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**RESULTS OF THE JUNE 20, 2017  
AIR EMISSION COMPLIANCE TESTS ON  
THE DRYER RTO AT THE  
LOUISIANA PACIFIC OSB PLANT  
SAGOLA, MICHIGAN**

Submitted to:

**LOUISIANA PACIFIC CORPORATION**  
N8504 Highway M-95  
Sagola, Michigan 49881

Attention:

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Reviewed by:

  
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Source Testing

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EJ/ej

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1 INTRODUCTION

AIR QUALITY DIVISION

On June 20, 2017 Interpoll Laboratories personnel conducted Air Emission compliance tests on the Dryer RTO at the Louisiana Pacific Corporation (LP) OSB Plant Located in Sagola, Michigan. On-site testing was performed by Chris Warneke and Ryan Schuth. Coordination between testing activities and plant operation was provided by Rich Menard of Louisiana Pacific Corp. The tests were witnessed by Jeremy Howe, a representative of the Michigan Department of Environmental Quality.

The Sagola plant operates three TSI single pass dryers fired with Model 230 FYR Coen Inner Air Heater primary burners each coupled with Duel Air Zone DAZ-24 register burners, a press and one GEKA thermal oil heater. Dryer emissions are controlled by three parallel Geoenergy WESP's and a MEGTEC two-cell RTO. Press emissions are ducted to a Huntington Environmental Systems Inc., five cell RCO prior to exhaust to the atmosphere. The Geka bark burning thermal oil heater emissions are controlled by dry ESP particulate removal system.

PM-10 sampling on the Dryer RTO Stack was conducted in accordance with EPA Method 201A (CFR Title 40, Part 51, Appendix M). An Interpoll Labs sampling train which meets or exceeds specifications in the above-cited reference was used to extract PM-10 samples by means of an Anderson PM-10 cyclone and a glass probe. The cyclone used in this work meets or exceeds the specifications of Method 201A. Velocity pressure measurements were made prior to and during, each run to determine the proper dwell times at each traverse point. Condensable particulate was collected in the back half of the Method 201A sampling train and analyzed in accordance with EPA Method 202.

Oxygen, carbon dioxide, oxides of nitrogen and carbon monoxide concentrations were determined in accordance with Methods 3A, 7E and 10, CFR Title 40, Part 60, Appendix A (revised July 1, 2016). A slip stream of sample gas was withdrawn from the exhaust gas stream using test ports (provided by the plant) on the stack using a heat-traced probe and filter assembly. After passing through the filter, the gas passed through two condenser-type moisture removal systems operating in series.

The particulate-free dry gas was then transported to the analyzers with the excess exhausted

to the atmosphere through a calibrated orifice which was used to ensure that the flow from the stack exceeds the requirements of the analyzers.

VOC concentrations were determined instrumentally in accordance with EPA Method 25A using a heated flame ionization detector (HFID) calibrated against propane in air standards. The THC concentration was continuously monitored by extracting a slipstream of exhaust gas by means of a heated probe and filter holder. A heat-traced Teflon line was used to transport the sample gas from the filter holder outlet to the analyzer inlet. The analog response of each analyzer was recorded with a computer data logger and backed up with a strip chart recorder. The O<sub>2</sub>, CO<sub>2</sub>, NO<sub>x</sub>, THC and CO analyzers were calibrated with EPA Protocol I gases. The instruments were calibrated before and after each run as per EPA Method 3A, 7E, 10 and 25A.

Formaldehyde determinations were performed using the NCASI 98.01 Method. Source gas was drawn through two midjet impingers, each containing chilled organic free water which absorbs the formaldehyde. Formaldehyde concentrations were measured by colorimetric analysis.

Testing on the Dryer RTO Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 5.5 stack diameters downstream and 5.8 stack diameters upstream of the nearest flow disturbances. A 12-point traverse was used to collect representative PM-10 samples.

The important results of the test are summarized in Section 2. Detailed results are presented in Section 3. Field data and all other supporting information are presented in the appendices.

2 SUMMARY AND DISCUSSION

The important results of the emission compliance tests are summarized on the following pages. An overview of all results is presented below:

<u>PARAMETER</u>	<u>LIMIT</u>	<u>MEASURED</u>
<b><u>DRYER RTO STACK</u></b>		
<b>PM-10</b>		
.....(GR/DSCF)	0.007	0.0017
.....(LB/HR)	10	0.74
<b>Carbon Monoxide</b>		
..... (ppm,d)	N/A	325.8
.....(LB/HR)	N/A	73.6
..... *(LB/TFP)	4.09	2.27
<b>VOC's</b>		
.....(ppmC,w)	N/A	23.6
.....(LBC/HR)	N/A	2.89
..... *(LBC/TFP)	0.34	0.089
<b>Formaldehyde</b>		
..... (ppm,d)	N/A	1.20
.....(LB/HR)	6.8	0.29
<b>NOx</b>		
..... (ppm,d)	N/A	31.4
.....(LB/HR)	N/A	11.6
..... *(LB/TFP)	0.99	0.36

\*Note- LBC/TFP (VOC) and LB/TFP (CO/NOx) Limits based on 60% softwood (permitted limit) and 40% hardwood dryer feed mix

It should be noted that because of a CO2 analyzer malfunction, Tedlar sample bags were collected and analyzed upon return to the laboratory for CO2. Results of the analysis are in Appendix D. Additionally, a few of the Carbon Monoxide 1-minute averages exceeded the gas span level (501ppm) during testing, although the average of each run did not exceed the span level. Because the CO instrument range was set at 1,000 ppm, and no CO spikes exceeded that range. The results were discussed and it was found to be acceptable to use the Method 10 instrumental data results. As a backup, the CO levels were also analyzed in the Tedlar bag samples and can be viewed in Appendix D. Since Run 3 had six one minute averages which exceeded the emission limit in terms of ppm (550ppm) the bag results from that run were incorporated and were used to

calculate the final results of the 3-run average. No other difficulties were encountered in the field by Interpoll Labs personnel or in the laboratory evaluation of the samples which were conducted by Interpoll Labs. On the basis of these facts and a complete review of the data and results, it is our opinion that the results reported herein are accurate and closely reflect the actual values which existed at the time the test was performed.

Test 1 Summary of the Results of the June 20, 2017, PM10 Emission Test on the  
on the Dryer RTO Stack at the Louisiana Pacific Corporation Facility Located in Sagola, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		06-20-17	06-20-17	06-20-17	
Time Start	(Hrs)	0830	1140	1445	
Time Finish	(Hrs)	1106	1419	1714	
Volumetric Flow					
Actual	(ACFM)	131,657	134,854	129,680	132,064
Standard	(DSCFM)	51,802	52,901	50,502	51,735
Gas Temperature	(°F)	306	313	313	311
Moisture Content	(%v/v)	39.64	39.33	39.75	40
Gas Composition (%v/v, dry)					
Carbon Dioxide		7.75	7.62	7.78	7.72
Oxygen		12.75	12.84	12.60	12.73
Nitrogen		79.50	79.54	79.62	79.55
Volume Through Gas Meter	(DSCF)	34.22	34.83	33.19	34.08
Isokinetic Variation	(%)	93.9	91.0	97.4	94.1
<b>PM10 Results (EPA Method 201A &amp; 202)</b>					
<i>Filterable-Dry Catch Only</i>					
Sample Mass (Filter & rinse)	(g)	0.0005	0.0004	0.0008	
Concentration - Actual	(GR/ACF)	0.00009	0.00007	0.00015	0.0001
Concentration - Standard	(GR/DSCF)	0.00023	0.00018	0.00037	0.00026
Emission Rate	(LB/HR)	0.100	0.080	0.161	0.11367
<i>Organic CPM</i>					
Sample Mass	(g)	0.0015	0.0012	0.0011	
Concentration - Actual	(GR/ACF)	0.00027	0.00021	0.00020	0.0002
Concentration - Standard	(GR/DSCF)	0.00068	0.00053	0.00051	0.00057
Emission Rate	(LB/HR)	0.300	0.241	0.221	0.25400
<i>Inorganic CPM</i>					
Sample Mass	(g)	0.0020	0.0020	0.0016	
Concentration - Actual	(GR/ACF)	0.00036	0.00035	0.00029	0.0003
Concentration - Standard	(GR/DSCF)	0.00090	0.00089	0.00074	0.00084
Emission Rate	(LB/HR)	0.400	0.402	0.322	0.37467
<i>PM10 (Dry + Organic + Inorganic)</i>					
Sample Mass	(g)	0.0040	0.0036	0.0035	
Concentration - Actual	(GR/ACF)	0.00071	0.00063	0.00063	0.0007
Concentration - Standard	(GR/DSCF)	0.00180	0.00160	0.00163	0.00168
Emission Rate	(LB/HR)	0.801	0.723	0.704	0.74267

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**Results of NCASI 98.01 Determinations**

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Test Number 2  
 Dryer RTO

		Run 1		Run 2		Run 3		Average
Date of Test		06-20-17		06-20-17		06-20-17		
Time of Runs								
	Start (Hrs)	0832		1140		1445		
	End (Hrs)	0932		1240		1545		
	Total (Min)	60		60		60		
Moisture Content	(%v/v)	39.6		39.3		39.7		<b>39.57</b>
Volumetric Flow Rate	(DSCFM)	51,802		52,901		50,502		<b>51,735</b>
Sample Volume	(DSL)	22.97	<b>Duplicate</b> 20.67	22.51	<b>Spike</b> 20.23	21.77	<b>Spike</b> 19.91	
Formaldehyde	(ppm,d)	1.24	1.22	1.12	5.39	1.26	5.74	<b>1.20</b>
	(LB/HR)	0.30	0.30	0.28		0.30		<b>0.29</b>
	(Result in %)		<b>1.23</b>		<b>93.67</b>		<b>96.63</b>	

Test 3 Summary of the Results of the June 20, 2017, Oxides of Nitrogen, Carbon Monoxide and VOC Emission Test on the Dryer RTO stack at the Louisiana Pacific Facility located in Sagola, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		06-20-17	06-20-17	06-20-17	
Time runs were done	(Hrs)	0832 / 0932	1140 / 1240	1445 / 1545	
Volumetric Flow					
Actual	(ACFM)	131,657	134,854	129,680	132,064
Standard	(DSCFM)	51,802	52,901	50,502	51,735
Gas Temperature	(°F)	306	313	313	311
Moisture Content	(%v/v)	39.64	39.33	39.75	39.57
Gas Composition (%v/v, dry)					
Carbon Dioxide		7.75	7.62	7.78	7.72
Oxygen		12.75	12.84	12.60	12.73
Nitrogen		79.50	79.54	79.62	79.55
<b>Results</b>					
Nox					
Concentration - ppm, wet	(ppm, w)	18.996	19.194	18.701	18.96
Concentration - ppm, dry	(ppm, d)	31.473	31.634	31.037	31.38
Emission Rate	(LB/HR)	11.68	11.99	11.23	11.63
Emission Rate	(LB/TFP)	0.360	0.370	0.347	0.36
CO					
Concentration - ppm, wet	(ppm, w)	207.875	182.911	200.959	197.25
Concentration - ppm, dry	(ppm, d)	344.403	301.462	333.520	326.46
Emission Rate	(LB/HR)	77.80	69.54	73.45	73.60
Emission Rate	(LB/TFP)	2.401	2.146	2.267	2.27
VOC					
Concentration - ppm, wet	(ppm, w)	24.599	27.571	18.552	23.57
Concentration - ppm, dry	(ppm, d)	40.76	45.44	30.79	39.00
Emission Rate	(LB/HR)	2.99	3.63	2.06	2.89
Emission Rate	(LB/TFP)	0.092	0.112	0.063	0.089
Production Rate	(Tons FP/Hr)	32.40	32.40	32.40	

\*Bag samples used to calculate final results for Run 3

### 3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Orsat (gas composition) and moisture is presented first followed by the computer printout of the PM-10 results. Preliminary measurements including test port locations are given in the appendices.

The results have been calculated on a personal computer using programs written specifically for source testing calculations. EPA-published equations have been used as the basis of the calculation techniques in these programs. The emission rates have been calculated using the product of the concentration times flow method.

### 3.1 Results of Orsat and Moisture Determinations

Test Number 1  
Dryer RTO

## Results of Gas Composition and Moisture Analyses --- Methods 3A and 4 (% v/v)

	Run 1	Run 2	Run 3
Date of Run	06-20-17	06-20-17	06-20-17
<b>Dry basis (Orsat)</b>			
Carbon Dioxide.....	7.75	7.62	7.78
Oxygen.....	12.75	12.84	12.60
Nitrogen.....	79.50	79.54	79.62
<b>Wet basis (Orsat)</b>			
Carbon Dioxide.....	4.68	4.60	4.70
Oxygen.....	7.70	7.75	7.61
Nitrogen.....	47.98	48.33	47.95
Water Vapor.....	39.64	39.33	39.75
Dry Molecular Weight.....	29.75	29.73	29.75
Wet Molecular Weight.....	25.09	25.12	25.08
Specific Gravity.....	0.867	0.868	0.866
Water Mass Flow.....	95462	96205	93473
Fo.....	1.052	1.058	1.067

Test Number 1  
 Dryer RTO

**EPA Method 201A Sampling Data**

		Run 1	Run 2	Run 3
Date of Test		06-20-17	06-20-17	06-20-17
Time of Runs	(Hrs)	0830 / 1106	1140 / 1419	1445 / 1714
Static Pressure	(In. of WC)	-0.61	-0.61	-0.61
Cross Sectional Area	(Sq. ft)	37.80	37.80	37.80
Pitot Tube Coefficient		0.84	0.84	0.84
Water in Sample Gas				
Impingers	(g)	464.6	463.8	452.4
Desiccant	(g)	12.0	15.0	12.0
Total	(g)	476.6	478.8	464.4
Gas Meter Coefficient		0.9970	0.9970	0.9970
Barometric Pressure	(In. of Hg)	28.35	28.35	28.35
Avg. Orifice Pressure Drop	(In. of WC)	0.17	0.17	0.17
Avg. Gas Meter Temperature	(°F)	63.3	63.9	63.0
Volume Through Gas Meter				
Meter Conditions	(CF)	35.88	36.57	34.79
Standard Conditions	(DSCF)	34.22	34.83	33.19
Total Sampling Time	(Min.)	153.77	158.22	147.57
Nozzle Diameter	(In.)	0.178	0.178	0.178
Avg. Stack Gas Temperature	(°F)	306	313	313
Volumetric Flow Rate				
Actual	(ACFM)	131,657	134,854	129,680
Dry Standard	(DSCFM)	51,802	52,901	50,502
PM-10 cutpoint	(um)	10.20	10.34	10.12
PM-2.5 cutpoint	(um)	2.48	2.54	2.45
Isokinetic Variation	(%)	93.9	91.0	97.4