



ADVANCED INDUSTRIAL RESOURCES, INC.

***PERMIT (ROP) COMPLIANCE TEST REPORT
(CO RE-TEST)
No. 11 BOILER***

AT

***VERSO ESCANABA LLC
ESCANABA, MICHIGAN
PROJECT ID: KR-9649***

RECEIVED

AUG 14 2017

AIR QUALITY DIVISION

PREPARED FOR:



**7100 COUNTY ROAD 426
ESCANABA, MICHIGAN 49829**

PREPARED BY:

**ADVANCED INDUSTRIAL RESOURCES, INC.
3407 NOVIS POINTE
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Test Date:

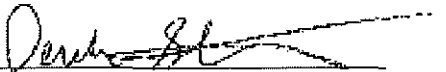
JUNE 14, 2017



ADVANCED INDUSTRIAL RESOURCES, INC.

REPORT CERTIFICATION SHEET


Having conducted the Technical Review of this report, I hereby certify the data, information, results, and calculations in this report to be accurate and true according to the methods and procedures used.



Derek Stephens
Technical Director
Advanced Industrial Resources

August 3, 2017
Date

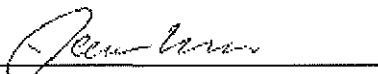
Having written and prepared this report, I hereby certify that the data, information and results in this report to be correct and all inclusive of the necessary information required for a complete third-party review of the testing event.



Steven Haigh
Report Preparation Director
Advanced Industrial Resources

August 3, 2017
Date

Having supervised all aspects of the field testing, I hereby certify the equipment preparation, field sample collection procedures, and all equipment calibrations were conducted in accordance to the applicable methodologies.



Dan Kirk
Field Project Supervisor
Advanced Industrial Resources

June 23, 2017
Date

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Verso Escanaba LLC (VE) operates an integrated pulp and paper mill in Escanaba, Michigan. The facility is operated under the Michigan Department of Environmental Quality (MDEQ) issued Renewable Operating Permit (ROP) Number MI-ROP-A0884-2016. Processes at the facility include the No. 11 Boiler.

Testing was conducted on the No. 11 Boiler exhaust duct and stack to quantify the emissions of carbon monoxide.

The field sampling portion of the test program was conducted on June 14, 2017, in accordance with the site-specific Test Plan submitted to the MDEQ. All test methods and procedures were performed by Advanced Industrial Resources, Inc. (AIR) in accordance with approved USEPA Methods (i.e., 40 CFR 60 Appendix A Methods 3a and 10).

1.2 KEY PERSONNEL

The key personnel who coordinated the test program and their telephone numbers are:

Adam Becker, Verso Escanaba LLC	906-233-2929
Derek Stephens, <i>QSTI I-IV</i> , Advanced Industrial Resources	404-843-2100
Scott Wilson, Advanced Industrial Resources	800-224-5007

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2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS & CONTROL EQUIPMENT DESCRIPTION

Verso Escanaba LLC operates a pulp and paper mill in Escanaba, Michigan. Processes at the facility include the No. 11 Boiler.

The No. 11 Boiler (EU11B68), installed 1981, modified 1986, is an ABB Combustion Engineering combination fuel boiler rated for 750,000 pounds of steam per hour (approximately 1040 million BTU per hour heat input) that provides steam for mill processes and steam turbine-generators for producing electricity. The No. 11 Boiler burns natural gas and solid fuels, which include pulverized coal, wood residue, wastewater treatment plant residuals, Tire-Derived Fuel (TDF), and non-hazardous secondary material (NHSM) engineered fuel pellets. Emissions from the No. 11 Boiler are controlled by an over-fired air system (OAF), multi-clone, and electrostatic precipitator. Opacity is monitored by a COMS which meets the design, installation, performance and certification requirements of Performance Specification 1 under Appendix B of 40 CFR 60 and the quality assurance requirements of Procedure 2 under Appendix F to 40 CFR 60. The COMS also meets the requirements of 63.7525. The boiler utilizes an oxygen trim system to maintain optimum air to fuel ratios.

2.2 SAMPLING LOCATION

The sampling location for PM emissions testing on the No. 11 Boiler exhaust is located at greater than 8.0 equivalent diameters downstream from the nearest upstream flow disturbance and at least 2.0 equivalent diameters upstream from the stack exhaust. The exhaust stack has a circular cross-section with an internal diameter of 168.0 inches. The stack has four sampling ports oriented on a 90 degree horizontal plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling location is presented in Appendix D.

The sampling location for CO emissions testing on the No. 11 Boiler exhaust is located within the duct prior to the breach of the No. 11 Boiler stack which is within the vicinity of the facility's CEMS probes and is where annual RATA certification tests are

conducted. This sample location is rectangular and is equipped with a single sample port. Previous testing and certification of the facility's CEMS has indicated an absence of stratification at this sample location. Therefore, sampling was conducted within the centroidal region of the duct for Methods 3A and 10.

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES

The purpose of the testing was to establish compliance with the applicable emissions limits set-forth in the facility's ROP.

3.2 FIELD TEST CHANGES, PROBLEMS, OR ITEMS OF NOTE

The testing was conducted in accordance with the Site-Specific Test Protocol submitted to the MDEQ. No problems were encountered during testing that required deviation from the planned test protocol.

3.3 PRESENTATION OF TEST RESULTS

Emission rates and concentrations are summarized and compared to ROP limits in Table 3-1. Complete emissions data are presented in Appendix A and Reduced and tabulated data from the field-testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D. Laboratory reports and custody records are presented in Appendix E.

TABLE 3-1: Results Summary - Facility Permit (ROP) Emission Standards

Source	Pollutant	Average Measured	Allowable	Units	% of Allowable
No. 11 Power Boiler	CO	0.0519	0.5	lb / MMBtu	10%

3.4 PROCESS OPERATION DATA

All essential process and control device monitoring equipment was operating and data was being recorded throughout the test periods. Data collected is presented in Appendix G and includes heat input rates per fuel type, applicable CEMS and COMS data, control device operating parameters and steam production rates.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Emission rate testing was performed on the No. 11 Power Boiler exhaust in accordance with 40 *CFR* 60 Appendix A. Specifically:

- EPA Method 3A was used for the calculation of the density and dry molecular weight of the effluent stack gas as well as to determine the oxygen and carbon dioxide concentrations using a calibrated instrumental analyzer.
- EPA Method 10 was used for the determination of carbon monoxide emission concentrations.
- EPA Method 19 was to determine the heat input of the boiler and was used to report the applicable emissions in the units of lbs/MMBtu.

5.0 QUALITY ASSURANCE ACTIVITIES

The quality assurance/quality control (QA/QC) measures associated with the sampling and analysis procedures given in the noted EPA reference methodologies, in Subparts A of 40 *CFR* 60 and 40 *CFR* 63, and in the *EPA QA/QC Handbook*, Volume III (EPA 600/R-94/038c) were employed, as applicable. Such measures included, but were not limited to, the procedures detailed below.

5.1 GAS ANALYZER CALIBRATION

5.1.1 CALIBRATION GAS CONCENTRATION VERIFICATION

AIR obtained a certificate from the gas manufacturer and confirmed that the documentation included all information required by the Environmental Protection Agency Traceability Protocol No. 1. AIR confirmed that the manufacturer certification was complete and current and that calibration gases certifications had not expired. This documentation was available on-site for inspection during testing and is presented in Appendix E.

5.1.2 MEASUREMENT SYSTEM PREPARATION

AIR assembled, prepared, and preconditioned each measurement system by following the manufacturer's written instructions for preparing and preconditioning each gas analyzer and, as applicable, the other system components. *AIR* made all necessary adjustments to calibrate the analyzers and the data recorders and to achieve the correct sampling rate.

5.1.3 ANALYZER CALIBRATION ERROR

After sampling system and analyzer assembly, preparation and calibration, AIR conducted a 3-point analyzer calibration error test before the first run. AIR introduced the low-, mid-, and high-level calibration gases sequentially in direct calibration mode. During the test, AIR made no adjustments to the system except to maintain the correct flow rate. AIR recorded the analyzer's response to each calibration gas and calculated the system calibration error. At each calibration gas level (low, mid, and high) the

calibration error was within ± 2.0 percent or 0.5 ppm of the calibration span.

5.1.4 INITIAL SYSTEM BIAS AND CALIBRATION ERROR CHECKS

Before sampling began, AIR determined that the high-level calibration gas best approximated the emissions and used it as the upscale gas. AIR introduced the upscale gas at the probe upstream of all sample conditioning components in system calibration mode. The time it took for the measured concentration to increase to a value that is within 95 percent of the certified gas concentration was recorded. AIR continued to observe the gas concentration reading until it reached a final, stable value and recorded the value.

Next, AIR introduced the low-level gas in system calibration mode and recorded the time required for the concentration response to decrease to a value that was within 5.0 percent of the certified low-range gas concentration.

AIR continued to observe the low-level gas reading until it reached a final, stable value and recorded the result. AIR operated the measurement system at the normal sampling rate during all system bias checks and made only the adjustments necessary to achieve proper calibration gas flow rates at the analyzer. From this data, AIR determined the initial system bias was less than 5% of the calibration span for the low- and high- level gases.

5.1.5 MEASUREMENT SYSTEM RESPONSE TIME

AIR calculated the measurement system response time from the data collected during the Initial System Bias Check.

5.2 INSTRUMENT INTERFERENCE RESPONSE

AIR obtained instrument vendor data that demonstrates the interference performance specification is not exceeded as defined in EPA Method 7E Section 13.4. Documentation is provided in Appendix D.

5.3 DATA REDUCTION CHECKS

AIR ran an independent check (using a validated computer program) of the calculations with predetermined data before the field test, and the *AIR* Team Leader conducted spot checks on-site to assure that data was being recorded accurately. After the test, *AIR* checked the data input to assure that the raw data had been transferred to the computer accurately.

5.4 EXTERNAL QUALITY ASSURANCE

5.4.1 TEST PROTOCOL EVALUATION

A Site-Specific Test Protocol (SSTP) was submitted to MDEQ in advance of testing, which provided regulatory personnel the opportunity to review and comment upon the test and quality assurance procedures used in conducting this testing.

5.4.2 ON-SITE TEST EVALUATION

A test schedule was submitted with the Site-Specific Test Protocol and MDEQ personnel were notified of all changes in the schedule. No tests were performed earlier than stated in the original schedule. Therefore, regulatory personnel were afforded the opportunity for on-site evaluation of all test procedures.

6.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) process is generally a seven-step iterative planning approach to ensure development of sampling designs for data collection activities that support decision making. The seven steps are as follows: (1) defining the problem; (2) stating decisions and alternative actions; (3) identifying inputs into the decision; (4) defining the study boundaries; (5) defining statistical parameters, specifying action levels, and developing action logic; (6) specifying acceptable error limits; and (7) selecting resource-effective sampling and analysis plan to meet the performance criteria. The first five steps are primarily focused on identifying qualitative criteria such as the type of data needed and defining how the data will be used. The sixth step defines quantitative criteria and the seventh step is used to develop a data collection design. In regards to emissions sampling, these steps have already been identified for typical monitoring parameters.

Monitoring methods presented in 40 *CFR* 60 Appendix A indicate the following regarding DQOs: Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods. At a minimum, each method provides the following types of information: summary of method; equipment and supplies; reagents and standards; sample collection, preservation, storage, and transportation; quality control; calibration and standardization; analytical procedures, data analysis and calculations; and alternative procedures. These test methods have been designed and tested according to DQOs for emissions testing and analysis. These test methods have been specified and were followed in accordance with the Site-Specific Test Protocol submitted to MDNRE to ensure that DQOs were met for this project.