Indianapolis, IN
Ft. Wayne, IN
Evansville, IN
South Bend, IN
Milwaukee, WI

WILCOX
ENVIRONMENTAL ENGINEERING

CORPORATE OFFICE
5757 West 74th Street
Indianapolis, IN 46278
phone 317.472.0999
fax 317.472.0993
www.wilcoxenv.com

Compliance Report on Particulate Matter, Carbon Monoxide, and Visible Emissions from Hot/Warm Mix Asphalt Unit

Rieth-Riley
Wyoming, MI

Wilcox Project # 181.15

September 2, 2015

Prepared For:

Rieth-Riley Construction Company
2020 Chicago Drive SW
Wyoming, MI 49519

EXECUTIVE SUMMARY

Wilcox Environmental Engineering, Inc. – Air Analysis Services (Wilcox) was contracted by Rieth-Riley Construction Company, Inc. (Rieth-Riley) to sample air emissions at the Wyoming, MI plant on August 4th, 2015. The hot/warm mix asphalt unit was tested to evaluate particulate matter (PM) emissions, opacity of visible emissions (VE), and carbon monoxide (CO) emissions. The testing program was performed consistent with US EPA Methods 1, 2, 3A, 4, 5, 9, and 10. The test results are summarized below in Table ES-1.

Table ES-1. Emissions Results Summary

Date	Test Parameter	Result	Permit Limit
8/6/2015	Particulate Matter	0.00210 gr/dscf	0.04 gr/dscf
		0.00186 lbs/ton	0.04 lbs/ton
	Opacity/VE	0.00%	20%
	Carbon Monoxide	0.0838 lbs/ton	0.201 lbs/ton

1.0 INTRODUCTION

Wilcox conducted source emissions testing on August 6th, 2015 at Rieth-Riley in Wyoming, MI in fulfillment of the submitted test plan for their hot mix asphalt (HMA) unit to demonstrate compliance with their Michigan Department of Environmental Quality (MDEQ) Permit No. 96-96A.

Table 1-1 below presents the emission unit(s) and parameters that were tested. The test was conducted in accordance with approved Environmental Protection Agency (EPA) Registered Test Methods and the submitted test protocol report is included in the Appendix of this document.

Table 1-1. Emissions Sampling Summary

TEST LOCATION	PARAMETER	TEST METHOD	# OF TEST RUNS	SAMPLE DURATION (MIN)	ANALYTICAL APPROACH
HMA UNIT	EXHAUST FLOW	USEPA METHOD 1,2	3	60	PITOT TUBE
	EXHAUST TEMP	USEPA METHOD 1,2	3	60	THERMOCOUPLE
	O2/CO2	USEPA METHOD 3A	3	60	PARAMAGNETIC/NDIR
	MOISTURE	USEPA METHOD 4	3	60	GRAVIMETRIC
	PM	USEPA METHOD 5	3	60	GRAVIMETRIC
	OPACITY OF VE	USEPA METHOD 9	3	60	VE READER
	CO	USEPA METHOD 10	3	60	NDIR/GFC

Table 1-2. Project Personnel

Firm	Contact	Title	Phone No.
Wilcox	Aaron Schavey	Senior Project Manager	317.472.0999
Wilcox	Taz Ziegler	Senior Technician	317.472.0999
Rieth-Riley	John Berscheit	Technical Services Manager	574.875.5183
MDEQ	Heidi Holloenbach	Environmental Scientist	616.356.0243

2.0 FACILITY DESCRIPTION AND SOURCE INFORMATION

Rieth-Riley Construction Co. is a paving contractor located at 2020 Chicago Drive, Wyoming, MI 49519. They operate Hot/Warm Mix Asphalt (HWMA) equipment, including a 500TPH counter-flow unified drying/mixing drum using a baghouse for control which is exhausted through a circular stack.

3.0 SUMMARY OF EVENTS AND RESULTS

3.1 Site Test Plan

Wilcox conducted emissions sampling on August 4th, 2015 in Wyoming, MI in strict accordance with the aforementioned USEPA Methods. The source operated at normal load conditions on the day of testing. Plant personnel kept track of production rates, which are included in the appendix of this report.

3.2 Summary of Results – HMA Unit

Wilcox tested emissions from the HWMA unit from 9:45 a.m. to 14:15 p.m. Table 3-1 displays detailed results of the sampling event.

Table 3-1. Results - Particulate Matter

Stack Gas Characteristics	Run 1 09:45 – 10:47	Run 2 11:30 – 12:33	Run 3 13:10 – 14:15	Average
Filterable PM(gr/dscf)	0.00236	0.00202	0.00191	0.00210
Filterable PM (lbs/hr)	0.810	0.691	0.652	0.718
Filterable PM (lbs/ton)	0.00213	0.00174	0.00171	0.00186
CO (ppmvd, uncorrected)	136	142	278	186
CO (lbs/hr)	23.8	24.7	48.3	32.3
CO (lbs/ton)	0.0625	0.0623	0.127	0.0838
Process Weight Rate (tons/hr)	380	397	382	386
Oxygen %	13.2	13.3	14.0	13.5
Carbon Dioxide %	4.83	3.66	3.59	4.03
Actual Cubic Feet / Minute	67,826	68,519	68,791	68,379
Dry Standard Cubic Feet / Minute	40,087	39,850	39,862	39,933
Avg. Stack Temp. (deg. F)	242	241	241	241
Stack Gas Velocity (feet/sec)	61.6	62.2	62.5	62.1
Avg. Sq. Rt. Delta p	0.909	0.915	0.918	0.914
%Isokinetics (Vn/Vs)	104	101	104	103
% Moisture of Stack Gas	22.7	23.8	24.0	23.5
Sample Volume (cubic feet)	47.6	45.9	45.1	46.2

4.0 METHODOLOGY

The sampling procedures used by Wilcox were performed according to Title 40 CFR Part 60 Appendix A and are as follows:

Table 4-1. Sampling Procedures

Method	Description
US EPA Method 1	Determination of Velocity Traverses for Stationary Sources
US EPA Method 2	Determination of Stack Gas Velocity and Volumetric Flow Rate
US EPA Method 3A	Gas Analysis for the Determination of Molecular Weight
US EPA Method 4	Determination of Moisture Content in Stack Gas
US EPA Method 5	Determination of Particulate Matter Emissions
US EPA Method 9	Determination of Visible Emissions
US EPA Method 10	Determination of Carbon Monoxide Emissions from Stationary Sources

4.1 Sample Point Determination-EPA Method 1

Sampling point locations were determined according to EPA Reference Method 1. A diagram demonstrating distance from port location to nearest disturbances is presented below in Figure 4-1. Sampling point dimensions are further described in Table 4-2.

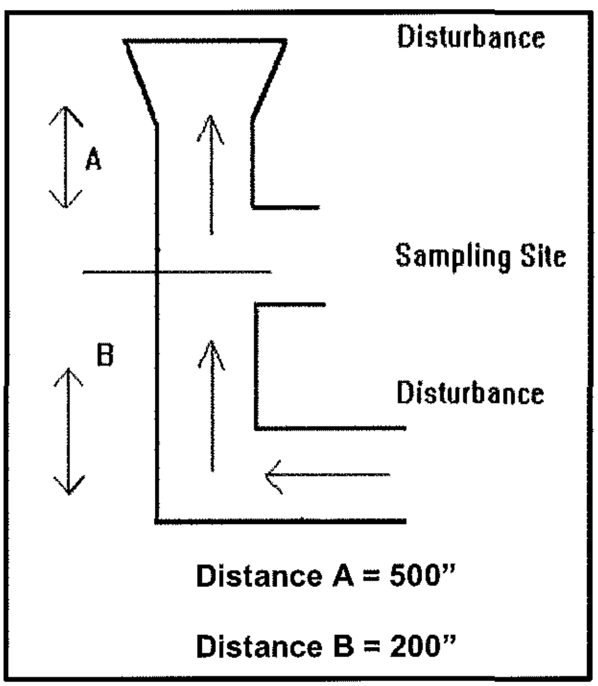

Figure 4-1. Sampling Site Diagram

Table 4-2. Sampling Points

Locations	Dimensions	Ports	Points Per Port	Total Points
Stack 1 Particulate Traverse	ø 58"	2	12	24

4.2 Velocity and Volumetric Flow Rate – EPA Method 2

EPA Method 2 was used to determine the gas velocity and flow rate at the stack. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made with a Type K thermocouple and digital pyrometer.

4.3 Gas Composition and Molecular Weight – EPA Method 3A

The oxygen and carbon dioxide concentrations were determined in accordance with EPA Method 3A using a paramagnetic and infrared detection analyzer. The remaining stack gas constituent was assumed to be nitrogen for the stack gas molecular weight determination.

4.4 Moisture Content – EPA Method 4

The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. The gas moisture was determined by quantitatively measuring condensed moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

4.5 Determination of Filterable PM– EPA Method 5

Particulate matter (PM) was withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ± 14°C (248 ± 25°F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The PM mass, which includes any material that condenses at or above the filtration temperature, was determined gravimetrically after the removal of uncombined water. A diagram of the Method 5 train is shown below in Figure 4-1.

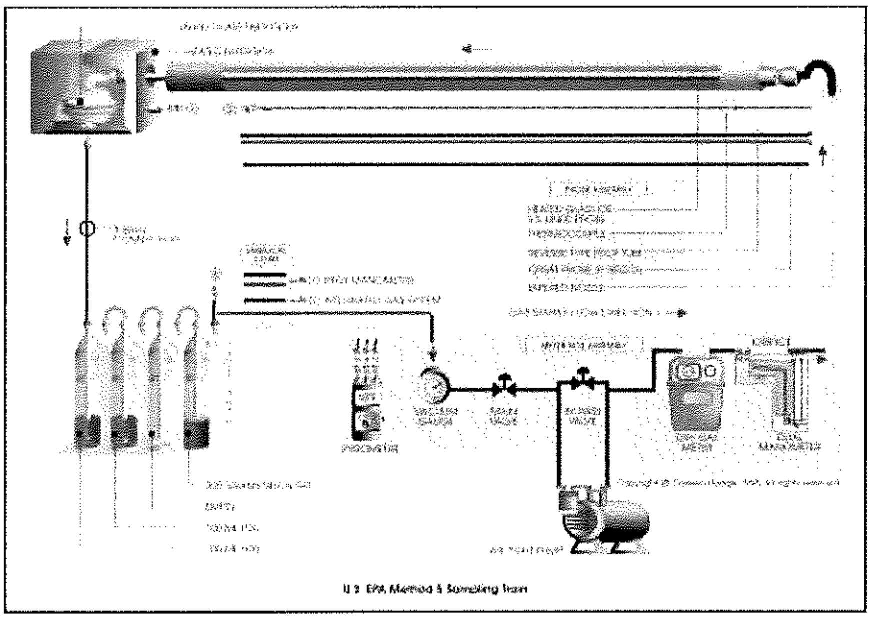

Figure 4-1. Method 5 Sampling Train

4.6 Visible Emissions – EPA Method 9

Stack opacity readings were taken for 60 minutes at 15 second intervals by a certified visible emissions reader. The visible emissions reading were conducted during each of the particulate test runs. The results are reported as an average opacity reading for the rolling six minutes with the highest opacity. A copy of the visible reader's current certification is included in the Appendix.

4.7 CO Determination – EPA Method 10

Stack gas was withdrawn from the stack and conditioned (moisture removed) before being analyzed by infra-red detection. Specific wavelengths of infrared light are absorbed by CO molecules. Molecular absorption is directly proportional to the concentration of CO. Quality assurance of the analyzer was first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines, and conditioner is also performed prior to and after each sample period to determine drift bias.

5.0 WILCOX QUALITY ASSURANCE AND QUALITY CONTROL

5.1 Sampling Protocol

Wilcox Environmental Engineering (Wilcox) is organized to facilitate sample management, analytical performance management, and data management. Personnel are assigned specific tasks to ensure implementation of the quality assurance/quality control (QA/QC) program. The Senior Project Manager in charge of air emission measurement projects reports directly to the Director of Air Analysis Services and are the QA officers responsible for program effectiveness and compliance.

The analysts perform the data reduction, analyses, and initial data review. Each analyst must check and initial their work, making certain that it is complete, determining that any instrumentation utilized has been properly calibrated, and ensuring that the analysis has been performed within the QA/QC limits.

The Senior Project Manager evaluates and verifies the data submitted by the analysts and verify that the data and documentation are complete, that all analyses has been performed within QA criteria specific to each method, checks calculations, assembles and signs the data package, and prepares the final report.

5.2 Equipment Maintenance and Calibration

The Field Supervisor and Field Technicians are in charge of routine maintenance and calibration of all source-testing equipment. Relevant calibration information is included in the Appendices of this report.

5.2.1 Equipment Maintenance

All major pieces of equipment have maintenance logs where all maintenance activities are recorded and documented. Table 5-1 shows routine maintenance that is performed on Wilcox source testing equipment.

Table 5-1. Test Equipment - Routine Maintenance Schedule

Equipment	Acceptance Limits	Frequency of Service	Methods of Service
Pumps	• Absence of leaks • Ability to draw vacuum within equipment specifications	Every 500 hours of operation or 6-months, whichever is less	• Visual inspection • Lubrication
Flow Meters	• Free mechanical movement • Absence of malfunction • Calibration within tolerance	Every 500 hours of operation or 6-months whichever is less	• Visual inspection • Clean • Calibrate
Electronic Instrumentation	• Absence of malfunction • Proper response to calibration gases and signals	As recommended by manufacturer or when required due to unacceptable limits	• Clean • Replace parts as necessary • Other recommended manufacturer service
Mobile Laboratory Sampling System	• Absence of leaks. • Sample lines clean and free of debris • Proper input flow rates to analyzers	At least once per month or sooner depending on nature of use.	• Change filters • Change gas dryer • Leak check • Check for contamination
Sample Lines	• Absence of soot and particulate buildup • Adequate sample flow	At least once per month or sooner depending on nature of use.	• Flush with solvents and water • Heat and purge line with nitrogen

5.2.2 Equipment Calibration

Current calibration information on equipment used during testing is included in the Appendices of this report.

The S-Type pitot tubes are calibrated initially upon purchase and then semiannually. Visual measurements are taken prior to each use to insure accidental damage has not occurred. Measurements are performed using a micrometer and protractor.

Each temperature sensor is marked and identified. This is done by marking each thermocouple end connector with a number. The sensor is calibrated as a unit with the control box potentiometer and associated lead wire as an identified unit. Calibrations are performed initially and annually at three set-points over the range of expected temperatures for that particular thermocouple. A reference output-voltage/thermocouple calibrator is used as a temperature reference source for the multi-point calibrations.

The field barometer is adjusted initially and semiannually to within 0.1" Hg of the actual atmospheric pressure at the Wilcox laboratory facility in Indianapolis, Indiana. All dry gas field meters are calibrated before initial use. Once the meter is placed in operation, its calibration is checked after each test series or bimonthly, whichever is less. Dry gas meters are calibrated against a NIST reference meter or orifice.

The dry gas meter orifice is calibrated before its initial use and then annually. This calibration is performed during the calibration of the dry gas test meter. The unit is checked in the field after every series of tests using a field gas-meter check procedure.

Analytical balances are internally calibrated prior to use following the manufacturer's instructions. The balances are further checked using Class S-1 analytical weights prior to daily usage. Field top loading balances are checked with a field analytical weight prior to usage.

6.0 WILCOX DATA REDUCTION VALIDATION AND REPORTING

The data presented in final reports are reviewed three times. First, the analyst reviews and certifies that the raw data complies with technical controls, documentation requirements, and standard group procedures. Second, the Senior Project Manager reviews and certifies that data packages comply to specifications for sample holding conditions, chain of custody, data documentation, and the final report is free of transcription errors. Third, a QA review is performed by additional senior personnel. This review thoroughly examines the entire completed data report. Once the review process is completed, the report is approved by Wilcox senior personnel and issued. All raw laboratory data and final reports are stored for a minimum of 5 years.

7.0 LIMITATIONS AND SIGNATURES

Wilcox Environmental Engineering, Inc.'s (Wilcox's) services, data, opinions, and recommendations described in this report are for Client's sole and exclusive use, and the unauthorized use of or reliance on the data, opinions, or recommendations expressed herein by parties other than Wilcox's Client is prohibited without Wilcox's express written consent. The services described herein are limited to the specific project, property, and dates of Wilcox's work. No part of Wilcox's report shall be relied upon by any party to represent conditions at other times or properties. Wilcox will accept no responsibility for damages suffered by third parties as a result of reliance upon the data, opinions, or recommendations in this report.

Wilcox's services are subject to all limitations, qualifications, and indemnifications enumerated in the terms and conditions or contract governing the work. Wilcox's findings, interpretations, opinions, and recommendations are probabilities based on Wilcox's professional judgment of site conditions as discernible from the limited, and often indirect, information provided by others, information available to us at the time we performed our work, or information observed or developed by Wilcox using the methods specified in the scope of work. Wilcox does not warrant the accuracy, completeness, or validity of information and independent opinions, conclusions, and recommendations provided or developed by others, nor does Wilcox assume any responsibility for documenting or reporting conditions detectable with methods or techniques not specified in the scope of work. Maps and drawings in this report are included only to aid the reader and should not be considered surveys or engineering studies. The investigation described in this report was also conducted within the context of agency rules, regulations, action levels, and enforcement policies in effect at the time Wilcox performed its work. Later changes in agency rules, regulations, action levels, or policies may result in different conclusions than those expressed in this report.

Wilcox has striven to perform the services in a manner consistent with that level of care and skill ordinarily exercised by other environmental consultants practicing in the same locality and under similar conditions existing at the time we performed our services. **No other warranty is either expressed or implied in this report or any other document generated in the course of performing Wilcox's services.**

Sincerely,
Wilcox Environmental Engineering, Inc.

Ernest Brummett
Project Manager – Air Analysis

Dave Williams
Director – Air Analysis

APPENDICES

Appendix A: .... Sample Calculations
Appendix B: ....Field Data Spreadsheets
Appendix C: ....Gas Analyzer Data
Appendix D: .... Visible Emissions Data
Appendix E: ....Laboratory Data
Appendix F: .... Calibration Data
Appendix G: .... Submitted Protocol
Appendix H: ....Production Data