

EMISSIONS TESTING REPORT 15018
Text and Appendices

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AIR QUALITY DIV.

PERFORMED FOR:

COVANTA ENERGY GROUP, INC.
Morristown, New Jersey

at the

Kent County Waste to Energy Facility
Grand Rapids, Michigan
Units 1 and 2 SDA Inlets and Stacks
June 2015

by

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2.0 SUMMARY OF RESULTS

2.1 Report Organization

The results of the testing project are summarized in Section 2. The process tested is discussed in Section 3. The sampling and analytical methods utilized are discussed in Section 4 while the Quality Assurance/Quality Control results are presented in Section 5. Appendix A contains detailed results of the testing program. Appendix B contains the field data that was collected and Appendix C contains the analytical results. Appendix D contains all pertinent testing equipment calibration data. Refer to the Table of Contents and the List of Tables and Figures for a complete reference with appropriate page numbers.

2.2 Presentation of Results

Table 2-1 presents the results of the emissions testing project for Unit 1. Table 2-2 presents the results of the emissions testing project for Unit 2. A more detailed summary of the sampling gas parameters is presented in Appendix A.

2.3 Total Hydrocarbon Results

Methane samples were not collected and analyzed because the onsite real-time total hydrocarbon results were significantly below the permitted limit for total non-methane hydrocarbons. This procedure was approved by Mr. Daryll Fickling and Mr. Terry Madden for previous testing programs. This report presents total hydrocarbons as carbon for comparison to the total non-methane hydrocarbons permit limit.

2.4 Opacity and Fugitive Emissions Results

Opacity measurements were taken on each unit utilizing the facility COMS in accordance with 40CFR60.11(e)(5) during each particulate test. Additionally, three EPA Method 22 test runs were performed for fugitive emissions on the ash handling system. No fugitive emissions results are presented in Appendix A because all values were zero. The field data sheets are located in Appendix B.14.

2.5 Dioxins/Furans Results and EMPC Values

In accordance with EPA Method 23, Section 9.9, all dioxins/furans results that were below the minimum detection limit (ND) were treated as zero when averaging or totaling the results. All dioxins/furans results that were an estimated maximum possible concentration (EMPC) are presented using the EMPC value as a positive catch when calculating the results.

**Table 2-1
Summary of Emissions
Unit 1 Annual Compliance Testing**

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 1 SDA Inlet Concentrations @ 7% O₂					
Hydrogen Chloride, ppmvd	920	1115	736	924	NA
Mercury, ug/DSCM	62.0	37.5	89.9	63.1	NA
Unit 1 Stack Emissions Rates, lb/hr					
Carbon Monoxide – 1 hour	0.481	0.641	0.802	0.641	26.05
Carbon Monoxide – 8 hour	0.963	0.642	0.803	0.803	6.51
Dioxins/Furans, 1985 US EPA TEF	3.01E-09	9.27E-10	2.36E-09	2.10E-09	3.38E-07
Hexavalent Chromium	3.59E-05	1.67E-05	1.69E-05	2.32E-05	4.69E-04
Metals					
Arsenic	2.19E-05	3.71E-05	2.90E-05	2.94E-05	7.0E-04
Beryllium	<3.71E-06	<3.64E-06	<3.57E-06	<3.64E-06	1.83E-05
Cadmium	1.34E-04	1.40E-04	2.44E-04	1.73E-04	4.17E-03
Chromium	1.56E-04	3.50E-04	2.05E-04	2.37E-04	NA
Lead	0.00103	0.00231	0.00190	0.00175	0.10
Mercury	0.0000560	0.0000727	0.0000833	0.0000707	0.07
Nitrogen Oxides – 1 hour	35.8	32.7	34.8	34.4	86
Nitrogen Oxides – 3 hour	32.9	31.6	33.3	32.6	75.25
Particulate	0.593	0.603	0.686	0.627	2.6
Sulfur Dioxide – 8 hour	1.84	1.47	1.10	1.47	15
Sulfuric Acid Mist (IC)	0.00641	<0.00626	<0.00683	<0.00650	4.4
Total Fluorides as HF	0.0121	0.0120	0.00861	0.0109	0.28
Total Hydrocarbons as CH ₄	0.108	0.0627	0.0743	0.0817	0.94
Unit 1 Stack Concentrations @ 7% O₂					
Dioxins/Furans, ng/DSCM (1985 US EPA TEF)	0.0294	0.00859	0.0219	0.0199	3.0
Hexavalent Chromium, ug/DSCM	0.315	0.150	0.162	0.209	4.2
Hydrogen Chloride, ppmvd	10.3	13.0	9.15	10.8	29
Metals					
Arsenic, ug/DSCM	0.205	0.351	0.285	0.280	6.2
Beryllium, ug/DSCM	< 0.0346	< 0.0343	< 0.0351	< 0.0347	0.16
Cadmium, ug/DSCM	1.25	1.33	2.40	1.66	37
Chromium, ug/DSCM	1.46	3.30	2.02	2.26	NA
Lead, mg/DSCM	0.00963	0.0218	0.0187	0.0167	0.87
Mercury, mg/DSCM	0.000523	0.000687	0.000819	0.000676	0.61
Opacity by Facility COMS, %	0.5	0.4	0.2	0.4	10
Particulate, gr/DSCF	0.00242	0.00249	0.00295	0.00262	0.010
Sulfuric Acid Mist, mg/DSCM (IC)	0.0564	<0.0533	<0.0598	<0.0565	39
Total Fluorides as HF, mg/DSCM	0.106	0.108	0.0827	0.0989	2.5
Total Hydrocarbons as CH ₄ , mg/DSCM	0.962	0.532	0.652	0.715	8.3
Unit 1 Stack Concentrations, ppmvd @ 7% O₂					
Carbon Monoxide – 1 hour	4	6	6	5	200
Carbon Monoxide – 4 hour	5	6	8	6	100
Carbon Monoxide – 8 hour	8	5	6	6	50
Nitrogen Oxides – 1 hour	173	171	171	172	400
Nitrogen Oxides – 3 hour	165	161	164	163	350
Sulfur Dioxide – 8 hour	7	5	4	5	50
Unit 1 Removal Efficiency, %					
HCl Removal Efficiency, ppmvd	98.9	98.8	98.8	98.8	≥ 95%
Sulfur Dioxide – 8 hour	87.9	88.8	92.3	89.7	≥ 75%

**Table 2-2
 Summary of Emissions
 Unit 1 Subpart Cb Testing**

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 1 SDA Inlet Concentrations @ 7% O₂					
Hydrogen Chloride, ppmvd	920	1115	736	924	NA
Mercury, ug/DSCM	62.0	37.5	89.9	63.1	NA
Unit 1 Stack Concentrations @ 7% O₂					
Cadmium, ug/DSCM	1.25	1.33	2.40	1.66	35
Dioxins/Furans, ng/DSCM	3.56	1.85	3.20	2.87	30
Hydrogen Chloride, ppmvd	10.3	13.0	9.15	10.8	29
Lead, mg/DSCM	0.00963	0.0218	0.0187	0.0167	0.40
Mercury, mg/DSCM	0.000523	0.000687	0.000819	0.000676	0.050
Particulate, mg/DSCM	5.54	5.70	6.75	6.00	25
Unit 1 RE%, @ 7% O₂					
HCl Removal Efficiency, ppmvd	98.9	98.8	98.8	98.8	≥ 95%
Hg Removal Efficiency, mg/DSCM	99.2	98.2	99.1	98.8	≥ 85%

Table 2-3
Summary of Emissions
Unit 2 Annual Compliance Testing

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 2 SDA Inlet Concentrations @ 7% O₂					
Hydrogen Chloride, ppmvd	783	758	885	809	NA
Mercury, ug/DSCM	24.8	25.7	34.3	28.3	NA
Unit 2 Stack Emissions Rates, lb/hr					
Metals					
Cadmium	5.07E-05	1.31E-04	8.90E-05	9.04E-05	4.17E-03
Lead	0.000794	0.000752	0.00101	0.000851	0.10
Mercury	0.0000637	0.0000784	0.000188	0.000110	0.07
Particulate	0.260	0.299	0.401	0.320	2.6
Unit 2 Stack Concentrations @ 7% O₂					
Hydrogen Chloride, ppmvd	13.0	19.2	18.2	16.8	29
Metals					
Cadmium, ug/DSCM	0.472	1.30	0.773	0.847	37
Lead, mg/DSCM	0.00739	0.00742	0.00874	0.00785	0.87
Mercury, mg/DSCM	0.000593	0.000774	0.00163	0.00100	0.61
Opacity by Facility COMS, %	0	0	0	0	10
Particulate, gr/DSCF	0.00106	0.00129	0.00152	0.00129	0.010
Unit 2 Removal Efficiency, %					
HCl Removal Efficiency, ppmvd	98.3	97.5	97.9	97.9	≥ 95%

**Table 2-4
 Summary of Emissions
 Unit 2 Subpart Cb Testing**

Parameter	Rep. 1	Rep. 2	Rep. 3	Average	Permit Limit
Unit 2 SDA Inlet Concentrations @ 7% O₂					
Hydrogen Chloride, ppmvd	783	758	885	809	NA
Mercury, ug/DSCM	24.8	25.7	34.3	28.3	NA
Unit 2 Stack Concentrations @ 7% O₂					
Cadmium, ug/DSCM	0.472	1.30	0.773	0.847	35
Hydrogen Chloride, ppmvd	13.0	19.2	18.2	16.8	29
Lead, mg/DSCM	0.00739	0.00742	0.00874	0.00785	0.40
Mercury, mg/DSCM	0.000593	0.000774	0.00163	0.00100	0.050
Particulate, mg/DSCM	2.42	2.95	3.48	2.95	25
Unit 2 RE%, @ 7% O₂					
HCl Removal Efficiency, ppmvd	98.3	97.5	97.9	97.9	≥ 95%
Hg Removal Efficiency, mg/DSCM	97.6	97.0	95.2	96.6	≥ 85%

2.6 CEM Parameters

The facility CEMS were utilized for the sulfur dioxide, nitrogen oxides, and carbon monoxide concentrations. The facility data was provided in 1, 3, 4, 8, and 24 hour averages as necessary.

The facility CEMS were utilized for sulfur dioxide, nitrogen oxides, and carbon monoxide along with the air flow rate results from the three EPA Method 29 test runs to calculate 1, 3, and 8 hour emission rates averages in pounds per hour (lb/hr). This data is contained in Appendix B.

2.7 Metals Reagent Blank Corrections

Chromium was detected at low levels in the reagent blank. In accordance with EPA Method 29, Sections 12.6 and 12.7, the test run catch weights were corrected for the lead blank values.

2.8 Sulfuric Acid Mist Results

The EPA Method 8 samples for sulfuric acid mist were analyzed using the Thorin titration as specified in EPA Method 8 and by Ion Chromatography techniques. Ion chromatography is more accurate because it avoids interferences that are inherent in the titration procedure. Mr. Gary McAlister of the USEPA has stated his "technical opinion that analyzing EPA Method 8 samples for sulfuric acid mist by IC is as accurate as analyzing the samples by the Thorin titrations as specified in EPA Method 8". Ion chromatography results were utilized for subsequent calculations in this report. The results of both analytical techniques are presented in Appendix C.

2.9 Non-detected Values

The results are presented using a worst-case scenario. All non-detected results were used as values for calculation purposes and the result is preceded by a "<" symbol. All non-detected results were used as a zero when calculating total catch weights for samples that had both a positive catch weight for one or more fractions and also non-detected fraction(s). When averaging across a set of three test runs, non-detected results were treated as values. Any average result that includes a non-detected value includes a "<" symbol in front of the result.

2.10 Duplicate Analyses

Run 2 for each unit was analyzed in duplicate for the metals of interest. All runs for mercury were analyzed in duplicate. All runs for HCl were analyzed in duplicate. The average of the duplicate analyses were used for reporting purposes.

2.11 Performance Audit Samples

One mercury audit (061815D, Cat No. 1428), two metals (As, Be, Cd, Cr, Pb) audits (061815D, Cat No. 1425 and 061815D, Cat No. 1426), one fluoride audit (061815D, Cat No. 1441), one sulfate audit (061815E, Cat No. 1444), and one hydrogen chloride audit (061815E, Cat No. 1440) were obtained from ERA. The results are summarized in Table 5-2 in Section 5 and complete results can be found in Appendix C.6.