RESULTS OF THE JANUARY 27, 2015 AIR EMISSION COMPLIANCE TEST ON THE THERMAL OIL HEATER AT THE LOUISIANA PACIFIC OSB PLANT IN SAGOLA, MICHIGAN

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1 INTRODUCTION

On January 27, 2015 Interpoll Laboratories personnel conducted Air Emission Compliance tests on the Thermal Oil Heater at the Louisiana Pacific Corporation (LP) OSB Plant located in Sagola, Michigan. On-site testing was performed by Trent Johnson, Trey Grealish and Jimmy Kingsbury. Coordination between testing activities and plant operation was provided by Hans Baij of Louisiana Pacific Corp. The tests were witnessed by a Joel Asher, 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 Thermal Oil Heater 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.

Carbon monoxide, oxides of nitrogen, oxygen and carbon dioxide concentrations were determined in accordance with Methods 3A, 7E and 10, CFR Title 40, Part 60, Appendix A (revised July 1, 2014). A slip stream of sample gas was withdrawn from the exhaust gas stream using test ports (provided by the plant) on the stack using a heat-traced probe and filter assembly.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

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_2, CO_2, NO_x, 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.

Testing on the Thermal Oil Heater Stack was conducted from two test ports oriented at 90 degrees on the stack. These test ports are located 7.58 stack diameters downstream and 5.05 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:

	LIMIT	MEASURED
THERMAL OIL HEATER STACK		
PM-10		
.....(GR/DSCF)	N/A	0.0014
.....(LB/HR)	11.55	0.17
CARBON MONOXIDE		
..... (ppm,d)	N/A	113.46
.....(LB/HR)	28.6	6.79
VOC's		
.....(ppmC,w)	N/A	3.55
.....(LBC/HR)	0.5	0.11
NOx		
..... (ppm,d)	N/A	103.2
.....(LB/HR)	16.8	10.17

No difficulties were encountered in the field by Interpoll Labs 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 January 27, 2015, PM10 Emission Test on the on the Thermal Oil Heater at the Louisiana Pacific Facility Located in Sagola, Michigan.

Item		Run 1	Run 2	Run 3	Average
Date of test		01-27-15	01-27-15	01-27-15	
Time Start	(Hrs)	0922	1138	1350	
Time Finish	(Hrs)	1110	1327	1540	
Volumetric Flow					
Actual	(ACFM)	31,405	31,039	31,307	31,250
Standard	(DSCFM)	13,564	13,566	14,145	13,758
Gas Temperature	(°F)	485	484	455	475
Moisture Content	(%v/v)	19.50	18.62	18.47	19
Gas Composition	(%v/v, dry)				
Carbon Dioxide		12.17	11.53	11.39	11.70
Oxygen		8.34	8.89	9.03	8.75
Nitrogen		79.49	79.58	79.58	79.55
Volume Though Gas Meter	(DSCF)	35.99	36.71	37.48	36.73
EPA F-Factor (Dry, O2)	(DSCF/mmBtu)	9240	9240	9240	
Isokinetic Variation	(%)	89.5	90.1	86.4	88.7
PM10 Results (EPA Method 201A & 202)					
Filterable-Dry Catch Only					
Sample Mass (Filter & rinse)	(g)	0.0001	0.0005	0.0007	
Concentration - Actual	(GR/ACF)	0.00002	0.00010	0.00014	0.0001
Concentration - Standard	(GR/DSCF)	0.00005	0.00022	0.00030	0.00019
Emission Rate	(LB/HR)	0.006	0.026	0.037	0.02300
Emission Factor	(LB/MMBTU)	0.0001	0.0005	0.0007	0.0004
Organic CPM					
Sample Mass	(g)	0.0011	0.0008	0.0007	
Concentration - Actual	(GR/ACF)	0.00020	0.00015	0.00013	0.0002
Concentration - Standard	(GR/DSCF)	0.00047	0.00034	0.00029	0.00037
Emission Rate	(LB/HR)	0.055	0.039	0.035	0.04300
Inorganic CPM					
Sample Mass	(g)	0.0015	0.0035	0.0013	
Concentration - Actual	(GR/ACF)	0.00028	0.00064	0.00024	0.0004
Concentration - Standard	(GR/DSCF)	0.00064	0.00147	0.00054	0.00088
Emission Rate	(LB/HR)	0.075	0.171	0.065	0.10367
PM10 (Dry + Organic + Inorganic)					
Sample Mass	(g)	0.0027	0.0048	0.0027	
Concentration - Actual	(GR/ACF)	0.00050	0.00089	0.00051	0.0006
Concentration - Standard	(GR/DSCF)	0.00117	0.00203	0.00113	0.00144
Emission Rate	(LB/HR)	0.136	0.236	0.136	0.16933

Test 2 Summary of the Results of the January 27, 2015, Oxides of Nitrogen, Carbon Monoxide and VOC Emission Compliance Test on the Thermal Oil Heater Stack at the Louisiana Pacific Plant located in Sagola, Michigan.

Item		Run 1	Run 2	Run 3	Average
Date of test		01-27-15	01-27-15	01-27-15	
Time runs were done	(Hrs)	0922 / 1022	1138 / 1238	1350 / 1450	
Volumetric Flow					
Actual	(ACFM)	31,402	31,036	31,304	31,247
Standard	(DSCFM)	13,571	13,573	14,152	13,765
Gas Temperature	(°F)	485	484	455	475
Moisture Content	(%v/v)	19.45	18.58	18.42	18.82
Gas Composition	(%v/v, dry)				
Carbon Dioxide		12.17	11.53	11.39	11.70
Oxygen		8.34	8.89	9.03	8.75
Nitrogen		79.49	79.58	79.58	79.55
Analytical Results					
NOx					
Concentration - ppm, wet	(ppm, w)	85.244	84.563	81.519	83.78
Concentration - ppm, dry	(ppm, d)	105.828	103.855	99.927	103.20
	(LB/MMBTU)	0.202	0.207	0.202	0.20
Emission Rate	(LB/HR)	10.287	10.097	10.129	10.17
CO					
Concentration - ppm, wet	(ppm, w)	140.188	66.244	69.319	91.92
Concentration - ppm, dry	(ppm, d)	174.039	81.356	84.972	113.46
	(LB/MMBTU)	0.202	0.099	0.104	0.14
Emission Rate	(LB/HR)	10.302	4.816	5.245	6.79
VOC Outlet (method 25a)					
Concentration - ppm, wet	(TGNM ppm, w as C)	2.74	3.62	4.30	3.55
Concentration - ppm, dry	(TGNM ppm, d as C)	3.40	4.45	5.27	4.37
Emission Rate	(LB/HR)	0.09	0.11	0.14	0.11

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

Interpoll Laboratories Report Number 15-33952
Louisiana Pacific
Sagola, Michigan

Test Number 1
Thermal Oil Heater

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

	Run 1	Run 2	Run 3
Date of Run	01-27-15	01-27-15	01-27-15
Dry basis (Orsat)			
Carbon Dioxide	12.17	11.53	11.39
Oxygen	8.34	8.89	9.03
Nitrogen	79.49	79.58	79.58
Wet basis (Orsat)			
Carbon Dioxide	9.80	9.28	9.17
Oxygen	6.71	7.16	7.27
Nitrogen	63.99	64.94	65.09
Water Vapor	19.50	18.62	18.47
Dry Molecular Weight	30.28	30.20	30.18
Wet Molecular Weight	27.89	27.93	27.93
Specific Gravity	0.963	0.965	0.965
Water Mass Flow	9220	8712	8991
Fo	1.032		

3.2 Results of PM-10 Determinations

Test Number 1
Thermal Oil Heater

EPA Method 201A Sampling Data

		Run 1	Run 2	Run 3
Date of Test		01-27-15	01-27-15	01-27-15
Time of Runs	(Hrs)	0922 / 1110	1138 / 1327	1350 / 1540
Static Pressure	(In. of WC)	-0.08	-0.08	-0.08
Cross Sectional Area	(Sq. ft)	12.31	12.31	12.31
Pitot Tube Coefficient		0.84	0.84	0.84
Water in Sample Gas				
Impingers	(g)	172.3	166.3	171.8
Desiccant	(g)	12.6	11.9	8.3
Total	(g)	184.9	178.2	180.1
Gas Meter Coefficient		0.9941	0.9941	0.9941
Barometric Pressure	(In. of Hg)	28.75	28.75	28.75
Avg. Orifice Pressure Drop	In. of WC)	0.41	0.42	0.42
Avg. Gas Meter Temperature	(°F)	77.2	81.2	82.4
Volume Through Gas Meter				
Meter Conditions	(CF)	38.29	39.35	40.27
Standard Conditions	(DSCF)	35.99	36.71	37.48
Total Sampling Time	(Min.)	104.45	105.86	108.09
Nozzle Diameter	(In.)	0.253	0.253	0.253
Avg. Stack Gas Temperature	(°F)	485	484	455
Volumetric Flow Rate				
Actual	(ACFM)	31,405	31,039	31,307
Dry Standard	(DSCFM)	13,564	13,566	14,145
PM-10 cutpoint	(um)	9.70	9.75	9.75
PM-2.5 cutpoint	(um)	2.31	2.33	2.31
Isokinetic Variation	(%)	89.5	90.1	86.4