

Date: 8/18/2022

**To:** File/Julia DeGagné

**From:** Thomas Rhodes

**Subject:** Source Test Review Report  
Covanta Marion, Inc.  
Permit No. 24-5398-TV-01

Test Dates: March 9-11, 2022  
Report Received: May 9, 2022  
Revised Report Received: July 5, 2022  
Source Tester: Montrose Air Quality  
DEQ Observed: Yes

**I) Source Description:** Covanta Marion, Inc. (CMI) owns and operates a Solid Waste-to-Energy Facility (Facility) in Brooks, Oregon. The primary objective of the CMI Facility is to provide for the disposal of solid waste. In order to achieve this primary objective the Facility receives, stores, and combusts solid waste as defined in Oregon Revised Statutes (ORS) 459.005 and the Facility's Solid Waste Permit. The combustible fraction of the solid waste is utilized to produce steam, which is in turn utilized in a turbine generator to produce electricity which is sold to the local utility. The Facility operates 24 hours per day, 365 days per year, except for periods of scheduled and unscheduled maintenance.

Additionally, CMI is authorized under the Solid Waste Permit to accept for disposal the following: a) cannery wastes; b) conditionally exempt small quantity generator hazardous wastes; c) narcotics, illicit drugs, and equipment and other materials used in the production of illicit drugs; d) pharmaceutical wastes such as prescription and over-the-counter drugs, and DEA-controlled substances; and e) infectious wastes.

**II) Process (es)/Emissions Unit(s) Tested:** Testing was conducted on the Unit 1 and Unit 2 combustors. Target operating parameters for the test were:

Minimum steam load	≥ 67 thousand pounds/hour (klbs/hr)
Minimum rate of Regulated Medical Waste (RMW)	1.5 tons/hour
Minimum rate of Liquid Direct Injection (LDI)	180 gallons/hour (gal/hr)

**III) Test Purpose:** To evaluate emissions of Toxic Air Contaminants (TACs) at a maximum steam production rate.

**IV) Testing Locations:**

**Unit 1 Stack:**

Diameter:	48"
Distance A (Method 1):	1440" (30 Diameters)
Distance B (Method 1):	1200" (25 Diameters)
Number traverse points utilized:	12

**Unit 2 Stack:**

Diameter:	48"
Distance A (Method 1):	1440" (30 Diameters)
Distance B (Method 1):	1200" (25 Diameters)
Number traverse points utilized:	12

**V) Testing Methodology:** The following testing methods were utilized during the testing program:

Exhaust Gas Flow Rate: EPA Methods 1-4  
Hydrogen Halides and Halogens: EPA Method 26A  
Dioxins and Furans (D/F): EPA Method 23  
Polychlorinated Biphenyls (PCBs): EPA Method 23  
Chlorophenols and Chlorobenzenes: EPA SW-846 Method 0023A  
Polycyclic Aromatic Hydrocarbons (PAHs): CARB Method 429  
Multi Metals: EPA Method 29  
Hexavalent Chromium: EPA SW-846 Method 0061

**VI) Summary of Results:** The test results and operating parameters are summarized in the Tables below:

Table 1: Hydrogen Halide and Halogen Emissions  
Table 2: Dioxin and Furan Emissions  
Table 3: PCB Emissions  
Table 4: Chlorophenol and Chlorobenzene Emissions  
Table 5: PAH Emissions  
Table 6: Multi Metal Emissions  
Table 7: Hexavalent Chromium Emissions

**TABLE 1: Hydrogen Halide and Halogen Emissions**

Parameter	Run 1	Run 2	Run 3	Average
Date	3/9/2022	3/9/2022	3/9/2022	--
Test Times	10:03-12:08	13:50-15:55	17:30-19:45	--
Steam Load (klbs/hr)	68.3	68.6	66.5	<b>67.8</b>
Lime flow (lbs/hr)	254	255	254	<b>254</b>
RMW (tons/hr)	1.3	2.0	1.4	<b>1.5</b>
RMW (% of total fuel)	13	20	16	<b>16.3</b>
LDI Rate (gals/hr)	210	198	198	<b>202</b>
Exhaust Gas Temperature (°F)	234	234	235	<b>234</b>
Exhaust Gas Moisture (%)	14.2	14.8	14.7	<b>14.6</b>
Exhaust O <sub>2</sub> (% dry vol)	12.7	12.0	12.1	<b>12.3</b>
Exhaust CO <sub>2</sub> (% dry vol)	6.8	7.3	7.2	<b>7.1</b>
Exhaust Gas Flow Rate (dscf/m)	44,027	43,227	43,764	<b>43,673</b>
Sample Volume (dscf)	80.148	78.111	79.709	<b>79.323</b>
<b>HCl Emissions:</b>	--	--	--	--
· ug/dscm	7163.5	7283.8	8075.6	<b>7507.6</b>
· ppmv	4.7	4.8	5.3	<b>4.9</b>
· lb/hr	1.18	1.18	1.32	<b>1.23</b>
· lb/1000 lb steam	1.73E-02	1.72E-02	1.98E-02	<b>1.81E-02</b>
<b>HBr Emissions:</b>	--	--	--	--
· ug/dscm	175.8	189.9	155.9	<b>173.9</b>
· ppmv	0.052	0.056	0.046	<b>0.052</b>
· lb/hr	2.89E-02	3.07E-02	2.55E-02	<b>2.84E-02</b>
· lb/1000 lb steam	4.24E-04	4.47E-04	3.82E-04	<b>4.18E-04</b>
<b>HF Emissions:</b>	--	--	--	--
· ug/dscm	< 11.0	< 10.8	< 11.5	<b>&lt; 10.9</b>
· ppmv	< 0.013	< 0.013	< 0.014	<b>&lt; 0.013</b>
· lb/hr	< 1.81E-03	< 1.75E-03	< 1.88E-03	<b>&lt; 1.78E-03</b>
· lb/1000 lb steam	< 2.65E-05	< 2.54E-05	< 2.83E-05	<b>&lt; 2.60E-05</b>
<b>Cl<sub>2</sub> Emissions:</b>	--	--	--	--
· ug/dscm	< 123.4	< 115.3	< 128.5	<b>&lt; 122.4</b>
· ppmv	< 0.042	< 0.039	< 0.043	<b>&lt; 0.041</b>
· lb/hr	< 2.03E-02	< 1.86E-02	< 2.10E-02	<b>&lt; 2.00E-02</b>
· lb/1000 lb steam	< 2.97E-04	< 2.72E-04	< 3.15E-04	<b>&lt; 2.95E-04</b>
<b>Br<sub>2</sub> Emissions:</b>	--	--	--	--
· ug/dscm	< 123.4	< 115.3	< 128.5	<b>&lt; 122.4</b>
· ppmv	< 0.019	< 0.017	< 0.019	<b>&lt; 0.018</b>
· lb/hr	< 2.03E-02	< 1.86E-02	< 2.10E-02	<b>&lt; 2.00E-02</b>
· lb/1000 lb steam	< 2.97E-04	< 2.72E-04	< 3.15E-04	<b>&lt; 2.95E-04</b>

'<' denotes results calculated using the MDL for results that were non-detect

**TABLE 2: Dioxin and Furan Emissions**

Parameters	Run 1	Run 2	Run 3	Average
Test Date	3/10/2022	3/11/2022	3/11/2022	--
Test Times	13:43-18:18	8:35-12:40	13:42-17:47	--
Steam Load (klbs/hr)	67.7	67.7	68.3	<b>67.9</b>
Baghouse Inlet Temperature (°F)	304	304	304	<b>304</b>
Carbon Feed (lbs/hr)	9.8	9.5	9.8	<b>9.7</b>
RMW (tons/hr)	1.3	2.1	1.0	<b>1.5</b>
RMW (% of total fuel)	16	23	10	<b>16.3</b>
LDI Rate (gals/hr)	174	192	186	<b>184</b>
Exhaust Gas Temperature (°F)	272	274	274	<b>273</b>
Exhaust Gas Moisture (%)	14.9	14.6	17.4	<b>15.7</b>
Exhaust O <sub>2</sub> (% dry vol)	11.6	11.5	10.5	<b>11.2</b>
Exhaust CO <sub>2</sub> (% dry vol)	7.7	7.9	8.7	<b>8.1</b>
Exhaust Gas Flow Rate (dscf/min)	42,641	41,898	41,110	<b>41,883</b>
Sample Volume (dscf)	129.103	148.065	129.661	<b>135.610</b>
<b>2,3,7,8-TCDD Emissions:</b>	--	--	--	--
· ng/dscm	< 9.87E-04	< 1.13E-03	< 1.03E-03	<b>&lt; 1.05E-03</b>
· lb/hr	< 1.57E-10	< 1.77E-10	< 1.58E-10	<b>&lt; 1.64E-10</b>
<b>1,2,3,7,8-PeCDD Emissions:</b>	--	--	--	--
· ng/dscm	< 1.03E-03	< 1.58E-03	< 1.85E-03	<b>&lt; 1.48E-03</b>
· lb/hr	< 1.64E-10	< 2.47E-10	< 2.84E-10	<b>&lt; 2.32E-10</b>
<b>1,2,3,4,7,8-HxCDD Emissions:</b>	--	--	--	--
· ng/dscm	< 9.96E-04	< 1.49E-03	< 2.45E-03	<b>&lt; 1.65E-03</b>
· lb/hr	< 1.59E-10	< 2.33E-10	< 3.77E-10	<b>&lt; 2.56E-10</b>
<b>1,2,3,6,7,8-HxCDD Emissions:</b>	--	--	--	--
· ng/dscm	3.53E-03	3.48E-03	4.47E-03	<b>3.83E-03</b>
· lb/hr	5.62E-10	5.45E-10	6.86E-10	<b>5.98E-10</b>
<b>1,2,3,7,8,9 HxCDD Emissions:</b>	--	--	--	--
· ng/dscm	< 1.66E-03	2.67E-03	< 2.42E-03	<b>&lt; 2.25E-03</b>
· lb/hr	< 2.65E-10	4.18E-10	< 3.72E-10	<b>&lt; 3.52E-10</b>
<b>1,2,3,4,6,7,8-HpCDD Emissions:</b>	--	--	--	--
· ng/dscm	2.32E-02	2.46E-02	2.69E-02	<b>2.49E-02</b>
· lb/hr	3.70E-09	3.85E-09	4.13E-09	<b>3.89E-09</b>
<b>OCDD Emissions:</b>	--	--	--	--
· ng/dscm	3.45E-02	3.22E-02	3.02E-02	<b>3.23E-02</b>
· lb/hr	5.49E-09	5.04E-09	4.65E-09	<b>5.06E-09</b>

'<' denotes results calculated using the EDL or EMPC for results that were non-detect.

**TABLE 2 continued: Dioxin and Furan Emissions**

Parameters	Run 1	Run 2	Run 3	Average
<b>2,3,7,8-TCDF Emissions:</b>	--	--	--	--
· ng/dscm	4.70E-03	2.29E-03	< 2.35E-03	<b>&lt; 3.11E-03</b>
· lb/hr	7.50E-10	3.59E-10	< 3.61E-10	<b>&lt; 4.90E-10</b>
<b>1,2,3,7,8-PeCDF Emissions:</b>	--	--	--	--
· ng/dscm	< 2.69E-03	< 3.12E-03	4.41E-03	<b>&lt; 3.41E-03</b>
· lb/hr	< 4.29E-10	< 4.89E-10	6.78E-10	<b>&lt; 5.32E-10</b>
<b>2,3,4,7,8-PeCDF Emissions:</b>	--	--	--	--
· ng/dscm	5.22E-03	5.15E-03	4.96E-03	<b>5.11E-03</b>
· lb/hr	8.33E-10	8.07E-10	7.62E-10	<b>8.00E-10</b>
<b>1,2,3,4,7,8-HxCDF Emissions:</b>	--	--	--	--
· ng/dscm	< 3.56E-03	4.15E-03	4.36E-03	<b>&lt; 4.02E-03</b>
· lb/hr	< 5.67E-10	6.50E-10	6.70E-10	<b>&lt; 6.29E-10</b>
<b>1,2,3,6,7,8-HxCDF Emissions:</b>	--	--	--	--
· ng/dscm	4.81E-03	4.44E-03	5.17E-03	<b>4.81E-03</b>
· lb/hr	7.67E-10	6.95E-10	7.95E-10	<b>7.52E-10</b>
<b>2,3,4,6,7,8-HxCDF Emissions:</b>	--	--	--	--
· ng/dscm	4.05E-03	< 2.32E-03	4.82E-03	<b>&lt; 3.73E-03</b>
· lb/hr	6.45E-10	< 3.63E-10	7.41E-10	<b>&lt; 5.83E-10</b>
<b>1,2,3,7,8,9 HxCDF Emissions:</b>	--	--	--	--
· ng/dscm	< 1.63E-03	1.19E-03	< 1.39E-03	<b>&lt; 1.40E-03</b>
· lb/hr	< 2.60E-10	1.87E-10	< 2.13E-10	<b>&lt; 2.20E-10</b>
<b>1,2,3,4,6,7,8-HpCDF Emissions:</b>	--	--	--	--
· ng/dscm	1.34E-02	1.34E-02	1.39E-02	<b>1.36E-02</b>
· lb/hr	2.14E-09	2.10E-09	2.13E-09	<b>2.12E-09</b>
<b>1,2,3,4,7,8,9-HpCDF Emissions:</b>	--	--	--	--
· ng/dscm	2.25E-03	< 1.49E-03	2.42E-03	<b>&lt; 2.05E-03</b>
· lb/hr	3.59E-10	< 2.33E-10	3.71E-10	<b>&lt; 3.21E-10</b>
<b>OCDF Emissions:</b>	--	--	--	--
· ng/dscm	4.35E-03	< 5.56E-03	4.55E-03	<b>&lt; 4.82E-03</b>
· lb/hr	6.93E-10	< 8.70E-10	6.99E-10	<b>&lt; 7.54E-10</b>

'<' denotes results calculated using the EDL or EMPC for results that were non-detect.

**TABLE 3: PCB Emissions**

Parameters	Run 1	Run 2	Run 3	Average
<b>PCB-5/8 Emissions:</b>	--	--	--	--
· ng/dscm	3.34E-01	8.63E-01	9.23E-02	<b>4.30E-01</b>
· lb/hr	5.32E-08	1.35E-07	1.42E-08	<b>6.75E-08</b>
<b>PCB-18 Emissions:</b>	--	--	--	--
· ng/dscm	2.28E-01	6.01E-01	5.91E-02	<b>2.96E-01</b>
· lb/hr	3.64E-08	9.41E-08	9.08E-09	<b>4.65E-08</b>
<b>PCB-28 Emissions:</b>	--	--	--	--
· ng/dscm	1.81E-01	2.21E-01	4.33E-02	<b>1.48E-01</b>
· lb/hr	2.88E-08	3.46E-08	6.65E-09	<b>2.34E-08</b>
<b>PCB-44 Emissions:</b>	--	--	--	--
· ng/dscm	1.01E-01	9.11E-02	< 2.72E-02	<b>&lt; 7.32E-02</b>
· lb/hr	1.61E-08	1.43E-08	< 4.18E-09	<b>&lt; 1.15E-08</b>
<b>PCB-52/69 Emissions:</b>	--	--	--	--
· ng/dscm	9.71E-02	1.05E-01	3.46E-02	<b>7.90E-02</b>
· lb/hr	1.55E-08	1.65E-08	5.32E-09	<b>1.24E-08</b>
<b>PCB-66/76 Emissions:</b>	--	--	--	--
· ng/dscm	4.95E-02	4.39E-02	2.28E-02	<b>3.87E-02</b>
· lb/hr	7.89E-09	6.87E-09	3.51E-09	<b>6.09E-09</b>
<b>PCB-77 Emissions:</b>	--	--	--	--
· ng/dscm	1.25E-02	1.91E-02	< 7.22E-03	<b>&lt; 1.29E-02</b>
· lb/hr	1.99E-09	2.99E-09	< 1.11E-09	<b>&lt; 2.03E-09</b>
<b>PCB-81 Emissions:</b>	--	--	--	--
· ng/dscm	< 2.45E-03	< 1.94E-03	< 2.47E-03	<b>&lt; 2.29E-03</b>
· lb/hr	< 3.90E-10	< 3.04E-10	< 3.80E-10	<b>&lt; 3.58E-10</b>
<b>PCB-90/101 Emissions:</b>	--	--	--	--
· ng/dscm	8.42E-02	5.65E-02	2.59E-21	<b>5.56E-02</b>
· lb/hr	1.34E-08	8.85E-09	3.98E-09	<b>8.75E-09</b>
<b>PCB-105 Emissions:</b>	--	--	--	--
· ng/dscm	3.01E-02	1.35E-02	9.31E-03	<b>1.76E-02</b>
· lb/hr	4.80E-09	2.12E-09	1.43E-09	<b>2.78E-09</b>
<b>PCB-114 Emissions:</b>	--	--	--	--
· ng/dscm	< 6.45E-03	< 3.36E-03	< 2.22E-03	<b>&lt; 4.01E-03</b>
· lb/hr	< 1.03E-09	< 5.27E-10	< 3.42E-10	<b>&lt; 6.32E-10</b>
<b>PCB-106/118 Emissions:</b>	--	--	--	--
· ng/dscm	6.37E-02	3.82E-02	1.97E-02	<b>4.05E-02</b>
· lb/hr	1.02E-08	5.98E-09	3.03E-09	<b>6.39E-09</b>
<b>PCB-123 Emissions:</b>	--	--	--	--
· ng/dscm	< 3.15E-03	< 2.27E-03	< 1.92E-03	<b>&lt; 2.44E-03</b>
· lb/hr	< 5.01E-10	< 3.55E-10	< 2.95E-10	<b>&lt; 3.84E-10</b>

'<' denotes results calculated using the EDL or EMPC for each sample fraction that was non-detect

**TABLE 3 continued: PCB Emissions**

<b>Parameters</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>	<b>Average</b>
<b>PCB-126 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 6.51E-03	< 3.34E-03	< 2.23E-03	< <b>4.03E-03</b>
• <b>lb/hr</b>	< 1.04E-09	< 5.23E-10	< 3.42E-10	< <b>6.34E-10</b>
<b>PCB-128/162 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	1.33E-02	7.01E-03	< 5.58E-03	< <b>8.65E-03</b>
• <b>lb/hr</b>	2.13E-09	1.10E-09	< 8.58E-10	< <b>1.36E-09</b>
<b>PCB-138/163/164 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	5.91E-02	2.72E-02	2.08E-02	<b>3.57E-02</b>
• <b>lb/hr</b>	9.42E-09	4.26E-09	3.19E-09	<b>5.62E-09</b>
<b>PCB-153 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 5.01E-02	< 1.96E-02	1.69E-02	< <b>2.88E-02</b>
• <b>lb/hr</b>	< 7.98E-09	< 3.06E-09	2.60E-09	< <b>4.55E-09</b>
<b>PCB-156 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 2.79E-03	3.70E-03	< 2.05E-03	< <b>2.85E-03</b>
• <b>lb/hr</b>	< 4.45E-10	5.79E-10	< 3.15E-10	< <b>4.46E-10</b>
<b>PCB-157 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 3.17E-03	< 1.66E-03	< 2.21E-03	< <b>2.35E-03</b>
• <b>lb/hr</b>	< 5.06E-10	< 2.59E-10	< 3.39E-10	< <b>3.68E-10</b>
<b>PCB-167 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 2.90E-03	< 1.49E-03	< 2.15E-03	< <b>2.18E-03</b>
• <b>lb/hr</b>	< 4.62E-10	< 2.33E-10	< 3.30E-10	< <b>3.42E-10</b>
<b>PCB-169 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 3.06E-03	< 1.52E-03	< 2.12E-03	< <b>2.24E-03</b>
• <b>lb/hr</b>	< 4.88E-10	< 2.38E-10	< 3.26E-10	< <b>3.51E-10</b>
<b>PCB-170 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 5.44E-03	< 2.03E-02	< 2.58E-03	< <b>9.44E-03</b>
• <b>lb/hr</b>	< 8.68E-10	< 3.18E-09	< 3.96E-10	< <b>1.48E-09</b>
<b>PCB-180 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	1.70E-02	< 7.04E-03	1.17E-02	< <b>1.19E-02</b>
• <b>lb/hr</b>	2.70E-09	< 1.10E-09	1.80E-09	< <b>1.87E-09</b>
<b>PCB-182/187 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	1.52E-02	< 5.22E-03	< 5.26E-03	< <b>8.56E-03</b>
• <b>lb/hr</b>	2.42E-09	< 8.18E-10	< 8.08E-10	< <b>1.35E-09</b>
<b>PCB-189 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 4.21E-03	< 1.72E-03	< 1.52E-03	< <b>2.49E-03</b>
• <b>lb/hr</b>	< 6.71E-10	< 2.70E-10	< 2.34E-10	< <b>3.92E-10</b>
<b>PCB-195 Emissions:</b>	--	--	--	--
• <b>ng/dscm</b>	< 7.77E-03	4.41E-03	< 3.76E-03	< <b>5.31E-03</b>
• <b>lb/hr</b>	< 1.24E-09	6.91E-10	< 5.78E-10	< <b>8.36E-10</b>

'<' denotes results calculated using the EDL or EMPC for results that were non-detect.

**TABLE 3 continued: PCB Emissions**

<b>Parameters</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>	<b>Average</b>
<b>PCB-206 Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 2.60E-02	1.79E-02	2.45E-02	<b>&lt; 2.28E-02</b>
· <b>lb/hr</b>	< 4.15E-09	2.80E-09	3.76E-09	<b>&lt; 3.57E-09</b>
<b>PCB-209 Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	5.66E-02	4.29E-02	5.83E-02	<b>5.26E-02</b>
· <b>lb/hr</b>	9.02E-09	6.72E-09	8.96E-09	<b>8.23E-09</b>
<b>Total PCB Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	3.88E+00	5.70E+00	1.09E+00	<b>3.56E+00</b>
· <b>lb/hr</b>	6.19E-07	8.93E-07	1.67E-07	<b>5.60E-07</b>

'<' denotes results calculated using the EDL or EMPC for results that were non-detect.



**TABLE 4: Chlorophenol and Chlorobenzene Emissions**

Parameters	Run 1	Run 2	Average
Test Date	3/10/2022	3/11/2022	--
Test Times	13:30-18:28	10:05-15:46	--
Steam Load (klbs/hour)	64.5	63.2	<b>63.9</b>
RMW (tons/hr)	1.8	1.1	<b>1.5</b>
RMW (% of total fuel)	18	12	<b>15</b>
LDI Rate (gals/hr)	186	192	<b>189</b>
Exhaust Gas Temperature (°F)	227	235	<b>231</b>
Exhaust Gas Moisture (%)	15.0	14.6	<b>14.8</b>
Exhaust O <sub>2</sub> (% dry vol)	12.9	11.4	<b>12.2</b>
Exhaust CO <sub>2</sub> (% dry vol)	6.7	7.6	<b>7.1</b>
Exhaust Gas Flow Rate (dscf/min)	43,329	42,326	<b>42,827</b>
Sample Volume (dscf)	124.294	128.367	<b>126.280</b>
<b>2-Chlorophenol Emissions:</b>	--	--	--
• ng/dscm	< 3.01E+01	< 2.92E+01	< <b>2.96E+01</b>
• lb/hr	< 4.88E-06	< 4.62E-06	< <b>4.75E-06</b>
<b>1,3-Dichlorobenzene Emissions:</b>	--	--	--
• ng/dscm	< 4.03E+01	3.94E+01	< <b>3.99E+01</b>
• lb/hr	< 6.53E-06	6.23E-06	< <b>6.38E-06</b>
<b>1,4-Dichlorobenzene Emissions:</b>	--	--	--
• ng/dscm	< 6.68E+01	< 6.47E+01	< <b>6.57E+01</b>
• lb/hr	< 1.08E-05	< 1.02E-05	< <b>1.05E-05</b>
<b>1,2-Dichlorobenzene Emissions:</b>	--	--	--
• ng/dscm	< 7.61E+01	< 7.38E+01	< <b>7.50E+01</b>
• lb/hr	< 1.23E-05	< 1.17E-05	< <b>1.20E-05</b>
<b>2,4-Dichlorophenol Emissions:</b>	--	--	--
• ng/dscm	< 5.94E+01	< 5.75E+01	< <b>5.85E+01</b>
• lb/hr	< 9.62E-06	< 9.10E-06	< <b>9.36E-06</b>
<b>1,2,4-Trichlorobenzene Emissions:</b>	--	--	--
• ng/dscm	< 5.11E+01	< 4.96E+01	< <b>5.03E+01</b>
• lb/hr	< 8.28E-06	< 7.84E-06	< <b>8.06E-06</b>
<b>2,4,6-Trichlorophenol Emissions:</b>	--	--	--
• ng/dscm	< 5.99E+01	6.47E+01	< <b>6.23E+01</b>
• lb/hr	< 9.71E-06	1.02E-05	< <b>9.97E-06</b>
<b>2,4,5-Trichlorophenol Emissions:</b>	--	--	--
• ng/dscm	< 7.13E+01	< 6.91E+01	< <b>7.02E+01</b>
• lb/hr	< 1.15E-05	< 1.09E-05	< <b>1.12E-05</b>
<b>2,3,4,6-Tetrachlorophenol Emissions:</b>	--	--	--
• ng/dscm	< 9.72E+01	< 9.41E+01	< <b>9.57E+01</b>
• lb/hr	< 1.57E-05	< 1.49E-05	< <b>1.53E-05</b>

'<' denotes results calculated using the DL for results that were non-detect.

**TABLE 4 continued: Chlorophenol and Chlorobenzene Emissions**

<b>Parameter</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Average</b>
<b>Hexachlorobenzene Emissions:</b>	--	--	--
· <b>ng/dscm</b>	< 9.12E+01	< 8.84E+01	< <b>8.98E+01</b>
· <b>lb/hr</b>	< 1.48E-05	< 1.40E-05	< <b>1.44E-05</b>
<b>Pentachlorophenol Emissions:</b>	--	--	--
· <b>ng/dscm</b>	< 6.34E+01	< 6.14E+01	< <b>6.24E+01</b>
· <b>lb/hr</b>	< 1.03E-05	< 9.71E-06	< <b>9.99E-06</b>

'<' denotes results calculated using the DL for results that were non-detect.

**TABLE 5: PAH Emissions**

Parameters	Run 1	Run 2	Run 3	Average
Test Date	3/10/2022	3/11/2022	3/11/2022	--
Test Times	13:43-18:18	8:35-12:40	13:42-17:47	--
Steam Load (klbs/hour)	67.7	67.7	68.3	<b>67.9</b>
Baghouse Inlet Temperature (°F)	304	304	304	<b>304</b>
Carbon Feed (lbs/hr)	9.8	9.5	9.8	<b>9.7</b>
RMW (tons/hr)	1.3	2.1	1.0	<b>1.5</b>
RMW (% of total fuel)	16	23	10	<b>16.3</b>
LDI Rate (gals/hr)	174	192	186	<b>184</b>
Exhaust Gas Temperature (°F)	273	271	275	<b>273</b>
Exhaust Gas Moisture (%)	15.0	14.2	16.8	<b>15.3</b>
Exhaust O <sub>2</sub> (% dry vol)	11.6	11.5	10.5	<b>11.2</b>
Exhaust CO <sub>2</sub> (% dry vol)	7.7	7.9	8.7	<b>8.1</b>
Exhaust Gas Flow Rate (dscf/min)	43,117	43,489	42,774	<b>43,126</b>
Sample Volume (dscf)	139.644	152.717	159.412	<b>150.591</b>
<b>Acenaphthene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· lb/hr	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Acenaphthylene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· lb/hr	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Anthracene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	5.34E+00	< 4.43E+00	< <b>4.94E+00</b>
· lb/hr	< 8.15E-07	8.68E-07	< 7.08E-07	< <b>7.97E-07</b>
<b>Benz[a]anthracene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· lb/hr	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Benzo[a]pyrene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· lb/hr	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Benzo[b]fluoranthene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· lb/hr	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Benzo[e]pyrene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	1.14E+01	< 4.43E+00	< <b>6.98E+00</b>
· lb/hr	< 8.15E-07	1.86E-06	< 7.08E-07	< <b>1.13E-06</b>
<b>Benzo[g,h,i]perylene Emissions:</b>	--	--	--	--
· ng/dscm	< 5.06E+00	1.82E+01	9.55E+00	< <b>1.09E+01</b>
· lb/hr	< 8.15E-07	2.96E-06	1.53E-06	< <b>1.77E-06</b>

'<' denotes results calculated using the RL for results that were non-detect.

**TABLE 5 continued: PAH Emissions**

<b>Parameters</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>	<b>Average</b>
<b>Benzo[k]fluoranthene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· <b>lb/hr</b>	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Chrysene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· <b>lb/hr</b>	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Dibenz[a,h]anthracene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· <b>lb/hr</b>	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Fluoranthene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	6.37E+00	2.84E+01	5.71E+00	<b>1.35E+01</b>
· <b>lb/hr</b>	1.03E-06	4.62E-06	9.14E-07	<b>2.19E-06</b>
<b>Fluorene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	1.48E+01	< 4.43E+00	< <b>8.10E+00</b>
· <b>lb/hr</b>	< 8.15E-07	2.41E-06	< 7.08E-07	< <b>1.31E-06</b>
<b>Indeno[1,2,3-cd]pyrene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· <b>lb/hr</b>	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>2-Methyl naphthalene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	1.55E+01	2.04E+01	4.54E+01	<b>2.71E+01</b>
· <b>lb/hr</b>	2.49E-06	3.31E-06	7.26E-06	<b>4.36E-06</b>
<b>Naphthalene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	7.43E+01	9.11E+01	1.11E+02	<b>9.21E+01</b>
· <b>lb/hr</b>	1.20E-05	1.48E-05	1.77E-05	<b>1.48E-05</b>
<b>Perylene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	< 4.62E+00	< 4.43E+00	< <b>4.70E+00</b>
· <b>lb/hr</b>	< 8.15E-07	< 7.52E-07	< 7.08E-07	< <b>7.58E-07</b>
<b>Phenanthrene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	7.00E+01	9.43E+01	1.94E+01	<b>6.13E+01</b>
· <b>lb/hr</b>	1.13E-05	1.53E-05	3.11E-06	<b>9.91E-06</b>
<b>Pyrene Emissions:</b>	--	--	--	--
· <b>ng/dscm</b>	< 5.06E+00	2.80E+01	5.47E+00	< <b>1.28E+01</b>
· <b>lb/hr</b>	< 8.15E-07	4.55E-06	8.75E-07	< <b>2.08E-06</b>

'<' denotes results calculated using the RL for results that were non-detect.

**TABLE 6: Multi Metal Emissions**

Parameter	Run 1	Run 2	Run 3	Average
Date	3/9/2022	3/9/2022	3/9/2022	--
Test Times	9:40-11:53	13:50-15:55	17:30-19:35	--
Steam Load (klbs/hr)	67.6	68.4	68.5	<b>68.2</b>
Natural Gas (kscf/hr)	0	0	0	<b>0</b>
Carbon Feed (lbs/hr)	9.8	9.8	9.9	<b>9.8</b>
RMW (tons/hr)	1.6	1.9	2.1	<b>1.9</b>
RMW (% of total fuel)	16	17	20	<b>17.7</b>
LDI Rate (gals/hr)	180	180	180	<b>180</b>
Exhaust Gas Flow Rate (dscf/m)	42,042	41,869	41,590	<b>41,834</b>
Sample Volume (dscf)	78.087	78.666	78.227	<b>78.327</b>
<b>Aluminum Emissions:</b>	--	--	--	--
· ug/dscm	7.38E+01	5.50E+01	< 5.34E+01	<b>&lt; 6.07E+01</b>
· lb/hr	1.16E-02	8.63E-03	< 8.32E-03	<b>&lt; 9.52E-03</b>
· lb/1000 lb steam	1.72E-04	1.26E-04	< 1.21E-04	<b>&lt; 1.40E-04</b>
<b>Antimony Emissions:</b>	--	--	--	--
· ug/dscm	2.46E+00	< 4.11E+00	4.41E+00	<b>&lt; 3.66E+00</b>
· lb/hr	3.87E-04	< 6.45E-04	6.86E-04	<b>&lt; 5.73E-04</b>
· lb/1000 lb steam	5.72E-06	< 9.42E-06	1.00E-05	<b>&lt; 8.39E-06</b>
<b>Arsenic Emissions:</b>	--	--	--	--
· ug/dscm	2.54E-01	< 3.59E-01	< 2.60E-01	<b>&lt; 2.91E-01</b>
· lb/hr	4.00E-05	< 5.63E-05	< 4.04E-05	<b>&lt; 4.56E-05</b>
· lb/1000 lb steam	5.91E-07	< 8.23E-07	< 5.90E-07	<b>&lt; 6.68E-07</b>
<b>Barium Emissions:</b>	--	--	--	--
· ug/dscm	1.38E+00	1.13E+00	1.09E+00	<b>1.20E+00</b>
· lb/hr	2.17E-04	1.77E-04	1.70E-04	<b>1.88E-04</b>
· lb/1000 lb steam	3.21E-06	2.59E-06	2.48E-06	<b>2.76E-06</b>
<b>Beryllium Emissions:</b>	--	--	--	--
· ug/dscm	< 2.76E-02	< 2.74E-02	< 2.75E-02	<b>&lt; 2.75E-02</b>
· lb/hr	< 4.34E-06	< 4.29E-06	< 4.29E-06	<b>&lt; 4.31E-06</b>
· lb/1000 lb steam	< 6.43E-08	< 6.28E-08	< 6.26E-08	<b>&lt; 6.32E-08</b>
<b>Cadmium Emissions:</b>	--	--	--	--
· ug/dscm	4.12E-01	< 7.14E-01	< 9.76E-01	<b>&lt; 7.01E-01</b>
· lb/hr	6.49E-05	< 1.12E-04	< 1.52E-04	<b>&lt; 1.10E-04</b>
· lb/1000 lb steam	9.60E-07	< 1.64E-06	< 2.22E-06	<b>&lt; 1.61E-06</b>
<b>Chromium Emissions:</b>	--	--	--	--
· ug/dscm	1.07E+00	1.73E+00	1.28E+00	<b>1.36E+00</b>
· lb/hr	1.69E-04	2.71E-04	2.00E-04	<b>2.13E-04</b>
· lb/1000 lb steam	2.50E-06	3.97E-06	2.91E-06	<b>3.13E-06</b>

'<' denotes results calculated using the MDL for front half and/or back half results that were non-detect.

**TABLE 6 continued: Multi Metal Emissions**

Parameter	Run 1	Run 2	Run 3	Average
<b>Cobalt Emissions:</b>	--	--	--	--
· ug/dscm	1.56E-01	1.11E-01	1.46E-01	<b>1.38E-01</b>
· lb/hr	2.46E-05	1.74E-05	2.27E-05	<b>2.16E-05</b>
· lb/1000 lb steam	3.65E-07	2.55E-07	3.31E-07	<b>3.17E-07</b>
<b>Copper Emissions:</b>	--	--	--	--
· ug/dscm	1.84E+00	1.90E+00	1.79E+00	<b>1.84E+00</b>
· lb/hr	2.90E-04	2.98E-04	2.78E-04	<b>2.89E-04</b>
· lb/1000 lb steam	4.29E-06	4.33E-06	4.06E-06	<b>4.24E-06</b>
<b>Iron Emissions:</b>	--	--	--	--
· ug/dscm	1.06E+02	1.12E+02	1.25E+02	<b>1.14E+02</b>
· lb/hr	1.66E-02	1.75E-02	1.95E-02	<b>1.79E-02</b>
· lb/1000 lb steam	2.46E-04	2.56E-04	2.84E-04	<b>2.62E-04</b>
<b>Lead Emissions:</b>	--	--	--	--
· ug/dscm	2.60E+00	4.77E+00	< 4.78E+00	<b>&lt; 4.05E+00</b>
· lb/hr	4.09E-04	7.48E-04	< 7.45E-04	<b>&lt; 6.34E-04</b>
· lb/1000 lb steam	6.05E-06	1.09E-05	< 1.09E-05	<b>&lt; 9.29E-06</b>
<b>Manganese Emissions:</b>	--	--	--	--
· ug/dscm	2.00E+00	1.74E+00	1.62E+00	<b>1.79E+00</b>
· lb/hr	3.15E-04	2.72E-04	2.53E-04	<b>2.80E-04</b>
· lb/1000 lb steam	4.67E-06	3.98E-06	3.69E-06	<b>4.11E-06</b>
<b>Mercury Emissions:</b>	--	--	--	--
· ug/dscm	< 6.68E-01	< 6.21E-01	< 6.46E-01	<b>&lt; 6.45E-01</b>
· lb/hr	< 1.05E-04	< 9.74E-05	< 1.01E-04	<b>&lt; 1.01E-04</b>
· lb/1000 lb steam	< 1.55E-06	< 1.43E-06	< 1.47E-06	<b>&lt; 1.48E-06</b>
<b>Molybdenum Emissions:</b>	--	--	--	--
· ug/dscm	< 1.38E+00	< 1.37E+00	< 1.38E+00	<b>&lt; 1.38E+00</b>
· lb/hr	< 2.17E-04	< 2.15E-04	< 2.15E-04	<b>&lt; 2.16E-04</b>
· lb/1000 lb steam	< 3.22E-06	< 3.14E-06	< 3.13E-06	<b>&lt; 3.16E-06</b>
<b>Nickel Emissions:</b>	--	--	--	--
· ug/dscm	7.40E-01	1.08E+00	5.65E-01	<b>7.95E-01</b>
· lb/hr	1.17E-04	1.69E-04	8.80E-05	<b>1.25E-04</b>
· lb/1000 lb steam	1.72E-06	2.47E-06	1.28E-06	<b>1.83E-06</b>
<b>Phosphorus Emissions:</b>	--	--	--	--
· ug/dscm	6.17E+00	1.33E+01	5.99E+00	<b>8.49E+00</b>
· lb/hr	9.71E-04	2.09E-03	9.33E-04	<b>1.33E-03</b>
· lb/1000 lb steam	1.44E-05	3.05E-05	1.36E-05	<b>1.95E-05</b>
<b>Potassium Emissions:</b>	--	--	--	--
· ug/dscm	1.25E+02	1.64E+02	1.56E+02	<b>1.48E+02</b>
· lb/hr	1.97E-02	2.58E-02	2.43E-02	<b>2.33E-02</b>
· lb/1000 lb steam	2.91E-04	3.77E-04	3.55E-04	<b>3.41E-04</b>

'<' denotes results calculated using the MDL for front half and/or back half results that were non-detect.

**TABLE 6 continued: Multi Metal Emissions**

<b>Parameter</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>	<b>Average</b>
<b>Selenium Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	4.54E-01	< 3.50E-01	3.23E-01	<b>&lt; 3.75E-01</b>
· <b>lb/hr</b>	7.14E-05	< 5.49E-05	5.03E-05	<b>&lt; 5.88E-05</b>
· <b>lb/1000 lb steam</b>	1.06E-06	< 8.02E-07	7.34E-07	<b>&lt; 8.64E-07</b>
<b>Silver Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	1.30E-01	< 9.92E-02	1.26E-01	<b>&lt; 1.19E-01</b>
· <b>lb/hr</b>	2.05E-05	< 1.56E-05	1.97E-05	<b>&lt; 1.86E-05</b>
· <b>lb/1000 lb steam</b>	3.03E-07	< 2.27E-07	2.87E-07	<b>&lt; 2.73E-07</b>
<b>Thallium Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	<9.75E-02	<9.54E-02	<9.60E-02	<b>&lt; 9.63E-02</b>
· <b>lb/hr</b>	<1.54E-05	<1.50E-05	<1.50E-05	<b>&lt; 1.51E-05</b>
· <b>lb/1000 lb steam</b>	<2.27E-07	<2.19E-07	<2.18E-07	<b>&lt; 2.21E-07</b>
<b>Vanadium Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	< 2.76E+00	< 2.74E+00	< 2.75E+00	<b>&lt; 2.75E+00</b>
· <b>lb/hr</b>	< 4.35E-04	< 4.29E-04	< 4.29E-04	<b>&lt; 4.31E-04</b>
· <b>lb/1000 lb steam</b>	< 6.43E-06	< 6.27E-06	< 6.27E-06	<b>&lt; 6.32E-06</b>
<b>Zinc Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	5.08E+01	7.20E+01	6.87E+01	<b>6.39E+01</b>
· <b>lb/hr</b>	8.00E-03	1.13E-02	1.07E-02	<b>1.00E-02</b>
· <b>lb/1000 lb steam</b>	1.18E-04	1.65E-04	1.56E-04	<b>1.47E-04</b>

'<' denotes results calculated using the MDL for front half and/or back half results that were non-detect.

**TABLE 7: Hexavalent Chromium Emissions**

<b>Parameter</b>	<b>Run 1</b>	<b>Run 2</b>	<b>Run 3</b>	<b>Average</b>
<b>Date</b>	3/9/2022	3/9/2022	3/9/2022	--
<b>Test Times</b>	9:40-11:53	13:50-16:12	17:30-19:45	--
<b>Steam Load (klbs/hr)</b>	67.6	68.1	68.6	<b>68.1</b>
<b>RMW (tons/hr)</b>	1.6	1.7	1.9	<b>1.7</b>
<b>RMW (% of total fuel)</b>	16	17	20	<b>17.7</b>
<b>LDI Rate (gals/hr)</b>	180	180	180	<b>180</b>
<b>Exhaust Gas Flow Rate (dscf/m)</b>	43,206	44,749	44,139	<b>44,031</b>
<b>Sample Volume (dscf)</b>	79.623	79.976	82.798	<b>80.799</b>
<b>Hexavalent Chromium Emissions:</b>	--	--	--	--
· <b>ug/dscm</b>	9.67E-01	1.23E+00	1.65E-01	<b>7.88E-01</b>
· <b>lb/hr</b>	1.56E-04	2.06E-04	2.73E-05	<b>1.30E-04</b>
· <b>lb/1000 lb steam</b>	2.31E-06	3.03E-06	3.98E-06	<b>1.91E-06</b>
· <b>% of total Chromium</b>	92	76	14	<b>61</b>



## **VII) Concerns & Comments:**

- 1) The reported three run average results for hydrogen fluoride (HF) and chlorine (Cl<sub>2</sub>) in Table 4-1 and 4-2 are incorrect. The reported averages appear to be for two runs instead of all three. The individual run results presented in the report are accurate. The correct average results are presented in Table 1 above.
- 2) The analysis for bromine (Br<sub>2</sub>) and chlorine (Cl<sub>2</sub>) used a dilution factor of 10. No explanation was provided as to why samples that were reported as ND required dilution.
- 3) The wrong sample volume was used in the Method 23 Run 2 calculations. Page 150 shows that a sample volume of 147.913 actual ft<sup>3</sup> was used in the calculations and the data sheet on page 69 shows a starting volume of 251.165 ft<sup>3</sup> and an ending volume of 404.098 ft<sup>3</sup> which gives a sample volume of 152.913 actual ft<sup>3</sup>. The lower sample volume value causes higher calculated emissions for D/F and PCBs in the source test report. The 152.913 actual ft<sup>3</sup> sample volume value was used to calculate the results presented in Tables 2 and 3 above.
- 4) Testing for chlorobenzenes and chlorophenols was not completed at the minimum required steam rate of  $\geq 67$  klbs /hr. The average steam rate during the two test runs was 63.9 klbs/hr.
- 5) For PAHs that were non-detect (ND), the reported in-stack detection limits (ISDLs) are approximately 10x higher than the estimated ISDLs in the approved source test plan.
- 6) The Method 29 front half reagent blank exceeded the allowable amount for aluminum, iron, and potassium. The maximum blank correction allowed by the method was used.
- 7) Molybdenum speciation analysis on the Method 26A particulate filters was completed as proposed in the source test plan and on bulk samples of baghouse fly ash. Analysis did not yield any results for molybdenum from the samples.

**VIII) Overall Evaluation:** As noted above, not all of the testing was completed at the required minimum steam rate specified in the source test plan approval letter. The test methods conducted, and the data provided are sufficient to evaluate emissions of TACs tested from the facility only at the operating conditions tested. Use of this data in a Cleaner Air Oregon risk assessment may result in source risk limits, as applicable, based on the conditions and operating parameters demonstrated during this source test.

cc: Terry Coble  
Covanta Marion, Inc.  
4850 Brooklake Road NE  
Brooks, OR 97305