barometric (in Hg)	Static P. (in H20)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
CAB2/Bugco	29.92	-052	30	4½	51	0.84	6' Glass	3-3	1.378

PITOT LEAK CHECK	DGM No.	DGM CAL Y	DGM ΔH@	Assumed Molst. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Inl.) (In Hg)	Leak Check (Inl.) cfm	Leak Check (Fln.) (In Hg)	Leak Check (Fln.) cfm	K Factor
✓	60823	1.0	1.85	13	6			15	0.001	7	0.000	9.5

$CO_2 = 9.1\%$

$O_2 = 10.8\%$

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (In H20)	ΔH Orifice (In H20)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (In Hg)	XAD Trap Temp. (°F)
1	1109	0	919.120	0.13	1.20	300	250	250	36		53	50	2	
2	1112	3	920.87	0.14	1.33	340	250	250	45		53	50	2	
3	1115	6	922.62	0.16	1.52	385	250	250	43		58	50	2	
4	1118	9	924.52	0.19	1.81	495	250	250	42		59	50	2	
5	1121	12	926.63	0.22	2.10	552	250	250	39		61	51	2	
6	1124	15	929.12	0.23	2.18	562	250	250	38		61	51	2	
7	1127	18	931.52	0.25	2.38	565	250	250	39		63	51	2	
8	1130	21	934.42	0.25	2.38	560	250	250	40		63	61	2	
9	1133	24	936.62	0.23	2.18	520	250	250	49		63	52	2	
10	1136	27	939.08	0.24	2.28	548	250	250	56		63	53	2	
1	1142	30	941.539	0.15	1.43	453	250	250	48		63	52	2	
2	1145	33	943.59	0.15	1.43	452	250	250	45		61	53	2	
3	1148	36	945.21	0.17	1.62	472	250	250	42		61	53	2	
4	1151	39	947.21	0.19	1.81	537	250	250	41		61	53	4	
5	1154	42	949.48	0.22	2.10	552	250	250	41		61	53	4	
6	1157	45	951.63	0.25	2.38	561	250	250	41		62	53	4	
7	1200	48	954.14	0.27	2.56	596	250	250	45		63	54	4	
8	1203	51	957.00	0.25	2.38	567	250	250	48		63	54	4	
9	1206	54	959.15	0.25	2.38	566	250	250	51		63	54	4	
10	1209	57	961.15	0.24	2.28	565	250	250	56		63	54	4	
	1212	60	964.577											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
60	45.457	0.4545	1.986	506.7	56.5

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Lousiana Pacific	MAINE	1-5 202	COMP-3	12-13-95	

OPERATORS	Barometric (In Hg)	Static P. (In H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (In.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
BAEZ / BUKO	29.92	-0.43	30	4½ Micro-quartz Glass	51	0.84	6' 6/ABS	3-3	0.379

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (In Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (In Hg)	Leak Check (Fin.) cfm	K Factor
✓	80823	1.88	1.00	13				15	0.001			9.5

$C.O_2 = 8.0\%$

$O_2 = 11.9\%$

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (In H2O)	ΔH Orifice (In H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (In Hg)	XAD Trap Temp. (°F)
1	1306	0	964.902	0.16	1.52	465	250	250	31		54	52	2	
2	1309	3	966.90	0.17	1.615	488	250	250	31		55	52	2	
3	1312	6	968.80	0.19	1.81	511	250	250	39		57	52	2	
4	1315	9	970.98	0.20	1.90	555	250	250	34		59	52	2	
5	1318	12	973.12	0.22	2.10	575	250	250	32		61	52	2	
6	1321	15	975.50	0.25	2.38	580	250	250	31		61	53	2	
7	1324	18	977.94	0.25	2.38	579	250	250	31		62	53	2	
8	1327	21	979.65	0.25	2.38	577	250	250	34		63	53	2	
9	1330	24	983.14	0.23	2.18	574	250	250	36		63	53	2	
10	1333	27	985.48	0.23	2.18	573	250	250	39		63	53	2	
1	1338	30	988.35	0.16	1.52	424	250	250	39		63	53	2	
2	1341	33	990.09	0.16	1.52	408	250	250	45		67	53	2	
3	1344	36	991.70	0.19	1.81	450	250	250	47		63	54	2	
4	1347	39	993.90	0.19	1.81	528	250	250	53		63	55	2	
5	1350	42	996.04	0.23	2.18	540	250	250	59		63	55	2	
6	1353	45	999.10	0.24	2.28	552	250	250	59		64	51	2	
7	1356	48	1002.2	0.26	2.47	557	250	250	59		64	51	2	
8	1359	51	1003.51	0.25	2.38	554	250	250	59		64	51	2	
9	1402	54	1006.01	0.23	2.18	552	250	250	59		65	51	2	
10	1405	57	1008.39	0.23	2.18	573	250	250	59		65	51	2	
	1408	60	1010.850											
			45.948 ✓											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
60	45,948	0.4617	2.039	529.3	57.6

560°F wet

TRC

Orsat Data

TEST #1 (LP)

$CO_2 = 91.0 = 9\%$

$O_2 = 80.2 = 10.8\%$

$CO_2 = 91.2 = 8.8\%$

$O_2 = 80.8 = 10.4\%$

CO_2	91.2	8.8
O_2	80.5	10.7

TEST #2 LP

$CO_2 = 91.0 = 9\%$

$O_2 = 80.2 = 10.8\%$

CO_2 90.8 = 9.2%

O_2 80.0 10.8%

CO_2	91.0	9%
O_2	80.2	10.8

TEST #3

$CO_2 = 92.0$ 8%

$O_2 = 80.0$ 12%

$CO_2 = 91.9$ 8.1%

$O_2 = 80.2$ 11.7%

CO_2	92.0	8.0%
O_2	80.1	11.9%

APPENDIX B

ANALYTICAL DATA AND DATA SUMMARIES

PARTICULATE TEST DATA

TEST	O-1	Comp-1	Comp-2	Comp-3
LOCATION	********	Stack	Stack	Stack
FIRM	********	LP	LP	LP
TIME	********	0910-1015	1109-1212	1306-1408
DATE	********	12-13-95	12-13-95	12-13-95
PROJECT NO.	********	19624	19624	19624
BAROMETRIC PRESSURE	in. Hg	29.92	29.92	29.92
STACK AREA	ft2	14.32	14.32	14.32
NOZZLE DIAMETER	in.	0.378	0.378	0.378
SAMPLING TIME	min.	60	60	60
DRY GAS METER CAL FACTOR [Y]	********	1.00	1.00	1.00
PITOT COEFFICIENT	********	0.84	0.84	0.84
AVG. SQUARE DELTA P	in. H_2O	0.484	0.455	0.462
AVG. DELTA H	in. H_2O	2.25	1.99	2.04
AVG. METER TEMP.	oF	48	57	58
STATIC PRESSURE	in. Hg	-0.50	-0.52	-0.43
AVG. STACK TEMPERATURE	oF	507	507	529
SAMPLE VOLUME	ft3	48.85	45.46	45.95
WATER COLLECTED	ml	165.0	165.0	160.0
CO 2	%	8.9	9.1	8.0
O 2	%	10.6	10.8	11.9
CO	%	0	0	0
N 2	%	80.5	80.1	80.1
PARTICULATE CATCH (Method 5)	mg	87.30	61.65	65.63
ORGANIC PM CATCH (Method 202)	mg	3.38	5.16	2.12
INORGANIC PM CATCH (Method 202)	mg	3.90	12.10	10.30
SAMPLE VOLUME DRY	DSCF	51.07	46.70	47.11
MOISTURE	%	13.2	14.3	13.8
MOLECULAR WEIGHT OF STACK GAS	lb/lb-mole	28.28	28.19	28.14
STACK VELOCITY	FPM	2232	2098	2158
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	31968	30044	30898
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	15133	14047	14203
ISOKINETIC RATIO	%	103.4	101.9	101.6
PARTICULATE CONCENTRATION	grains/DSCF	0.02637	0.02037	0.02150
PARTICULATE EMISSION RATE	lb/hour	3.42	2.45	2.62
PARTICULATE EMISSION RATE	lb/mmBTU	0.0733	0.0577	0.0683
ORGANIC PM CONCENTRATION	grains/DSCF	0.00102	0.00171	0.00069
ORGANIC PM EMISSION RATE	lb/hour	0.13	0.21	0.08
INORGANIC PM CONCENTRATION	grains/DSCF	0.00118	0.00400	0.00337
INORGANIC PM EMISSION RATE	lb/hour	0.15	0.48	0.41

TRC ENVIRONMENTAL CORPORATION, INC.
5 WATERSIDE CROSSING, WINDSOR, CT 06095
860-298-6326
Connecticut Certification No. PH-0426
AIHA Laboratory Accreditation No. 259

LABORATORY REPORT

LOUISIANA PACIFIC

Lab Number: 16322
Date Rec'd: 12/15/95
Date Analyzed: 12/18/95
Sample Description: Method 5 - Emissions
No. Samples: 3 Trains and 2 Blanks
Lab Project No.: 10902-3001-00005
TRC Project No: 19624

Sample Number	Media	Particulate (mg)
TO-PM-1	Filter #331	72.08
TO-PM-1	Probe Wash	15.22
TO-PM-2	Filter #322	53.74
TO-PM-2	Probe Wash	7.91
TO-PM-3	Filter #323	57.84
TO-PM-3	Probe Wash	7.79
TO-PM-B	Filter Blank	ND<0.5
TO-PM-B	Acetone Blank	0.68

Analyst: Lance Cotton/Dan Plimpton

Reviewed by: Margaret F. Flanagan for

Margaret F. Flanagan
Quality Control Manager

Gary L. Ritter, CIH, CHMM, LSP
Laboratory Director

TRC ENVIRONMENTAL CORPORATION, INC.
5 WATERSIDE CROSSING, WINDSOR, CT 06095
860-298-6326
Connecticut Certification No. PH-0426
AIHA Laboratory Accreditation No. 259

LABORATORY REPORT

LOUISIANA PACIFIC

Lab Number: 16322
Date Rec'd: 12/15/95
Date Analyzed: 12/18/95 through 12/26/95
Sample Description: Method 202 - Emissions From Stationary Sources
No. Samples: 3 Trains and 2 Blanks
Lab Project No.: 10902-3001-00005
TRC Project No: 19624

Sample Number	Media	Particulate (mg)
TO-M202-1	Backhalf Rinse -Organic	3.38
TO-M202-1	Backhalf Rinse - Inorganic	3.90
TO-M202-2	Backhalf Rinse - Organic	5.16
TO-M202-2	Backhalf Rinse - Inorganic	12.10
TO-M202-3	Backhalf Rinse - Organic	2.12
TO-M202-3	Backhalf Rinse - Inorganic	10.30
TO-M202-Blank	$MeCl_2$ Blank	ND<0.5
TO-M202-Blank	HPLC Blank	ND<0.5

Analyst: Lance Cotton/Dan Plimpton

Reviewed by: _____ _____
Margaret F. Flanagan, Quality Control Manager
Gary L. Ritter, CIH, CHMM, LSP, Laboratory Director

TRC Environmental Corporation

EMISSIONS TESTING OF A THERMAL OIL HEATER

Presented to

Louisiana-Pacific Corporation
Houlton, Maine

Prepared by

TRC Environmental Corporation
Windsor, Connecticut

Raymond Potter
Manager, Emissions Measurement Group

TRC Project No. 19624
January, 1996

TRC Environmental Corporation
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Appendices

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was retained by Louisiana-Pacific Corporation to conduct a compliance emissions measurement test program at its facility in New Limerick, Maine. The purpose of this program was to demonstrate that the combined emissions from the thermal oil heaters (TOHs) are in compliance with United States Environmental Protection Agency (USEPA) regulations and the State of Maine Department of Environmental Protection Agency (MEDEP) permit number A-327-72-A-R. Emissions measurements were performed in the common TOH exhaust stack to determine the combined emission rate of particulate matter from the TOHs. All testing was conducted in accordance with accepted USEPA test methodologies.

The test program was conducted on December 13, 1995 and was supervised by Mr. Raul Baez of TRC. Ms. Sue Somers, of Louisiana-Pacific provided the process and logistical support during the program. Mr. Robert Hartley, of the Maine State Department of Environmental Protection, observed the test program.

Section 2.0 of this test report presents a summary and discussion of the test results. Section 3.0 provides a brief description of the process and the parameters that were monitored during testing. Section 4.0 details the test methods to be used, and Section 5.0 presents TRC's quality control plan for this program.

2.0 SUMMARY AND DISCUSSION OF RESULTS

Triplicate 60-minute emissions tests were conducted in the common TOH exhaust stack to determine the emission rate of PM. Sampling was conducted in accordance with EPA Methods 1-5. Both TOH units were in operation during testing.

The results of the PM tests are presented in Table 2-1. The results indicate that the average PM emission concentration was 0.0227 grains per dry standard cubic foot and that the average emission rate was 2.83 pounds per hour. The average emission rate based on heat input and the published Fd factor for wood/bark of 9600 dry standard cubic feet per million BTU (40 CFR 60, Appendix A, Method 19) was 0.0064 pounds per million BTU (lb/mmBTU). The average emission rate of 0.0664 lb/mmBTU is less than the permit limit of 0.15 lb/mmBTU.

Table 2-1

Summary of Particulate Emissions
from the Thermal Oil Heaters
EPA Method 5

Louisiana-Pacific Corporation
New Limerick, Maine
December 13, 1995

Test Number Time Location	Comp-1 0910-1015 Stack	Comp-2 1109-1212 Stack	Comp-3 1306-1408 Stack	Average
Stack Conditions				
Stack Temperature (oF)	507	507	529	514
CO_2 (%)	8.90	9.10	8.00	8.67
O_2 (%)	10.6	10.8	11.9	11.1
Moisture (%)	13.20	14.26	13.78	13.75
Volumetric Flowrate, Actual (ACFM)	32000	30000	30900	31000
Volumetric Flowrate, Dry Std. (DSCFM)a	15100	14000	14200	14400
Sample Conditions				
Sample Volume Dry (DSCF)	51.07	46.70	47.11	48.29
Isokinetic Ratio (%)	103.4	101.9	101.6	102.3
Particulate Emissions (EPA Method 5)				
Particulate Catch (mg)	87.3	61.7	65.6	71.5
Concentration (grains/DSCF)	0.0264	0.0204	0.0215	0.0227
Mass Emission Rate (lb/hr)	3.42	2.45	2.62	2.83
Mass Emission Rate (lb/mmBTUb	0.0733	0.0577	0.0683	0.0664

a - DSCFM Dry Standard Conditions at 68oF and 29.92 in. Hg
b - lb/mmBTU calculated using an Fd factor of 9600 DSCF/mmBTU, as published in 40 CFR 60 Method 19

3.0 PROCESS DESCRIPTION

The thermal oil heaters (TOHs) are used to supply hot thermal oil to the board process, hot ponds, building space heat, and other miscellaneous loads. The TOHs are fired with bark and wood wastes that are generated from the debarking operation and waferboard production areas. Each TOH is rated at 24.6 X 10^6 BTU per hour input. The TOHs can also be fired on #2 fuel oil when the wood delivery system is off line.

Exhaust gases from the TOHs are cleaned by a multi-clone unit and separate dry electrostatic precipitators (ESP) before being exhausted through a common 100 foot tall stack.

The multi-clone is a multi-tubular mechanical dust collection system, manufactured by Hutch Engineering, Model #10, size 36-6. It is equipped with 24 operating 9" cast iron tubes, and energy recovery cones. Each multi-clone is designed to collect 78% or more of the dust in the flue gas providing that not more than 25% of the dust is under 10 microns in size.

Each ESP is composed of a single chamber curtain array of one collector and one ionizer section, designed to collect dust. The ESPs were manufactured by Joy Technologies and have a rated efficiency of approximately 75% at an inlet loading rate of 14.8 pounds per hour. Five external air operated rappers remove the accumulated dust/ash from the TOHs, which then falls into a collection hopper with an attached air lock. The ionizer operates from a 55 Kv. 400 ma. oil immersed high voltage transformer and full wave rectifier.

3.1 Operating Parameters

During testing the following parameters were recorded:

Thermal Oil Heater	ESP	Press
Fuel Consumption	Collector Voltage	Panels/Hour
Incoming Oil Temperature	Collector Current	Panel Weight
Outgoing Oil Temperature	Input Amperage	Press Temp.
	Sparks per Minute	Tons/Hour

Copies of the recorded process data are presented in **Appendix C**.

4.0 SAMPLING AND ANALYTICAL METHODS

PM sampling was conducted in the common 51.25 inch diameter exhaust of the thermal oil heaters in accordance with EPA Methods 1-5. The sampling location was located at least 2 diameters upstream and 7 diameters downstream from flow disturbances. Twelve traverse points were sampled with each isokinetic sampling train. The sampling point locations are presented in **Figure 4-1**.

The following sections describe the various methods that were used.

4.1 EPA Method 5

Emission concentrations of PM were measured at the exhaust of the thermal oil heater in accordance with EPA Methods 1-5.

4.1.1 Sample Collection

PM sampling was accomplished by use of an EPA Method 5 train. The sample train is shown schematically in **Figure 4-2** and consisted of a nozzle, probe, filter, four impingers, a vacuum pump, dry-gas meter, and an orifice flow meter.

A stainless steel nozzle was attached to a glass-lined stainless steel probe which was heated to prevent condensation. Teflon mat filter papers supported in 4½-inch glass filter holders were used as the particulate collection media. The filter assembly was enclosed in a heated box to maintain temperatures at 248°F ± 25°F. A thermocouple located inside the back half of the filter holder monitored the gas stream temperature and verified that the temperature was kept at 248°F ± 25°F.

An ice bath containing four impingers was attached to the back end of the filter. The first and second impingers contained 100 milliliters (mℓ) each of deionized water. The third impinger was empty, and the fourth impinger contained silica gel to remove any remaining moisture. Flexible tubing, a vacuum gauge, a needle valve, a leakless vacuum pump, a bypass valve, a dry-gas meter calibration orifice, and an inclined manometer completed the sampling train. The stack velocity pressure and temperature were monitored by an S-

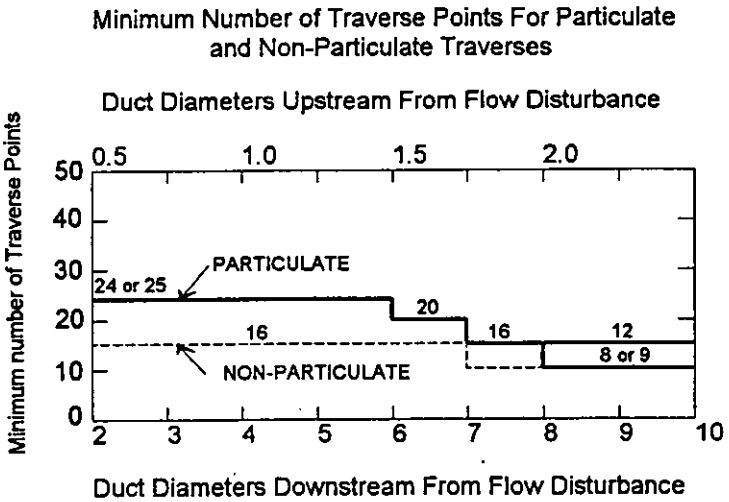
Figure 4-1

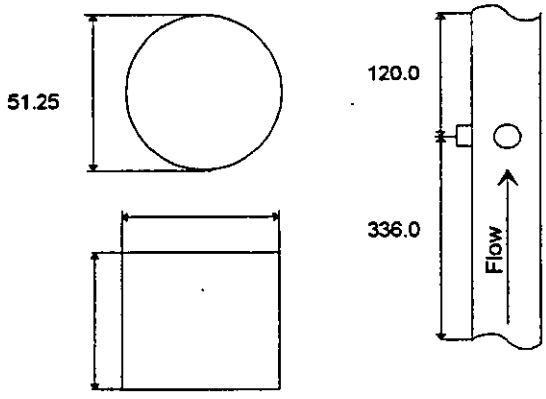
TRC Environmental Corporation

EPA Method 1 Data Sheet

Firm	Louisiana-Pacific	Total Traverse Points Required	12
Location	Thermal Oil Heater Exhaust	Number of Ports	2
Diameters Upstream	2	Points Per Port	6
Diameters Downstream	7	Traverse (Horizontal or Vertical)	Horizontal
Nipple Size (in.)	3.25		

Minimum Number of Traverse Points For Particulate and Non-Particulate Traverses





Cross-Sectional Layout For Rectangular Stacks	
Total Traverse Points	Matrix
9	3x3
12	4x3
16	4x4
20	5x4
25	5x5

Location of Points on a Circular Stack

Point Number On a Diameter	(Percent of Stack Diameter from Inside Wall to Traverse Point) No. of Traverse Points on a Diameter) 4	8	10	12
1	6.7	3.2	2.6	2.1
2	25.0	10.5	8.2	6.7
3	75.0	19.4	14.6	11.8
4	93.3	32.3	22.6	17.7
5		67.7	34.2	25.0
6		80.6	65.8	35.6
7		89.5	77.4	64.4
8		96.8	85.4	75.0
9			91.8	82.3
10			97.4	88.2
11				93.3
12				97.9

Traverse Point Location

Point Number	Distance From Wall	Total Distance
1	2.3	5.6
2	7.5	10.8
3	15.2	18.5
4	36.1	39.4
5	43.7	47.0
6	49.0	52.3
7		
8		
9		
10		
11		
12		

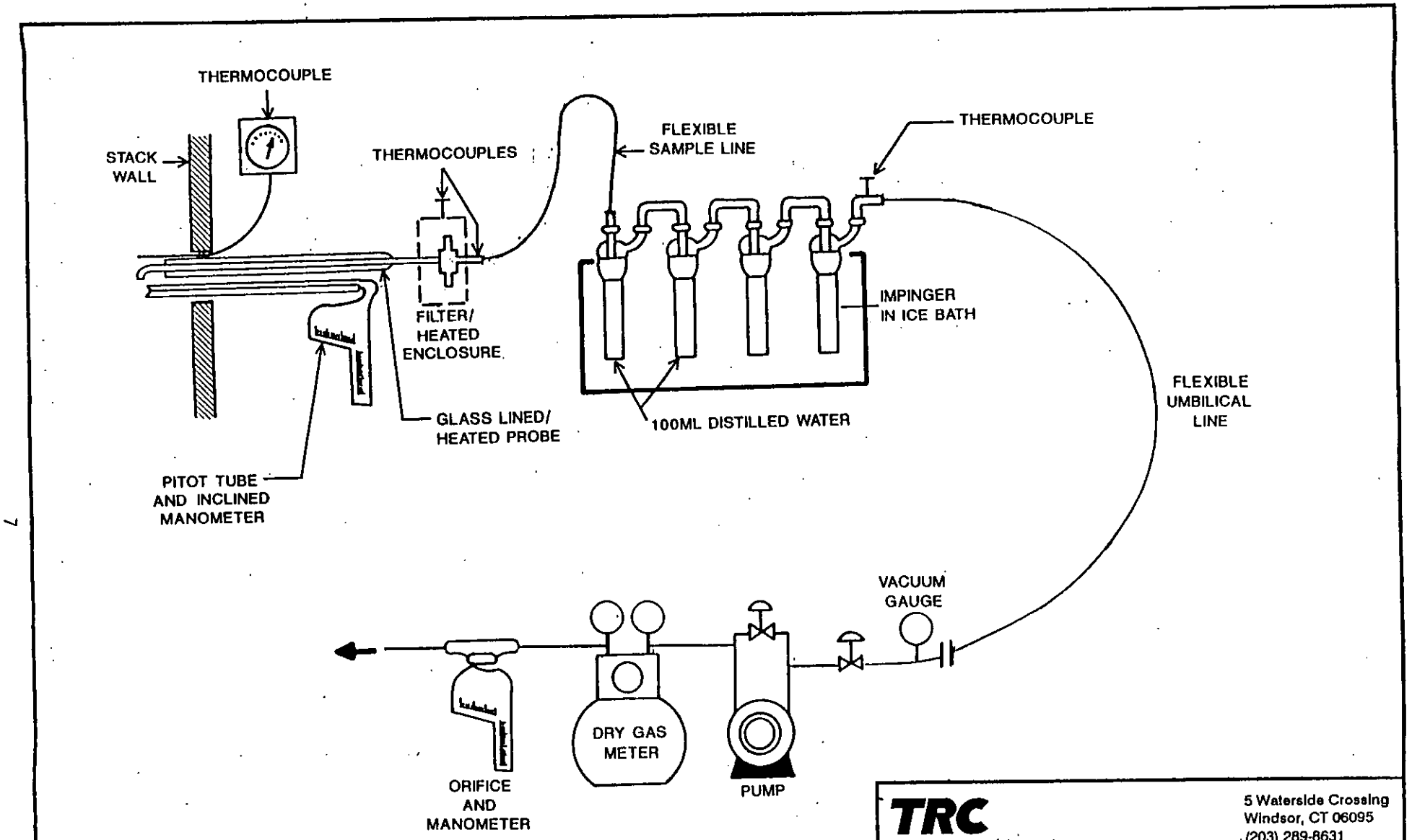


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Figure 4-2

EPA PARTICULATE SAMPLING TRAIN

type pitot and a thermocouple connected to a potentiometer. A check valve was not used in the TRC sampling train.

A nomograph was used to quickly determine the orifice pressure drop required for the measured pitot velocity pressure and stack temperature in order to maintain isokinetic sampling conditions. Sampling flow was adjusted by means of the bypass valve. Before and after each particulate test run, the sampling train was leak checked to meet the 0.02 cfm limit. All pertinent test data were recorded on the appropriate field data sheets.

4.1.2 Sample Recovery

Three sample containers were used, as follows:

Container No. 1: The filter was sealed with Para-film in the field, and recovered at the TRC on-site trailer into a clean petri dish.

Container No. 2: The nozzle, probe, and filter housing were rinsed in triplicate with acetone and deposited into a clean sample container.

Container No. 3: Silica gel from the fourth impinger was transferred to its original container and weighed to the nearest 0.5 milligram (mg).

4.1.3 Sample Analysis

The samples were transported to TRC's laboratory, where the following analyses were performed:

Container No. 1: The filter and any loose PM from the sample container was transferred to a tared glass weighing dish. The sample was then oven dried at 320°F ± 10°F for six hours, cooled in a desiccator for two hours, and weighed to constant weight. Results were reported to the nearest 0.1 mg.

Container No. 2: The acetone wash was transferred to a tared beaker and evaporated to dryness at ambient temperature and pressure. The sample was

then oven dried at 320°F ± 10°F for six hours, cooled in a desiccator for two hours, and weighed to constant weight. Results were reported to the nearest 0.1 mg.

Container No. 3: Silica gel was weighed to the nearest 0.5 mg. The weight of the moisture entrapped in the silica gel, along with the impingers, was used to calculate the moisture content of the stack gas.

4.2 EPA Method 3 - Oxygen and Carbon Dioxide Monoxide Measurements

An integrated Tedlar bag sample was collected concurrent with each PM test run and analyzed in accordance with EPA Method 3 for O_2 and CO_2. **Figure 4-3** presents a schematic of the sampling train. Concentrations of O_2 and CO_2 were measured using an Orsat flue gas analyzer. Each bag sample was analyzed in triplicate.

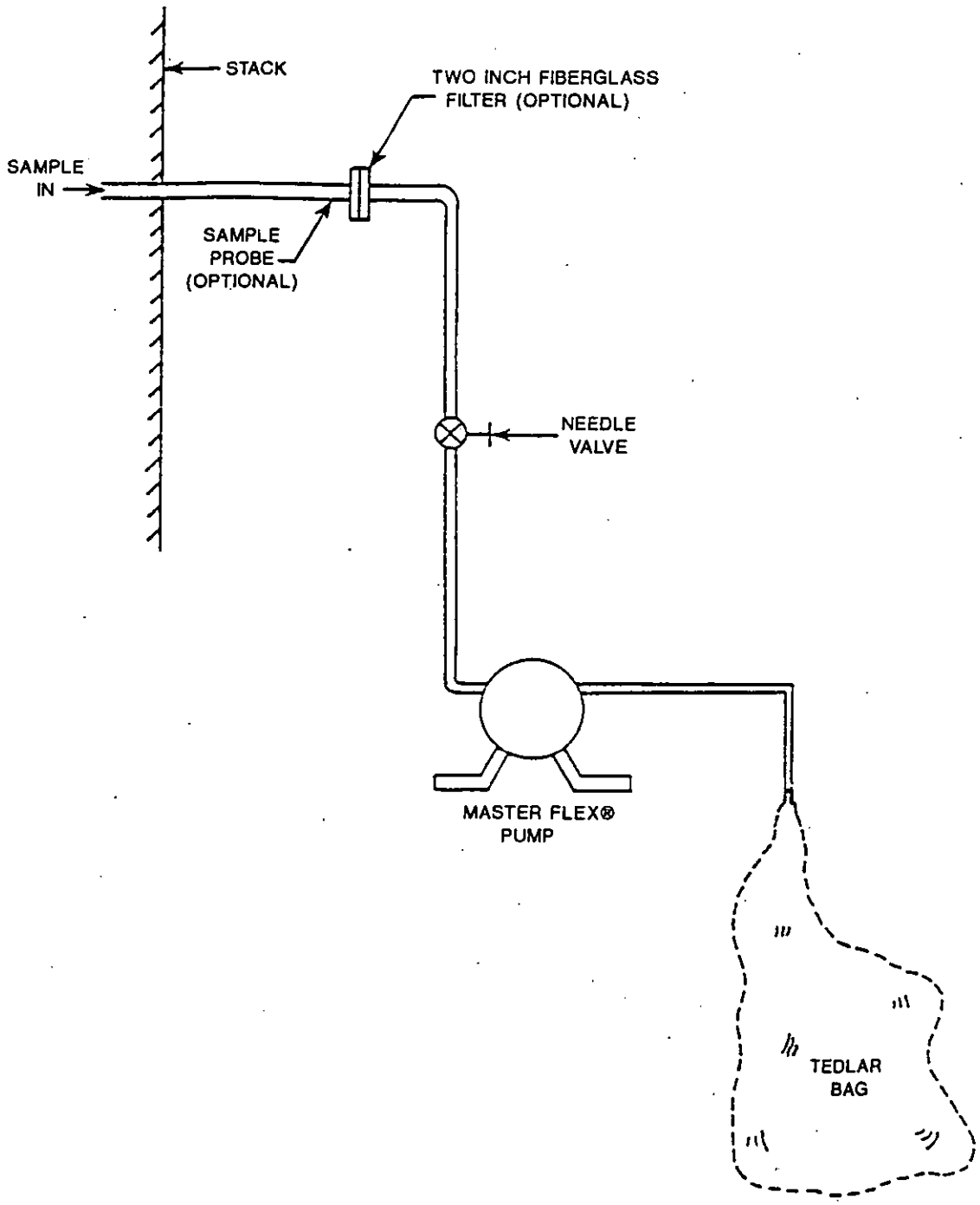

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Figure 4-3

EPA METHOD 3
SAMPLING TRAIN SCHEMATIC

5.0 QUALITY ASSURANCE

The project manager will be responsible for implementation of the TRC quality assurance (QA) program as applied to this project. The program is designed to ensure that emission measurement work is performed by qualified people using proper equipment following written procedures in order to provide accurate, defensible data.

At the beginning of the test day, a meeting will be held to orient TRC and Louisiana-Pacific personnel to the activities scheduled for that day and to determine if any special considerations are appropriate for the day's work.

5.1 Sampling Quality Assurance

The TRC quality assurance program for source measurements is designed so that the work done by competent, trained individuals experienced on the specific metrologies being used; using properly calibrated equipment; and using approved procedures for sample handling and documentation.

TRC's measurement devices, pitot tubes, dry-gas meters, thermocouples, and portable gas analyzers are uniquely identified and calibrated with documented procedures and acceptance criteria before and after each field effort. Records of all calibration data are maintained in TRC files.

Data are recorded on standard forms. Bound field notebooks are used to record observations and miscellaneous elements affecting data, calculations, or evaluation. Specific details of TRC's QA program for stationary air pollution sources may be found in *Quality Assurance Handbook for Air Pollution Measurement Systems,* Volume III (EPA-600/4-77-027b).

In the mobile laboratory, analysts record calibration and analysis data in notebooks and summarize specific data on prepared data sheets. Notebooks, data sheets, and calculations will be reviewed by the project manager.

5.2 Analytical Quality Control

Compressed gases used as fuels and carriers are purchased at specific purities, according to application. Compressed gases used as calibration standards are always National Institute for Standards and Technology (NIST) traceable, either directly or indirectly.

Appendix A

Field Data Sheets

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Thermal Oxidizer	1-5 CO_2	comp-1	12/13/95	CO_2 = 8.7% O_2 = 10.6%

OPERATORS	Barometric (in Hg)	Static P. (in H2O)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (in.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzle Number	Nozzle Diameter
Baez / Boyle	29.9	-0.50	30	4½ Glass	51	0.84	6' Glass	3-3	0.378

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Init.) (in Hg)	Leak Check (Init.) cfm	Leak Check (Fin.) (in Hg)	Leak Check (Fin.) cfm	K Factor
✓	80823	1.88	1.0	13%	b			15	0.000	10	0.000	9.5

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (in H2O)	ΔH Orifice (in H2O)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (in Hg)	XAD Trap Temp. (°F)
1	0910	0	870.00	0.16	1.52	354	250	250	18		44	38	2	
2	0913	3	871.81	0.16	1.52	371	250	250	18		46	38	2	
3	0916	6	873.87	0.20	1.90	450	250	250	21		48	39	2	
4	0919	9	876.01	0.23	2.19	534	250	250	24		49	39	2	
5	0922	12	878.47	0.26	2.47	551	250	250	28		52	40	2	
6	0925	15	880.92	0.27	2.57	554	250	250	28		52	40	2	
7	0928	18	883.01	0.27	2.57	559	250	250	28		54	42	3	
8	0931	21	886.41	0.27	2.57	553	250	250	28		54	42	3	
9	0934	24	889.12	0.27	2.57	559	250	250	28		54	42	3	
10	0937	27	891.61	0.27	2.57	554	250	250	28		55	43	3	
1	0945	30	894.314	0.17	1.62	409	250	250	28		51	43	3	
2	0948	33	896.81	0.18	1.76	367	250	250	28		53	44	3	
3	0951	36	898.40	0.20	1.90	450	250	250	29		53	44	3	
4	0954	39	900.61	0.24	2.28	538	250	250	29		52	44	3	
5	0957	42	903.21	0.25	2.36	547	250	250	29		56	44	3	
6	1000	45	905.69	0.27	2.57	550	250	250	29		56	45	4	
7	1003	48	908.25	0.27	2.57	554	250	250	29		57	45	4	
8	1006	51	910.91	0.27	2.57	552	250	250	29		57	46	4	
9	1009	54	913.55	0.26	2.47	552	250	250	29		57	46	4	
10	1012	57	916.20	0.26	2.47	552	250	250	29		58	46	4	
	1015	60	916.849											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
60	48.849	0.4844	2.252	507.0	47.8

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
Louisiana Pacific	Thermal Oxidizer	1-5 202	Comp-2	12/13/95	

OPERATORS	Barometric (In Hg)	Static P. (In H20)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (In.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
Baer/Coyco	29.92	-052	30	A1	51	0.84	6' 6/SS	3-3	0.378

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Inl.) (In Hg)	Leak Check (Inl.) cfm	Leak Check (Fin.) (In Hg)	Leak Check (Fin.) cfm	K Factor
✓	608223	1.85	1.0	13	6			15	0.001	7	0.000	9.5

$CO_2 = 9.1\%$

$O_2 = 10.8\%$

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (In H20)	ΔH Orifice (In H20)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (In Hg)	XAD Trap Temp. (°F)
1	1109	0	919.120	0.13	1.20	300	250	250	36		53	50	2	
2	1112	3	920.87	0.14	1.33	340	250	250	45		53	50	2	
3	1115	6	922.62	0.16	1.52	385	250	250	43		58	50	2	
4	1118	9	924.52	0.19	1.81	495	250	250	42		59	50	2	
5	1121	12	926.63	0.22	2.10	552	250	250	39		61	51	2	
6	1124	15	929.12	0.23	2.18	562	250	250	39		61	51	2	
7	1127	18	931.52	0.25	2.38	565	250	250	39		63	51	2	
8	1130	21	934.42	0.25	2.38	560	250	250	40		63	61	2	
9	1133	24	936.62	0.23	2.18	520	250	250	49		63	52	2	
10	1136	27	939.08	0.24	2.28	548	250	250	56		63	53	2	
1	1142	30	941.539	0.15	1.43	453	250	250	48		63	52	2	
2	1145	33	943.54	0.15	1.43	452	250	250	45		61	53	2	
3	1148	36	945.21	0.17	1.62	472	250	250	42		61	53	2	
4	1151	39	947.21	0.19	1.81	537	250	250	41		61	53	4	
5	1154	42	949.48	0.22	2.10	552	250	250	41		61	53	4	
6	1157	45	951.63	0.25	2.38	561	250	250	41		62	53	4	
7	1200	48	954.74	0.27	2.56	596	250	250	45		63	54	4	
8	1203	51	957.00	0.25	2.38	567	250	250	48		63	54	4	
9	1206	54	959.35	0.25	2.38	566	250	250	51		63	54	4	
10	1209	57	961.15	0.24	2.28	565	250	250	56		63	54	4	
	1212	60	964.577											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
60	45.457	0.4545	1.986	506.7	56.5

TRC

ISOKINETIC SAMPLING DATA

PLANT NAME, CITY, STATE	SAMPLING LOCATION	Method No.	RUN NUMBER	TEST DATE	Notes
LOUSIANA PACIFIC	MAINE	1-5 202	COMP-3	12-13-95	

OPERATORS	Barometric (In Hg)	Static P. (In H20)	Ambient T. (°F)	Filter Type & Filter Number(s)	Stack I.D. (In.)	Pitot Tube Cp	Probe Length and Liner Type	Nozzel Number	Nozzel Diameter
BURZ / BLYKO	29.92	-0.43	30	4½ Micro Quartz Glass	51	0.84	6' 6/ASS	3-3	0.378

PITOT LEAK CHECK	DGM No.	DGM ΔH@	DGM CAL Y	Assumed Moist. %	Pitot No.	Stack Therm. No.	Impinger Therm. No.	Leak Check (Ini.) (In Hg)	Leak Check (Ini.) cfm	Leak Check (Fin.) (In Hg)	Leak Check (Fin.) cfm	K Factor
✓	80823	1.88	1.00	13				15	0.001			9.5

$CO_2 = 8.0\%$

$O_2 = 11.9\%$

POINT NUMBER	CLOCK TIME (24-hour)	ELAPSED TEST TIME (min)	DRY GAS METER READING (Cubic Feet)	ΔP Velocity (In H20)	ΔH Orifice (In H20)	Stack Temp. (°F)	Probe Temp. (°F)	Filter Oven Temp. (°F)	Impinger Temp. (°F)	AUX Temp. (°F)	DGM Temp. (°F) DGM In	DGM Temp. (°F) DGM Out	Sample Train Vacuum (In Hg)	XAD Trap Temp. (°F)
1	1306	0	964.902	0.16	1.52	465	250	250	31		54	52	2	
2	1309	3	966.90	0.17	1.615	488	250	250	31		55	52	2	
3	1312	6	968.80	0.19	1.81	511	250	250	39		57	52	2	
4	1315	9	970.98	0.20	1.90	555	250	250	34		59	52	2	
5	1318	12	973.12	0.22	2.10	575	250	250	32		61	52	2	
6	1321	15	975.50	0.25	2.38	580	250	250	31		61	53	2	
7	1324	18	977.94	0.25	2.38	579	250	250	31		62	53	2	
8	1327	21	979.65	0.25	2.38	577	250	250	34		63	53	2	
9	1330	24	983.14	0.23	2.18	574	250	250	36		63	53	2	
10	1333	27	985.48	0.23	2.18	573	250	250	39		63	53	2	
1	1338	30	988.35	0.16	1.52	424	250	250	39		63	53	2	
2	1341	33	990.09	0.16	1.52	408	250	250	45		67	53	2	
3	1344	36	991.70	0.19	1.81	450	250	250	47		63	54	2	
4	1347	39	993.90	0.19	1.81	528	250	250	53		63	55	2	
5	1350	42	996.04	0.23	2.18	540	250	250	59		63	55	2	
6	1353	45	999.10	0.24	2.28	552	250	250	59		64	51	2	
7	1356	48	1002.2	0.26	2.47	557	250	250	59		64	51	2	
8	1359	51	1003.51	0.25	2.38	554	250	250	59		64	51	2	
9	1402	54	1006.01	0.23	2.18	552	250	250	59		65	51	2	
10	1405	57	1008.39	0.23	2.18	573	250	250	59		65	51	2	
	1408	60	1010.850											
			45.948 ✓											

Total Run Time	DGM Volume	Ave. SQRT ΔP	Average ΔH	Stack Temp	Ave. DGM Temp.
60	45.948	0.4617	2.039	529.3	57.6

560°F 14 pt

TRC

Orsat Data

TEST #1 (LP)

$CO_2 = 91.0 = 9\%$

$O_2 = 80.2 = 10.8\%$

$CO_2 = 91.2 = 8.8\%$

$O_2 = 80.8 = 10.4\%$

CO_2 91.2 — 8.8

O_2 80.5 10.7

TEST #2 LP

$CO_2 = 91.0 = 9\%$

$O_2 = 80.2 = 10.8\%$

CO_2 90.8 = 9.2%

O_2 80.0 10.8%

CO_2 91.0 9%

O_2 80.2 10.8

TEST #3

$CO_2 = 92.0$ 8%

$O_2 = 80.0$ 12%

$CO_2 = 91.9$ 8.1%

$O_2 = 80.2$ 11.7%

CO_2 92.0 8.0%

O_2 80.1 11.9%

Appendix B

Analytical Data and Data Summaries

PARTICULATE TEST DATA

TEST	O-1	Comp-1	Comp-2	Comp-3
LOCATION	********	Stack	Stack	Stack
FIRM	********	LP	LP	LP
TIME	********	0910-1015	1109-1212	1306-1408
DATE	********	12-13-95	12-13-95	12-13-95
PROJECT NO.	********	19624	19624	19624
BAROMETRIC PRESSURE	in. Hg	29.92	29.92	29.92
STACK AREA	ft2	14.32	14.32	14.32
NOZZLE DIAMETER	in.	0.378	0.378	0.378
SAMPLING TIME	min.	60	60	60
DRY GAS METER CAL FACTOR [Y]	********	1.00	1.00	1.00
PITOT COEFFICIENT	********	0.84	0.84	0.84
AVG. SQUARE DELTA P	in. H_2O	0.484	0.455	0.462
AVG. DELTA H	in. H_2O	2.25	1.99	2.04
AVG. METER TEMP.	oF	48	57	58
STATIC PRESSURE	in. Hg	-0.50	-0.52	-0.43
AVG. STACK TEMPERATURE	oF	507	507	529
SAMPLE VOLUME	ft3	48.85	45.46	45.95
WATER COLLECTED	ml	165.0	165.0	160.0
CO 2	%	8.9	9.1	8.0
O 2	%	10.6	10.8	11.9
CO	%	0	0	0
N 2	%	80.5	80.1	80.1
PARTICULATE CATCH (Method 5)	mg	87.30	61.65	65.63
ORGANIC PM CATCH (Method 202)	mg	0.00	0.00	0.00
INORGANIC PM CATCH (Method 202)	mg	0.00	0.00	0.00
SAMPLE VOLUME DRY	DSCF	51.07	46.70	47.11
MOISTURE	%	13.2	14.3	13.8
MOLECULAR WEIGHT OF STACK GAS	lb/lb-mole	28.28	28.19	28.14
STACK VELOCITY	FPM	2232	2098	2158
VOLUMETRIC FLOWRATE, ACTUAL	ACFM	31968	30044	30898
VOLUMETRIC FLOWRATE, DRY STD.	DSCFM	15133	14047	14203
ISOKINETIC RATIO	%	103.4	101.9	101.6
PARTICULATE CONCENTRATION	grains/DSCF	0.02637	0.02037	0.02150
PARTICULATE EMISSION RATE	lb/hour	3.42	2.45	2.62
PARTICULATE EMISSION RATE	lb/mmBTU	0.0733	0.0577	0.0683

TRC ENVIRONMENTAL CORPORATION, INC.
5 WATERSIDE CROSSING, WINDSOR, CT 06095
860-298-6326
Connecticut Certification No. PH-0426
AIHA Laboratory Accreditation No. 259

LABORATORY REPORT

LOUISIANA PACIFIC

Lab Number: 16322
Date Rec'd: 12/15/95
Date Analyzed: 12/18/95
Sample Description: Method 5 - Emissions
No. Samples: 3 Trains and 2 Blanks
Lab Project No.: 10902-3001-00005
TRC Project No: 19624

Sample Number	Media	Particulate (mg)
TO-PM-1	Filter #331	72.08
TO-PM-1	Probe Wash	15.22
TO-PM-2	Filter #322	53.74
TO-PM-2	Probe Wash	7.91
TO-PM-3	Filter #323	57.84
TO-PM-3	Probe Wash	7.79
TO-PM-B	Filter Blank	ND<0.5
TO-PM-B	Acetone Blank	0.68

Analyst: Lance Cotton/Dan Plimpton

Reviewed by: _____ or _____

Margaret F. Flanagan
Quality Control Manager

Gary L. Ritter, CIH, CHMM, LSP
Laboratory Director

ANALYSIS OF [redacted] METHOD [redacted] FOR CASCADE FILTERS

Project Name: Louisiana Pacific Project Number: 19624

Weighing QC

Final Weight	1	2	3	4	5	6
Date	12/18/95	12/18/95				
Time	07.30	13:31				
0.500g	0.49996	0.49996				
100.000g	99.99938	99.99938				
%RH	24%	24%				
°F	68°	70°				

Silica Gel

Sample ID	g

Sample Type F=Filter I=Thimble PW=Probe Wash C=Cascade Filter

Test # / mls PW	F/T# / Beaker #	FW 1	FW 2	FW 3	Average FW	Initial W F/I	Initial W Beaker	Blank Correction	mg Particulate
		FW 4	FW 5	FW 6					
TO-PM-1	331	0.53240 ✓	0.53245 ✓		0.53242 ✓	0.46034			72.08 mg ✓
TO-PM-1		3.37069 ✓	3.37069 ✓		3.37069 ✓	3.35504			15.65
82 mls.	6					~~3.35550~~		✓ − 0.435 =	~~15.19 mg~~ 15.22 ~~14.76~~ mg
TO-PM-2	322	0.51572 ✓	0.51579 ✓		0.51576 ✓	0.46202			53.74 mg ✓
TO-PM-2		3.18706 ✓	3.18647 ✓		3.18702 ✓				
62 mls.	9					3.17878		✓ − 0.329 =	8.24 mg ✓ 7.91 mg
TO-PM-3	323	0.51925 ✓	0.51937 ✓		0.51931 ✓	0.46147			57.84 mg ✓
TO-PM-3		3.21232 ✓	3.21237 ✓		3.21235 ✓ 4 WRC				7.9 WRC
189 mls.	8					3.20355		✓ − 1.00 =	8.80 mg ✓ 7.79 mg
TO-PM-B	320	0.46510 ✓	0.46514 ✓		0.46512 ✓	0.46550			−0.38 mg or ND < 0.5 mg

Blank corrected

Witnessed and Understood by me: Margaret Flanagan Date: Recorded by: Lanie Cotton Date: 12/19/95 12/19/95

Form 911-2

Project Name: [redacted] Project Number: [redacted]

Weighing QC

Final Weight	1	2	3	4	5	6
Date	12/18/95	12/18/95				
Time	07:30	13:31				
0.500g	0.49996	0.49996				
100.000g	99.99938	99.99939				
%RH	24%	24%				
°F	68°	70°				

Silica Gel	
Sample ID	g

Sample Type F=Filter T=Thimble PW=Probe Wash C=Cascade Filter

Test # mls PW	F/T# Beaker #	FW 1 FW 4	FW 2 FW 5	FW 3 FW 6	Average FW	Initial W F/T Initial W Beaker	Blank Correction	mg Particulate	
TO-PM-B 128 M/S.	10	3.00947	3.00944		3.00946	3.00878		0.68 mg	= 0.00531 mg/M³

Witnessed and Understood by me,

Date:	Recorded by,		Date

Form 911-2

TRC Environmental Consultants, Inc.

CHAIN OF CUSTODY RECORD

NO 12958

PROJECT NO.	PROJECT NAME	PARAMETERS	
196024	Louisiana Pacific		1322

SAMPLERS: (Signature) Raul Baez (Printed) Raul Baez

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	METHOD 5	REMARKS
TO-PM-1	12/13				Thermal Oxidizer	1	X	Filter #331
TO-PM-1	1				"	1	X	Acetone
TO-PM-2	12/13				"	1	X	Filter # 322
TO-PM-2	1				"	1	X	Acetone
TO-PM-3	12/13				"	1	X	Filter # 223
TO-PM-3	1				"	1	X	Acetone
TO-PM-B	12/13				"	1	X	blank
TO-PM-B	1				"	1	X	blank

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Raul Baez	12/14/95				
(Printed) R. Baez		(Printed)	(Printed)		(Printed)

Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks
		Lance Cotton	12/14/95 12:00	
(Printed)		(Printed) Lance Cotton		

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

Environmental Consultants, Inc.

CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	PARAMETERS	1 of 2
1960 4	LOUISIANA PACIFIC		

SAMPLERS: (Signature) [signature] (Printed) KARL FOSTER

FIELD SAMPLE NUMBER	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	M202	Formaldehyde								REMARKS
TO-M202-1	12/13					1	X									
TO-M202-2	"					1	X									
TO-M202-3	"					1	X									
TO-BLANK	12/13						X									
FORM-IN-1	12/14					1		X								
FORM-IN-2	"					1		X								
FORM-IN-3	"					1		X								
FORM-OT-1	12/14					1		X								
FORM-OT-2	"					1		X								
FORM-OT-3	"					1		X								
FORM-H2O	"					1		X								

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	12/15/91 1000				
(Printed) KARL FOSTER		(Printed)	(Printed)		(Printed)
Relinquished by: (Signature)	**Date / Time**	**Received for Laboratory by: (Signature)**	**Date / Time**	**Remarks**	
		[signature]	12/16/91 1200		
(Printed)		(Printed) Lance Cotter			

Distribution: Original Plus One Accompanies Shipment (white and yellow); Copy to Coordinator Field Files (pink).

Appendix C

Process Data

FIELD NOTES FROM KONUS COMPLIANCE TEST
12/13/95

Introduction: Both Konus units on line supplying heat loads including the press and hot ponds.

0910 Compliance test #1 started.

0915 Konus thermal oil flow rates: #1) 0.344 0.324 0.295
#2) 0.32

note: Konus #2 is equipped with a GEKA coil section which has only one set of coils vs. Konus #1 with 3 parallel coils.

0930 Both Konus internals look OK. (firebox)

Visual emissions not possible at this time due to the outside temp. of 0-+5 and the amount of water vapor in the stack emissions.

0943 Konus thermal oil flow rates: #1) 0.345 0.324 0.295
#2) 0.32

1010 End of first compliance run.

1045 Konus thermal oil flow rates: #1) 0.348 0.325 0.3
#2) 0.32

1100 Visual Emissions: 5% steady opacity with 15-25% during rapping intervals.

1108 Beginning of second Compliance run.

1110 Both konus internals look OK. (firebox)

1135 Both konus internals look OK. (firebox)

1145 Konus thermal oil flow rates: #1)0.35 0.323 0.3
#2 0.32

1208 End of second compliance run.

1310 Beginning of third compliance run.

1410 End of third compliance run.

by Mark Stile

LOUISIANA-PACIFIC CORP.
HOULTON, MAINE

PRESS REPORT

OPERATOR K.P. SHIFT AM (PM) CREW D DATE 12/13/95

LINE SPEED	FROM	TO	THICK-NESS	PRESS LOADS	PRESS TEMP	OVERALL TIMER	DECOMP. TIMER	REASON FOR LINESPEED CHANGE
60	700	725	7/16	7	215°	148	13.	Start
37	725	700	23/32 TG	96	215°	260	19.1	Scheduled.

TOTALS 103 (3/8" FOOTAGE) = 295173

FLKR STROKES 1265 TDT 168 PEAB OIL BRNR: O DEBARKER DT 2.07 SANDER DT 12hr.

KONUS #1 2642 KONUS #2 2612 SURFACE OIL BURNER O CORE OIL BURNER O

DOWNTIME FROM	DOWNTIME TO	DOWNTIME(MINS) DEPARTMENTS M	E	O	QC	REASON FOR DOWN TIME
915	1035		80			Unloader Cage dropping in Pit (Bent Stu
1035	1100				25	Surface Wax Froze.
1200	1244		44			Changed Brake. Bolted on Cage again
1255	108		13			Cage still going down.
115	121		6			Changed motor starter for Unloader
						Cage brake.
			143		25	

*** MAINTENANCE / LOCK-OUT LOG ***

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT
			7 7/16 - 12544	
			96 23/32 TG - 282629	

LOUISIANA-PACIFIC
HOULTON, MAINE

ML

SHIFT OPERATING REPORT

UPERVISOR T. Tower SHIFT AM (PM) CREW D DATE 12/13/95

PRESS OPERATION:

THICKNESS	PRESSLOADS	3/8" FTG	DOWNTIME (Mins) M	E	O	QC
7/16	7	12544				
23/32	96	282629				
TOTAL	103	295173		143		25T

YARD OPERATIONS:

FIRE DUMP CLEANED 2 TIMES
TRUCKS USED DIRECT ____ TRUCKS
BARK TRUCKS LOADED ____ TRAILERS
MISCELLANEOUS ____

KONUS FURNACE	HRS. FUEL USAGE WOOD	HRS. FUEL USAGE OIL
#1	12 hrs.	0
#2	12 hrs.	0

DRYER OPERATION:

	DRY FUEL USAGE LBS.	OIL FUEL USAGE IIRS.	AVE. INLET TEMP	RUNNING TIME MINS.	DOWN TIME	AVG. WET MOISTURE	AVG. DRY MOISTURE	REASON FC OIL USAGE
CORE	4850	0	890	576	144	36.0%	4.6%	None
SURFACE	5610	0	770	581	139	39.0%	7.7%	None

# OF UNITS	1/4	5/16	3/8	7/16	15/32	1/2	19/32	23/32	OTHE
A				3+89pcs				83	
A 1/2 UNITS									
U				2				8pcs	
E & X									

IF LESS THAN 99.5%, WHY?

MAINTENANCE/LOCK-OUT LOG

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT

PERSONNEL COMMENTS/CONCERNS:

ABSENT/TARDY	REASON	EXTRA PERSONNEL	REASON

LOUISIANA-PACIFIC
HOULTON, MAINE

ML

SHIFT OPERATING REPORT

SUPERVISOR McNinch SHIFT ~~AM~~ PM CREW A DATE 12-13-95

PRESS OPERATION:

THICKNESS	PRESSLOADS	3/8" FTG	DOWNTIME (Mins)			
			M	E	O	QC
7/16	209	374539				
	-					
TOTAL	209	374539				

YARD OPERATIONS:

FIRE DUMP CLEANED ____ TIMES
TRUCKS USED DIRECT ____ TRUCKS
BARK TRUCKS LOADED ____ TRAILERS
MISCELLANEOUS ____

KONUS FURNACE	HRS. FUEL USAGE WOOD	HRS. FUEL USAGE OIL
#1	12 Hours	0
#2	12 Hours	0

DRYER OPERATION:

	DRY FUEL USAGE LBS.	OIL FUEL USAGE HRS.	AVE. INLET TEMP	RUNNING TIME MINS.	DOWN TIME	AVG. WET MOISTURE	AVG. DRY MOISTURE	REASON FO OIL USAGE
CORE	6,585	0	957	720	0	39.0%	4.4%	Nonells
SURFACE	7,375	0	802	720	0	41.4%	8.8%	Nonellse

# OF UNITS	1/4	5/16	3/8	7/16	15/32	1/2	19/32	23/32	OTHE
A				112					
A 1/2 UNITS									
U				1pc					
E & X				8pcs E					

IF LESS THAN 99.5%, WHY?

MAINTENANCE/LOCK-OUT LOG

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT

PERSONNEL COMMENTS/CONCERNS:

ABSENT/TARDY	REASON	EXTRA PERSONNEL	REASON

LOUISIANA-PACIFIC CORP.
HOULTON, MAINE

PRESS REPORT

59.71

OPERATOR K. Blake | SHIFT (AM) PM | CREW A | DATE 12-13-95

LINE SPEED	FROM	TO	THICK-NESS	PRESS LOADS	PRESS TEMP	OVERALL TIMER	DECOMP. TIMER	REASON FOR LINESPEED CHANGE
61	700	700	7/16	209	215	150	13.0	start

TOTALS 209 (3/8" FOOTAGE) = ~~358482~~ 374539

FLKR STROKES 1694 TDT 0 min PEAB OIL BRNR: 0 mins DEBARKER DT 5.43 SANDER DT 6.47

KONUS #1 364 KONUS #2 3493 SURFACE OIL BURNER 0 min CORE OIL BURNER 0 hrs

DOWNTIME FROM	DOWNTIME TO	DOWNTIME(MINS) DEPARTMENTS M	E	O	QC	REASON FOR DOWN TIME

*** MAINTENANCE / LOCK-OUT LOG ***

MOTOR # LOCKED OUT	FROM	TO	BRIEF DESCRIPTION OF WORK BEING DONE	INITIALS OF PERSON LOCKING OUT

APPENDIX A-1

Press Production Rate Calculations

Date: 12/18/95 Name: MARK STICE

Board Size manufactured during the Emission Test = 7/16"

Total Time = 3 Hours Running time = 3 Hours

Total Pressloads produced = 52.41 LOADS.

Pressloads / Running Time Hours = 17.47

Production in tons =

$$\frac{\text{Pressloads}}{\text{hour}} \times \frac{12 \text{ (8'x16' boards)}}{\text{Pressload}} \times \text{Average Trimmed Board Weight (8'x 16' size)}$$

$$\times \frac{1 \text{ Ton}}{2000 \text{ lbs}} = 19.38 \text{ Tons Finished Product / Hour}$$

Tons/Day Rate: Tons Finished Product / Hr. X 24 hours

= 465.1 Tons per Day.

$$\frac{17.47 \times 12 \times 184.89}{2000} = 19.38 \times 24 = 465.1$$

WORK SHEET FOR APPENDIX A-1

BOARD WEIGHTS: TEST 1 = 19,106.8 Kg.

" " " 2 = 19,068.5 Kg.

" " " 3 = 18,949.2 Kg.

TOTAL 57,124.5 (UNTRIMMED)

$$\frac{57,124.5}{629 \text{ BOARDS}} = 90.82 \text{ Kg} - (0.0768 \times 90.82)$$ (TRIM RATIO)

= 83.85 Kg. (TRIMMED WEIGHT AVERAGE)

83.85 Kg x 2.205 #/Kg = 184.89 # " " "

TEST 1 (0910-1010 HOURS) – 17.33 LOADS 19,106.8 Kg. (UNFINISHED)
208 BOARDS. 19.4 TON (FINISHED)

TEST 2 (1108-1208 HOURS) – 17.33 ~~HOURS~~ LOADS 19,068.5 Kg. (UNFINISHED)
208 BOARDS 19.4 TON (FINISHED)

TEST 3 (1310-1410 HOURS) – 17.75 LOADS 18,949.2 Kg. (UNFINISHED)
213 BOARDS 19.29 TON (FINISHED)

12/18/95

MARK STILE

APPENDIX A-2

Thermal Oil Heater Firing Rate Calculations

Date: 12/18/95 Name: MARK STILE

Average Oil Temperatures in °C.

Unit	Temp. Inlet	Temp. Outlet	Differential temp.
1	220.5	254.6	34.1 °C = 93.4 °F
2	234.6	257.5	22.9 °C = 73.2 °F

Formula: °F. = 9/5°C +32

104°F.= Maximum design Differential temperature per thermal oil heater.

Thermal Oil Heater #1:

BTU INPUT= Ave Differential Temp °F / 104°F (max design temp) X (24.6 x 10^6)BTU =

23.63×10^6 BTU/HR

Thermal Oil Heater #2:

BTU INPUT= Ave Differential Temp °F / 104°F (max design temp) X (24.6 x 10^6)BTU =

21.39×10^6 BTU/HR

BTU inputs of thermal oil heaters #1 + #2 = 45.02×10^6 BTU/HR

WORK SHEET #1
FOR
APPENDIX A-2

AVERAGE THERMAL OIL FLOW RATES:

TEST 1:	KONUS 1 - 0.321 BAR		AVERAGE:
	KONUS 2 - 0.32 "		
TEST 2:	KONUS 1 - 0.321 "		#1 = 0.321
	KONUS 2 - 0.32 "		
TEST 3:	KONUS 1 - 0.322 "		#2 = 0.32
	KONUS 2 - 0.32 "		

HEAT TRANSFER AREA IS PROPORTIONAL TO VOLUME.

VOLUMES: #1 = 1543 GAL #2 = 1787 GAL

AS A RATIO TO #1, $\#2 = \frac{1787}{1543} = 1.158$

HEAT INPUT IN BTU's $(Q) = UA\Delta T$

$$U = \left[\overset{\#1}{\frac{0.321}{0.3} = 1.07}\right] \quad \left[\overset{\#2}{\frac{0.32}{0.3} = 1.067}\right]$$

LET AREA OF #1 = 1 & AREA OF #2 = 1.158

$$\Delta T = \left[\overset{\#1}{\frac{93.4}{104} = 0.8979}\right] \quad \left[\overset{\#2}{\frac{73.2}{104} = 0.704}\right]$$

°F

WORK SHEET #2
FOR
APPENDIX A-2

$\therefore$ #1 $= 1.07 \times 1 \times 0.8979 \times 24.6 \times 10^6 = \underline{23.63 \times 10^6}$ BTU/HR

#2 $= 1.067 \times 1.158 \times 0.704 \times 24.6 \times 10^6 = \underline{21.39 \times 10^6}$ BTU/HR

$$\begin{array}{r} 23.63 \times 10^6 \\ + \quad 21.39 \times 10^6 \\ \hline 45.02 \times 10^6 \text{ BTU/HR} \end{array}$$

TOTAL

10 min
READINGS

THERMAL OIL HEATERS

Temperature & Fuel Report

Houlton, Me.

S tpoint #1: 258 Setpoint #2: 258

Date: 12-13-95 Name: Danny

TIME	Oil Temperatures #1 In	#1 Out	#2 In	#2 Out	Fuel Counter #1 Start & Finish	#2 Start & Finish	Moisture 30 min.	#1 ΔT	#2 ΔT
741	220	253	235	256	3524	4101			
751	222	259	238	262	3557	4133	39.2 %		
01	219	251	234	254	3609	4183			
11	220	258	235	260	3655	4241			
821	230	259	234	256	3712	4287	38.0 %		
31	220	258	233	259	3752	4358			
41	224	262	237	259	3794	4383			
851	220	250	233	255	3826	4439			
01	219	260	233	258	3871	4508			
911	218	253	229	254	3923	4581		35	25
921	219	254	233	263	3986	4652	41.2 %	35	30
31	220	249	233	254	4035	4689		29	21
941	222	254	233	257	4095	4727		32	24
951	220	255	233	259	4151	4800		35	26
1	221	255	235	256	4190	4567	40.0%	34	21
1011	223	260	238	265	4230	4913		37	27
1021	224	257	235	257	4261	4933			
31	220	252	233	255	4315	4990	AVG.	33.86	24.86
1041	218	261	234	255	4372	5069	38.0%		
51	220	257	236	265	4413	5122			
01	226	263	239	260	4439	5123			
1111	220	256	235	253	4482	5190		36	18
1121	220	257	235	258	4525	5260	41.2 %	37	23
31	224	255	237	262	4572	5286		31	25
1141	221	254	235	253	4610	5336		33	18
51	218	251	234	259	4662	5411		33	25
1201	218	250	230	260	4720	5483	41.0%	32	30
1211	219	254	234	257	4791	5543		35	23
221	222	252	235	260	4837	5592			
1231	223	258	236	258	4883	5621	AVG. =	33.86	23.14
1241	222	263	237	256	4936	5671	42.2%		
251	222	259	236	262	4966	5700			
101	222	264	237	257	4990	5746			
11	221	253	235	254	5035	5814		32	19
21	222	258	237	262	5087	5853	41.4 %	36	25
1	222	257	237	256	5124	5881		35	19
41	221	252	236	256	5172	5925		31	20
51	219	256	234	255	5224	6002		37	21
201	221	257	237	258	5265	6035	42.0%	36	21
11	222	257	237	256	5315	6077		35	19
221	221	257	236	257	5358	6144		34.57	20.57

ESP
REPORT

10 MIN
READINGS

Houlton, Me.

Date: 12-15-95 Name: Danny

	Electrostatic Precipitator #1			Electrostatic Precipitator #2			
TIME	KV	MA	Amps	KV	MA	Amps	Sparks
741	36.00	70	20	40	20	16	32
751	36.00	70	20	40	20	12	36
801	37.15	70	20	40	30	12	36
811	37.15	80	22	42	40	14	32
827	38.30	80	22	42	40	16	36
831	37.15	60	10	42	30	16	34
841	36.00	60	20	40	30	14	32
851	36.00	70	15	40	30	14	36
901	37.15	60	20	42	30	12	38
911	37.15	70	22	42	30	12	34
921	37.15	70	22	42	20	12	38
931	37.15	70	22	42	40	16	34
941	38.30	80	22	38	30	12	36
951	38.30	80	20	40	30	14	34
1001	37.15	70	22	40	30	16	30
1011	37.15	60	20	42	30	12	36
1021	36.00	60	20	40	30	14	36.
1031	36.00	80	22	40	60	12	30
1041	37.15	80	22	38	60	16	36
1051	38.30	80	20	40	20	12	38
1101	36.00	60	20	40	30	12	30
1111	36.00	70	22	42	30	16	30
1121	36.00	60	20	40	30	16	32
1131	38.30	80	22	40	20	14	34
1141	38.30	80	22	42	30	16	32
1151	37.15	70	22	40	30	14	32
1201	37.15	70	22	40	20	10	34
1211	38.30	80	25	40	30	14	36
1221	37.15	70	20	40	30	14	32
1231	38.30	70	20	40	40	16	36
1241	37.15	60	10	42	30	14	28
1251	38.30	70	22	42	30	12	32
101	37.15	60	20	40	30	16	32
111	38.30	70	22	42	40	16	30
121	37.45	70	25	40	30	14	32
131	38.30	80	20	40	30	14	32
141	37.15	70	20	42	20	12	32
151	36.00	60	20	40	30	14	32
201	36.00	70	20	40	30	16	30
211	38.30	70	20	40	40	16	30
221	38.30	70	20	42	30	14	32
231	36.00						

TEST #1

TEST #2

TEST 3

KONUS CHECK LIST
30 min. Readings

Date 12-13-95 Name Danny

TIME:	745	817	847	915	945	1015	1045	1115
1. Fuel Conveyors	OK	OK	OK	OK	OK	OK	OK	OK
2. Stoker Screws	OK	OK	OK	OK	OK	OK	OK	OK
3. Metering Screws	OK	OK	OK	OK	OK	OK	OK	OK
4. Ash Conveyors	OK	OK	OK	OK	OK	OK	OK	OK
5. Ash Airlocks	OK	OK	OK	OK	OK	OK	OK	OK
6. ID Dampers	OK	OK	OK	OK	OK	OK	OK	OK
7. FD Dampers	OK	OK	OK	OK	OK	OK	OK	OK
8. ID Fans	OK	OK	OK	OK	OK	OK	OK	OK
9. FD Fans	OK	OK	OK	OK	OK	OK	OK	OK
10. ESP Rappers	OK	OK	OK	OK	OK	OK	OK	OK
11.								
12.								

COMMENTS:

KONUS CHECK LIST
30 min. Readings

Date 12-13-95 Name Danny

TIME:	1145	1215	1245	115	145	215	230	
1. Fuel Conveyors	OK	OK	OK	ok	OK	OK	OK	
2. Stoker Screws	OK	OK	OK	OK	OK	OK	OK	
3. Metering Screws	OK	OK	OK	OK	OK	OK	OK	
4. Ash Conveyors	OK	OK	OK	OK	OK	OK	OK	
5. Ash Airlocks	OK	OK	OK	OK	OK	OK	OK	
6. ID Dampers	OK	OK	OK	OK	OK	OK	OK	
7. FD Dampers	OK	OK	OK	OK	OK	OK	OK	
8. ID Fans	OK	OK	OK	OK	OK	OK	OK	
9. FD Fans	OK	OK	OK	OK	OK	OK	OK	
10. ESP Rappers	OK	OK	OK	OK	OK	OK	OK	
11.								
12.								

COMMENTS: Time 1'28

ol Flow #1 Kons

1 0.35 2 0.34 3 0.3

ol Flow #2 Kons

#1 0.34

#1 cyclone 12-15-95

time in	time out	weight	Barrell weight	
6:30	7:43	75.5	29.4	= 46.1
7:47	8:30	56.1	29.4	= 26.7
8:33	9:32	63.35	29.4	= 33.95
9:34	10:37	61.7	29.4	= 32.3
10:39	11:40	62.1	29.4	= 32.7
11:43	12:36	62.4	29.4	= 33
12:38	1:36	59.1	29.4	= 29.7
1:38	2:30	60.5	29.4	= 31.1

8 HOURS

275.55 #

$\frac{275.55}{8}$ = 34.44 #/HR AVE.

#1 precipitator

time in	time out	weight	bottle weight	
6:30	7:40	44.6	31.95	= 12.65
7:43	8:34	40.5	31.95	= 8.55
8:38	9:36	41.6	31.95	= 9.65
9:38	10:39	45.6	31.95	= 13.65
10:41	11:37	42.7	31.95	= 10.75
11:39	12:38	40.8	31.95	= 8.85
12:40	1:38	38.8	31.95	= 6.85
1:40	2:33	45.3	31.95	= 13.35
	8.05 Hrs.			84.3 #

$\frac{84.3}{8.05} = 10.47$ #/Hr.

#2 cyclone

time in	time out	weight	barrell weight	
6:30	7:30	64.2	42.8 =	21.4
7:35	8:42	56.7	42.8 =	13.9
8:44	9:30	61.7	42.8 =	18.9
9:32	10:30	63.8	42.8 =	21
10:32	11:30	60.3	42.8 =	17.5
11:32	12:30	59.5	42.8 =	16.7
12:32	1130	58.6	42.8 =	15.8
1133	2:30	58.7	42.8 =	15.9

141.1

8 Hrs.

$\frac{141.1}{8} = 17.64$ #/Hr

#2 Precipitator

time in	time out	weight	barrell weight		
6:30	7:35	46.6	39.4	=	7.2
7:40	8:44	46.3	39.4	=	6.9
8:46	9:59	45.3	39.4	=	5.9
9:40	10:33	52.1	39.4	=	12.7
10:35	11:32	49.6	39.4	=	10.2
11:35	12:32	46.3	39.4	=	6.9
12:34	1:33	46.5	39.4	=	7.1
1:35	2:30	48.4	39.4	=	9.0

8 HRS.

65.9 #

$\frac{65.9}{8} = 8.24$ #/HR.

TRIM RATIO

7/16 WEIGHTS — 12-2-95

#1 ~~9.1%~~ 90.1 − 83.3 = 6.8

$$\frac{90.1 - 83.3}{90.1} = 0.0755 = 7.55\%$$

#2 ~~1.2%~~ $\frac{53.5}{52.2}$ = 0.0712

#3 ~~1.2%~~ $\frac{54.4}{53.2}$

#4 ~~1.2%~~ $\frac{54.4}{52.7}$

#5 ~~1.1%~~ $\frac{55.9}{51.6}$

#6 ~~1.1%~~ $\frac{40.0}{52.1}$

$$\frac{495.1}{536.3} = 0.9231 = \text{AVERAGE } 0.0768$$

= 7.68%

Appendix D

Calibration Data

METHOD 5 MODULE CALIBRATION

ORIFICE/NOZZLE NO. 80823

BAROMETRIC PRESSURE (P_b) 29.40 in. Hg

DATE 12-22-95

DGM SERIAL NO. 2547143

STANDARD METER P-697

NAME S. Bayko

MODULE ORIFICE SETTING ΔH (in H_2O)	STANDARD METER				MODULE METER					
	VOLUME V_s (ft^3)	FACTOR Y_s	TEMPERATURE t_s (°F)	PRESSURE ΔP_s (in H_2O)	VOLUME V_m (ft^3)	TEMPERATURE t_{mi} (°F)	TEMPERATURE t_{mo} (°F)	TIME θ (min.)	Y	ΔH@ (in H_2O)
0.5	5	1.00	70	-0.30	5.008	71	70	12.96	1.00	1.91
1.0	5		70	-0.40	5.018	72	71	9.25	1.00	1.95
1.5	10		70	-0.54	10.063	72	72	14.91	.99	1.90
2.0	10		70	-0.62	10.047	74	73	12.87	1.00	1.88
3.0	10		70	-0.90	10.112	74	73	10.06	.99	1.72
								AVERAGE	1.00	1.87

FOR CHECK, USE THE AVERAGE ΔH@ FOR ΔH:

$$Y = \frac{V_s \left(P_b + \frac{P_s}{13.6}\right)(t_m + 460)\, Y_s}{V_m \left(P_b + \frac{\Delta H}{13.6}\right)(t_s + 460)}$$

ACCEPTANCE CRITERIA:

Each Y must be 1.00 ± 0.01

$$\Delta H@ = \left[\frac{(0.0317)\,\Delta H}{P_b\,(t_m + 460)}\right]\left[\frac{(t_s + 460)\,\theta}{V_s\, Y_s}\right]^2$$

Average ΔH@ must be 1.84 ± 0.25

Each ΔH@ must be within 0.15 of the average ΔH@

TC Readout Calibrated with Constant Voltage Source

t_{mi} 72 °F t_{mo} 72 °F Reference Thermometer 72.2 °F

Module Leak Check OK

Heater Box Control OK OK Probe Heater Control OK

Module Cleaned OK Pitot Tube Manometer Leak Check OK

Calibrated and Checked by Alyce Bayko Date 12-22-95

Reviewed by Date

METHOD 5 MODULE CALIBRATION

80823

MODULE ORIFICE SETTING ΔH (in Hg)	STANDARD METER		DRY GAS METER		
	VOL_{Final}	$VOL_{Initial}$	VOL_{Final}	$VOL_{Initial}$	
0.5			484.008	479.000	=5.00
1.0			489.026	484.008	=5.01
1.5			499.089	489.026	=10.06
2.0			509.136	499.089	=10.04
3.0			519.248	509.136	=10.11

Operator _____ Date _____

Status (Circle One): Green Red

Was Any Maintenance Performed (Circle One): Yes No

If Yes, Please Describe in Detail Below:

_____

_____

_____

_____

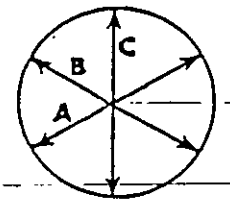
_____

_____

_____

TRC
NOZZLE CALIBRATION DATA SHEET

NOZZLE SET NO. SS SET 3 DATE 7-20-95 TECHNICIAN J Michaud



NOZZLE NO.	DIAMETER*	A	B	C	AVERAGE**
3-1		.189	.191	.192	.191
3-2		.256	.254	.255	.255
3-3		.378	.379	.378	.378
3-4		.507	.509	.506	.507
3-5		.129	.128	.127	.128
3-6		.740	.742	.741	.741
3-8		.323	.323	.323	.323

* Measure to nearest .001"
** Three measurements must be within .004" of each other

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