COMPLIANCE TEST REPORT
CHIP THICKNESS SCREENING SYSTEM
AT
VERSO ESCANABA LLC
ESCANABA, MICHIGAN
PROJECT ID: KR-9649

PREPARED FOR:

VERSO

7100 COUNTY ROAD 426
ESCANABA, MICHIGAN 49829

PREPARED BY:

ADVANCED INDUSTRIAL RESOURCES, INC.
3407 NOVIS POINTE
ACWORTH, GEORGIA 30101

Test Date:
JUNE 14-16, 2017

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	August 7, 2017
Technical Director	Date
Advanced Industrial Resources	

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	August 7, 2017
Report Preparation Director	Date
Advanced Industrial Resources	

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	June 23, 2017
Field Project Supervisor	Date
Advanced Industrial Resources	

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AIR QUALITY DIVISION

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

Verso Escanaba LLC (VE) operates an integrated pulp and paper mill in Escanaba, Michigan. Michigan Department of Environmental Quality (MDEQ) issued Renewable Operating Permit (ROP) Number MI-ROP-A0884-2016, and relevant sections of the Title 40 of the Code of Federal Regulations, Part 60 (40 *CFR* 60).

A regulatory compliance test was conducted to determine the compliance status of the CTS System with regard to particulate matter (PM).

The CTS System is comprised of six (6) individual emissions sources including the No. 1 Chip Reclaim Cyclone (East), No. 2 Chip Reclaim Cyclone (West), Air Density Separator Cyclone No. 1A, Air Density Separator Cyclone No. 1B, Air Density Separator Cyclone No. 2A, and Air Density Separator Cyclone No. 2B. Each source is equipped with an individual exhaust and testing was conducted on each stack exhaust separately and non-simultaneously.

The field sampling portion of the test program was conducted on June 14-16, 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 1, 2, 3a, 4 and 5).

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, *QSTI I-IV*, Advanced Industrial Resources	404-843-2100
Scott Wilson, Advanced Industrial Resources	800-224-5007

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS & CONTROL EQUIPMENT DESCRIPTION

The Escanaba Paper Company includes several emission sources that are subject to the emission limits and monitoring requirements of Permit Number MI-ROP-A0884-2008 and relevant sections of the Title 40 of the Code of Federal Regulations, Part 60 (40 *CFR* 60) including the Chip Thickness Screening (CTS) System. The CTS System is comprised of two (2) chip surge bins and four (4) air density separators. The emissions from these processes are controlled by the No. 1 Chip Reclaim Cyclone (East), No. 2 Chip Reclaim Cyclone (West), Air Density Separator Cyclone No. 1A, Air Density Separator Cyclone No. 1B, Air Density Separator Cyclone No. 2A, and Air Density Separator Cyclone No. 2B.

2.2 SAMPLING LOCATION

The sampling location on the No. 1 Chip Reclaim Cyclone East (Cyclone No. 1 East) exhaust is located 2.21 stack diameters downstream and 0.6 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 44.0 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

The sampling location on the No. 2 Chip Reclaim Cyclone (Cyclone No. 2 West) exhaust is located 2.3 stack diameters downstream and 0.6 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 37.5 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

The sampling location on the Air Density Separator Cyclone No. 1A (ADS 1A) exhaust is located 6.2 stack diameters downstream and 5.8 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 25.0 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

The sampling location on the Air Density Separator Cyclone No. 2A (ADS 2A) exhaust is located 6.2 stack diameters downstream and 5.8 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 25.0 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

The sampling location on the Air Density Separator Cyclone No. 1B (ADS 1B) exhaust is located 6.2 stack diameters downstream and 5.8 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 25.0 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

The sampling location on the Air Density Separator Cyclone No. 2B (ADS 2B) exhaust is located 6.2 stack diameters downstream and 5.8 stack diameters upstream from any flow disturbance. The exhaust stack from the cyclone has a circular cross-section with an internal diameter of 25.0 inches. The stack has two (2) sampling ports oriented 90 degrees to one another in a plane perpendicular to the exhaust flow direction. A schematic diagram of the sampling locations is presented in Appendix D. Twenty-four (24) sampling points (twelve points per port) were used for USEPA Methods 2, 3, 4, and 5, in accordance with USEPA Method 1 requirements.

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES

The purpose of the test program is to determine the compliance status of the six cyclone exhausts associated with the CTS System with regard to PM and PM_{10} emissions established in the facility's Renewable Operating Permit Number MI-ROP-A0884-2016.

3.2 FIELD TEST CHANGES AND PROBLEMS

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 CHIP THICKNESS SCREENING SYSTEM TEST RESULTS

Concentrations and mass rates are presented in Appendix A. Emission rates and concentrations are preliminarily summarized and compared to the applicable permit limits in Table: 3-1. Reduction data is presented in Appendix B and raw field data is presented in Appendix D.

Table 3-1 Summary of Test Results

Source	Pollutant	Average Measured	Allowable	Units	% of Allowable
Chip Thickness Screening System Total	PM	0.00219	0.00750	gr/dscf	**29%**
		1.29	5.58	lb/hour	**23%**

3.3.1 PARTICULATE MATTER RESULTS

The Chip Thickness Screening System combined emissions shall not exceed 0.0075 grains per dry standard cubic feet (gr/dscf) nor 5.58 pounds per hour (lb/hr) of total filterable particulate matter. The combined PM emissions resulting from the testing of the Chip Thickness Screening System were determined to be **0.00219 grains/dscf and 1.29 lb/hr**, respectively.

3.4 PROCESS MONITORING

Please note that due to the nature of these processes, production data through the CTS system, especially the ADS cyclones, is not readily available. Best estimates were made of production rates by the woodyard superintendent and are presented in Appendix G. Production rates through the four ADS cyclones were calculated differently than in the previous compliance test report and a range was determined. Although the production rates for the ADS cyclones are somewhat less than reported in the previous compliance test report, the woodyard superintendent verified all CTS sources were operating at maximum normal operating conditions during testing.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Emission rate testing was conducted according to the methodology in *Title 40 Code of Federal Regulation*, Part 60, Appendix A as applicable to particulate matter emitting sources. Specifically, Method 1 was used for the qualification of the location of sampling ports and for the determination of the stack gas velocity and volumetric flow rate. Method 2 was used for the determination of the stack velocity and volumetric flow rate. Method 3A was used for the determination of the composition and dry molecular weight for effluent stack gas. Method 4 was used for the determination of the moisture content of effluent stack gas. Method 5 was used for the determination of particulate matter emissions from stationary sources. EPA Method 201a was used for the determination of PM_{10} emissions.

Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter. The particulate matter mass, which includes any material that condenses at or above the filtration temperature, was determined gravimetrically after the removal of uncombined water.

Samples from EPA Method 5 testing were recovered on site in a controlled environment. All samples were stored upright in a closed sample box until final laboratory analysis. In order to limit the chain of custody, only essential *AIR* personnel were permitted access to these samples.

5.0 QUALITY ASSURANCE ACTIVITIES

5.1 INTERNAL QUALITY ASSURANCE

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

5.1.1 Particulate Matter Filter Preparation

As prescribed in USEPA Method 5 Section 7.1.1, particulate matter filters employed for the determination of particulate matter emissions per USEPA Methods 5 and 201a are high-purity glass-fiber filters, without organic binder. These filters exhibit at least 99.95% efficiency of removal of 0.3-micron dioctyl phthalate smoke particles.

All filters are conditioned before and after field use according to procedures given in Section 8.1.3 of USEPA Method 5. The glass-fiber filters are desiccated at 68 ± 10 °F and ambient pressure for a minimum of 24 hours. Each filter is then weighed at intervals of not less than 6 hours to a constant weight (i.e. ≤0.5 mg change from previous weighing) and the results are recorded to the nearest 0.1 mg in the laboratories log book. Filters are counted into groups of 25 and stored inside plastic Petri dishes, which are sealed with tape. After sample collection, each filter is collected individually, placed in a labeled Petri dish, and stored upright in the secure sample shipping box. After field sampling, one of the unused filters from this set of 25 is separated, placed individually in a labeled Petri dish, and stored upright with the other samples for use in the laboratory analysis blank.

5.1.2 Probe Nozzle Diameter Checks

Probe nozzles were calibrated before field testing by measuring the internal diameter of the nozzle entrance orifice along three different diameters. Each diameter was measured to the nearest 0.001 inch, and all measurements were averaged. The diameters were within the limit of acceptable variation of 0.004".

5.1.3 Pitot Tube Face Plane Alignment Check

Before field testing, each Type S Pitot tube was examined in order to verify that the face planes of the tube were properly aligned, per Method 2 of 40 *CFR* 60, Appendix A. The external tubing diameter and base-to-face plane distances were measured in order to verify the use of 0.84 as the baseline (isolated) pitot coefficient. At that time the entire probe assembly (i.e., the sampling probe, nozzle, thermocouple, and Pitot tube) was inspected in order to verify that its components met the interference-free alignment specifications given in EPA Method 2. Because the specifications were met, then the baseline pitot coefficient was used for the entire probe assembly.

After field testing, the face plane alignment of each Pitot tube was checked. No damage to the tube orifices was noted.

5.1.4 Metering System Calibration

Every three months each dry gas meter (DGM) console is calibrated at five orifice settings according to Method 5 of 40 *CFR* 60, Appendix A. From the calibration data, calculations of the values of Y_m and $\Delta H_@$ are made, and an average of each set of values is obtained. The limit of total variation of Y_m values is ± 0.02, and the limit for $\Delta H_@$ values is ± 0.20.

After field testing, the calibration of the DGM console was checked by performing three calibration runs at a single intermediate orifice setting that is representative of the range used during field-testing. Each DGM was within the limit of acceptable relative variation from Y_m of 5.0%.

5.1.5 TEMPERATURE GAUGE CALIBRATION

After field testing, the temperature measuring instruments on each sampling train was calibrated against standardized mercury-in-glass reference thermometers. Each indicated temperature was within the limit of acceptable variation between the absolute reference temperature and the absolute indicated temperature of 1.5%.

5.1.6 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. Flow rates, temperatures and moisture levels were relatively constant (variation <5%) during the three test runs, which indicates that data recording and Method 2 and 4 sampling and calculation errors are not likely.

5.2 EXTERNAL QUALITY ASSURANCE

5.2.1 TEST PROTOCOL EVALUATION

A Site-Specific Test Protocol was submitted to the MDNRE 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.

5.2.2 ON-SITE TEST EVALUATION

A test schedule was submitted with the SSTP 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 a 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.