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**RESULTS OF THE JANUARY 31, 2017
AIR EMISSION MACT COMPLIANCE TESTING
AT THE LP CORP FACILITY LOCATED
IN SAGOLA, MICHIGAN
(SRN N1315)
PERMIT #MI-ROP-N1315-2013**

Submitted to:

LOUISIANA PACIFIC CORPORATION

N8504 Highway M-95
Sagola, Michigan 49881

Attention:

Rich Menard

Reviewed by:



Kathleen Eickstadt

Source Testing Department

Report Number 17-35819(TOH)
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DVH.

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1 INTRODUCTION

On January 31, 2017, Interpoll Laboratories personnel conducted MACT Emission compliance testing 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 and Kevin Chesler. Coordination between testing activities and plant operation was provided by Rich Menard of Louisiana Pacific Corp. The tests were witnessed by Joel Asher and Robert Dickman 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 a dry ESP particulate removal system.

Hydrogen Chloride and Total Filterable Particulate Matter (PM) samples were collected using EPA Methods 1-5, 26A. A preliminary determination of the gas linear velocity profile was made before the first particulate/HCl determination to allow selection of the appropriate nozzle diameter required for isokinetic sample withdrawal. An Interpoll Labs sampling train, which meets or exceeds specifications in the above-cited reference was used to extract particulate samples by means of a heated glass-lined probe. After the samples were collected, the front half filterable particulate sample were recovered according to EPA Method 5 specifications, and the 0.1 N H₂SO₄ impinger catch was quantitatively recovered into all glass sample containers closed with teflon-lined caps. The samples were returned to the laboratory, where the Filterable PM and HCl samples were logged in and analyzed. The HCl samples were diluted and analyzed for chloride by automated ion chromatography (IC) as per EPA Method 26A. An audit sample for analysis of HCl was procured and analyzed to satisfy the requirements of the Stationary Source Audit Program (SSAP).

Mercury testing was performed using EPA Method 30B-"Determination of Total Vapor Phase Mercury Emissions from Coal Fired Combustion Sources Using Carbon Sorbent Traps." An

EPA Method 30B train was used to extract known volumes of flue gas from the stack through paired 10mm diameter dual section iodinated carbon sorbent traps. All sorbent traps used in this testing were prepared by Ohio Lumex Co. Analysis was performed by Interpoll Laboratories personnel using an Ohio Lumex Company direct thermal analyzer with Atomic Absorption Spectrometry (AAS). A spike recovery test was incorporated into the first test, and spike levels were estimated to match the level of mercury expected at the source emission limit.

Oxygen, Carbon Dioxide, and Carbon Monoxide concentrations were determined in accordance with Methods 3A and 10. A slipstream of sample gas was withdrawn from the exhaust gas stream 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. The analog response of each analyzer was recorded with a computer datalogger. The O₂, CO₂, and CO analyzers were calibrated with EPA Protocol 1 Standard gases. The instruments were calibrated before and after each run as per EPA Method 3A and 10.

A summary of all of the important results of the engineering testing is given in the following section. Supplemental information such as field data sheets, laboratory results, procedures and calculation equations are presented in the appendices.

2 SUMMARY AND DISCUSSION

The air emission results are summarized in the following tables. An overview of all results is presented below:

Table 1: Summary of the Test Results

Stack Vent No.: Emission Unit No.	Limitation Basis of Pollutant Tested	Pollutant Tested and Applicable Emission Limit	Test Result
GEKA Thermal Oil Heater (EUTOH)	Table 2(8)(b) to Subpart DDDDD of Part 63	Filterable PM 0.037 lb/MMBtu of heat input	Filterable PM 0.00008 lb/MMBtu of heat input
	Table 2(1)(b) to Subpart DDDDD of Part 63	Mercury 5.7E-06 lb/MMBtu of heat input	Mercury 6.6E-07 lbs/mmBtu
	Table 2(1)(a) to Subpart DDDDD of Part 63	HCl 2.2E-02 lb/MMBtu of heat input	HCl ≤ 8E-04 lbs/mmBtu
	Table 2(8)(a) to Subpart DDDDD of Part 63	Carbon Monoxide 1,500 ppm,dry corrected to 3% oxygen	Carbon Monoxide 271.4 ppm,dry corrected to 3% oxygen

Part 63, Subpart DDDDD, Table 2 classifications for this unit are. 1. Unit designed to burn Solid Fuel (HCl and Mercury), and 8. Stokers/Sloped Grate/others designed to burn wet biomass fuels (CO and Filterable PM).

No difficulties were encountered in the field by Interpoll Labs or in the laboratory analysis 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 January 31, 2017, Particulate Emission Compliance Test on the Thermal Oil Heater Stack at the LP facility in Sagola, Michigan

Item	Run 1	Run 2	Run 3	Average
Date of test	01-31-17	01-31-17	01-31-17	
Time (Start/Finish) (Hrs)	0845 / 1049	1130 / 1335	1420 / 1623	
Volumetric Flow				
Actual (ACFM)	33,657	33,298	33,269	33,408
Standard (SCFM)	17,213	17,029	16,958	17,067
Dry Standard (DSCFM)	14,700	14,150	14,181	14,344
Gas Temperature (°F)	508	508	511	509
Moisture Content (%v/v)	14.60	16.91	16.38	15.96
Gas Composition (%v/v, dry)				
Carbon Dioxide	8.78	9.95	9.79	9.51
Oxygen	11.65	10.45	10.53	10.88
Nitrogen	79.57	79.60	79.68	79.62
Sample Volume (dscf)	73.26	73.99	72.16	73.13
Isokinetic Variation (%)	97.5	102.3	99.5	99.8
Particulate Results-EPA Method 5				
<i>Dry Catch Only</i>				
Sample Mass (Nozzle, PW, Filter) (g)	0.0002	0.0001	0.0001	
Concentration - Actual (GR/ACF)	0.00002	0.00001	0.00001	0.00001
Concentration - Actual (MG/ACM)	0.041	0.021	0.021	0.02746
Concentration - Standard (GR/DSCF)	0.00004	0.00002	0.00002	0.00003
Emission Rate (LB/HR)	0.005	0.003	0.003	0.004
Emission Factor (LB/MMBTU)	0.00013	0.00006	0.00006	0.00008

Table 1 Summary of the January 31, 2017 Hydrogen Chloride Emission Compliance Test on the Thermal Oil Heater Stack at the LP facility in Sagola, Michigan.

Item		Run 1		Run 2		Run 3		Average	
Date of test		01-31-17		01-31-17		01-31-17			
Time runs were done	(Hrs)	0845	/	1049	1130	/	1335	1420 / 1623	
Volumetric Flow									
	Actual (ACFM)	33,657		33,298		33,269		33,408	
	Standard (DSCFM)	14,700		14,150		14,181		14,344	
Gas Temperature	(°F)	507.6		507.6		510.8		508.6	
Moisture Content	(%v/v)	14.60		16.91		16.38		15.96	
Gas Composition	(%v/v, dry)								
	Carbon Dioxide	8.78		9.95		9.79		9.5	
	Oxygen	11.65		10.45		10.53		10.9	
	Nitrogen	79.57		79.60		79.68		79.6	
Analytical Results									
<i>Hydrogen Chloride</i>									
	Analytical results (ug Cl-/sample)	<	1114.0	<	1288.0	<	1296.0	<	1232.7
	Concentration (MG/DSCM)	<	0.552	<	0.632	<	0.652	<	0.61
	Concentration (GR/DSCF)	<	0.0002	<	0.0003	<	0.0003	<	0.0003
	Concentration (ppm, dry)	<	0.36	<	0.42	<	0.43	<	0.40
	Concentration (ppm, dry @ 7%O ₂)	<	0.55	<	0.55	<	0.58	<	0.56
	Mass Rate (LB/HR)	<	0.030	<	0.03	<	0.03	<	0.03
	Emission Rate (LB/mmBtu)	<	0.0007	<	0.0008	<	0.0008	<	0.0008

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Test 2 Summary of the January 31, 2017, Carbon Monoxide Emission Test on the Thermal Oil Heater Stack at the Louisiana Pacific Facility located in Sagola, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		01-31-17	01-31-17	01-31-17	
Time runs were done	(Hrs)	8:45 / 10:49	1130 / 13:35	1420 / 16:23	
Volumetric Flow					
Actual	(ACFM)	33,656	33,297	33,268	33,407
Standard	(DSCFM)	14,700	14,150	14,181	14,344
Gas Temperature	(°F)	508	508	511	509
Moisture Content	(%v/v)	14.60	16.91	16.38	15.96
Gas Composition (%v/v, dry)					
Carbon Dioxide		8.78	9.95	9.79	9.51
Oxygen		11.65	10.45	10.53	10.87
Nitrogen		79.57	79.60	79.68	79.62
Results					
CO					
Concentration - ppm, wet	(ppm, w)	161.635	79.931	137.279	126.282
Concentration - ppm, dry	(ppm, d)	189.268	96.199	164.170	149.879
Concentration- ppm, dry @3%O2	(ppm, d)	366.244	164.732	283.295	271.424
Emission Rate	(LB/MMBTU)	0.298	0.134	0.231	0.221
Emission Rate	(LB/HR)	12.13	5.94	10.15	9.407



Test Number 3
Thermal Oil Heater

Results of Draft Method 30B Mercury Determinations

		Run 1			Run 2			Run 3			Average
Date of test		01-31-17			01-31-17			01-31-17			
Time of Runs (CDT)	Start (Hrs)	0845			1130			1420			
	End (Hrs)	1049			1336			1623			
Total Sampling Time	(Min.)	96.0			96.0			96.0			
Gas Composition	(%v/v)										
	Carbon Dioxide, d	9.39			10.16			9.94			
	Oxygen, d	11.34			10.47			10.72			
	Nitrogen	79.27			79.37			79.34			
Fuel Factor	(dscf/mmBtu)	9,600			9,600			9,600			
		<u>A</u>	<u>C</u>	<u>Avg.</u>	<u>A</u>	<u>C</u>	<u>Avg.</u>	<u>A</u>	<u>C</u>	<u>Avg.</u>	
Standard Liters Sampled		79.89	78.20		88.93	79.88		78.28	81.73		
DSCM Sampled		0.079886	0.0782		0.0889	0.0799		0.0783	0.0817		
Target Sample volume (%)		-1.06	1.06		-12.51	-1.06		0.97	-3.40		
Mercury											
Trap ID #		OL344950	OL369690		OL312261	OL387694		OL344854	OL387829		
Spike mass	(ng)	50			50			50			
Sample Mass	(ng)	40.8	89.8		45.8	95.8		38.8	94.8		
Sample Mass	(ug)	0.0408	0.0898		0.0458	0.0958		0.0388	0.0948		
Concentration	(ug/m ³)	0.511	0.51	0.51	0.52	0.57	0.54	0.50	0.55	0.52	0.53
f-factor method	(lb/mmBtu)	0.00000067	0.00000067	0.00000067	0.00000062	0.00000069	0.00000065	0.00000061	0.00000067	0.00000064	0.00000065
f-factor method	(lb/trillionBtu)	0.67	0.67	0.68	0.62	0.69	0.65	0.61	0.67	0.64	0.658
Paired train Agreement RD	(%)	-0.18			5.36			5.02			Limit 5.7 lb/Tbtu
Paired train Agreement	(Abs. diff.)	0.00			0.06			0.05			
Crec	(ug/m ³)	0.64			0.68			0.66			
Spike Recovery-R	(%)	99.72			109.32			108.57			105.87

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 particulate 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 Gas Composition and Moisture Determinations

Test Number 1
Thermal Oil Heater

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

Date of Run		Run 1 01-31-17	Run 2 01-31-17	Run 3 01-31-17
Dry basis				
Carbon Dioxide.....	(%)	8.78	9.95	9.79
Oxygen.....	(%)	11.65	10.45	10.53
Nitrogen.....	(%)	79.57	79.60	79.68
Wet basis				
Carbon Dioxide.....	(%)	7.50	8.27	8.19
Oxygen.....	(%)	9.95	8.68	8.81
Nitrogen.....	(%)	67.95	66.14	66.63
Water Vapor.....		14.60	16.91	16.38
Dry Molecular Weight.....	(g/gmole)	29.87	30.01	29.99
Wet Molecular Weight.....	(g/gmole)	28.14	27.98	28.02
Specific Gravity.....		0.972	0.966	0.968
Water Mass Flow.....	(lb/hr)	7051	8075	7788
Fo.....		1.054	1.050	1.059

3.2 EPA Method 26A (HCl and Filterable PM) Sampling Data

Test Number 1
Thermal Oil Heater

Results of EPA Method 5/202 Sampling Data

		Run 1	Run 2	Run 3
Date of Test		01-31-17	01-31-17	01-31-17
Time of Runs	(Hrs)	0845 / 1049	1130 / 1335	1420 / 1623
Static Pressure	(In. of WC)	-0.13	-0.13	-0.13
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)	249.1	303.4	285.7
Desiccant	(g)	16.5	15.9	14.0
Total	(g)	265.6	319.3	299.7
Gas Meter Coefficient		1.0033	1.0033	1.0033
Barometric Pressure	(In. of Hg)	28.05	28.05	28.05
Avg. Orifice Pressure Drop	(In. of WC)	1.54	1.59	1.52
Avg. Gas Meter Temperature	(°F)	74.1	81.7	81.2
Volume Through Gas Meter				
Meter Conditions	(CF)	78.50	80.40	78.35
Standard Conditions	(DSCF)	73.26	73.99	72.16
Total Sampling Time	(Min.)	120.00	120.00	120.00
Nozzle Diameter	(In.)	0.310	0.310	0.310
Avg. Stack Gas Temperature	(°F)	508	508	511
Volumetric Flow Rate				
Actual	(ACFM)	33,657	33,298	33,269
Dry Standard	(DSCFM)	14,700	14,150	14,181
Isokinetic Variation	(%)	97.5	102.3	99.5

3.3 EPA Method 30B Sampling and QA/QC Data

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Facility Louisiana Pacific/Sagola
 Location Sagola, MI
 Source ID Thermal Oil Heater
 Date 1/31/2017

30B QA/QC Table

	Field Spike		Paired Train		Breakthrough		Breakthrough		Sample Volume (L)		
	Recovery	Pass/Fail	Agreement	Pass/Fail	A	Pass/Fail	B	Pass/Fail	A	B	Pass/Fail
Run 1	99.72	Pass	-0.18	Pass	2.03	Pass	0.91	Pass	-1.1	1.1	Pass
Run 2	109.32	Pass	5.36	Pass	1.80	Pass	0.85	Pass	-12.5	-1.1	Pass
Run 3	108.57	Pass	5.02	Pass	2.13	Pass	0.86	Pass	0.97	-3.40	Pass
Avg.	105.87	Pass									

QA/QC Specifications/requirements

Field Spike Recovery Test: 85-115% average of three runs

Paired Train Agreement: <10% RD for concentrations > 1ug/dscm, <20% or <0.2ug/dscm absolute difference for conc < 1ug/dscm

Breakthrough: < 10% of section 1 Hg mass for Hg concentrations >1 ug/dscm; < 20% RD of section 1 Hg mass for Hg concentrations <1 ug/dscm

Sample Volume: Within +/- 20% of total volume sampled during field recovery test