Derenzo and Associates, Inc.
Environmental Consultants

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EMISSION TEST REPORT

Report Title RESULTS FOR THE VERIFICATION OF VOLATILE ORGANIC COMPOUND CAPTURE EFFICIENCY FOR COATING PROCESSES

Report Date August 20, 2014

Test Dates June 24, 2014

Facility Information	
Name	Pioneer Metal Finishing Industrial Hwy facility
Street Address	24600 Industrial Hwy.
City, County	Warren, Macomb
Phone	(586) 759-3559

Facility Permit Information	
Renewable Operating Permit:	MI-ROP-N5747-2011a
Permit to Install No.	2-03L (issued January 31, 2014)

Testing Contractor	
Company Mailing Address	Derenzo and Associates, Inc. 39395 Schoolcraft Road Livonia, Michigan 48150
Phone	(734) 464-3880
Project No.	140400B

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

RENEWABLE OPERATING PERMIT
REPORT CERTIFICATION

Authorized by 1994 P.A. 451, as amended. Failure to provide this information may result in civil and/or criminal penalties.

Reports submitted pursuant to R 336.1213 (Rule 213), subrules (3)(c) and/or (4)(c), of Michigan's Renewable Operating Permit (ROP) program must be certified by a responsible official. Additional information regarding the reports and documentation listed below must be kept on file for at least 5 years, as specified in Rule 213(3)(b)(ii), and be made available to the Department of Environmental Quality, Air Quality Division upon request.

Source Name: Pioneer Metal Finishing Industrial Hwy — County: Macomb

Source Address: 24600 Industrial Hwy — City: Warren

AQD Source ID (SRN): N5747 — ROP No.: N5747-2011a — ROP Section No.:

Please check the appropriate box(es):

☐ **Annual Compliance Certification (Pursuant to Rule 213(4)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, this source was in compliance with **ALL** terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference. The method(s) used to determine compliance is/are the method(s) specified in the ROP.

☐ 2. During the entire reporting period this source was in compliance with all terms and conditions contained in the ROP, each term and condition of which is identified and included by this reference, **EXCEPT** for the deviations identified on the enclosed deviation report(s). The method used to determine compliance for each term and condition is the method specified in the ROP, unless otherwise indicated and described on the enclosed deviation report(s).

☐ **Semi-Annual (or More Frequent) Report Certification (Pursuant to Rule 213(3)(c))**

Reporting period (provide inclusive dates): From _____ To _____

☐ 1. During the entire reporting period, **ALL** monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred.

☐ 2. During the entire reporting period, all monitoring and associated recordkeeping requirements in the ROP were met and no deviations from these requirements or any other terms or conditions occurred, **EXCEPT** for the deviations identified on the enclosed deviation report(s).

☒ **Other Report Certification**

Reporting period (provide inclusive dates): From _____ To _____

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

VOC capture efficiency test report for metal parts coating lines.
The testing was performed in accordance with the approved test plan and the
processes were operated at the maximum routine operating conditions for the facility.

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in this report and the supporting enclosures are true, accurate and complete

Mark Bennett	VP & GM Coating Operations	586-480-1718
Name of Responsible Official (print or type)	Title	Phone Number
Signature of Responsible Official		Date: 8/21/14

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

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EMISSION TEST REPORT

RESULTS FOR THE VERIFICATION OF
VOLATILE ORGANIC COMPOUND CAPTURE EFFICIENCY FOR
COATING PROCESSES

PIONEER METAL FINISHING
WARREN, MICHIGAN

1.0 INTRODUCTION

Pioneer Metal Finishing (Pioneer Metal) operates a metal parts coating facility located at 24600 Industrial Hwy., Warren, Macomb County, Michigan (Industrial Hwy facility, State Registration No. N5747). Coating is transferred metal parts using dip and spray application and dried or cured in coating ovens. The coating lines are equipped with a process air collection system that exhausts captured volatile organic compounds (VOC) to a regenerative thermal oxidizer (RTO) for VOC reduction.

In 2013 and into 2014, Pioneer Metal (formerly Hi-Tech Coatings, Inc.) made several improvements to its facility air collection system and installed VOC capture enclosures for each of its three large dip-spin coating lines (EU-LINE1-MODEL24, EU-LINE7-MODEL25 and EU-LINE13-MODEL26).

Pioneer Metal received a State of Michigan Permit to Install (PTI No. 2-03L issued January 31, 2014) from the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) that specifies capture and control system requirements for its coating lines. The PTI requires Pioneer Metal to demonstrate VOC capture efficiency of its three (3) large dip-spin coating lines using the smoke tube test method. At the same time, the facility is required to verify capture efficiency of the three chain-on-edge coating lines (COE1, 2 and 3), a small dip-spin line (Model 10), and a stand-alone batch oven.

Derenzo and Associates, Inc. representatives Robert Harvey, Tyler Wilson, and Anthony Brogowski performed the VOC capture efficiency evaluation on June 24, 2014 using procedures specified in the Test Plan dated May 21, 2014 that was submitted to and approved by the MDEQ-AQD. The project was coordinated by Eric Rosenberg, Warren Campus Manager for Pioneer Metal. MDEQ-AQD representatives Mark Dziadosz and Iranna Konanahalli were on-site to observe portions of the compliance testing.

Attachment 1 provides a copy of the MDEQ-AQD test plan approval letter.

Questions regarding this emission test report should be directed to:

Robert L. Harvey, P.E.
General Manager
Derenzo and Associates, Inc.
4990 Northwind Dr, Ste 120
E. Lansing, MI 48823
(517) 324-1880

Mr. Eric Rosenberg
Warren Campus Manager
Pioneer Metal Finishing
24600 Industrial Hwy.
Warren, MI 48089
(586) 480-1712

1.1 Report Certification

A Renewable Operating Permit Report Certification Form (EQP 5736) signed by the Pioneer Metal Responsible Official accompanies this report.

This test report was prepared by Derenzo, Associates, Inc. based on the field sampling data collected by Derenzo and Associates, Inc. Facility process data were collected and provided by Pioneer Metal employees or representatives.

Report Prepared By:

Robert L. Harvey, P.E.
General Manager

2.0 SUMMARY OF RESULTS

VOC capture efficiency for the three (3) large dip-spin coating lines was evaluated using the smoke tube test method; observation of the airflow direction of visual smoke at enclosure openings. At the same time, capture efficiency of the three chain-on-edge coating lines (COE1, 2 and 3), a small dip-spin line (Model 10), and a stand-alone batch oven was verified using a combination of the smoke tube test method and differential pressure measurements.

The results of the capture efficiency evaluation are presented in Table 2.1 below. All enclosures are connected to the VOC collection system and exhibited inward flow as indicated by the observation of air current smoke.

The average measured differential pressure for all enclosures classified as permanent total enclosures exceeded -0.007 inches of water (the PTE criteria) with the exception of the enclosure for the small dip-spin line (Model 10). The average measured differential pressure for this enclosure was -0.0018 inches of water. Suggested corrective actions are provided in Section 5.0 of this report.

Table 2.1 Summary of capture efficiency test results for each coating line

Emission Unit Coating Process	Smoke Tube Verified Inward Flow (Y/N)	Differential Pressure (inches w.c.)
EU-LINE1-MODEL24	Y	NA
EU-LINE3-COE1 (Primer Booth)	Y	-0.0178
EU-LINE3-COE1 (Topcoat Booth)	Y	-0.0290
EU-LINE4-COE2 (Primer Booth)	Y	-0.0075
EU-LINE4-COE2 (Topcoat Booth)	Y	-0.0104
EU-LINE5-COE3	Y	-0.0176
EU-LINE6-MODEL10*	Y	-0.0018
EU-LINE7-MODEL25	Y	NA
EULINE13-MODEL26	Y	NA
EUBATCHOVEN	Y	NA

NA These systems are classified as non-fugitive enclosures. Differential pressure measurements not required.
* Measured differential pressure did not meet the PTE criteria of -0.007 inches water

3.0 SOURCE DESCRIPTION

3.1 Coating Line Processes

Pioneer Metal operates a number of spay and dip coating processes:

- Three (3) large dip-spin coating lines that are identified as EU-LINE1-MODEL24, EU-LINE7-MODEL25, and EU-LINE13-MODEL26 in the PTI.

- A small dip-spin coating line (EU-LINE6-MODEL) that operates as a permanent total enclosure (PTE).

- Two (2) chain-on-edge (COE) coating lines, identified as EU-LINE3-COE1 and EU-LINE4-COE2 in the PTI, that consist of a continuously moving chain, two spray booths and a curing oven. The booths operate as PTEs; the curing ovens operate as non-fugitive enclosures.

- A Sprimag COE spray coating line, identified as EU-LINE5-COE3 in the PTI. The Sprimag line is an enclosed conveyorized coating line used for coating the interior surface of metal parts. The line is operated as a PTE from the coating section through the attached curing oven.

- A batch oven (identified as EUBATCHOVEN in the PTI) that is a stand-alone enclosed oven. Parts are loaded into the oven in bulk on carts, containers, or pallets and the oven is sealed (door secured closed) while in operation.

- Four (4) Tumble Spray coating lines. In these lines the parts are tumbled within a sealed drum while the coating is spray applied with an HVLP applicator. During operation the tumble spray cover is in the closed position and the opening is sealed by the vacuum caused by the evacuation fan. There are no natural draft openings while the unit is in operation.

3.2 Type of Raw Materials Used

The coatings applied by the processes are either for corrosion resistance, adhesion, or surface priming. The high performance coatings are primarily solvent based, though some waterborne formulations are used. These coatings are received from the manufacturer and diluted (reduced) with organic solvents or water prior to their application.

3.3 Emission Control System Description

Solvent laden air from the individual processes is combined in a mixing plenum near the center of the facility and exhausted to the RTO emissions control system.

The RTO system consists of a variable frequency drive (VFD) fan, three (3) energy recovery columns packed with ceramic heat exchange media and a high-temperature combustion chamber containing natural gas-fired burners. The VFD fan maintains an appropriate vacuum within the process air collection system and directs the collected air to the RTO unit where it is oxidized (combusted) at high temperatures.

The RTO effluent gas is released to atmosphere via a rectangular vertical exhaust stack.

3.4 Process Operating Conditions During the Compliance Testing

During the capture efficiency evaluation, all coating processes operated normally and applied solvent-based coating at typical application rates.

The RTO inlet fan was operated normally to maintain an appropriate vacuum within the main air collection header. The fan operated at 65.8 Hertz (Hz) as indicated by the VFD output display, which resulted in a captured gas volumetric flowrate was 20,516 actual cubic feet per minute (acfm) based on airflow measurements performed at the inlet to the RTO fan

The RTO combustion chamber temperature was set at 1,500°F and ranged between 1499 and 1527 °F during the testing as observed by the test crew (based on intermittent observations, not continuous monitoring records).

A summary of the VOC capture and emission control system operating parameters during the test event is presented in Table 3.1 below.

Attachment 2 provides RTO operating records and flowrate measurements for the capture efficiency evaluation period.

Table 3.1 VOC capture and emission control system operating parameters

Operating parameter	Value	
Average fan speed	65.8	Hz
Average RTO inlet vacuum	1.5	in wc
Avg RTO inlet flowrate, actual	20,516	acfm
Avg RTO inlet flowrate, standard	17,722	scfm
Chamber temperature setpoint	1,500	°F
Chamber temp (min.)	1,499	°F
Chamber temp (max.)	1,527	°F

4.0 SAMPLING AND ANALYTICAL PROCEDURES

A description of the sampling and analytical procedures is provided in the Test Plan dated May 21, 2014, which was approved by the MDEQ-AQD. This section provides a summary of those procedures.

4.1 Smoke Tube Air Current Observations for Non-Fugitive Enclosures

Ventilation or air current smoke tubes were used to observe the direction of air flow for the air collection systems associated with the three (3) large dip-spin lines (Model 24, 25 and 26), chain on edge ovens (COE1 and COE2), and batch oven.

The smoke tube was placed in front of each natural draft opening, an adequate amount of smoke was generated manually using the squeeze bulb, and the direction of air flow (into or out of the natural draft opening) was noted. All natural draft openings for each process were tested and recorded on a data sheet.

Attachment 3 provides field data sheets that were used to identify natural draft openings and record the direction of airflow.

4.2 Differential Pressure Measurements for Permanent Total Enclosures

Enclosure differential pressure measurements for the chain-on-edge coating booths (COE1 and COE2), Sprimag Booth/Oven and the Model#10 dip-spin line was performed using a Heise® PTE-1 Handheld Pressure Calibrator.

Prior to use, the pressure measurement instrument performs a self zero and calibration procedure. To measure enclosure differential pressure, the low-pressure side of the differential pressure measurement cell was connected by flexible tubing to a port installed on the enclosure wall (or inserted into the enclosure if a measurement port doesn't exist) and the high-pressure side of the measurement cell was open to the surrounding environment. Five (5) individual differential pressure (inches water column) readings were recorded using the 'hold' function on the instrument. The average recorded differential pressure was calculated for each enclosure.

Attachment 4 provides field data sheets that were used to record differential pressure readings.

4.3 Captured Gas Flowrate to the RTO

The captured gas volumetric flowrate was measured at the inlet to the RTO near the beginning and end of the capture efficiency evaluation period. The sampling location for the combined coating line exhaust (RTO inlet) is in the 30-inch diameter duct exterior to the facility wall.

Velocity traverse locations for the sampling points were determined in accordance with USEPA Method 1. The exhaust gas velocity pressure and temperature were measured at each sampling location in accordance with USEPA Method 2. An S-type Pitot tube connected to a red-oil manometer was used to determine velocity pressure and a K-type thermocouple mounted to the Pitot tube was used for temperature measurements. The Pitot tube and connective tubing were leak-checked to verify the integrity of the measurement system. The gas molecular weight was verified using a Fyrite® combustion gas analyzer. Gas moisture content was determined using the wet bulb/dry bulb technique. A summary of the volumetric airflow measurement methods is summarized below:

Method 1	Velocity and sampling locations will be selected based on physical duct measurements in accordance with USEPA Method 1.
Method 2	Gas velocity pressure will be determined using a Type-S Pitot tube connected to a red oil incline manometer. Exhaust gas temperature will be measured using a K-type thermocouple connected to the Pitot tube.
Method 3	RTO inlet gas O_2 and CO_2 content will be determined by Fyrite® combustion gas analyzer.
Method 4	The inlet gas moisture will be determined by wet bulb/dry bulb temperature measurements.

The velocity measurement field data sheets and flowrate calculations are provided in Attachment 1 with the RTO operating data.

5.0 TEST RESULTS AND DISCUSSION

5.1 Evaluation of Test Results

The results of the capture efficiency evaluation are presented in Table 2.1. All enclosures are connected to the VOC collection system and exhibited inward flow as indicated by the observation of air current smoke.

The average measured differential pressure for all enclosures classified as permanent total enclosures exceeded -0.007 inches of water (the PTE criteria) with the exception of the enclosure for the small dip-spin line (Model 10). The average measured differential pressure for this enclosure was -0.0018 inches of water.

Based on a review of calendar year 2013 material use data, the Model 10 dip-spin coating line (EU-LINE6-MODEL10) is used infrequently and is a very small source of emissions. Monthly coating use for all months in 2013 did not exceed 200 gallons per month and were often below 10 gallons per month. The total coating application rate for calendar year 2013 was less than 500 gallons. Based on the operating nature and material use rates for this process, Derenzo and Associate recommends that this process be removed from the facility's permit since its operation appears to satisfy the permit to install exemption provided in Michigan Air Pollution Control Rule 287 or that the permit be revised to establish a maximum permitted coating use rate in lieu of an emissions control requirement. The process would remain connected to the facility's air pollution control system. However, the requirement to maintain a permanent total enclosure for this process, based on its very small material use and emission rates, seems unnecessary.

5.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing was performed in accordance with the Test Plan dated May 21, 2014 and the MDEQ-AQD test plan approval letter. During the testing program the coating lines were operated at normal operating conditions, at or near maximum capacity and satisfied the parameters specified in the MDEQ-AQD test plan approval letter.