DESTRUCTION EFFICIENCY TEST REPORT

for

REGENERATIVE THERMAL OXIDIZER

at

KPMF USA Investment, LLC
67 Kay Industrial Drive
Lake Orion, Michigan

RECEIVED
JUL 0 1 2015
AIR QUALITY DIV.

Test Date: June 4, 2015

Report Date: June 30, 2015

Prepared by:

Environmental Partners, Inc.
305 Hoover Boulevard, Suite 200
Holland, Michigan 49423

EPI
Environmental Partners Inc.

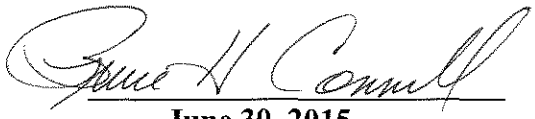
Report Certification:

Air emissions testing was performed under my observation and in conjunction with the production operations on June 4, 2015 at the KPMF USA Investment facility in Lake Orion, Michigan. This report presents the testing results and operational data collected during the testing. The data presented herein are believed to be a true and accurate representation of actual field conditions observed during the compliance testing exercise.

Bruce H. Connell

Principal

Environmental Partners, Inc.



June 30, 2015

1.0 INTRODUCTION AND PURPOSE OF THE TEST PROGRAM

A compliance test program was conducted at the KPMF USA Investment (KPMF) manufacturing facility located in Lake Orion, Michigan on June 4, 2015. The purpose of the test program was to determine the Volatile Organic Compound (VOC) destruction efficiency of the air pollution control system used to control the VOC emissions from the adhesive coating line (EUCoatingLn). The coating line is located in a fully contained enclosure with air locks for entry and egress.

The test program was conducted in accordance with the test plan dated April 8, 2015 and confirmed by the Michigan Department of Environmental Quality (MDEQ) on April 23, 2015. A copy of the test plan and the MDEQ confirmation is included in Appendix A.

The coating process under evaluation is regulated by the Michigan issued New Source Review Permit to Install No. 46-13. The testing was conducted to satisfy special condition numbers V.2 and V.3 of EUCoatingLn and to confirm compliance with special condition numbers IV.2 and IV.4.

The overall compliance test program was coordinated by Mr. Bruce Connell, of Environmental Partners, Inc. The destruction efficiency test programs were performed by The Stack Test Group. Plant operations were coordinated by Mr. Dale Charter, KPMF and Mr. Joshua Flood, Kay Automotive. The compliance test program was witnessed by Mr. Tom Gasloli, MDEQ-AQD and Mr. Samuel Liveson, MDEQ-AQD.

2.0 PROCESS AND CONTROLS SYSTEMS DESCRIPTION

KPMF operates a plastic casted film line (EU-CoatingLn) that is used to manufacture PVC casted film as well as apply adhesive, inks, or urethane clear topcoat. The application methods vary between reverse roll coating, rotary screen coating, knife-over-roller coating or slot die coating.

On the day of testing, the coating line was applying an adhesive (Loctite Duro-Tak 2835) in the knife-over-roller coating operation. In the process, a web fed substrate is fed through a series of rollers leading up to the application station. At the application station, liquid adhesive is applied to the substrate just before the knife blade. As the coating is deposited on the substrate the knife blade spreads it across the substrate to the desired thickness, with the assistance of the support roller located beneath the coated substrate.

After leaving the application station, the substrate is fed through an indirect oil heated dryer with seven separate heating sections. The oil is pre-heated through a heat exchanger located in the exhaust of the regenerative thermal oxidizer (RTO). The RTO is manufactured by Anguil Environmental Systems, Inc. which has a rate air flow of 19,000 scfm and a design destruction efficiency of 98%.

In accordance with Special Condition IV.2 of EU-CoatingLn, the RTO must maintain a minimum combustion chamber temperature above 1550 ^{o}F when operating the coating line.

Testing was conducted on June 4, 2015. Appendix B contains process related information along with periodic hand written recordings of the combustion chamber temperature and data logging data from the combustion chamber. The data logger records an average of the minimum and maximum temperature, over two minute increments between two (2) separate thermocouples located in the combustion chamber. This type of data recording dampens the peaks and valleys of the true temperature range, as can be seen by observing the data logger summary data against the instantaneous hand written data.

The entire coating operation is located in a non-fugitive enclosure with all of the air from within the enclosure being directed to the RTO. The enclosure has three entrances which consist of an air lock, where all air within the air lock is directed back into the enclosure. The company has installed a differential pressure gauge, to monitor the pressure drop between the inside of the enclosure and the area immediately outside the enclosure. On the day of testing, differential pressure readings were recorded every 5 minutes. This data is located in Appendix B along with the handwritten combustion chamber recordings.

3.0 TEST METHODOLOGIES

Three one-hour test runs were performed at the inlet and outlet of the oxidizer unit. For each test run, the concentrations and mass emission rates of VOCs at the inlet and outlet test locations were compared in order to determine the VOC destruction efficiency. All tests were conducted in accordance with USEPA Methods 1-4, and 25A, as described in the *Code of Federal Regulations, Title 40, Part 60, Appendix A*. Descriptions of these methods are as follows:

USEPA Method	Description
1	Sample and Velocity Traverses for Stationary Sources
2	Determination of Stack Gas Velocity and Volumetric Flow Rate
3	Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight
4	Determination of Moisture Content in Stack Gases
25A	Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer

Additionally, differentia pressure drop readings were recorded across the enclosure barrier to verify the inward flow of air into the enclosure which is indicative of the enclosure being negative relative to the room. The differential pressure gauge was located in an easy accessible location for the MDEQ-AQD to monitor throughout the test series. A copy of the recordings is included in Appendix B.

3.1 Volumetric Flow Rate Determination – USEPA Methods 1 - 4

The volumetric flow rate of the exhaust was determined following USEPA Methods 1 through 4. Velocity measurement points were selected in accordance with USEPA Method 1. Gas stream velocities were determined using a Type-S pitot tube and inclined manometer in accordance with USEPA Method 2.

Velocity measurements were made, during each one hour test, at each test location (inlet and outlet). Concentrations of carbon dioxide were determined using the instrumental analyzer technique in accordance with USEPA Method 3A. Gas stream moisture contents were determined by passing the exhaust sample gas through a series of four chilled impingers containing pre-measured amounts of absorbing solution, followed by an impinger containing silica gel. Volumetric determinations were made of moisture gain, and equivalent water vapor volumes were determined in accordance with USEPA Method 4.

3.2 Total Gaseous Organic Concentration Determination – USEPA Method 25A

The procedures outlined in USEPA Method 25A were followed to determine the total gaseous organic concentration in the exhaust streams at the inlet and outlet of the oxidizer. For each test run, a gas sample was collected continuously for a minimum of 60 minutes from a single representative sampling point. The gas sample stream was passed through a heated filter and stainless steel probe, and drawn to a flame ionization analyzer via a Teflon sample line that was heated to at least 250°F.

The RTO the inlet and outlet concentrations were measured with separate JUM Model 3-300A Flame Ionization Analyzers. In each case the flame ionization analyzer was pre-calibrated in the applicable ranges. Appropriate mid-range and zero calibration gases were introduced, and the analyzer response was checked between each test run, as well as after the final test run. Calibration gases consisted of certified (Protocol 1) concentrations of propane in air. Sixty one-minute averages for each run were totaled and averaged to determine an average organic concentration for each of the three test runs. Organic concentrations are expressed on a parts per million by volume as propane (ppmv C_3H_8) basis.

VOC emission results for each test are presented on a concentration basis (parts per million by volume as propane, ppmv C_3H_8), and mass emission rate basis (pounds per hour as propane). The VOC destruction efficiency of the oxidizer was calculated by comparing the mass of VOC measured at the oxidizer inlet to the mass of VOC measured in the oxidizer exhaust for each test run, and computing the arithmetic average of the three efficiency values. The calculated destruction efficiency for the RTO is summarized in Table 5.

4.0 PRESENTATION OF PRODUCTION DATA

The MDEQ-AQD stack test approval letter, dated April 23, 2015, requested that the RTO be operated at its standard settings. In addition the letter requested that the coating line, line speed, coating usage, the RTO combustion chamber temperature, and enclosure pressure drop be recorded during each test run.

Table 1 presents a summary of the coating usage rate and emission estimates. Table 2 presents a summary of the combustion chamber temperatures, as recorded on the datalogger and from handwritten field notes. Table 3 presents the range of differential pressures across the process enclosure.

Table 1 – Estimated Rack Throughput Rate (EU-CoatingLn)

Test #	**Usage (gal)**	**VOC (lbs)**	**Coating Width**	**Line Speed (fpm)**
1	37	180.4	48.75	49.7
2	46	224.3	48.75	49.7
3	42	204.8	48.75	49.7

Table 2 – Combustion Chamber Temperature (RTO)

Test #	**Data Logger**		**Handwritten Data**			
	Min	Max	TE121A Min	TE121A Max	TE122A Min	TE122A Mas
1	1617	1686	1563	1713	1590	1745
2	1616	1621	1568	1679	1578	1683
3	1622	1628	1560	1680	1578	1687

Table 3 – Enclosure Pressure Drop

Test #	**Differential Pressure (in. H2O)**	
	Min	Max
1	-0.01	-0.01
2	-0.01	-0.02
3	-0.01	-0.02

5.0 PRESENTATION AND DISCUSSION OF TEST RESULTS

The results of the compliance test program are summarized in Table 4. The test plan and MDEQ acknowledgement letter, process operational data, control device data, summary calculations, field test data sheets, VOC concentration readings, equipment calibrations and calibration gas certification sheets are included in the following Appendices:

Summary

- The average calculated destruction efficiency for the RTO was above the required 98%.
- The Non-Fugitive Enclosure verification test demonstrated that the enclosure was operated under negative pressure with respect to the immediate area outside the enclosure.
- During the three test runs, the combustion chamber temperature was operating as low as 1560 °F.

Table 4
Anguil (RTO) Destruction Efficiency Test Summary
(EU- CoatingLn)
KPMF USA Investment
Lake Orion, Michigan
Test Date: June 4, 2015

Parameter	**1**	**2**	**3**	**Avg.**
Start Time	08:10	09:25	10:35	
Stop Time	09:10	10:25	11:35	
Test Data				
Inlet Volumetric Flow Rate (scfm)	11,657	11,499	10,889	11,349
Inlet VOC Concentration (ppmv C_3H_8)	1,730	1,752	1,845	1,775.7
Inlet VOC Mass Emission Rate (lbs/hr C_3H_8)	138.182	138.042	137.655	137.960
Outlet Volumetric Flow Rate (scfm)	15,844	14,874	15,269	15,329
Outlet VOC Concentration (ppmv C_3H_8)	2.2	2.1	1.7	2.0
Outlet VOC Mass Emission Rate (lbs/hr C_3H_8)	0.239	0.214	0.178	0.210
VOC Destruction Efficiency (%)	**99.83**	**99.84**	**99.87**	**99.85**