

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

N314326218

FACILITY: CARROLL PRODUCTS, INC.	SRN / ID: N3143
LOCATION: 44056 Phoenix Drive, STERLING HTS	DISTRICT: Southeast Michigan
CITY: STERLING HTS	COUNTY: MACOMB
CONTACT: Mike Murphy , Plant Manager	ACTIVITY DATE: 07/21/2014
STAFF: Iranna Konanahalli	COMPLIANCE STATUS: Compliance
SUBJECT: FY 2014 level-2 scheduled annual inspection of Carroll Products, Inc.	SOURCE CLASS: SM OPT OUT
RESOLVED COMPLAINTS:	

Carroll Products, Inc. (N3143)
44056 Phoenix Drive
Sterling Heights, Michigan 48314-1463

Phone: 586-254-6300; Fax: 586-254-1751; Cell: 248-420-6533
Permit-to-Install Number 78-01 (ROP Opt-out) dated May 14, 2001
Consent Order AQD No. 42-2001 dated November 13, 2001: Terminated on March 24, 2005.

On July 21, 2014, I conducted a level-2 scheduled annual inspection of Carroll Products, Inc. ("Carroll" or "the company"), located at 44056 Phoenix Drive, Sterling Heights, Michigan 48314-1463. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994, PA 451; Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) administrative rules; and Permit-to-Install Number 78-01 (ROP Opt-out) dated May 14, 2001.

During the inspection, Mr. Mike Murphy (Phone: 586-254-6300; Fax: 586-254-9458), Plant Manager, and Mr. Joseph Wolf (Phone: 586-254-6300; Fax: 586-254-9458; Cell: 248-930-0385; E-mail: j.wolf@carrollproducts.com), President, one of three owners, Mr. Don Logan, Maintenance Tech., assisted me. Mr. Eugene H. Stys (586-254-6300), president & owner, retired from the company in CY2008 and discontinued consulting since Feb 2012. Mr. Eugene H. Stys and Mr. Gary Dehaun sold their interests in the company to Mr. Mike Murphy, Mr. Joel Manardo and Mr. Joseph Wolf.

During FY 2014 inspection, Mr. Wolf was on vacation but assisted via phone and he stated that he would send the CY 2013 US EPA RM-24 report.

The company operates four (4) flexographic (packaging and specialty flexography) printing units identified as **Carraro, Wolverine, FMC and Comexi printing presses**. Printing of inks on polyethylene, polypropylene rolls of packaging materials is accomplished using these four printing presses. The four flexographic printing press lines have a VOC capture systems that vent VOC laden air to MegTech Regenerative Thermal Oxidizer (RTO) via common exhaust manifold that is located at the roof-top. The capture systems were replaced in CY2009 as result of the February 5, 2009, Violation Notice.

Regenerative thermal oxidizers (RTO) offer superior heat recovery characteristics versus any other oxidation system. RTOs use recovered energy to pre-heat incoming process air to oxidation temperatures. This significantly lowers overall operating costs. RTOs are particularly effective for process streams with low solvent loading. Carroll has installed MEGTEC

MILLENNIUM RTO.

The MEGTEC MILLENNIUM 8000 RTO (Design inlet flow rate 8,200 acfm @ 120 °F, Design exhaust flow rate 10,200 acfm @ 215 °F, Maximum burner heat input 1.4 MMBTU / Hr, Typical burner heat input 0.3 MMBTU / Hr) uses an inexpensive ceramic heat exchange media that is virtually indestructible. The media's exceptionally low resistance minimizes pressure drop. Typical pressure drop is 14 inches of water across the media pad. That means smooth operations and reduced electrical operating costs. The system delivers thermal efficiencies of 95%. Even at relatively low solvent (VOC) concentrations, the system can sustain thermal conditions (about 1600 °F) with the heat released during VOC oxidation — requiring no additional fuel for VOC destruction. At Carroll, July 21, 2014, temperature profile reflects high thermal efficiency: incoming VOC laden process air from four presses is at 100 °F, outgoing exhaust air to ambient atmosphere, after thermal oxidation of VOC and heat recovery is at 224 °F (varies: 170-250 °F) and the combustion chamber temperature is at 1601°F. The temperature data are logged on to strip charts (paper). The Millennium RTO unit has two combustion chambers: one in oxidation mode and the other in heat recovery mode. Every 180 seconds, the chambers switch from oxidation mode to heat recovery mode and visa versa. According to $Q = m c_p \Delta T$, where m = mass of media, c_p = heat capacity of media and ΔT = temperature change, heat released and absorbed by the media. There are two ceramic packing media to exchange heat; while one media pad is in heat absorption mode and the other in heat release mode.

Once a year, MegTec conducts preventive maintenance. It also fine-tunes performance of the Millennium RTO unit. The thermocouples are changed every year. In CY 2007, additional ceramic packing was added. MegTec conducted annual maintenance during May 14-16, 2014. Invoice No. 123521 dated June 12, 2014, for \$3,637.36 for parts and service shows that maintenance activities were done. Many parts were replaced: Igniter-spark, Thermocouple, Bushing, Oxygen monitor, etc.

Carraro Print Press (EU-CARRARO): The Carraro 830 Stack Press is equipped with four-color capability and is configured with single common exhaust point for both between-colors dryers and overhead dryers. The ink is dried by a forced air ventilation system. The supply air is heated to 100 degree Fahrenheit and blown on to plastic film and picked up by an exhaust hood followed by an enclosed oven located on the top of the press. The inks are dried immediately after printing. The Capture System enclosure was replaced in CY2009 as a result of the Feb 5, 2009, VN.

Wolverine Press (EU-WOLVERINE): The Wolverine 384 4-color Stack Press is equipped with four-color capability. Unlike Carraro, it is not equipped with heat source and uses ambient air for between-colors and overhead dryers. The Capture System enclosure was replaced in CY2009 as a result of the Feb 5, 2009VN.

FMC Printing Press (EU-FMC): The FMC (Hudson Sharp (HS)) 586 6-color CI press is central impression (CI) cylinder type press with six-color capability and an overhead dryer. The film passes through a heated enclosure (100 degrees Fahrenheit) located on the top of the press to dry the ink. Both between-color and overhead dryers are tied into a common exhaust duct. The Capture System enclosure was replaced in CY2009 as a result of the Feb 5, 2009VN.

Comexi Printing Press (EU-COMEXI): The Comexi FS 1500 six-color central impression (CI) press was installed in 1999. The press has six-color capability. The Comexi press is

equipped with chambered doctor blades that help reduce fugitive emissions. Both between-color and overhead dryer supply and exhaust systems are independent of each other and located at opposite ends of the press. New enclosure was not added because the capture system was ok during FY2009 inspection.

A common manifold that carries VOC laden air from the presses to the RTO is located on the roof-top.

Capture systems

For all capture system enclosures, ceiling area was covered based upon FY 2009 inspection and recommendation.

All captured VOC from four presses go to roof-top manifold. Combined exhaust air is delivered to the RTO for destruction. Plastic sheets that enclose the printing presses were not installed properly during the February 2, 2009, inspection. This resulted in potentially inadequate capture; please refer to the Notice of Violation dated February 5, 2009. A minimum overall capture efficiency of 65 percent from FG-FLEXO is required (PTI No. 78-01, SC No. 3). AQD observed improper operation of capture devices (plastic sheets that did not cover properly) during August 29, 2007, inspection and pointed out to the company officials for corrective action. The improper enclosure was an ongoing problem. Based upon the VN follow-up inspections of March 31 and June 22, 2009, and FY 2010 inspection, all enclosures except for Comexi were replaced. Based upon the FY 2014 inspection, now all capture systems are working properly.

New plastic enclosure curtains were at site on July 21, 2014. As of July 21, 2014 the curtains are to be installed within a couple of months. The curtains (SAVE-T-CURTAINS [800-888-9750, www.tmi-pvc.com]) were purchased for Grainger.

US EPA RM24 analysis

Prior to Feb 2009, Carroll failed to determine VOC content according to US EPA Reference Method 24 (or 24A), SC No. 7 (PTI No. 78-01) and the October 25, 2007, letter to Eugene H. Stys, President, describes an alternative method. Please refer to the February 5th NOV for additional details.

Based upon FY2010 inspection, RM24 analysis (PTI No. 78-01SC 7 and Oct 25, 2007, letter) was conducted. On 11/13/2009, SF Analytical Laboratories (262-754-5300) of New Berlin, WI 53151, conducted RM24 analysis for VOC content, water content, density, etc. Again in CY 2010 and CY 2011, Carroll failed to perform US EPA RM 24 analysis. Upon request during the FY 2012 inspection (May 30, 2012), Carroll conducted RM 24 analysis during June 7-8, 2012, using SF Analytical Laboratories. AQD received the analytical report via e-mail (Joseph Wolf <j.wolf@carrollproducts.com> Wed 6/6/2012 9:05 AM). Notice of Violation was not sent for failure to conduct RM24 test considering the fact that RTO together with associated capture systems provides 76 percent capture and 99 percent destruction (PTI No. 78-01SC 3 & 4). I informed Mr. Wolf that June 7-8, 2012, report counts towards CY 2011 analysis and that Carroll is required to perform RM24 test by Dec 2012 for CY 2012.

Mr. Wolf could not produce CY 2013 RM24 test report by August 4, 2014; the report was due by Dec 2013. I asked him to conduct US EPA RM24 analyses immediately. This CY 2014 RM24 analytical report would be good for both CY 2013 & 2014.

Consent Order and RTO

The inks are purchased from Toyo (which replaced in 2010 Flint Ink Company); Sun Chemical Company does not supply inks any more based upon FY 2014 inspection. The company uses solvent-based inks due to quality problems associated with water-based inks (adhesion and gloss). The Permit-to-Install Number 78-01 (ROP Opt-out) enquires VOC control to satisfy Rule 336.1624 and Rule 336.1702 BACT. The permit and consent order are a result of an enforcement action initiated in order to ensure compliance with Rule 336.1624. Carroll installed 8,000 SCFM (12,600 Nm³ per hour) Millennium Regenerative Thermal Oxidizer (RTO) to control VOC emissions from the printing presses. On or about July 13, 2002, Carroll started operating this RTO, which delivers thermal efficiencies up to 95 percent.

While solvent based inks give better quality with shorter dryer, water based inks give poor quality and need higher capacity dryer. Carroll does not use water based inks.

Solvent cleaning

Cleaning method had been changed to cleaning inside an enclosed tank (EU-CLEANUPTANK). However, the clean-up tank is not used anymore because those printing jobs are not done anymore. Miscellaneous solvent (n-propanol) usage has substantially reduced in recent years. Since CY2006, clean-up occurs at the press while RTO is still running.

RTO

The company has chosen the set point of 1590 degrees Fahrenheit (SC 4). When the RTO operating temperature falls below the set-point, the presses shutdown automatically (SC 4). Temperature charts are present to record temperature continuously (SC 8). The charts are replaced every two months.

VOC emissions

The company used to produce short-duration printing jobs about a decade ago. In recent years, the duration has become longer. As a result, VOC emissions have reduced from about 35 tons per year to less than 20 tons per year. In addition, clean-up emissions have substantially reduced since most clean up occurs within a RTO controlled enclosure.

After control at the Millennium RTO, while VOC emissions due to inks and diluent solvents are 3,081 pounds per month, VOC emissions due to clean-up solvents are 29 pounds per month. For the entire facility, while VOC emissions are 17 tons (33,537 lbs.) per 12-month rolling period (SC 1 limit: 28.9 tpy), HAP emissions are 0.00 pounds per 12-month rolling period (SC 2 limit: 9 [single] / 22.5 [aggregate] tpy).

Pursuant to Special Condition No. 9, VOC and HAP records are kept. Carroll prepared 12-month rolling period summary for April. Approximately, 17 tons of VOC per 12-month rolling time period were emitted. HAP emissions are negligible (0.00 pounds per 12-month rolling time period). These emissions take into account RTO control.

All emissions data are based upon April 2014 VOC report.

RTO stack test

The permit and the consent order (which was terminated in March 2005) require capture and destruction of VOC in a regenerative thermal oxidizer. Minimum capture efficiency (CE) of 65 percent by weight and minimum destruction efficiency (DE) of 95 percent by weight are required. Carroll installed 8,000 SCFM (12,600 Nm³ per hour) Millennium Regenerative Thermal Oxidizer (RTO) to control VOC emissions. On or about July 13, 2002, Carroll started operating this RTO. Based upon the June 2003 stack tests, CE = 76.3% > 65% (PTI No. 78-01SC 3) and DE = 98.7% > 95% (PTI No. 78-01SC 4)

The company's Consent Order No. 42-2001, paragraph 11 (terminated in March 2005) and Permit-to-Install No. 78-01 dated May 14, 2001 required that Carroll Products test for capture efficiency and destruction efficiency within 180 days of commencement of operation of the Regenerative Thermal Oxidizer (RTO); RTO commenced operation on July 13, 2002 (SC 6). Because AQD required the company to test the oxidizer when the roof vent is operating and, according to the company, it was not technically feasible to operate the printing processes when the roof vent is open & operating during winter months, AQD allowed an extension of time for Carroll Products to carry out the oxidizer performance tests by August 30, 2003.

Pursuant to PTI No. 78-01(SC 6), Carroll conducted performance tests on June 17 & 18, 2003. On July 22, 2003, AQD received the test reports. The capture efficiency (CE) and destruction efficiency (DE) reported in the July 2003 stack test report are 76.3 percent and 98.7 percent, respectively (SC 3 & 4 limits: CE > 65 % and DE > 95%). Resulting overall control efficiency (CE * DE) is 75 percent. MACTEC (513-489-6611) of Cincinnati, Ohio, conducted the sampling and analysis.

Conclusion:

Pursuant to PTI 78-01 (SC 6) and the Consent Order, now terminated, Carroll conducted performance tests on June 17 & 18, 2003. The capture efficiency (CE) and destruction efficiency (DE) reported in the July 2003 stack test report are 76.3 percent and 98.7 percent, respectively (SC 3 & 4 limits: CE > 65 % and DE > 95%). Resulting overall control efficiency (CE * DE) is 60 percent. After the Notice of Violation dated February 5, 2009, the capture system enclosures were replaced. US EPA RM24 analyses are required by December of every year.

NAME J. Blumenthal DATE 8/4/2014 SUPERVISOR CTE