

Executive Summary Boiler Compliance Test Report

for

Graphic Packaging International

79 Fountain Street

Battle Creek, Michigan

PTI #9-15, MI-ROP-B1678-2011

Testing Date: March 7, 2016

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On April 8, 2015, Graphic Packaging International was granted PTI #9-15 (in part) for the replacement of the burners on Boiler **EUBLR001** with low NOx technology coupled with the restriction to burn pipeline grade natural gas (only). The boiler portion of the PTI request reduces (restricts) emissions to levels lower than those previously allowed for this emissions unit.

Following the burner replacement, the testing was conducted during the operation of both paper machines, the operation of a steam powered turbine and also while venting steam to generate maximum steam demand/load conditions for the unit. The testing satisfies the testing requirement found in Permit to Install #9-15 at condition (V)(1) EUBLR001 and followed the "approved" test plan dated September 9, 2015. The test plan received an acknowledgement letter from the MDEQ-AQD dated October 16, 2015.

The test team conducted the testing in accordance with U.S. EPA stack testing methods found in 40 CFR, Part 60, Appendix A. Specifically test methods 1, 2, 3A, 4, and 7E were followed. The NOx testing indicated compliance with the 120 pounds of NOx per million standard cubic feet (lbs/MMscf) of natural gas burned.

The testing results for the three run average values are as follows:

Parameter	3-Run Average
Steam load	118,033 pounds per hour
Oxygen Content	7.14 %
NOx Concentration	73.91 ppm (dry basis)
NOx Emission Rate	0.117 pounds per MMBtu
	17.69 pounds per hour
	117.6 pounds per MMscf of natural gas
Natural Gas Consumption Rate	150.3 per 1000 scf of natural gas per hour (mscf)
Stack Gas Flow Rate	33,865 dscfm

End of summary report.

BOILER COMPLIANCE TEST REPORT

**As Defined By The
Code of Federal Regulations; Title 40 Parts 60**

RMCEINC Project #2016-22056

**GRAPHIC PACKAGING INTERNATIONAL
BATTLE CREEK FACILITY
BOILER & PAPER MACHINE #2
BATTLE CREEK, MICHIGAN**

**PERMIT NO.: 9-15
ROP NO.: MI-ROP-B1534-2011**

**PREPARED FOR:
GRAPHIC PACKAGING INTERNATIONAL**


BY:

RMC ENVIRONMENTAL, INC. – CHICAGO REGIONAL OFFICE

REPORT CERTIFICATION

The sampling, analysis, and data collection performed for this report were carried out under my direction and supervision, and I hereby certify that this test report is authentic and accurate, to the best of my knowledge.

Date 4/4/2016

Signature 
Rachel Chleborowicz, QSTI
Project Manager
RMC ENVIRONMENTAL, INC.

2.0 PROJECT SUMMARY

The compliance testing was conducted for Graphic Packaging International who used the test method results to verify the NO_x emission rates for EUBL001 in conformance with the air permit to install 9-15/MI-ROP-B1678-2011. The compliance test results are shown in **Tables 2-1**.

RMCEINC calculated the NO_x emission rate (lbs NO_x/mmBtu and pounds of NO_x per million standard cubic feet of fuel burned) using the dry basis reference measurements of ppm NO_x and percent O₂ and an F-Factor of 8,710 scf/mmBtu. RMCEINC conducted the reference method testing while the source was operated at maximum achievable load.

TABLE 2-1. BOILER #9 COMPLIANCE TEST SUMMARY

RUN NO. (TIME)	AVERAGE STEAM LOAD	% OXYGEN	Oxides of Nitrogen (NO _x)				GAS FLOW (MCF)	EFFLUENT FLOWRATES (DSCFM)
			CONCENTRATION (PPM) ^A	EMISSION RATE LB/MMBTU	LB / HR	LB / MMCF		
1 (845-945)	115,080	6.46	73.64	0.111	16.51	113.1	146	31,290
2 (955-1055)	121,420	7.47	75.14	0.122	18.73	121.6	154	35,486
3 (1105-1205)	117,600	7.48	72.96	0.118	17.84	118.2	151	34,821
AVERAGES	118,033	7.14	73.91	0.117	17.69	117.6	150.3	33,865
BOILER PERMIT & NSPS SPECIFICATIONS (lb/mmCF)						120		

^AParts per million, dry basis & lb/mmBtu

3.0 REFERENCE TEST EQUIPMENT AND PROCEDURES

The certification test program measured exhaust gas concentrations of NO_x lbs/mmBtu for comparison to the source limits. RMCEINC used the procedures that conform to the requirements of CFR; Title 40 Part 60 and EPA Test Methods 1, 3A, and 7E (CFR; Title 40 Part 60, Appendix A). The equipment and procedures RMCEINC used in meeting these requirements are described below.

3.1 O₂ and NO_x Concentrations

Concentration measurements of O₂ and NO_x are made according to EPA Methods 3A, and 7E using the analyzers listed in **Table 3-1**. **Figure 3-1** is a schematic of the dry extractive reference measurement gas sampling system used by RMCEINC. All components of the sampling system that contact the sample are stainless steel, glass, or Teflon.

The test program includes the measurement of exhaust gas concentrations of NO_x. RMCEINC used the procedures that conform to the requirements of CFR; Title 40 Part 60, Appendix A, Methods 1, 3A and 7E. A pretest stratification check was conducted and it was determined that each location meet the > 5% difference between points. A single sampling point was used for the balance of the sampling.

The sample traverse points used during this test project are defined in the Source Stack/Duct Cross-Diagrams figures in Section 3. Each traverse point was continuously sampled for 20 minutes during each test run.

The probe assemblies are temperature controlled to maintain the sample above the dew point and includes the sample filter. A temperature controlled Teflon umbilical connects the probes to an ice bath condenser. The condenser is equipped with a condensate discharge pump to continuously remove the condensate from the condenser traps. The dried sample is then transported to the mobile laboratory's sample manifold.

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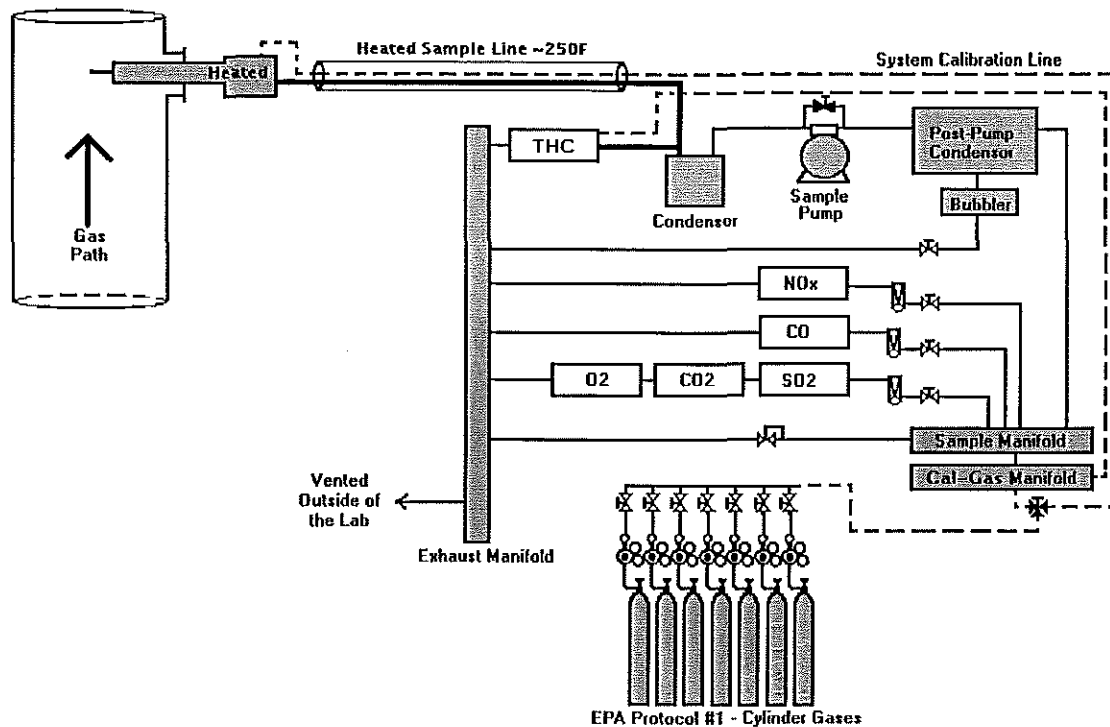
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TABLE 3-1. REFERENCE METHOD ANALYZERS

Parameter	Analyzer	Analytical Technique	Instrument Span
NO _x	Thermo Environmental Instruments Model 10A or 42H	Chemiluminescence	0-115 ppm
O ₂	Teledyne 3300PA	Micro Fuel Cell	0-20.9 %

RMCEINC conducts a three-point (zero, mid-range, and high-range) analyzer calibration error check on each reference analyzer before initiating the relative accuracy testing. This check is conducted after final calibration adjustments are made by injecting the calibration gases directly into each gas analyzer and recording the responses on the reference data acquisition system.

FIGURE 3-1. REFERENCE METHOD GAS SAMPLING SYSTEM DIAGRAM



RMCEINC conducts zero and upscale calibration bias checks both before and after each test run in order to quantify measurement system calibration drift and sampling system bias. Upscale is either the mid-range, or high-range gas, whichever most closely approximates the flue gas level. During these checks, the calibration gases are introduced into the sampling system through the Omni-Probe sample chamber located at the three probe outlets or at the three-way valve assembly so that the calibration gases are analyzed in the same manner as the flue gas samples.

RMCEINC recorded the reference analyzer measurements as 1-minute and run averages on the reference DAS. All test run concentration results were determined from the average gas concentrations measured during the run and adjusted based on the zero and upscale sampling system bias check results (Equation 7E-1 presented in CFR; Title 40 Part 60, Method 7E, Section 8). The reference emission rate values in units of lb/mmBtu were computed from each test run average of adjusted, dry basis concentrations and using the O₂-based dry F-factor (8710 for natural gas) and equation presented in CFR; Title 40 Part 60, Method 19, Section 2.4.

4.0 REFERENCE EQUIPMENT QUALITY ASSURANCE PROCEDURES

This section defines the quality assurance procedures used by RMCEINC during the test program. These descriptions briefly highlight the a few procedures used by RMCEINC. Additional information and detailed procedures are defined in CFR Title 40 Part 60.

RMCEINC followed the calibration and quality assurance procedures of CFR Title 60 Appendix A (EPA Test Methods) throughout the test program. The results of sampling system bias and calibration drift tests for each test run are calculated and presented in **Appendix A**. Example calculations in **Appendix B** indicate how each test run's final results are calculated. Reference measurement system performance test data are contained in **Appendix C**. Cylinder gases used during the testing were certified by Scott Specialty Gases using EPA Protocol #1 requirements. The calibration gas certificates of analysis are included in **Appendix D**.

RMCEINC uses computers throughout the test program. Spreadsheets and software programs are checked in our office for accuracy. Software used by RMCEINC is structured to eliminate human errors in data entry where possible by automating the process. When possible RMCEINC inputs field data directly into the DAS system and eliminates the hand written field data sheets. These systems provide an accurate measurement of the raw test data and are not used to modify or change test data in any manner. Equations used in these systems are taken directly from the CFR when possible and notations are provided if originated from an alternate source or customized in any manner.

RMCEINC monitors the operation (temperatures and pressures) of the Omni-Probe during the test project to insure compliance with EPA GD-31. This guideline document requires sample flow from each traverse points to be maintained within ten percent (10%) of each other. If the sample flow difference between two traverse points exceeds or approaches the limit, RMCEINC pauses testing until the flows can be equalized.