

Date: 4/8/2022

**To:** File/Julia DeGagné**From:** Thomas Rhodes**Subject:** Source Test Review Report  
Covanta Marion, Inc.  
Permit No. 24-5398-TV-01Test Dates: December 8, 2021  
Report Received: January 31, 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 2 combustor. Target operating parameters for the test were:

Minimum steam load	≥ 67,000 lbs/hr
Minimum rate of Regulated Medical Waste (RMW)	1.5 tons/hr
Minimum rate of Liquid Direct Injection (LDI)	180 gallons/hr

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

**IV) Testing Locations:**

**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  
Ammonia: BAAQMD Method ST-1B  
Hydrogen Halides and Halogens: Modified EPA Method 26A  
Aldehydes: Modified CARB Method 430  
Volatile Organic Compounds: EPA SW-846 Method 0031

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

- Table 1: Ammonia Emissions
- Table 2: Aldehyde Emissions
- Table 3: Hydrogen Halide and Halogen Emissions
- Table 4: Volatile Organic Compound Emissions

**TABLE 1: Ammonia Emissions**

Parameter	Run 1	Run 2	Run 3 <sup>a</sup>	Average
Date	12/8/2021	12/8/2021	12/8/2021	--
Test Times	9:37-10:37	11:23-12:23	13:13-14:13	--
Steam Load (lbs/hr)	68,300	67,900	66,700	<b>67,633</b>
Ammonia Injection (gal/hr)	0.0	0.1	0.0	<b>0.03</b>
RMW (tons/hr)	1.62	0.81	0.0	<b>0.81</b>
RMW (% of total fuel)	16	7	0	<b>7.7</b>
LDI Rate (gals/hr)	181	211	183	<b>192</b>
Exhaust Gas Flow Rate (dscf/m)	36,736	38,544	<i>37,432</i>	<b>37,432</b>
Sample Volume (dscf)	39.072	38.206	37.912	<b>38.397</b>
NH <sub>3</sub> Emissions:	--	--	--	--
· ppmv	1.5	1.5	2.7	<b>1.9</b>
· lb/hr	0.15	0.15	<i>0.27</i>	<b>0.19</b>
· lb/1000 lb steam	2.18E-03	2.20E-03	<i>4.05E-03</i>	<b>2.81E-03</b>

<sup>a</sup> Flow rate was not measured during Run 3 of the ammonia testing. The average flow rate from the three Method 26A velocity traverses was used to estimate the mass emission rate for that test run. Estimated lb/hr and lb/1000 lb steam values are *italicized*.

**TABLE 2: Aldehyde Emissions**

Parameter	Run 1	Run 2 <sup>a</sup>	Run 3 <sup>a</sup>	Average
Date	12/8/2021	12/8/2021	12/8/2021	--
Test Times	11:39-12:39	13:13-14:13	14:40-15:40	--
Steam Load (lbs/hr)	68,200	66,700	68,000	<b>67,633</b>
RMW (tons/hr)	0.54	0.0	1.05	<b>0.53</b>
RMW (% of total fuel)	5	0	10	<b>5</b>
LDI Rate (gals/hr)	161	183	212	<b>185</b>
Exhaust Gas Flow Rate (dscf/m)	38,544	37,432	37,432	<b>37,432</b>
Sample Volume (dsL)	30.120	29.871	30.285	<b>30.092</b>
<b>Formaldehyde Emissions:</b>	--	--	--	--
· ug/dscm	< 41.8	< 42.2	< 41.6	<b>&lt; 41.9</b>
· ppmv	< 0.03	< 0.03	< 0.03	<b>&lt; 0.03</b>
· lb/hr	< 6.04E-03	< 5.91E-03	< 5.83E-03	<b>&lt; 5.93E-03</b>
· lb/1000 lb steam	< 8.86E-05	< 8.87E-05	< 8.58E-05	<b>&lt; 8.77E-05</b>
<b>Acetaldehyde Emissions:</b>	--	--	--	--
· ug/dscm	< 41.8	42.5	< 41.6	<b>&lt; 42.0</b>
· ppmv	< 0.02	0.02	< 0.02	<b>&lt; 0.02</b>
· lb/hr	< 6.04E-03	5.97E-03	< 5.83E-03	<b>&lt; 5.95E-03</b>
· lb/1000 lb steam	< 8.86E-05	8.94E-05	< 8.58E-05	<b>&lt; 8.79E-05</b>
<b>Acrolein Emissions:</b>	--	--	--	--
· ug/dscm	< 41.8	< 42.2	< 41.6	<b>&lt; 41.9</b>
· ppmv	< 0.02	< 0.02	< 0.02	<b>&lt; 0.02</b>
· lb/hr	< 6.04E-03	< 5.91E-03	< 5.83E-03	<b>&lt; 5.93E-03</b>
· lb/1000 lb steam	< 8.86E-05	< 8.87E-05	< 8.58E-05	<b>&lt; 8.77E-05</b>

<sup>a</sup> Flow rate was not measured during Run 2 and 3 of the aldehyde testing. The average flow rate from the three Method 26A velocity traverses was used to estimate the mass emission rates for those test runs. Estimated lb/hr and lb/1000 lb steam values are *italicized*.

'<' denotes results calculated using the reporting limit of five times the average field blank concentration.

**TABLE 3: Hydrogen Halide and Halogen Emissions**

Parameter	Run 1	Run 2	Run 3	Average
Date	12/8/2021	12/8/2021	12/8/2021	--
Test Times	9:37-10:37	11:23-12:23	16:28-17:28	--
Steam Load (lbs/hour)	68,300	67,900	66,700	<b>67,633</b>
Lime flow (lbs/hr)	249	249	283	<b>260</b>
RMW (tons/hr)	1.62	0.81	1.35	<b>1.26</b>
RMW (% of total fuel)	16	7	14	<b>12.3</b>
LDI Rate (gals/hr)	181	211	172	<b>188</b>
Exhaust Gas Temperature (°F)	268	269	264	<b>267</b>
Exhaust Gas Moisture (%)	16.2	15.8	16.6	<b>16</b>
Exhaust O <sub>2</sub> (% dry vol)	11.0	11.0	11.1	<b>11.0</b>
Exhaust CO <sub>2</sub> (% dry vol)	8.4	8.5	8.3	<b>8.4</b>
Exhaust Gas Flow Rate (dscf/m)	36,736	38,544	37,015	<b>37,432</b>
Sample Volume (dscf)	43.100	43.193	42.265	<b>42.853</b>
<b>HCl Emissions:</b>	--	--	--	--
· ug/dscm	6717.5	10224.0	7540.2	<b>8160.5</b>
· ppmv	4.42	6.73	4.96	<b>5.37</b>
· lb/hr	0.92	1.47	1.04	<b>1.15</b>
· lb/1000 lb steam	1.35E-02	2.17E-02	1.56E-02	<b>1.69E-02</b>
<b>HBr Emissions:</b>	--	--	--	--
· ug/dscm	219.6	164.3	183.0	<b>188.9</b>
· ppmv	0.065	0.049	0.054	<b>0.056</b>
· lb/hr	3.02E-02	2.37E-02	2.53E-02	<b>2.64E-02</b>
· lb/1000 lb steam	4.41E-04	3.49E-04	3.80E-04	<b>3.90E-04</b>
<b>HF Emissions:</b>	--	--	--	--
· ug/dscm	< 18.5	< 18.5	< 18.1	<b>&lt; 18.5</b>
· ppmv	< 0.02	< 0.02	< 0.02	<b>&lt; 0.02</b>
· lb/hr	< 2.54E-03	< 2.66E-03	< 2.51E-03	<b>&lt; 2.60E-03</b>
· lb/1000 lb steam	< 3.72E-05	< 3.92E-05	< 3.76E-05	<b>&lt; 3.82E-05</b>
<b>Cl<sub>2</sub> Emissions:</b>	--	--	--	--
· ug/dscm	198.3	197.0	218.9	<b>204.7</b>
· ppmv	0.067	0.067	0.074	<b>0.069</b>
· lb/hr	2.72E-02	2.84E-02	3.03E-02	<b>2.86E-02</b>
· lb/1000 lb steam	3.99E-04	4.18E-04	4.54E-04	<b>4.24E-04</b>
<b>Br<sub>2</sub> Emissions:</b>	--	--	--	--
· ug/dscm	< 28.3	< 25.6	< 28.0	<b>&lt; 27.3</b>
· ppmv	< 0.0042	< 0.0038	< 0.0042	<b>&lt; 0.0041</b>
· lb/hr	< 3.88E-03	< 3.69E-03	< 3.87E-03	<b>&lt; 3.81E-03</b>
· lb/1000 lb steam	< 5.68E-05	< 5.43E-05	< 5.81E-05	<b>&lt; 5.64E-05</b>

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

**TABLE 4: Volatile Organic Compound Emissions**

Parameter	Run 1	Run 2 <sup>a</sup>	Run 3	Average
Date	12/8/2021	12/8/2021	12/8/2021	--
Test Times	9:37-12:09	12:45-15:14	15:47-18:06	--
Steam Load (lbs/hr)	68,100	66,900	67,800	<b>67,600</b>
RMW (tons/hr)	1.39	0.53	1.36	<b>1.09</b>
RMW (% of total fuel)	14	5	13	<b>10.7</b>
LDI Rate (gals/hr)	196	182	199	<b>192</b>
Exhaust Gas Flow Rate (dscf/m)	36,736	37,432	37,015	<b>37,432</b>
Sample Volume (dsL)	62.331	61.473	61.762	<b>61.855</b>
<b>Acetone Emissions:</b>	--	--	--	--
· ug/dscm	< 1.95E+01	< 2.01E+01	< 2.09E+01	<b>&lt; 2.02E+01</b>
· lb/hr	< 2.69E-03	< 2.82E-03	< 2.90E-03	<b>&lt; 2.80E-03</b>
· lb/ 1000 lb steam	< 3.95E-05	< 4.22E-05	< 4.27E-05	<b>&lt; 4.15E-05</b>
<b>Benzene Emissions:</b>	--	--	--	--
· ug/dscm	< 1.73E+01	< 3.58E+01	< 2.90E+01	<b>&lt; 2.74E+01</b>
· lb/hr	< 2.38E-03	< 5.02E-03	< 4.02E-03	<b>&lt; 3.80E-03</b>
· lb/ 1000 lb steam	< 3.49E-05	< 7.50E-05	< 5.93E-05	<b>&lt; 5.64E-05</b>
<b>Bromodichloromethane Emissions:</b>	--	--	--	--
· ug/dscm	< 2.05E+00	< 2.06E+00	< 1.98E+00	<b>&lt; 2.03E+00</b>
· lb/hr	< 2.83E-04	< 2.88E-04	< 2.74E-04	<b>&lt; 2.82E-04</b>
· lb/ 1000 lb steam	< 4.15E-06	< 4.31E-06	< 4.04E-06	<b>&lt; 4.17E-06</b>
<b>Bromomethane Emissions:</b>	--	--	--	--
· ug/dscm	< 6.39E+00	< 6.16E+00	< 4.50E+00	<b>&lt; 5.68E+00</b>
· lb/hr	< 8.79E-04	< 8.63E-04	< 6.25E-04	<b>&lt; 7.89E-04</b>
· lb/ 1000 lb steam	< 1.29E-05	< 1.29E-05	< 9.21E-06	<b>&lt; 1.17E-05</b>
<b>Carbon Disulfide Emissions:</b>	--	--	--	--
· ug/dscm	< 3.51E+00	< 5.96E+00	< 4.94E+00	<b>&lt; 4.80E+00</b>
· lb/hr	< 4.83E-04	< 8.35E-04	< 6.85E-04	<b>&lt; 6.68E-04</b>
· lb/ 1000 lb steam	< 7.09E-06	< 1.25E-05	< 1.01E-05	<b>&lt; 9.89E-06</b>
<b>Carbon Tetrachloride Emissions:</b>	--	--	--	--
· ug/dscm	< 2.94E+00	< 2.98E+00	< 3.03E+00	<b>&lt; 2.98E+00</b>
· lb/hr	< 4.05E-04	< 4.18E-04	< 4.21E-04	<b>&lt; 4.14E-04</b>
· lb/ 1000 lb steam	< 5.94E-06	< 6.24E-06	< 6.21E-06	<b>&lt; 6.13E-06</b>
<b>Chlorobenzene Emissions:</b>	--	--	--	--
· ug/dscm	< 6.53E-01	< 6.85E-01	< 6.66E-01	<b>&lt; 6.68E-01</b>
· lb/hr	< 8.99E-05	< 9.61E-05	< 9.23E-05	<b>&lt; 9.28E-05</b>
· lb/ 1000 lb steam	< 1.32E-06	< 1.44E-06	< 1.36E-06	<b>&lt; 1.37E-06</b>
<b>Chlorodibromomethane Emissions:</b>	--	--	--	--
· ug/dscm	< 8.50E-01	< 8.35E-01	< 8.13E-01	<b>&lt; 8.33E-01</b>
· lb/hr	< 1.17E-04	< 1.17E-04	< 1.13E-04	<b>&lt; 1.16E-04</b>
· lb/ 1000 lb steam	< 1.72E-06	< 1.75E-06	< 1.66E-06	<b>&lt; 1.71E-06</b>

**TABLE 4: Volatile Organic Compound Emissions continued**

Parameter	Run 1	Run 2 <sup>a</sup>	Run 3	Average
<b>Chloroform Emissions:</b>	--	--	--	--
· ug/dscm	< 4.90E+00	< 5.25E+00	< 5.07E+00	< 5.07E+00
· lb/hr	< 6.74E-04	< 7.36E-04	< 7.02E-04	< 7.04E-04
· lb/ 1000lb steam	< 9.90E-06	< 1.10E-05	< 1.04E-05	< 1.04E-05
<b>Chloromethane Emissions:</b>	--	--	--	--
· ug/dscm	< 3.43E+00	< 6.67E+00	< 5.99E+00	< 5.36E+00
· lb/hr	< 4.73E-04	< 9.35E-04	< 8.31E-04	< 7.46E-04
· lb/ 1000lb steam	< 6.94E-06	< 1.40E-05	< 1.23E-05	< 1.11E-05
<b>Dichlorodifluoromomethane Emissions:</b>	--	--	--	--
· ug/dscm	< 1.89E+00	< 1.87E+00	< 1.86E+00	< 1.87E+00
· lb/hr	< 2.60E-04	< 2.63E-04	< 2.57E-04	< 2.60E-04
· lb/ 1000lb steam	< 3.83E-06	< 3.93E-06	< 3.80E-06	< 3.85E-06
<b>1,2-Dichloroethane Emissions:</b>	--	--	--	--
· ug/dscm	< 4.35E-01	< 5.45E-01	< 5.51E-01	< 5.10E-01
· lb/hr	< 5.99E-05	< 7.64E-05	< 7.64E-05	< 7.09E-05
· lb/ 1000lb steam	< 8.80E-07	< 1.14E-06	< 1.13E-06	< 1.05E-06
<b>Methylene Chloride Emissions:</b>	--	--	--	--
· ug/dscm	< 1.48E+01	< 1.44E+01	< 1.21E+01	< 1.38E+01
· lb/hr	< 2.04E-03	< 2.02E-03	< 1.67E-03	< 1.91E-03
· lb/ 1000lb steam	< 2.99E-05	< 3.01E-05	< 2.47E-05	< 2.82E-05
<b>Styrene Emissions:</b>	--	--	--	--
· ug/dscm	< 3.75E-01	< 4.61E-01	< 4.19E-01	< 4.18E-01
· lb/hr	< 5.16E-05	< 6.46E-05	< 5.81E-05	< 5.81E-05
· lb/ 1000lb steam	< 7.58E-07	< 9.66E-07	< 8.57E-07	< 8.60E-07
<b>Tetrachloroethene Emissions:</b>	--	--	--	--
· ug/dscm	< 9.51E-01	< 1.03E+00	< 1.10E+00	< 1.03E+00
· lb/hr	< 1.31E-04	< 1.44E-04	< 1.52E-04	< 1.43E-04
· lb/ 1000lb steam	< 1.92E-06	< 2.16E-06	< 2.25E-06	< 2.11E-06
<b>Toluene Emissions:</b>	--	--	--	--
· ug/dscm	< 4.86E+00	< 4.85E+00	< 6.74E+00	< 5.48E+00
· lb/hr	< 6.68E-04	< 6.80E-04	< 9.35E-04	< 7.61E-04
· lb/ 1000lb steam	< 9.81E-06	< 1.02E-05	< 1.38E-05	< 1.13E-05
<b>Trichloroethene Emissions:</b>	--	--	--	--
· ug/dscm	< 6.88E-01	< 8.04E-01	< 7.51E-01	< 7.48E-01
· lb/hr	< 9.46E-05	< 1.13E-04	< 1.04E-04	< 1.04E-04
· lb/ 1000lb steam	< 1.39E-06	< 1.69E-06	< 1.54E-06	< 1.54E-06
<b>Trichlorofluoromethane Emissions:</b>	--	--	--	--
· ug/dscm	< 1.18E+00	< 1.20E+00	< 1.15E+00	< 1.18E+00
· lb/hr	< 1.62E-04	< 1.68E-04	< 1.60E-04	< 1.63E-04
· lb/ 1000lb steam	< 2.38E-06	< 2.51E-06	< 2.35E-06	< 2.42E-06

**TABLE 4: Volatile Organic Compound Emissions**

Parameter	Run 1	Run 2 <sup>a</sup>	Run 3	Average
<b>Vinyl Chloride Emissions:</b>	--	--	--	--
· ug/dscm	< 1.03E+00	< 1.17E+00	< 1.24E+00	<b>&lt; 1.15E+00</b>
· lb/hr	< 1.42E-04	< <i>1.64E-04</i>	< 1.72E-04	<b>&lt; 1.59E-04</b>
· lb/ 1000lb steam	< 2.08E-06	< <i>2.46E-06</i>	< 2.54E-06	<b>&lt; 2.36E-06</b>
<b>m,p-Xylene Emissions:</b>	--	--	--	--
· ug/dscm	< 9.26E-01	< 8.98E-01	< 8.41E-01	<b>&lt; 8.89E-01</b>
· lb/hr	< 1.27E-04	< <i>1.26E-04</i>	< 1.17E-04	<b>&lt; 1.23E-04</b>
· lb/ 1000lb steam	< 1.87E-06	< <i>1.88E-06</i>	< 1.72E-06	<b>&lt; 1.82E-06</b>

<sup>a</sup> Flow rate was not measured during Run 2 of the volatile organic compound testing. The average flow rate from the three Method 26A velocity traverses was used to estimate the mass emission rates for that test run. Estimated lb/hr and lb/1000 lb steam values are *italicized*.

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

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

- 1) Testing for metals, hexavalent chromium, dioxins and furans, PAHs, chlorophenols and chlorobenzenes was not completed due to leachate from the Marion County ash monofill becoming unavailable for delivery to the site. Leachate from the Marion County ash monofill was to be used for Liquid Direct Injection (LDI) during the testing. This was discussed while DEQ was onsite observing the source testing. The facility submitted an extension request to complete source testing by March 31, 2022, to ensure that sufficient leachate would be available to complete the source testing at the desired LDI rate.
- 2) Flow rate measurements used to calculate mass emissions rates needed to have been taken during, immediately prior to, or immediately after each test method. Flow rate measurements were only taken during the modified Method 26A test runs. Run 3 of Method ST-1B, runs 2 and 3 of Method 430, and run 2 of SW-846 Method 0031 do not have corresponding flow rate measurements. The average of the modified Method 26A flow rate measurements was used to estimate mass emission rates in the tables above for each test run that did not have a corresponding flow rate measurement.
- 3) The Method 26A reagent blank exceeded the allowable amount of HCl. The maximum blank correction allowed by the method was used.
- 4) There were some minor data entry errors of the Method 0031 lab data. The correct lab data is used in the Table 4 above.
- 5) The amount of Regulated Medical Waste (RMW) burned during the test runs was less than the minimum rate of 1.5 tons/hour in the approved source test plan.
- 6) Acrolein, hydrogen fluoride, and bromine were non-detect in all sample fractions and all test runs.
- 7) Only Method 0031 analytes that were detected in at least one sample fraction are listed in Table 4 of this review report. Results for compounds that were non-detect in all sample fractions for all test runs can be found in Appendix A.10 of the source test report.

**VIII Overall Evaluation:** As noted above, testing was not successfully completed for the RMW operating parameter approved in the source test plan. 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  
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