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RESULTS OF THE MAY 6-7, 2020 AIR EMISSION COMPLIANCE TESTING AT THE LOUISIANA PACIFIC SIDING PLANT IN NEWBERRY, MICHIGAN

Submitted to:

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Attention:

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Source Testing

Report Number 20-38411
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KE/kce

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ABBREVIATIONS

ACFM	actual cubic feet per minute
cc (ml)	cubic centimeter (milliliter)
DSCFM	dry standard cubic foot of dry gas per minute
DSML	dry standard milliliter
DEG-F (°F)	degrees Fahrenheit
DIA.	Diameter
FT/SEC	feet per second
g	gram
GPM	gallons per minute
GR/ACF	grains per actual cubic foot
GR/DSCF	grains per dry standard cubic foot
g/dscm	grams per dry standard meter
HP	horsepower
HRS	hours
IN.	inches
IN.HG.	inches of mercury
IN.WC.	inches of water
LB	pound
LB/DSCF	pounds per dry standard cubic foot
LB/HR	pounds per hour
LB/10^6BTU	pounds per million British Thermal Units heat input
LB/MMBTU	pounds per million British Thermal Units heat input
MW	megawatt
mg/dscm	milligrams per dry standard cubic meter
ug/dscm	micrograms per dry standard cubic meter
microns (um)	micrometer
MIN.	minutes
ng	nanograms
PM	particulate matter
PPH	pounds per hour
PPM	parts per million
ppmC	parts per million carbon
ppm,d	parts per million, dry
ppm,w	parts per million, wet
ppt	parts per trillion
PSI	pounds per square inch
SQ.FT.	square feet
TPD	tons per day
ug	micrograms
v/v	percent by volume
w/w	percent by weight

Standard conditions are defined as 68 °F (20 °C) and 29.92 IN. of mercury pressure

1 INTRODUCTION

On May 6-7, 2020 Interpoll Laboratories personnel conducted Air Emission compliance testing on the Dryer RTO and Konus Thermal Oil Heater at the Louisiana Pacific Corporation (LP) OSB Plant located in Newberry, Michigan. On-site testing was performed by Scott Fjelsta, Jim Thoma, Chris Warneke, Josh Kircher and Ed Juers. Coordination between testing activities and plant operation was provided by Nick Waddell of Louisiana Pacific Corp. The tests were witnessed by Jeremy Howe and Joseph Scanlon of the State of Michigan Department of Environment, Great Lakes, and Energy.

Particulate evaluations were performed in accordance with EPA Methods 1-5, CFR Title 40, Part 60, and Appendix A (revised July 1, 2019). A preliminary determination of the gas linear velocity profile was made at each test location before the first particulate determination to allow selection of the appropriate nozzle diameter for isokinetic sample withdrawal. An Interpoll Labs sampling train, which meets or exceeds specifications in the above-cited reference was used to isokinetically extract particulate samples by means of a heated glass-lined probe. Wet catch samples were collected in the back half of the Method 5 sampling train and analyzed in accordance with EPA Method 202.

Oxygen, carbon dioxide, oxides of nitrogen, carbon monoxide and total hydrocarbon concentrations were determined in accordance with Methods 3A, 7E, 10 and 25A (Ibid). A slipstream of sample gas was withdrawn from the exhaust gas stream using a heated stainless steel probe equipped with a filter to remove interfering particulate material. The particulate-free gas was transported to the analyzers by means of a heat-traced probe and filter assembly. After passing through the filter, the gas passed through a chilled condenser-type moisture removal system. 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.

Total gaseous hydrocarbon concentrations were determined instrumentally using a VIG Model 20/2 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 datalogger. The O_2, CO_2, NOx, CO and VOC analyzers were calibrated with EPA Protocol 1 standard gases. The instrument was calibrated before and after each run.

Trace metal sampling was performed in accordance with EPA Method 29. The Multi-Metal Modified Method 5 (4M5) sampling train, described in this method, was used to isokinetically collect solid and vapor phase trace metals from the exhaust gas stream at the Stack. The aerosol or solid phase trace metal samples were collected on Pallflex^R Type 2500 QAT ultra pure filters. The vapor phase trace metals were collected in an all glass impinger train. The first and second impingers each contained 100 cc of a mixture of 5% HNO_3 and 10% H_2O_2. The recovered four-part samples were returned to the laboratory where the probe rinse, filter, nitric acid impinger catch was dissolved in acid (including the quartz filter) and analyzed for manganese by Inductively Coupled Argon Plasma Emission Spectrometry (ICP) Two field-biased blanks were collected, recovered and analyzed with the field samples.

The 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 results of the compliance tests are summarized in the following tables. An overview of all results is presented in the table below:

Table 1: Summary of the Test Results

Stack Vent No.: Emission Unit No.	Underlying Applicable Requirements	Pollutant Tested and Applicable Emission Limit	Test Result
(EUDRYERRC) Dryer System Stack P002	EUDRYERRC V Testing and Sampling R336.1202(3)	**PM/PM10** 0.020 gr/dscf 7.9 lb/hr	**PM/PM10 (No Recirc)** 0.0029 gr/dscf 1.158 lb/hr
			PM/PM10 (Recirc) 0.0035 gr/dscf 1.266 lb/hr
		CO 23.98 lb/hr	**CO (No Recirc)** 17.22 lb/hr
			CO (Recirc) 20.20 lb/hr
		NOx 14.8 lb/hr	**NOx (No Recirc)** 4.31 lb/hr
			NOx (Recirc) 4.89 lb/hr
		VOC 5.12 lb/hr	**VOC (No Recirc)** 2.63 lb Carbon/hr
			VOC (Recirc) 3.24 lb Carbon/hr
		Acetaldehyde 1.17 lb/hr	**Acetaldehyde (No Recirc)** 0.70 lb/hr
			Acetaldehyde (Recirc) 0.74 lb/hr
		Acrolein 0.195 lb/hr	**Acrolein (No Recirc)** 0.29 lb/hr
			Acrolein (Recirc) 0.31 lb/hr
		Formaldehyde 1.11 lb/hr	**Formaldehyde (No Recirc)** 1.78 lb/hr
			Formaldehyde (Recirc) 1.89 lb/hr
		Manganese 0.03 lb/hr	**Manganese (No Recirc)** $\leq$ 0.001 lb/hr
			Manganese (Recirc) $\leq$ 0.001 lb/hr

Stack Vent No.: Emission Unit No.	Underlying Applicable Requirements	Pollutant Tested and Applicable Emission Limit	Test Result
Thermal Oil Heater (EUKONUSTOH) Stack P001	**R336.1205 (3) R336.1331**	**PM/PM10** 4.3 lb/hr 0.081 lb/1,000 lb exhaust gases corrected to 50% excess air	**PM/PM10** 0.508 lb/hr 0.019 lb/1,000 lb exhaust gases corrected to 50% excess air
		CO 26.lb/hr 0.87 lb/MMBtu	**CO** 4.82 lb/hr 0.246 lb/MMBtu
		NOx 15.5 lb/hr 0.4 lb/MMBtu	**NOx** 4.08 lb/hr 0.211 lb/MMBtu
		VOC 0.77 lb/hr	**VOC** 0.04 lb carbon/hr

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 9 Summary of the May 6, 2020, PM/PM10 Emission Compliance Test on the Dryer RTO Outlet (Stack P002) at the LP Facility Located in Newberry, MI.

(No Dryer Recirculation)

Item		Run 1	Run 2	Run 3	Average
Date of test		05-06-20	05-06-20	05-06-20	
Time (Start/Finish)	(Hrs)	0850 / 0955	1042 / 1147	1216 / 1321	
Volumetric Flow					
Actual	(ACFM)	81,811	83,110	84,335	83,085
Standard	(SCFM)	59,819	60,795	61,425	60,680
Dry Standard	(DSCFM)	45,211	46,258	47,088	46,186
Gas Temperature	(°F)	246	246	249	247
Moisture Content	(%v/v)	24.42	23.91	23.34	23.89
Gas Composition	(%v/v, dry)				
Carbon Dioxide		3.50	3.26	3.15	3.30
Oxygen		17.16	17.23	17.37	17.25
Nitrogen		79.34	79.51	79.49	79.45
Sample Volume	(dscf)	51.12	52.32	53.21	52.21
Isokinetic Variation	(%)	99.2	99.2	99.1	99.2
Particulate Results-EPA Methods 5 & 202 (Dry Impinger Technique)					
Front Half Dry Catch Only (Filterable only)					
Sample Mass (Nozzle, PW, Filter)	(g)	0.0071	0.0058	0.0021	
Concentration - Actual	(GR/ACF)	0.00118	0.00095	0.00034	0.00083
Concentration - Actual	(MG/ACM)	2.709	2.179	0.778	1.88865
Concentration - Standard	(GR/DSCF)	0.00214	0.00171	0.00061	0.00149
Emission Rate	(LB/HR)	0.830	0.678	0.246	0.585
Organic CPM					
Sample Mass	(g)	0.001238462	0.000538462	0.001338462	
Concentration - Actual	(GR/ACF)	0.00021	0.00009	0.00022	0.000171
Concentration - Standard	(GR/DSCF)	0.00037	0.00016	0.00039	0.000307
Emission Rate	(LB/HR)	0.145	0.063	0.157	0.122
Inorganic CPM					
Sample Mass	(g)	0.003961538	0.004061538	0.003561538	
Concentration - Actual	(GR/ACF)	0.00066	0.00067	0.00058	0.000635
Concentration - Standard	(GR/DSCF)	0.00120	0.00120	0.00103	0.001142
Emission Rate	(LB/HR)	0.463	0.475	0.417	0.452
Total Particulate (Dry + Organic + Inorganic)					
Sample Mass	(g)	0.0123	0.0104	0.007	
Concentration - Actual	(GR/ACF)	0.00205	0.00171	0.00113	0.001630
Concentration - Standard	(GR/DSCF)	0.00371	0.00307	0.00203	0.002937
Emission Rate	(LB/HR)	1.439	1.216	0.819	1.158

Test 10 Summary of the May 6, 2020, Oxides of Nitrogen, Carbon Monoxide and VOC's Test on the RTO Outlet Duct at the LP facility located in Newberry, Michigan.

(No Dryer Recirculation)

Item		Run 1	Run 2	Run 3	Average
Date of test		05-06-20	05-06-20	05-06-20	
Time runs were done	(Hrs)	0850 / 0950	1042 / 1142	1216 / 1316	
Volumetric Flow					
Actual	(ACFM)	81,811	83,110	84,335	83,085
Standard	(SCFM)	59,819	60,795	61,425	60,680
Standard	(DSCFM)	45,211	46,258	47,088	46,186
Gas Temperature	(°F)	246	246	249	247
Moisture Content	(%v/v)	24.42	23.91	23.34	23.89
Gas Composition	(%v/v, dry)				
Carbon Dioxide		3.50	3.26	3.15	3.30
Oxygen		17.16	17.23	17.37	17.25
Nitrogen		79.34	79.51	79.49	79.45
Results:					
Oxides of Nitrogen (EPA Method 7E)					
Concentration	(ppm , d)	14.01	12.83	12.32	13.05
Emission Rate	(LB /HR)	4.54	4.25	4.15	4.31
Carbon Monoxide (EPA Method 10)					
Concentration	(ppm , d)	87.75	85.81	82.96	85.51
Emission Rate	(LB /HR)	17.30	17.31	17.03	17.22
VOC (EPA Method 25a)					
Concentration	(ppm Propane, d)	11.60	10.35	10.59	10.85
Concentration	(TGNM ppm Propane, d)	11.04	9.55	9.86	10.15
Concentration	(ppm Carbon, d)	34.81	31.06	31.77	32.55
Concentration	(TGNM ppm Carbon, d)	33.11	28.66	29.57	30.45
Emission Rate (Lb x/Hr)	(LB Carbon/HR)	2.95	2.69	2.80	2.81
Emission Rate (Lb x/Hr)	(TGNM LB Carbon/HR)	2.80	2.48	2.61	2.63
Emission Rate (Lb x/Hr)	(LB Propane/HR)	3.61	3.29	3.42	3.44
Emission Rate (Lb x/Hr)	(TGNM LB Propane/HR)	3.43	3.04	3.19	3.22

TGNM = Total Gaseous Non-methane

Results of NCASI 98.01 Determinations

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LP
Newberry, MI

Test Number 11
RTO Outlet

		Run 1		Run 2		Run 3		Average
Date of Test		05-06-20		05-06-20		05-06-20		
Time of Runs								
Start	(Hrs)	0850		1042		1216		
End	(Hrs)	0950		1142		1316		
Total	(Min)	60		60		60		
Moisture Content	(%v/v)	24.4		23.9		23.3		
Volumetric Flow Rate	(DSCFM)	45,211		46,258		47,088		
		Spike/Duplicate		**Spike/Duplicate**		**Spike/Duplicate**		
Sample Volume	(DSL)	20.46	20.17	22.25	24.22	21.54	24.74	
Acetaldehyde	(ppm,d)	1.88	3.51	2.38	3.62	2.34	3.56	**2.20**
	(ppm,d of duplicate)		1.75		2.16		2.13	
	(LB/HR)	0.58		0.76		0.76		**0.70**
	(%)		**92.71%**		**85.17%**		**85.19%**	
	(Duplicate %)		**3.51%**		**4.76%**		**4.72%**	
Acrolein	(ppm,d)	0.62	1.29	0.79	1.24	0.78	1.24	**0.73**
	(ppm,d of duplicate)		0.59		0.66		0.67	
	(LB/HR)	0.243		0.317		0.322		**0.29**
	(%)		**96.17%**		**78.29%**		**80.36%**	
	(Duplicate %)		**2.22%**		**8.76%**		**7.70%**	
Formaldehyde	(ppm,d)	6.98	9.23	9.00	10.78	8.76	10.80	**8.25**
	(ppm,d of duplicate)		6.82		8.77		8.83	
	(LB/HR)	1.48		1.95		1.93		**1.78**
	(%)		**93.27%**		**88.52%**		**103.54%**	
	(Duplicate %)		**1.18%**		**1.30%**		**0.40%**	

Table 12 Summary of the Results of the May 6, 2020 Manganese Emission Test on the Dryer RTO (Stack P002) at the LP Facility Located in Newberry, MI.

(No Dryer Recirculation)

Item			Run 1		Run 2		Run 3		Average
Date of test			05-06-20		05-06-20		05-06-20		
Time runs were done		(Hrs)	1355 / 1500		1525 / 1630		1655 / 1800		
Volumetric Flow									
	Actual	(ACFM)	86740		86651		86864		86752
	Standard	(DSCFM)	47560		46649		47529		47246
Gas Temperature		(°F)	251		253		251		252
Moisture Content		(%v/v)	23.69		24.91		23.86		24.16
Gas Composition		(%v/v, dry)							
	Carbon Dioxide		3.61		3.76		3.41		3.60
	Oxygen		17.33		17.19		17.24		17.26
	Nitrogen		79.06		79.04		79.34		79.15
Isokinetic Variation		(%)	99.7		101.3		98.8		99.9
Sample Volume		(DSCF)	46.94		46.80		46.47		
Results									
Manganese		(ug) <	8.00	<	8.00	≤	9.80		
	Concentration - Actual	(ug/DSCM) <	6.018	<	6.036	≤	7.447	≤	6.500
	Emission Rate	(LB/HR) <	0.001	<	0.001	≤	0.001	≤	0.001

"<" = BDL (Below Detection Level)-All analytical levels used to calculate emission values are less than the laboratory's detection levels.

"≤" = DLL (Detection Level Limited)- At least one but not all values used to calculated emission values are less than the laboratory's detection levels.

Test 13 Summary of the Results of the May 6, 2020, Particulate Emission Compliance Test on the Thermal Oil Heater (Stack P001) at the LP Facility Located in Newberry, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		05-06-20	05-06-20	05-06-20	
Time (Start/Finish)	(Hrs)	0955 / 1204	1250 / 1456	1535 / 1740	
Volumetric Flow					
Actual	(ACFM)	16,976	15,997	16,273	16,415
Standard	(SCFM)	11,571	10,900	11,066	11,179
Dry Standard	(DSCFM)	10,389	9,695	9,863	9,982
Gas Temperature	(°F)	297	298	299	298
Moisture Content	(%v/v)	10.22	11.05	10.87	10.71
Gas Composition	(%v/v, dry)				
Carbon Dioxide		5.48	6.35	6.40	6.08
Oxygen		14.61	14.05	13.93	14.20
Nitrogen		79.91	79.60	79.67	79.73
Sample Volume	(dscf)	59.90	56.30	56.78	57.66
Isokinetic Variation	(%)	99.9	100.6	99.7	100.1
Particulate Results-EPA Methods 5 & 202 (Dry Impinger Technique)					
Front Half Dry Catch Only (Filterable only)					
Sample Mass (Nozzle, PW, Filter)	(g)	0.0293	0.0131	0.0145	
Concentration - Actual	(GR/ACF)	0.00462	0.00218	0.00239	0.00306
Concentration - Actual	(MG/ACM)	10.568	4.979	5.465	7.00388
Concentration - Standard	(GR/DSCF)	0.00755	0.00359	0.00394	0.00503
Emission Rate	(LB/HR)	0.672	0.298	0.333	0.434
Emission Factor	(LB/MMBTU)	0.034	0.015	0.016	0.022
Organic CPM					
Sample Mass	(g)	0.0006	0.0008	0.0009	
Concentration - Actual	(GR/ACF)	0.00010	0.00014	0.00015	0.000131
Concentration - Standard	(GR/DSCF)	0.00016	0.00023	0.00025	0.000215
Emission Rate	(LB/HR)	0.015	0.019	0.021	0.018
Emission Factor	(LB/MMBTU)	0.001	0.001	0.001	0.001
Inorganic CPM					
Sample Mass	(g)	0.0032	0.0023	0.0019	
Concentration - Actual	(GR/ACF)	0.00050	0.00038	0.00031	0.000394
Concentration - Standard	(GR/DSCF)	0.00082	0.00062	0.00051	0.000648
Emission Rate	(LB/HR)	0.073	0.052	0.043	0.056
Emission Factor	(LB/MMBTU)	0.004	0.003	0.002	0.003
Total Particulate (Dry + Organic + Inorganic)					
Sample Mass	(g)	0.0331	0.0162	0.0173	
Concentration - Actual	(GR/ACF)	0.00522	0.00269	0.00285	0.003586
Concentration - Standard	(GR/DSCF)	0.00853	0.00444	0.00470	0.005889
Emission Rate	(LB/HR)	0.759	0.369	0.397	0.508
Emission Rate	(LB/1,000 LB Flue Gas Corr.to 50% excess air)	0.029	0.014	0.015	0.019
Emission Factor	(LB/MMBTU)	0.039	0.019	0.019	0.026

Test 14 Summary of the Results of the May 6, 2020, Oxides of Nitrogen, Carbon Monoxide and VOC's Test on the Thermal Oil Heater at the Louisiana Pacific Facility located in Newberry, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		05-06-20	05-06-20	05-06-20	
Time runs were done	(Hrs)	0955 / 1055	1250 / 1350	1535 / 1635	
Volumetric Flow					
Actual	(ACFM)	16,982	16,006	16,283	16,424
Standard	(SCFM)	11,576	10,906	11,072	11,185
Standard	(DSCFM)	10,393	9,701	9,869	9,988
Gas Temperature	(°F)	297	298	299	298
Moisture Content	(%v/v)	10.22	11.05	10.87	10.71
Gas Composition	(%v/v, dry)				
Carbon Dioxide		5.28	6.03	6.13	5.81
Oxygen		14.82	14.40	14.02	14.41
Nitrogen		79.90	79.57	79.85	79.77
Results:					
Oxides of Nitrogen (EPA Method 7E)					
Concentration	(ppm , d)	57.19	57.76	56.08	57.01
Emission Rate	(LB /HR)	4.26	4.01	3.96	4.08
Emission Factor	(lb/mmBTU)	0.225	0.213	0.195	0.211
Carbon Monoxide (EPA Method 10)					
Concentration	(ppm , d)	74.74	93.42	165.32	111.16
Emission Rate	(LB /HR)	3.39	3.95	7.12	4.82
Emission Factor	(lb/mmBTU)	0.179	0.210	0.350	0.246
VOC (EPA Method 25a)					
Concentration	(ppm Propane, d)	1.35	1.78	2.75	1.96
Concentration	(TGNM ppm Propane, d)	0.65	0.58	0.68	0.64
Concentration	(ppm Carbon, d)	4.05	5.35	8.24	5.88
Concentration	(TGNM ppm Carbon, d)	1.95	1.75	2.04	1.91
Emission Rate (Lb x/Hr)	(LB Carbon/HR)	0.08	0.10	0.15	0.11
Emission Rate (Lb x/Hr)	(TGNM LB Carbon/HR)	0.04	0.03	0.04	0.04
Emission Rate (Lb x/Hr)	(LB Propane/HR)	0.10	0.12	0.19	0.13
Emission Rate (Lb x/Hr)	(TGNM LB Propane/HR)	0.05	0.04	0.05	0.04

TGNM = Total Gaseous Non-methane

Test 15 Summary of the May 7, 2020, PM/PM10 Emission Compliance Test on the Dryer RTO (Stack P002) at the LP Facility Located in Newberry, MI.

(With Dryer Recirculation)

Item		Run 1	Run 2	Run 3	Average
Date of test		05-07-20	05-07-20	05-07-20	
Time (Start/Finish)	(Hrs)	0745 / 0850	0915 / 1020	1050 / 1155	
Volumetric Flow					
Actual	(ACFM)	81,801	80,302	79,803	80,636
Standard	(SCFM)	59,223	58,199	58,120	58,514
Dry Standard	(DSCFM)	42,185	41,593	42,092	41,957
Gas Temperature	(°F)	249	248	245	247
Moisture Content	(%v/v)	28.77	28.53	27.58	28.29
Gas Composition	(%v/v, dry)				
Carbon Dioxide		3.95	3.89	3.69	3.84
Oxygen		16.08	16.26	16.49	16.28
Nitrogen		79.97	79.85	79.82	79.88
Sample Volume	(dscf)	50.19	47.30	47.38	48.29
Isokinetic Variation	(%)	104.4	99.7	98.7	100.9
Particulate Results-EPA Methods 5 & 202 (Dry Impinger Technique)					
Front Half Dry Catch Only (Filterable only)					
Sample Mass (Nozzle, PW, Filter)	(g)	0.0062	0.0052	0.005	
Concentration - Actual	(GR/ACF)	0.00098	0.00088	0.00086	0.00091
Concentration - Actual	(MG/ACM)	2.249	2.009	1.966	2.07477
Concentration - Standard	(GR/DSCF)	0.00191	0.00170	0.00163	0.00174
Emission Rate	(LB/HR)	0.689	0.605	0.587	0.627
Organic CPM					
Sample Mass	(g)	0.001390323	0.001090323	0.000990323	
Concentration - Actual	(GR/ACF)	0.00022	0.00018	0.00017	0.000191
Concentration - Standard	(GR/DSCF)	0.00043	0.00036	0.00032	0.000369
Emission Rate	(LB/HR)	0.154	0.127	0.117	0.133
Inorganic CPM					
Sample Mass	(g)	0.004909677	0.004609677	0.003709677	
Concentration - Actual	(GR/ACF)	0.00078	0.00078	0.00064	0.000731
Concentration - Standard	(GR/DSCF)	0.00151	0.00150	0.00121	0.001407
Emission Rate	(LB/HR)	0.546	0.536	0.436	0.506
Total Particulate (Dry + Organic + Inorganic)					
Sample Mass	(g)	0.0125	0.0109	0.0097	
Concentration - Actual	(GR/ACF)	0.00198	0.00184	0.00167	0.001829
Concentration - Standard	(GR/DSCF)	0.00384	0.00356	0.00316	0.003519
Emission Rate	(LB/HR)	1.389	1.268	1.140	1.266

Test 16 Summary of the May 7, 2020, Oxides of Nitrogen, Carbon Monoxide and VOC's Test on the RTO Outlet Duct at the LP facility located in Newberry, Michigan.

(With Dryer Recirculation)

Item		Run 1	Run 2	Run 3	Average
Date of test		05-07-20	05-07-20	05-07-20	
Time runs were done	(Hrs)	0745 / 0845	0915 / 1015	1050 / 1150	
Volumetric Flow					
Actual	(ACFM)	81,801	80,302	79,803	80,636
Standard	(SCFM)	59,223	58,199	58,120	58,514
Standard	(DSCFM)	42,185	41,593	42,092	41,957
Gas Temperature	(°F)	249	248	245	247
Moisture Content	(%v/v)	28.77	28.53	27.58	28.29
Gas Composition	(%v/v, dry)				
Carbon Dioxide		3.95	3.89	3.69	3.84
Oxygen		16.08	16.26	16.49	16.28
Nitrogen		79.97	79.85	79.82	79.88
Results:					
Oxides of Nitrogen (EPA Method 7E)					
Concentration	(ppm , d)	17.86	16.32	14.60	16.26
Emission Rate	(LB /HR)	5.40	4.86	4.40	4.89
Carbon Monoxide (EPA Method 10)					
Concentration	(ppm , d)	114.68	116.24	100.32	110.41
Emission Rate	(LB /HR)	21.10	21.08	18.42	20.20
VOC (EPA Method 25a)					
Concentration	(ppm Propane, d)	15.77	15.57	13.73	15.03
Concentration	(TGNM ppm Propane, d)	14.47	14.40	12.43	13.77
Concentration	(ppm Carbon, d)	47.32	46.71	41.19	45.08
Concentration	(TGNM ppm Carbon, d)	43.42	43.21	37.29	41.31
Emission Rate (Lb x/Hr)	(LB Carbon/HR)	3.74	3.64	3.24	3.54
Emission Rate (Lb x/Hr)	(TGNM LB Carbon/HR)	3.43	3.36	2.94	3.24
Emission Rate (Lb x/Hr)	(LB Propane/HR)	4.57	4.45	3.97	4.33
Emission Rate (Lb x/Hr)	(TGNM LB Propane/HR)	4.20	4.12	3.60	3.97

TGNM = Total Gaseous Non-methane

Results of NCASI 98.01 Determinations

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Test Number 17
RTO Outlet

		Run 1		Run 2		Run 3		Average
Date of Test		05-07-20		05-07-20		05-07-20		
Time of Runs								
Start	(Hrs)	0745		0915		1050		
End	(Hrs)	0845		1015		1316		
Total	(Min)	60		60		60		
Moisture Content	(%v/v)	28.8		28.5		27.6		
Volumetric Flow Rate	(DSCFM)	42,185		41,593		42,092		
		Spike/Duplicate		**Spike/Duplicate**		**Spike/Duplicate**		
Sample Volume	(DSL)	20.60	19.66	20.24	21.64	24.07	24.88	
Acetaldehyde	(ppm,d)	2.73	4.41	2.69	4.23	2.33	3.59	**2.58**
	(ppm,d of duplicate)		2.54		2.54		2.12	
	(LB/HR)	0.79		0.77		0.67		**0.74**
	(%)		**89.88%**		**91.15%**		**85.65%**	
	(Duplicate %)		**3.58%**		**2.87%**		**4.76%**	
Acrolein	(ppm,d)	0.93	1.64	0.92	1.50	0.68	1.19	**0.84**
	(ppm,d of duplicate)		0.88		0.82		0.60	
	(LB/HR)	0.343		0.334		0.251		**0.31**
	(%)		**92.97%**		**85.21%**		**85.49%**	
	(Duplicate %)		**2.94%**		**5.86%**		**6.79%**	
Formaldehyde	(ppm,d)	9.58	12.20	10.04	12.30	9.24	11.24	**9.62**
	(ppm,d of duplicate)		9.56		9.91		9.16	
	(LB/HR)	1.89		1.95		1.82		**1.89**
	(%)		**99.07%**		**94.47%**		**95.93%**	
	(Duplicate %)		**0.13%**		**0.66%**		**0.46%**	

Table 18 Summary of the Results of the May 7, 2020, Manganese Emission Test on the Dryer RTO (Stack P002) at the LP Facility Located in Newberry, MI.

Item		Run 1	Run 2	Run 3	Average
Date of test		05-07-20	05-07-20	05-07-20	
Time runs were done	(Hrs)	1218 / 1323	1345 / 1450	1512 / 1617	
Volumetric Flow					
Actual	(ACFM)	80588	83764	82995	82449
Standard	(DSCFM)	42821	43567	43287	43225
Gas Temperature	(^{o}F)	247	247	247	247
Moisture Content	(%v/v)	26.81	28.39	28.18	27.79
Gas Composition	(%v/v, dry)				
Carbon Dioxide		3.84	3.94	3.88	3.89
Oxygen		16.83	16.59	16.95	16.79
Nitrogen		79.33	79.47	79.18	79.32
Isokinetic Variation	(%)	98.9	101.9	99.8	100.2
Sample Volume	(DSCF)	41.94	43.96	42.79	
Results					
Manganese	(ug)	≤ 9.20	≤ 10.80	≤ 10.90	
Concentration - Actual	(ug/DSCM)	≤ 7.746	≤ 8.675	≤ 8.995	≤ 8.472
Emission Rate	(LB/HR)	≤ 0.001240	≤ 0.001414	≤ 0.001456	≤ 0.001

"<" = BDL (Below Detection Level)-All analytical levels used to calculate emission values are less than the laboratory's detection levels.

"≤" = DLL (Detection Level Limited)- At least one but not all values used to calculated emission values are less than the laboratory's detection levels.

3 RESULTS

The results of all field and laboratory evaluations are presented in this section. Gas composition and moisture is presented first followed by the computer printout of the particulate, and trace metals sampling data. Preliminary measurements including test port locations are given in the appendices.

The results have been calculated on a personal computer using programs written in using Microsoft Excel spreadsheets 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

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Test Number 9
RTO Outlet

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

		Run 1	Run 2	Run 3
Date of Run		05-06-20	05-06-20	05-06-20
Dry basis				
Carbon Dioxide.....	(%)	3.50	3.26	3.15
Oxygen.....	(%)	17.16	17.23	17.37
Nitrogen.....	(%)	79.34	79.51	79.49
Wet basis				
Carbon Dioxide.....	(%)	2.64	2.48	2.41
Oxygen.....	(%)	12.97	13.11	13.31
Nitrogen.....	(%)	59.96	60.50	60.93
Water Vapor.....		24.42	23.91	23.34
Dry Molecular Weight.....	(g/gmole)	29.25	29.21	29.20
Wet Molecular Weight.....	(g/gmole)	26.50	26.53	26.58
Specific Gravity.....		0.915	0.916	0.918
Water Mass Flow.....	(lb/hr)	40989	40771	40211
Fo.....		1.068	1.126	1.123

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Test Number 12
RTO Outlet

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

	Run 1	Run 2	Run 3
Date of Run	05-06-20	05-06-20	05-06-20
Dry basis (Orsat)			
Carbon Dioxide	3.61	3.76	3.41
Oxygen	17.33	17.19	17.24
Nitrogen	79.06	79.04	79.34
Wet basis (Orsat)			
Carbon Dioxide	2.75	2.83	2.60
Oxygen	13.22	12.91	13.13
Nitrogen	60.33	59.35	60.41
Water Vapor	23.69	24.91	23.86
Dry Molecular Weight	29.27	29.29	29.24
Wet Molecular Weight	26.6003	26.48	26.55
Specific Gravity	0.919	0.915	0.917
Water Mass Flow	41434	43408	41782
Fo	0.990	0.984	1.072

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Test Number 13
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		05-06-20	05-06-20	05-06-20
Dry basis				
Carbon Dioxide.....	(%)	5.48	6.35	6.40
Oxygen.....	(%)	14.61	14.05	13.93
Nitrogen.....	(%)	79.91	79.60	79.67
Wet basis				
Carbon Dioxide.....	(%)	4.92	5.65	5.71
Oxygen.....	(%)	13.11	12.50	12.42
Nitrogen.....	(%)	71.75	70.80	71.01
Water Vapor.....		10.22	11.05	10.87
Dry Molecular Weight.....	(g/gmole)	29.46	29.58	29.58
Wet Molecular Weight.....	(g/gmole)	28.29	28.30	28.32
Specific Gravity.....		0.977	0.977	0.978
Water Mass Flow.....	(lb/hr)	3318	3379	3372
Fo.....		1.149	1.079	1.089

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Test Number 15
RTO Outlet

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

		Run 1	Run 2	Run 3
Date of Run		05-07-20	05-07-20	05-07-20
Dry basis				
Carbon Dioxide.....	(%)	3.95	3.89	3.69
Oxygen.....	(%)	16.08	16.26	16.49
Nitrogen.....	(%)	79.97	79.85	79.82
Wet basis				
Carbon Dioxide.....	(%)	2.81	2.78	2.67
Oxygen.....	(%)	11.46	11.62	11.95
Nitrogen.....	(%)	56.96	57.07	57.81
Water Vapor.....		28.77	28.53	27.58
Dry Molecular Weight.....	(g/gmole)	29.28	29.27	29.25
Wet Molecular Weight.....	(g/gmole)	26.03	26.06	26.15
Specific Gravity.....		0.899	0.900	0.903
Water Mass Flow.....	(lb/hr)	47805	46573	44950
Fo.....		1.219	1.193	1.194

3.2 Particulate Sampling Data

Test Numbe 9
RTO Outlet

Results of EPA Method 5/202 Sampling Data

		Run 1	Run 2	Run 3
Date of Test		05-06-20	05-06-20	05-06-20
Time of Runs	(Hrs)	0850 / 0955	1042 / 1147	1216 / 1321
Static Pressur	(In. of WC)	-0.50	-0.50	-0.50
Cross Sectional Area	(Sq. ft)	22.17	22.17	22.17
Pitot Tube Coefficient		0.84	0.84	0.84
Avg. Sq. root of Delta p		0.8976	0.9126	0.9250
Water in Sample Gas				
Impingers	(g)	328.9	333.0	328.5
Desiccant	(g)	21.4	15.7	15.1
Total	(g)	350.3	348.7	343.6
Gas Meter Coefficient		1.0065	1.0065	1.0065
Barometric Pressure	(In. of Hg)	29.29	29.29	29.29
Avg. Orifice Pressure Drop	(In. of WC)	2.17	2.28	2.37
Avg. Gas Meter Temperature	(°F)	66.3	69.0	72.7
Volume Through Gas Meter				
Meter Conditions	(CF)	51.45	52.92	54.18
Standard Conditions	(DSCF)	51.12	52.32	53.21
Total Sampling Time	(Min.)	64.00	64.00	64.00
Nozzle Diameter	(In.)	0.269	0.269	0.269
Avg. Stack Gas Temperature	(°F)	246	246	249
Volumetric Flow Rate				
Actual	(ACFM)	81,811	83,110	84,335
Dry Standard	(DSCFM)	45,211	46,258	47,088
Isokinetic Variation	(%)	99.2	99.2	99.1

Test Numbe 13
Thermal Oil Heater

Results of EPA Method 5/202 Sampling Data

		Run 1	Run 2	Run 3
Date of Test		05-06-20	05-06-20	05-06-20
Time of Runs	(Hrs)	0955 / 1204	1250 / 1456	1535 / 1740
Static Pressur	(In. of WC)	-0.10	-0.10	-0.10
Cross Sectional Area	(Sq. ft)	19.63	19.63	19.63
Pitot Tube Coefficient		0.84	0.84	0.84
Avg. Sq. root of Delta p		0.209756992	0.197650871	0.200945578
Water in Sample Gas				
Impingers	(g)	133.6	138.4	137.8
Desiccant	(g)	11.0	10.0	9.0
Total	(g)	144.6	148.4	146.8
Gas Meter Coefficient		0.9959	0.9959	0.9959
Barometric Pressure	(In. of Hg)	29.26	29.26	29.26
Avg. Orifice Pressure Drop	(In. of WC)	0.87	0.78	0.80
Avg. Gas Meter Temperature	(°F)	71.5	75.7	80.5
Volume Through Gas Meter				
Meter Conditions	(CF)	61.81	58.56	59.58
Standard Conditions	(DSCF)	59.90	56.30	56.78
Total Sampling Time	(Min.)	120.00	120.00	120.00
Nozzle Diameter	(In.)	0.416	0.416	0.416
Avg. Stack Gas Temperature	(°F)	297	298	299
Volumetric Flow Rate				
Actual	(ACFM)	16,976	15,997	16,273
Dry Standard	(DSCFM)	10,389	9,695	9,863
Isokinetic Variation	(%)	99.9	100.6	99.7

Test Numbe 15
RTO Outlet

Results of EPA Method 5/202 Sampling Data

		Run 1	Run 2	Run 3
Date of Test		05-07-20	05-07-20	05-07-20
Time of Runs	(Hrs)	0745 / 0850	0915 / 1020	1050 / 1155
Static Pressur	(In. of WC)	-0.50	-0.50	-0.50
Cross Sectional Area	(Sq. ft)	22.17	22.17	22.17
Pitot Tube Coefficient		0.84	0.84	0.84
Avg. Sq. root of Delta p		0.8851	0.8698	0.8680
Water in Sample Gas				
Impingers	(g)	412.3	387.7	369.2
Desiccant	(g)	17.6	12.8	13.4
Total	(g)	429.9	400.5	382.6
Gas Meter Coefficient		1.0065	1.0065	1.0065
Barometric Pressure	(In. of Hg)	29.12	29.12	29.12
Avg. Orifice Pressure Drop	(In. of WC)	2.13	1.87	1.88
Avg. Gas Meter Temperature	(°F)	73.5	69.6	69.0
Volume Through Gas Meter				
Meter Conditions	(CF)	51.51	48.22	48.25
Standard Conditions	(DSCF)	50.19	47.30	47.38
Total Sampling Time	(Min.)	64.00	64.00	64.00
Nozzle Diameter	(In.)	0.269	0.269	0.269
Avg. Stack Gas Temperature	(°F)	249	248	245
Volumetric Flow Rate				
Actual	(ACFM)	81,801	80,302	79,803
Dry Standard	(DSCFM)	42,185	41,593	42,092
Isokinetic Variation	(%)	104.4	99.7	98.7