SECTION 22a-174-38 MWC RULE PERFORMANCE TESTING AT THE BRISTOL RRF

Prepared for

Covanta Bristol, Inc.
Bristol, CT

Prepared by

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COMPANY'S CERTIFICATION
Final Stack Test Report
State of Connecticut

TRC Project No. 477974.0000.0000
Covanta Bristol

"I have personally examined and am familiar with the information submitted in this document all attachments thereto, and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that any false statement made in the submitted information may be punishable as a criminal offense under section 22a-175 of the Connecticut General Statues or, in accordance with section 22a-6 of the Connecticut General Statues, under section 53a-157b of the Connecticut General Statues, and in accordance with any other applicable statue."

Gary Ritter CIH
ABIH Certification #5015

Richard Kopacz
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EXECUTIVE SUMMARY TABLE
COMPARISON OF AVERAGE EMISSIONS TO SECTION 38 EMISSION LIMITS
September 23, 26, 28, 29, 30, 2022 - COVANTA BRISTOL

Air Pollutant	Units	Unit 1	Unit 2	Section 38 Limits
Particulate Matter (PM)	mg/dscm @7% O_2	3.6	6.6	25
Cadmium (Cd)	mg/dscm @7% O_2	0.0013	0.0015	0.035
Lead (Pb)	mg/dscm @7% O_2	0.010	0.019	0.4
Mercury (Hg)	mg/dscm @7% O_2	0.013	0.0009	0.028
	% Removal	80.4	98.7	>85
Sulfur Dioxide (SO_2)	ppm @ 7% O_2	6	7	29
	% Removal	92.3	90.5	>75
Oxides of Nitrogen (NO_x)	ppm @ 7% O_2	107	115	U1-120, U2-150
Carbon Monoxide (CO)	ppm @ 7% O_2	17	19	100
Ammonia (NH_3)	ppm @ 7%O_2	2.2	2.1	20
Hydrogen Chloride (HCl)	ppm @ 7% O_2	21.7	12.2	29
	% Removal	97.2	98.5	95
Dioxin/Furan (PCDD/PCDF)	ng/dscm @7% O_2	NA	2.89	30
	ng/ncm CTEF@12%CO_2	NA	0.025	1.95
Maximum Opacity	%	0	0	10
Fugitive Ash Emissions	% of observation time	0.0		5
Tested Steam Production Rate	klbs/hr	86	87	
Tested Baghouse Inlet Temperature	F	310	315	
Tested Carbon Injection Rate	lb/hr	12	12	
Maximum Allowable Steam Production Rate	klbs/hr	94.6	95.7	
Maximum Allowable Baghouse Inlet Temperature	F	340	345	
Minimum Allowable Carbon Injection Rate	lb/hr	12	12	

(1) In cases where the emission limit for a pollutant is measured either as a concentration or as a percent reduction by weight or volume, the less stringent applies.
(2) Compliance with the sulfur dioxide emission limit and/or reduction was based on a 24-hour geometric average of the hourly average emission concentration using the plant CEM system outlet data.
(3) Compliance with the oxides of nitrogen emission limit was based on a 24-hour daily arithmetic average emission concentration using the plant CEM data.
(4) Compliance with the carbon monoxide emission limit was based on the greatest 4-hour daily arithmetic average emission using the plant CEM outlet data.
(5) Compliance with the opacity limit was based on the greatest 6-minute arithmetic average during the test period.
(6) The regulatory limit for fugitive ash visual emissions is 5% of the observation period or nine minutes during a three-hour period.
(7) The dioxin/furan emissions tests were only conducted on Unit 2.
The max steam production rate, max baghouse inlet temperature, and minimum carbon injection rate for Unit 1 were determined during the dioxin/furan compliance test in 2021.

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) was retained by Covanta Bristol Inc. (Covanta) to conduct a compliance emissions measurement program at the Bristol Resource Recovery Facility (RRF) in Bristol, Connecticut. The Covanta facility operates two municipal waste combustors and the program objective was to demonstrate compliance on both units with limits specified in the *Regulations of the Connecticut State Agencies (RCSA) Section 22a-174-38 "Municipal Waste Combustors", RCSA Section 22a-174-29* and the 2016 New Source Review (NSR) permit. Each combustor unit is equipped with a pollution control system consisting of carbon injection, a spray dryer scrubber and a baghouse, and emission tests were conducted at the scrubber inlet and baghouse outlet. In addition, visible emission observations were conducted on the ash systems. Measurements were conducted in accordance with U.S EPA test methods with the unit's operating at greater than 90% of capacity (greater than 68,400 lb/hr of steam). Test parameters and methods are shown in Tables 1-1, 1-2 and 1-3.

Combustor emission limits are specified in *RCSA Section 22a-174-38, Section 22a-174-29* and the NSR permit. The Bristol facility was constructed prior to September 20, 1994 and must demonstrate compliance with the emissions limits in Tables 38-1, 38-3, and 38-4 of subsection (c) of the regulation. Emission limits and control efficiency limits are summarized in Table 1-4.

Testing was conducted on September 23, 26, 28, 29, and 30, 2022; by Richard Kopacz, Chris Robinson, Pat Hoffman, Tom Howland, Mike Moauro, and Tim Marsh. Jacob Achey and Daryll Fickling of Covanta provided coordination with the plant operations. DEEP personnel including Soumya Kalleth was notified and was present during the field test program. Process data sheets were provided after each day of testing.

Section 2.0 of this report presents a summary and discussion of results. A description of the process is contained in Section 3.0. Section 4.0 presents descriptions of the sampling and analytical methods and Section 5.0 presents a discussion of quality assurance.

Table 1-1
Baghouse Outlet Emissions Test Matrix

Pollutant	EPA Method
Particulate Matter (PM)	Method 5
Hydrogen Chloride (HCl)	Method 26A
Ammonia (NH_3)[2]	Method 26A
Cd, Hg, Pb	Method 29
Dioxins/furans/PAH (PCDD/PCDF)[1]	Method 23/052
Opacity (Plant COMS)	Method 9
Sulfur Dioxide (Plant CEMS)	Method 6C
Oxide of Nitrogen (Plant CEMS)	Method 7E
Carbon Monoxide (Plant CEMS)	Method 10
Carbon Dioxide (Plant CEMS)	Method 3/3A
Oxygen (Plant CEMS)	Method 3/3A

Notes:
(1) Measurements for PCDD/PCDF were conducted at the exhaust of Unit 2 only.
(2) Ammonia emissions were measured by ion chromatograph analysis of a Method 26 aliquot.

Table 1-2
Spray Dryer Inlet Emissions Test Matrix

Pollutant	EPA Method
Hydrogen Chloride (HCl)	Method 26
Mercury (Hg)	Method 29
Sulfur Dioxide (SO_2)	Method 6C

Table 1-3
Ash System Fugitive Emissions Observations

Pollutant	EPA Method
Fugitive Emissions	Method 22

Table 1-4
Municipal Waste Combustor Limits

Pollutant	Emission Limit [1]
Particulate Matter	25 mg/dscm
Cadmium	0.035 mg/dscm
Lead	0.40 mg/dscm
Mercury	0.028 mg/dscm, or 85% reduction by weight or volume[2]
Sulfur Dioxide	29 parts per million by volume dry (ppmvd), or 75% reduction by weight or volume[2], [3]
Oxides of Nitrogen	120 ppmvd for U1/ 150ppmvd for U2 [4]
Carbon Monoxide	100 ppmvd [5]
Hydrogen Chloride	29 ppmvd, or 95% reduction by weight or volume[3]
Ammonia	20 ppmvd
Dioxin/furan	30 ng/dscm total mass
Opacity	10% [6]
Fugitive Ash Emissions	Visible emissions shall not be observed for more than 9 minutes (5%) over a three-hour period.

Notes;

(1) All emission limits, except those for opacity, are based on correction to 7% oxygen.

(2) In cases where the emission limit for a pollutant is measured either as a concentration or as a percent reduction by weight or volume, the less stringent limit will apply.

(3) Compliance with the sulfur dioxide emission limit and/or reduction will be based on a 24-hour geometric average of the hourly arithmetic average emission concentration using the plant CEM system data.

(4) Compliance with the nitrogen oxide emission limit will be based on a 24-hour daily arithmetic average emission concentration using the plant CEM system data.

(5) Compliance with the carbon monoxide emission limit will be based on a 4-hour block average emission concentration using CEM system data.

(6) Compliance with the opacity emission limit will be based on a six-minute arithmetic average.

2.0 SUMMARY AND DISCUSSION OF RESULTS

Emission tests and visible emission observations demonstrated compliance with applicable limits on both combustors. Results are discussed below, and summary tables are presented at the end of this section. The maximum allowable stack concentration (MASC) calculations for each compound is referenced in Appendix P.

2.1 Unit 1

2.1.1 EPA Method 5 – Particulate Emissions

Unit 1 baghouse outlet particulate emissions in units of milligrams per dry standard cubic meter (mg/dscm) at 7% O_2 are reported in Table 2-1. Field and summary data is contained in Appendix C. The average particulate emissions were below the regulatory limits.

2.1.2 EPA Method 26 – HCl and Ammonia Emissions

Unit 1 baghouse outlet, ammonia and scrubber inlet HCl emissions data are reported in Table 2-1 and the complete data are contained in Appendix B. HCl emissions are reported in mg/dscm @ 7%O2 while ammonia emissions are reported as parts per million (ppm) @ 7%O_2 and lb/hr. HCl and ammonia were in compliance with their regulatory limits.

2.1.3 EPA Method 29 – Metals Emissions

Unit 1 baghouse outlet metals emissions and scrubber inlet mercury emissions data are reported in Table 2-1 and the complete data are contained in Appendix C. Emissions of each target metal were below the applicable emission limit. Results are reported as ug/dscm @ 7% O_2 for comparison to the Section 38 limits for cadmium, lead, and mercury. Each metal was in compliance with their Section 38 limit. The reported metals emissions were not blank corrected.

2.1.4 Continuous Emission Monitoring – SO_2, NOx, CO, and Opacity

Unit 1 continuous emission monitoring data collected from the plant system is summarized in Table 2-1. Complete data are contained in Appendix E. Emissions were below the applicable limits (24-hour geometric average for SO_2, 24-hour arithmetic average for NO_X, and 4-hour arithmetic average for CO).

2.2 Unit 2

2.2.1 EPA Method 5 – Particulate Emissions

Unit 2 baghouse outlet particulate emissions in units of milligrams per dry standard cubic meter (mg/dscm) at 7% O_2 are reported in Table 2-2 and the filterable particulate emission rate in units of pounds per hour is reported in Table 2-5. Field and summary data is contained in Appendix C. The average particulate emissions were below the regulatory limits.

2.2.2 EPA Method 26 – HCl and Ammonia Emissions

Unit 2 baghouse outlet, ammonia and scrubber inlet HCl emissions data are reported in Table 2-2 and the complete data are contained in Appendix B. HCl emissions are reported in mg/dscm @ 7%O2 while ammonia emissions are reported as ppm @ 7%O_2 and lb/hr. HCl and ammonia were in compliance with their regulatory limits.

2.2.3 EPA Method 29 – Metals Emissions

Unit 2 baghouse outlet metals emissions and scrubber inlet mercury emissions data are reported in Table 2-2 and the complete data are contained in Appendix C. Emissions of each target metal were below the applicable emission limit. Results are reported as ug/dscm @ 7% O_2 for comparison to the Section 38 limits for cadmium, lead, and mercury. Each metal was in compliance with their Section 38 limit. The reported metals emissions were not blank corrected.

2.2.5 Continuous Emission Monitoring – SO_2, NOx, CO, and Opacity

Unit 1 continuous emission monitoring data collected from the plant system is summarized in Table 2-2. Complete data are contained in Appendix E. Emissions were below the applicable limits (24-hour geometric average for SO_2, 24-hour arithmetic average for NO_X, and 4-hour arithmetic average for CO).

2.2.5 EPA Method 23 – PCDD/PCDF Emissions

Unit 2 PCDD/PCDF emissions are reported in Table 2-2 and the complete data are contained in Appendix D. Results are reported as nanograms per dry standard cubic meter corrected to seven percent oxygen (ng/dscm@7%O_2), nanograms per normal cubic meters using Connecticut toxic equivalency factor ng/ncm(CTEF) @12%CO_2 and 2,3,7,8 tetra chlorinated dibenzo dioxin (TCDD) lb/hr. The average PCDD/PCDF emissions were below their Section 38 regulatory limit.

2.3 DEP Audits

Audits were not conducted since the audit program is no longer available.

2.4 Problems and Reference Method Deviations

The first two metals tests on Unit 2 completed on 9/26/2022 were repeated as it was determined they did not meet test guidelines due to a baghouse failure after the second metals test was completed. Voided runs 1 & 2 are included in the appendices of this report as requested by CTDEEP. All metals runs on Unit 2 were in compliance with emissions limits. Only the 3rd, 4th, and 5th sample runs will be used for compliance.

2.5 Fugitive Emissions From The Ash Conveyor Systems

Fugitive visible emissions from ash conveyors and the main ash handling conveyor systems are presented in Table 2-3. Fugitive emissions were not detected during the 3-hour observation period. The regulatory limit for detectable visual emissions is 9 minutes or 5% of a 3-hour observation period. Complete data are contained in Appendix J.

2.6 Reporting Non-Detected Fractions/Species

When one sample fraction is below the detection limit and one sample fraction is above the detection limit, emissions are calculated on the basis of the above detection limit value only; the non-detect fraction is treated as zero and the emissions are reported as actual emissions without a < symbol. If the analysis shows that all sample fractions are below the detection limit, the emission rate is calculated based on the sum of all the detection limits for each fraction and the result is preceded by a < symbol. However, PCDD/PCDF are an exception to rule; total congener emissions include the sum of real values and detection limit values and are not prefaced with a < symbol.

Table 2-1
Covanta Bristol Unit 1 Test Results

Parameter	Units	Run 1	Run 2	Run 3	Average	Limit
Unit 1 SDA Inlet Concentrations						
Hydrogen Chloride	ppm@7%O_2	949	1187	687	941	NA
Mercury	ug/dscm@7%O_2 lb/hr	119.5 0.0124	83.79 0.0085	39.27 0.0035	80.85 0.0081	NA NA
Unit 1 Outlet Concentrations						
Ammonia	ppm@7%O_2 lb/hr	1.67 0.15	2.82 0.23	2.13 0.18	2.2 0.2	20 NA
Carbon Monoxide	ppm@7%O_2	-	-	-	17	100
Hydrogen Chloride	ppm@7%O_2 lb/hr	25.9 4.9	21.9 3.8	17.2 3.1	21.7 3.9	29 NA
Mercury	ug/dscm@7%O_2	15.61	10.43	13.04	13.02	28
Cadmium	ug/dscm@7%O_2	3.03	0.44	0.47	1.31	35
Lead	ug/dscm@7%O_2	16.38	8.36	6.66	10.47	400
Cadmium	ug/acm	1.07	0.16	0.17	0.47	1178
Lead	ug/acm	5.8	3.1	2.4	3.7	8835
Mercury	ug/acm	5.5	3.8	4.7	4.7	2945
Oxides of Nitrogen	ppm@7%O_2	-	-	-	107	120
Particulate (front half)	mg/dscm@7%O_2 gr/dscf@12%CO_2 lb/hr	1.8 0.0008 0.19	3.3 0.0015 0.39	5.6 0.0027 0.66	3.6 0.0017 0.41	25 NA NA
PCDD/PCDF	ng/dscm@7%O_2 ng/ncmCTEF@12%CO_2 2,3,7,8 TCDD lb/hr	NA NA NA	NA NA NA	NA NA NA	NA NA NA	30 1.95
Opacity	%	-	-	-	1	10
Sulfur Dioxide	ppm@7%O_2	-	-	-	6	29
Unit 1 % Removal Efficiency						
HCl RE%,	%RE	96.9	97.1	97.6	97.2	$\geq$95%
Mercury RE%,	%RE	86.9	87.6	66.8	80.44	$\geq$85%
SO2 RE%,	%RE	-	-	-	92.3	$\geq$75%

Table 2-2
Covanta Bristol Unit 2 Test Results

Parameter	Units	Run 1	Run 2	Run 3	Average	Limit
Unit 2 SDA Inlet Concentrations						
Hydrogen Chloride	ppm@7%O_2	838	747	836	807	NA
Mercury	ug/dscm@7%O_2 lb/hr	62.6 0.0062	145.4 0.0158	47.6 0.0054	85.2 0.0091	NA
Unit 2 Outlet Concentrations						
Ammonia	ppm@7%O_2 lb/hr	1.63 0.2	2.01 0.2	2.75 0.2	2.1 0.2	20 NA
Carbon Monoxide	ppm@7%O_2	-	-	-	19	100
Hydrogen Chloride	ppm@7%O_2 lb/hr	21.69 4.2	6.72 1.4	8.06 1.5	12.2 2.3	29 NA
Cadmium	ug/dscm@7%O_2	1.6	1.3	1.7	1.5	35
Lead	ug/dscm@7%O_2	21.3	17.1	19.1	19.1	400
Mercury	ug/dscm@7%O_2	1.1	0.9	0.8	0.9	28
Cadmium	ug/acm	0.5	0.5	0.6	0.5	1094
Lead	ug/acm	7.4	5.9	6.8	6.7	8201
Mercury	ug/acm	0.4	0.3	0.3	0.3	2734
Oxides of Nitrogen	ppm@7%O_2	-	-	-	115	150
Particulate (front half)	mg/dscm@7%O_2 gr/dscf@12%CO_2 lb/hr	6.3 0.0029 0.75	6.5 0.0030 0.75	7.1 0.0033 0.89	6.6 0.0031 0.80	25 NA NA
PCDD/PCDF	ng/dscm@7%O_2 ng/ncmCTEF@12%CO_2 2,3,7,8 TCDD lb/hr	3.35 0.032 6.1E-10	2.07 0.018 1.6E-10	3.25 0.026 1.6E-10	2.9 0.025 3.1E-10	30 1.95
Opacity	%	-	-	-	0	10
Sulfur Dioxide	ppm@7%O_2	-	-	-	7	29
Unit 2 % Removal Efficiency						
HCl RE%,	%RE	97.4	99.1	99.0	98.5	$\geq$95%
Mercury RE %,	%RE	98.3	99.4	98.4	98.7	$\geq$85%
SO2 RE %,	%RE	-	-	-	90.5	$\geq$75%

Table 2-3
Fugitive Emissions Summary Table
Ash Convey System

Date:: Time: Total Observation Time (Minutes): Test Number:	9/27/22 8:20-9:30 60 M22-1	9/27/22 0940-1050 60 M22-2	9/27/22 1055-1205 60 M22-3	Total opacity observed 180 mins.	Limit[1]
Opacity Observed > 0% (Minutes)	0	0	0	0	9
Opacity Observed > 0% (% of observation period)	0	0	0	0	5%

[1]Visible emissions shall not be observed for more than 9 minutes (5%) over a three-hour period.

3.0 PROCESS INFORMATION

The Bristol Resource Recovery Facility began commercial operation in May 1988. The facility processes 650 tons per day of solid waste into 16.3 megawatts of renewable energy. Most of the energy is sold to Eversource, a subsidiary of Northeast Utilities. Covanta Bristol provides reliable and sustainable waste management to 14 communities that are members of the Bristol Resource Recovery Policy Board, a consortium representing the towns of Berlin, Branford, Bristol, Burlington, Hartland, New Britain, Plainville, Plymouth, Southington, Seymour, Warren, Washington, and Wolcott. The towns have a combined population of 300,000.

Refuse collection trucks are weighed at the scale house and monitored for safety. Once cleared, they enter the tipping building and dump their waste into the storage pit. An overhead crane mixes the waste in the pit and lifts the waste up into a feed chute leading to the furnace. From the feed chute, waste is pushed by hydraulic ram feeders onto a stoker grate. The Martin Reverse-Reciprocating Stoker is sloped downward and is comprised of alternate rows of fixed and moving grate bars. The grate bars push upward against the natural downward movement of the waste bed. This constant movement ensures that the burning waste is continually agitated and pushed back, thus serving as underfire for freshly-fed waste. A forced draft fan supplies the primary combustion air through the front and rear walls of the furnace.

Inside the steel tubes that form the furnace walls and the boiler, heat from the combustion process converts water to steam. The superheater further heats the steam before it is sent to a turbine generator to produce electricity. After passing through the boiler, the bottom ash slowly makes its way to the end of the grate where it falls into the water quench trough of the Martin Ash Discharger.

From the boiler, the cooled gases enter the advanced air pollution control system. Using the lime slurry, the dry scrubber neutralizes any acid-forming gases, such as sulfur oxides and hydrogen chloride.

As the gas stream travels through these filter devices, more than 99 percent of particulate matter is removed. Captured fly ash particles fall into hoppers and are transported by an enclosed conveyor system to the Dustmizer where they are wetted to prevent dust and mixed with the bottom ash from the grate. The ash residue is then conveyed to an enclosed building where it is loaded into trucks and taken to a landfill designed to protect against groundwater contamination. Ash residue from the furnace can be processed for removal of recyclable scrap iron.

All aspects of the plant operation are monitored from the control room 24 hours per day, seven days per week, 365 days per year. Process data are recorded with the CEM Data Acquisition System (DAS).

Table 3-1

Unit 1

Pollutant Monitor	Unit No.	Location	Emission Limit	Range	Monitor Manufacturer	Model Numbe r	Serial Number
NO_x	1	Stack	120 ppmdv @7% O_2	0-500 ppm	Thermo Environmental	42I	1405260797
CO	1	Stack	100 ppmdv @7% O_2	0-500 ppm 0-2000 ppm	Thermo Environmental	48i	48i-636219814
SO_2	1	Stack	29 ppmdv @7% O_2	0-150 ppm	AMETEK Western Research	921	AY-921-9373-2
O_2	1	Stack	----------	0-25 %	Servomex	1420D	S-3317
SO_2/O_2	1	Economizer	----------	0-25 % 0-500 ppm	CAI	ZPA2	N8P1908
SO_2/O_2	1	Stack	29 ppmdv@7% O_2	0-200/ 0-20%	Mir	9000e	154
NO_x/ CO	1	Stack	120 ppmdv @7% O_2 100 ppmdv @7% O_2	0-500 ppm 0-2000ppm	Mir	9000e	154
SO_2/O_2	1	Economizer	29 ppmdv@7% O_2	0-200/ 0-20%	Mir	9000e	154

TABLE 3-2

Unit 2

Pollutant Monitor	Unit No.	Location	Emission Limit	Range	Monitor Manufacturer	Model Numbe r	Serial Number
NO_x	2	Stack	150 ppmdv @7% O_2	0-500 ppm	Thermo Environmental	42i	1405260798
CO	2	Stack	100 ppmdv @7% O_2	0-500 ppm 0-2000 ppm	Thermo Environmental	48i	48i-636219813a
SO_2	2	Stack	29 ppmdv @7% O_2	0-150 ppm	AMETEK Western Research	921	AY-921-9373-4
O_2	2	Stack	----------	0-25 %	Servomex	1420D	S-3318
SO_2/O_2	2	Economizer	----------	0-25 % 0-500 ppm	CAI	ZPA2	N8P1907
SO_2/O_2	2	Stack	29 ppmdv@7% O_2	0-200/ 0-20%	Mir	9000e	152
NO_x/ CO	2	Stack	120 ppmdv @7% O_2 100 ppmdv @7% O_2	0-500 ppm 0-2000ppm	Mir	9000e	152
SO_2/O_2	2	Economizer	29 ppmdv@7% O_2	0-200/ 0-20%	Mir	9000e	159

TABLE 3-3

Back up

Pollutant Monitor	Unit No.	Location	Emission Limit	Range	Monitor Manufacturer	Model Number	Serial Number
SO_2/O_2	Both BU	Stack	29 ppmdv@7% O_2	0-200/0-20%	Mir	9000e	153
NO_x/ CO	Both BU	Stack	120 ppmdv @7% O_2 100 ppmdv @7% O_2	0-500ppm 0-2000 ppm	Mir	9000e	153

The DAS was printed for each test period and this data was provided to TRC for inclusion in this report. Process operating limits are determined during the annual dioxins/furans and mercury emissions tests. The operating limits parameters are described below, and the values are summarized in the table.

- **Steam Load** – Maximum 4-hour arithmetic average unit load during dioxin/furan 4-hour test runs. Limit is equal to 110% of the maximum steam load recorded during the testing.

- **Particulate Matter Control Device Inlet Temperature** – Maximum 4-hour arithmetic average flue gas temperature at the particulate matter control device inlet during dioxin/furan test. Limit is equal to 17°C (30°F) above the maximum temperature.

- **Carbon Mass Feed Rate** – Average carbon mass feed rate in lbs/hr during the dioxin/furan and mercury emissions tests. Limit is to equal or exceed level based on a 24-hour arithmetic average.

Parameter	Operating Limit
Unit 1	
Steam Load	Maximum 94.6 Klbs./hour[1]
Particulate Matter Control Device Inlet Temp.	Maximum 340 °F[1]
Carbon Mass Feed Rate	Minimum 12 lbs./hour
Unit 2	
Steam Load	Maximum 95.7 Klbs./hour
Particulate Matter Control Device Inlet Temp.	Maximum 345 F
Carbon Mass Feed Rate	Minimum 12 lbs./hour

[1] Since Unit 1 did not require dioxin/furan testing, the Steam Load Level and Particulate Matter Control Device Inlet Temperature operating limits are those from the most recent dioxin/furan test (2021 Performance Test).

4.0 SAMPLING AND ANALYTICAL METHODS

Particulate (filterable) and metals emissions and concentrations were determined utilizing an EPA Method 29 sampling train. The accumulated emissions time of fugitive emissions was determined by observing the process area(s) during normal operations for a predetermined observation period (three one-hour periods). The concentrations and emission rates of tetra through octa polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF or dioxin/furans) was determined utilizing EPA 23. Hydrogen chloride and ammonia concentrations and emission rates were determined utilizing EPA Method 26, modified to use large impingers (Method 5-type) to avoid sampling problems. Detailed descriptions of each sampling method are presented in **Appendix O**.

4.1 Sampling Locations

Emissions tests were conducted at sampling points selected in accordance with EPA Method 1. Appendix H includes Method 1 data forms and schematics for each sampling location.

The inlet sampling locations were essentially identical. Two 8-inch diameter sampling ports, 8.5 inches in length, spaced 90 degrees apart were located on the 64-inch diameter ducts. There were 24 traverse points (12 per port) used for isokinetic sampling.

The outlet sampling locations were essentially identical. The sampling platform was located 40 feet above grade (64 ft. Elevation). Two 8-inch diameter sampling ports, 8.5 inches in length, spaced 90 degrees apart were located on the 60-inch diameter stacks. The ports were 8 diameters downstream from a flow disturbance and greater than 8 diameters upstream from the stack exit. There were 16 traverse points, (8 per port) used for isokinetic sampling.

5.0 QUALITY ASSURANCE

TRC's quality assurance program for source emission measurement was designed so that work is performed by competent individuals using properly calibrated equipment and approved procedures for sample collection, recovery and analyses. The Program Manager, Project Manager and the Program Quality Assurance Manager were responsible for developing data of the highest quality. The Program Quality Assurance Manager was responsible for performing the accuracy and precision evaluations and the QC reporting. Specific details of TRC's quality assurance program may be found in EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume III (EPA-600/4-94-0271b).

Sampling and measurement equipment, including continuous analyzers, recorders, pitot tubes, dry meters, orifice meters, thermocouples, probes, nozzles, and any other pertinent apparatus, were uniquely identified, underwent preventive maintenance, and was calibrated before and after each field effort, following written procedures and acceptance criteria. Most calibrations were performed with standards traceable to the National Institute for Science and Technology (NIST). These standards include wet test meters, standard pitot tubes, and NIST Standard Reference Materials. Records of all calibration data are maintained in TRC files. Copies of calibration records were made available on-site.

During field tests, sampling performance and progress were continually evaluated, and deviations from sampling method criteria were reported to the Field Team Leader who then determined the validity of the test run. All field data were recorded on prepared data sheets. A Field Team Leader maintained a written log describing the events of each day. Field samples, including field blanks, were transported from the field in shockproof, secure containers. Sample integrity was controlled through the use of prepared data sheets, positive sample identification, and chain-of-custody forms.

All calculations were performed using an Excel spreadsheet developed by TRC. Final results were checked by a senior-level project engineer.