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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.

Background Report Reference

AP-42 Section Number: 10.6.1

Background Report Section: 4

Reference Number: 28

**Title: Letter and Attachment from J. Boswell
to L. Kessari, USEPA, Washington, DC
Revised VOC Calculations for June 14-17,
1994 test on at Louisiana Pacific Corp.
Facility in Hanceville, Alabama
October 19, 1994**



Louisiana-Pacific Corporation

P.O. Box 3107
Conroe, Texas 77305
409/756-0511

GOES WITH
TEST REPORT

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4-28)

October 19, 1994

Memo: Hanceville, Alabama OSB Mill
RTO Stack Sampling Report

To: Laxmi Kesari, US EPA

From: Jim Boswell, Dir. Environmental Control, S'th.
Division

Attached are revised pages reflecting the changes in VOC calculations as outlined on the page entitled "REVISED VOC VALUES". Contact me if you have any questions.

REVISED VOC VALUES

It has been brought to my attention that the report of testing we did at L-P's Hanceville OSB facility during June, 1994, contained errors regarding VOC emissions calculations. The corrected results indicate VOC emissions are somewhat higher than that previously reported. The West RTO emissions were reported as 1.25 #/hr. VOC and should be reported as 1.95 #/hr. The East RTO emissions were reported as 0.62 #/hr. VOC and should be 0.99 #/hr. The Press Vent RTO emissions were reported as 0.34 #/hr. VOC and should be 0.37 #/hr.

Mr. Michael Jordan of ADEM and Mr. Danny Russell (EML) pointed out that the conversion of wet basis ppm VOC as propane to dry basis ppm VOC as carbon appeared to be the source of an error. Upon examination of the spread sheet calculations, it was discovered that although the formula for the conversion was correctly inserted, the individual calculations had an error whose magnitude was the factor of the stack gas moisture content. This error appeared wherever VOC emissions were addressed in the report. Specifically, the introduction page and 8 additional pages of the report were effected.

Please attach these to the existing pages or remove those in error and insert the revised ones into the report.

SHOULD ALSO
HAVE COLLECTED
DRYER INLET
MULTIPLYING
VOC

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 • 606 B Highway 51 North

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July 30, 1994

Subject: Louisiana Pacific Corporation
Hanceville, Alabama

On June 14 through 17, 1994, Environmental Monitoring Laboratories performed air emissions testing for Louisiana Pacific Corporation's oriented strand board (OSB) facility in Hanceville, Alabama. Testing was performed to determine emissions of particulate matter (PM), volatile organic compounds (VOC), formaldehyde (HCOH) nitrogen oxides (NO_x), and carbon monoxide (CO) from the regenerative thermal oxidizer (RTO) system controlling emissions from five OSB dryers and from the RTO controlling emissions from the press vent. Testing was also simultaneously performed at the RTO inlets to determine removal efficiency.

DRYERS RTO	PM		VOC as C		HCOH		CO		NO _x	
	#/hr.	gr/dscf	#/hr.	ppm	#/hr.	ppm	#/hr.	ppm	#/hr.	ppm
WEST RTO	4.88	0.009	1.95	14.2	0.118	0.34	5.84	20	14.86	32
EAST RTO	5.60	0.011	0.99	8.1	0.133	0.43	4.20	16	12.87	29
RTO INLET	103.7	—	263.6	—	5.52	—	24.12	—	16.54	—
REMOVAL EFFICIENCY	90.4		98.9		95.4		58.4		-67.7	

PRESS VENT RTO	PM		VOC as C		HCOH		CO		NO _x	
	#/hr.	gr/dscf	#/hr.	ppm	#/hr.	ppm	#/hr.	ppm	#/hr.	ppm
RTO OUTLET	2.08	0.002	0.37	1.8	0.030	0.06	5.33	11	7.89	10
RTO INLET	4.13	—	147.4	—	1.81	—	ND	ND	ND	ND
REMOVAL EFFICIENCY	74.8		99.7		98.3		—		—	

The testing project was coordinated by Dr. James T. Boswell of Louisiana Pacific Corporation. Mr. Scott Roberts of ADEM was present to witness portions of the testing. Danny Russell of Environmental Monitoring laboratories coordinated sample collection and analysis and report preparation. Armstrong Environmental performed testing at the RTO inlets. All formaldehyde samples were shipped to Oxford Laboratories in Wilmington, North Carolina for analysis. Otherwise sample custody was limited to Mr. Moore and Mr. Russell. Mr. David Chiles and Mr. Russ Karon of Smith Engineering Company were also present.

Following is a report of the test.

1.1.2 Dryers East RTO

VOC/HCOH Emissions Test - June 16, 1994

Run No.		1	2	3	AVG.
Date		6/16/94	6/16/94	6/16/94	—
Time Start		0839	1300	1453	—
Time End		1001	1403	1620	—
Formaldehyde Emissions	#/hr	0.168	0.116	0.116	0.133
Formaldehyde Emissions	ppm	0.47	0.41	0.40	0.43
VOC Emissions	#/hr	1.11	1.02	0.84	0.99
VOC Emissions	ppm as C	7.8	9.1	7.2	8.1
Volumetric Flowrate	acfm	134941	106757	111975	117891
Volumetric Flowrate	dscfm	75557	59722	61852	65711
Velocity	ft./sec.	56.4	44.6	46.8	49.3
Stack Temperature	°F	290	278	283	284
Moisture	%	19.5	20.8	21.4	20.6
Sample Rate	% isokinetic	108	106	108	107

1.1.4 Dryers West RTO

VOC/HCOH Emissions Test - June 16, 1994

Run No.		1	2	3	AVG.
Date		6/16/94	6/16/94	6/16/94	—
Time Start		0840	1300	1455	—
Time End		1000	1406	1620	—
Formaldehyde Emissions	#/hr	0.160	0.101	0.092	0.118
Formaldehyde Emissions	ppm	0.40	0.32	0.30	0.34
VOC Emissions	#/hr	2.39	1.71	1.74	1.95
VOC Emissions	ppm as C	15.1	13.5	14.1	14.2
Volumetric Flowrate	acfm	150109	120381	119930	130140
Volumetric Flowrate	dscfm	84682	67749	65971	72801
Velocity	ft./sec.	62.7	50.3	50.1	54.4
Stack Temperature	°F	292	282	287	287
Moisture	%	18.7	19.9	21.2	19.9
Sample Rate	% isokinetic	103	105	106	105

1.1.6 Press Vent RTO

VOC/HCOH Emissions Test - June 15, 1994

Run No.		4	5	6	AVG.
Date		6/15/94	6/15/94	6/15/94	-----
Time Start		1000	1153	1332	-----
Time End		1106	1258	1450	-----
Formaldehyde Emissions	#/hr	0.033	0.030	0.028	0.030
Formaldehyde Emissions	ppm	0.06	0.06	0.05	0.06
VOC Emissions	#/hr	0.26	0.39	0.46	0.37
VOC Emissions	ppm as C	1.3	1.9	2.2	1.8
Volumetric Flowrate	acfm	155683	153732	156054	155156
Volumetric Flowrate	dscfm	111920	110086	111648	111218
Velocity	ft./sec.	64.3	63.5	64.5	64.1
Stack Temperature	°F	238	241	241	240
Moisture	%	4.3	4.3	4.3	4.3
Sample Rate	% isokinetic	101	102	102	102

1.3 Totals, Averages and Efficiency Summaries

1.3.1 Dryer Multiclone Inlets

PARAMETER	UNITS	Average of two dryers tested	Projected total of four dryers *
PARTICULATE LOADING	#/hr	25.92	103.67
VOC LOADING (as C)	#/hr	65.91	263.64 ✓
NOx LOADING	#/hr	4.14	16.54 ✓
CO LOADING	#/hr	6.03	24.12 ✓
FORMALDEHYDE LOADING	#/hr	1.38	5.52 ✓
VOLUMETRIC FLOWRATE	dscfm	27508	110030

* - Four dryer total is presented here. Attempts to operate all five dryers at maximum load were not successful. Therefore four of the dryers were operated at maximum furnish rates.

1.3.2 Dryer East and West RTO Outlets

PARAMETER	UNITS	Average of both RTO's	Total of both RTO's	Removal Efficiency
PARTICULATE EMISSIONS	#/hr	5.24	10.48	90.4
VOC EMISSIONS (as C)	#/hr	1.47	2.94	98.9
NOx EMISSIONS	#/hr	13.87	27.73	- 67.7
CO EMISSIONS	#/hr	5.02	10.04	58.4
FORMALDEHYDE EMISSIONS	#/hr	0.126	0.251	95.4
VOLUMETRIC FLOWRATE	dscfm	66456	132912	—

1.3.3 Press Vent Inlets

PARAMETER	UNITS	Average of two inlets	Total of two inlets
PARTICULATE LOADING	#/hr	4.13	8.26
VOC LOADING (as C)	#/hr	73.68	147.35
NO _x LOADING	#/hr	ND	ND
CO LOADING	#/hr	ND	ND
FORMALDEHYDE LOADING	#/hr	0.91	1.81
VOLUMETRIC FLOWRATE	dscfm	51176	102352

1.3.4 Press Vent RTO Outlet

PARAMETER	UNITS	RTO Outlet	Removal Efficiency
PARTICULATE EMISSIONS	#/hr	2.08	74.8
VOC EMISSIONS (as C)	#/hr	0.37	99.7
NO _x EMISSIONS	#/hr	7.89	—
CO EMISSIONS	#/hr	5.33	—
FORMALDEHYDE EMISSIONS	#/hr	0.030	98.3
VOLUMETRIC FLOWRATE	dscfm	110443	—

Louisiana Pacific Corporation - Hanceville, Alabama

Dryers East RTO

VOC/HCOH Emissions Test - June 16, 1994

Calculations:

		RUN 4	RUN 5	RUN 6	AVG.
1. Pm	: in.Hg (DH/13.6)+Pbar	29.7498	29.6886	29.7183	
2. Ps	: in. Hg (Pg/13.6)+Pbar	29.5581	29.5581	29.5581	
3. An	: sq ft ((Dn/24)^2)(3.1416)	3.74E-04	3.74E-04	4.12E-04	
4. Vmstd	: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	45.911	35.567	41.487	
5. Vwstd	: scf (.04707cf/ml)(Vlc)	11.109	9.367	11.273	
6. Bws	: dimensionless Vwstd/(Vwstd+Vmstd)	0.1948	0.2085	0.2137	0.2057
7. Md	: mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.3	29.296	29.3	
8. Ms	: mol.wt. wet basis Md(1-Bws)+18 Bws	27.10	26.94	26.89	
9. Vs	: ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	56.41	44.63	46.81	49.28
10. Q	: cfm Vs As(60 sec/min)	134941	106757	111975	117891
11. Qstw	: scfm Q(Ps/Pstd)(Tstd/Ts)	93839	75451	78659	82650
12. Qstd	: dscfm Qstw(1-Bws)	75557	59722	61852	65711
13. I	: percent [(100 Ts)(.002669 Vlc+(Vm Pm/Tm))/(60 theta Vs Ps An)	107.86	105.72	108.08	107.22

Formaldehyde Emissions

14. E,HCOH	: pounds/hr (M,HCOH/Vmstd)(Qstd)(60)/(453590000)	0.168	0.116	0.116	0.133
15. C,HCOH	: ppm (M,HCOH/Vmstd)(.0283)	0.47	0.41	0.40	0.43

VOC Emissions

16. C,VOC	: ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	7.8	9.1	7.2	8.1
17. E,VOC	: pounds/hr (C,VOC)(3.116e-8)(Qstd)(60)	1.11	1.02	0.84	0.99

Louisiana Pacific Corporation - Hanceville, Alabama
 Dryers West RTO
 VOC/HCOH Emissions Test - June 16, 1994

Calculations:

		RUN 4	RUN 5	RUN 6	AVG.
1. Pm	: in.Hg (DH/13.6)+Pbar	29.7713	29.7156	29.7906	
2. Ps	: in. Hg (Pg/13.6)+Pbar	29.5522	29.5522	29.5522	
3. An	: sq ft ((Dn/24)^2)(3.1416)	3.74E-04	3.74E-04	4.75E-04	
4. Vmstd	: dscf Vm Y(Pm/Pstd)(Tstd/Tm)	49.134	39.995	50.114	
5. Vwstd	: scf (.04707cf/ml)(Vlc)	11.273	9.955	13.486	
6. Bws	: dimensionless Vwstd/(Vwstd+Vmstd)	0.1866	0.1993	0.2120	0.1993
7. Md	: mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.22	29.28	29.3	
8. Ms	: mol.wt. wet basis Md(1-Bws)+18 Bws	27.13	27.03	26.90	
9. Vs	: ft/sec Kp Cp (sqrDP)sqr(Ts/(Ps Ms))	62.75	50.32	50.13	54.40
10. Q	: cfm Vs As(60 sec/min)	150109	120381	119930	130140
11. Qstw	: scfm Q(Ps/Pstd)(Tstd/Ts)	104111	84613	83723	90816
12. Qstd	: dscfm Qstw(1-Bws)	84682	67749	65971	72801
13. I	: percent [(100 Ts)(.002669 Vic+(Vm Pm/Tm))/(60 theta Vs Ps An)	103.00	104.79	106.37	104.72

Formaldehyde Emissions

14. E,HCOH	: pounds/hr (M,HCOH/Vmstd)(Qstd)(60)/(453590000)	0.160	0.101	0.092	0.118
15. C,HCOH	: ppm (M,HCOH/Vmstd)(.0283)	0.40	0.32	0.30	0.34

VOC Emissions

16. C'VOC	: ppm as Carbon, dry ((C,VOC)*3)/(1-Bws)	15.1	13.5	14.1	14.2
17. E,VOC	: pounds/hr (C'VOC)(3.116e-8)(Qstd)(60)	2.39	1.71	1.74	1.95

Louisiana Pacific Corporation - Hanceville, Alabama
 Press Vent RTO
 VOC/HCOH Emissions Test - June 15, 1994

Calculations:	RUN 4	RUN 5	RUN 6	AVG.
1. Pm : in.Hg (DH/13.6)+Pbar	29.8738	29.8703	29.8751	
2. Ps : in. Hg (Pg/13.6)+Pbar	29.7074	29.7074	29.7074	
3. An : sq ft $((Dn/24)^2 \times 3.1416)$	2.52E-04	2.52E-04	2.52E-04	
4. Vmstd : dscf $Vm Y(Pm/Pstd)(Tstd/Tm)$	42.592	42.141	42.602	
5. Vwstd : scf $(.04707cf/ml)(Vlc)$	1.906	1.883	1.930	
6. Bws : dimensionless $Vwstd/(Vwstd+Vmstd)$	0.0428	0.0428	0.0433	0.0430
7. Md : mol.wt. dry basis .44 CO2+.32 O2+.28(CO+N2)	29.012	29.012	29.016	
8. Ms : mol.wt. wet basis $Md(1-Bws)+18 Bws$	28.54	28.54	28.54	
9. Vs : ft/sec $Kp Cp (sqrDP)sqr(Ts/(Ps Ms))$	64.32	63.52	64.48	64.11
10. Q : cfm $Vs As(60 \text{ sec/min})$	155683	153732	156054	155156
11. Qstw : scfm $Q(Ps/Pstd)(Tstd/Ts)$	116929	115004	116706	116213
12. Qstd : dscfm $Qstw(1-Bws)$	111920	110086	111648	111218
13. I : percent $[(100 Ts)(.002669 Vlc + (Vm Pm/Tm))/(60 \text{ theta } Vs Ps An)$	101.49	102.08	101.76	101.77

Formaldehyde Emissions

14. E,HCOH : pounds/hr $(M,HCOH/Vmstd)(Qstd)(60)/(453590000)$	0.033	0.030	0.028	0.030
15. C,HCOH : ppm $(M,HCOH/Vmstd)(.0283)$	0.06	0.06	0.05	0.06

VOC Emissions

16. C,VOC : ppm as Carbon, dry $((C,VOC)*3)/(1-Bws)$	1.3	1.9	2.2	1.8
17. E,VOC : pounds/hr $(C,VOC)(3.116e-8)(Qstd)(60)$	0.26	0.39	0.46	0.37