

**RECEIVED**

DEC 09 2013

AIR QUALITY DIV.



**Marathon  
Petroleum Company LP**

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

B6037

**REPORT IDENTIFICATION NO.: ENV 13-1897**

***PREPARED FOR:***

MARATHON PETROLEUM COMPANY LP  
BAY CITY TERMINAL  
BAY CITY, MICHIGAN

***PREPARED BY:***

MARATHON PETROLEUM COMPANY LP  
REFINING ANALYTICAL AND DEVELOPMENT DEPARTMENT-  
ENVIRONMENTAL FIELD SERVICES SECTION  
11631 U.S. RT 23  
CATLETTSBURG, KENTUCKY 41129

***TESTING PERSONNEL:***

JOSH HALL, TECHNICIAN  
606-921-2181 (OFFICE)  
[jkhall@marathonpetroleum.com](mailto:jkhall@marathonpetroleum.com)

LEE SAMMONS, TECHNICIAN  
606-921-2180 (OFFICE)  
[kfsammons@marathonpetroleum.com](mailto:kfsammons@marathonpetroleum.com)

**TEST DATE: OCTOBER 16, 2013**

**MEMORANDUM**

**October 20, 2013**

**TO: K. Crame**

**cc:**

**G. Adamczyk\***  
**J. Wick\***  
**B. Wilt\***  
**K. Vorst\***  
**J. Badertscher\***

**FROM: J. Hall**

**\*Without Attachments**

**SUBJECT: Bay City Terminal:  
Vapor Recovery Unit Emissions Compliance Test Results**

On October 16, 2013 an emissions performance test was conducted on the Marathon Petroleum Company LP's Bay City truck loading facility Vapor Recovery unit. The purpose of the testing was to determine the volatile organic compounds (VOC's) emissions rate from the vapor recovery unit's exhaust outlet during the truck loading process at the facility. The data collected were compared to the regulatory emissions rate as specified by the Michigan Department of Environmental Quality – Air Quality Division for bulk gasoline terminals. The maximum regulatory rate allowed is 10 mg/liter of gasoline for the facility. The test results show an emissions rate of 2.70 mg/liter for the Vapor Recovery Unit which is well below the regulatory standard. The results of the test are attached.

If there are any questions regarding these tests, please contact me at extension 2181 or by email at [jkhall@marathonepetroleum.com](mailto:jkhall@marathonepetroleum.com).

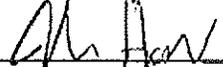
J. Hall

# Marathon Petroleum Company LP

## CERTIFICATIONS

1. Certification of sampling procedures by the team leader of the personnel conducting the sampling procedures and compiling the test report:

"I certify that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this test report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

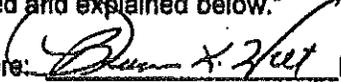
Signature:  Printed Name of Person Signing: Josh Hall

Title: Technician, Stack Testing Group

Date: 11-25-13

2. Certification of test report by the senior staff person at the testing company who is responsible for checking the test report:

"I certify that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature:  Printed Name of Person Signing: Brian K. Will

Title: Supervisor, Stack Testing Group

Date: 11/25/2013

3. This report may not be reproduced without written approval from RAD Environmental Field Services.
4. The testing conducted followed requirements as specified according to NELAP specifications.
5. Deviations from testing protocol: none

**VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN**

**TABLE OF CONTENTS**

<b>I.</b>	<b>INTRODUCTION AND SUMMARY</b>	<b>4-5</b>
<b>II.</b>	<b>PROCESS DESCRIPTION</b>	<b>6</b>
<b>III.</b>	<b>SAMPLING AND ANALYSIS PROCEDURES</b>	<b>7-9</b>
<b>IV.</b>	<b>TEST RESULTS</b>	<b>10-11</b>
<b>V.</b>	<b>APPENDICES</b>	
	<b>APPENDIX A: Emissions Rate Calculation Equations</b>	<b>12-13</b>
	<b>APPENDIX B: Vapor Recovery Unit Performance Test Field and Calculation Summary Data</b>	<b>14-16</b>
	<b>APPENDIX C: Unit Fuel Dispensing and Truck Tank Data of Leaking Compartments</b>	<b>17-22</b>
	<b>APPENDIX D: Vapor Collection and Control System</b>	<b>23-24</b>
	<b>APPENDIX E: Instrument and Test Equipment Calibration Data</b>	<b>25-41</b>

**RECEIVED**

DEC 09 2013

AIR QUALITY DIV.

**VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN**

**I. INTRODUCTION AND SUMMARY**

The Marathon Petroleum Company LP's Environmental Field Services Section conducted a compliance test on the Zink Vapor Recovery Unit located at the Bay City Terminal Loading facility. This facility serves as a vapor recovery system for their bulk gasoline, diesel and fuel oil loading. The testing was conducted on October 16, 2013.

The purpose of the testing was to determine the volatile organic compounds (VOC's) emissions rate from the vapor recovery unit's exhaust outlet during truck loading procedures. The emission rate was compared to the regulatory emissions rate as specified by the Michigan Department of Environmental Quality – Air Quality Division for the bulk gasoline terminals.

Test methods followed those as detailed in the Code of Federal Regulations, CFR40, Part 60, 2004, Subpart XX and Part 63, 2001, Subpart R. Specific procedures used were EPA Methods 2A, 21, 25B and Subsection 60.503 (d).

The testing was conducted by Mr. Josh Hall and Mr. Lee Sammons of Refining Analytical and Development's Environmental Field Services Section. Ms. Kim Crame of Marathon Petroleum Company LP's Terminal, Transport and Rail's Environmental Group coordinated the testing with Mr. Nathan Hude and Ms. Kathy Brewer of the Michigan Department of Environmental Quality – Air Quality Division representing the state during testing.

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

I. INTRODUCTION AND SUMMARY (cont.)

A total of 35 leak free trucks were loaded during the testing period. A total of 292,166 gallons of accountable gasoline was recorded for measurement of VOC's emissions. The testing lasted 6 hours which met the requirement of 6 hours as stated in the regulations of Subpart XX.

The test results are as follows:

Total mass of organic compounds emissions of VRU during the 6 hour test (mg as propane)	2,982,456
Emissions rate of total organic compounds, mg/liter of gasoline loaded	2.70
Emissions rate of total organic compounds, mg/liter of total volume loaded	1.92

**VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN**

**II. PROCESS DESCRIPTION**

Marathon Petroleum Company LP's Bay City truck loading facility utilizes a Zink Vapor Recovery Unit to adsorb organic vapors emitted from the bottom tank during loading procedures. This process consists of two (2) carbon beds which cycle based on the CEM smart system. One carbon bed is exposed to hydrocarbon until the CEM smart system is activated and switches to the other carbon bed. After exposure the carbon bed will then go through a regeneration process. The purpose of regeneration is to restore the carbon adsorber to a level where it will effectively adsorb hydrocarbons again. The gas vapor, which adsorbs on the activated carbon, is vented to the atmosphere. During the regeneration process the bed recycles under vacuum at 27.5 inches of water for 15 minutes while the other bed is being utilized. During the recycle process in the carbon adsorber, a vacuum pump pulls the hydrocarbon from the carbon. The hydrocarbon vapors from the carbon adsorber are mixed with the vacuum pump seal fluid and are discharged to an absorber/separator.

The liquid hydrocarbons are condensed and separated from the seal fluid in the separator compartment and discharged back to a holding tank. Any remaining hydrocarbons pass through the packed absorber tower and are contacted by the fresh stream of gasoline which absorbs most of the remaining hydrocarbons. The small amount of hydrocarbon that is left then leaves the top of the absorber and is directed back to the carbon adsorber which starts the whole process again.

The VOC's sampling point is located after the turbine meter where the volume of exhaust air is measured. The exhaust is connected to a duct for total measurement.

A diagram of the Zink Vapor Recovery Unit system is presented in Appendix D.

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

**III. SAMPLING AND ANALYSIS PROCEDURES**

A performance test was performed on the Bay City Terminal's Zink Vapor Recovery unit. The testing was conducted on October 16, 2013.

The test procedures used followed those as required in the Code of Federal Regulations, CFR40, Part 60, 2004, Subpart XX including EPA Methods 2A, 21 and 25B and Subsection 60.503 and CFR40, Part 63, Subpart R.

The vapor recovery unit emissions rate was determined by monitoring a number of parameters on the controlled system. These parameters included:

1. A complete leak check on the vapor recovery unit system including all of the connections and hoses at the loading bays.
2. An organic vapor leak check of each tank compartment of each truck loading gasoline during the loading process.
3. A determination of the vapor flow rate exhausted from the carbon bed adsorber beds.
4. A determination of the volume of fuel loaded during the test period.
5. A determination of the emissions rate of hydrocarbons during the test period.

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

III. **SAMPLING AND ANALYSIS PROCEDURES(cont)**

A. **Vapor Recovery Units Initial Leak Check**

An initial organic vapor leak check on the vapor recovery unit was conducted during the loading process prior to testing on October 16, 2013. All connections and hose fittings were checked by using EPA Method 21 procedures. A GasTech GT201, Organic Vapor Analyzer, was used to detect any leakage from fittings.

B. **Tank Truck Compartment Leak Checks**

Throughout the loading process of each tank truck for gasoline a leak check was conducted on each truck tanker. The leak check consisted of checking each dome and hose connection to the vapor recovery vent line. An EPA approved alternative method of sight, sound and smell was used to perform a leak check of each dome, gasket and hose connection to vent line. Leaks and load capacity were documented to determine accountability of each load to establish an accurate emissions rate. Only data acquired during the loading of leak free trucks were used in the final calculation of vapor recovery emissions rate. No leaks were detected.

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

RECEIVED  
DEC 09 2013  
AIR QUALITY DIV.

III. SAMPLING AND ANALYSIS PROCEDURES(cont)

C. Vapor Flow Rate

**Carbon Beds**

The vapor volume flow rate from the two exhaust tees was determined by using an American Turbine Meter following EPA Method 2A. The meter was connected to a 6" tee connecting the exhaust line with an inline vacuum breaker to eliminate backflow problems. Readings were taken every 5 minutes.

D. Fuel Volume Determination

During each loading process the volume loaded was logged along with the tanker ID and purchaser. The recorded data were used in the determination of the volume of products, gasoline and diesel, for both accountable and total volumes.

E. Determination of Total Organic Concentrations

The total hydrocarbon sampling and analysis of both carbon beds were conducted on site using an HORIBA VIA 510 NDIR Total Hydrocarbon Analyzer following EPA Method 25B. The sampling port was connected from the 8" line leading to the turbine meter.

Zero gas and EPA Protocol 1 calibration standards in nitrogen were used in the calibration of the HORIBA instrument. Each calibration gas was sent from the bottle to the three way valve and back through the sampling line for the leak check determination and efficiency of the sampling line. The five standards used in the outlet concentration calibration were nitrogen for zero (<0.2 ppm), 0.121%, 0.248%, 0.490% and 0.896% as propane in nitrogen.

VOLATILE ORGANIC COMPOUNDS EMISSIONS  
COMPLIANCE TEST  
BAY CITY TERMINAL VAPOR RECOVERY UNIT  
MARATHON PETROLEUM COMPANY LP  
TERMINAL, TRANSPORT AND RAIL  
BAY CITY LOADING FACILITY  
BAY CITY, MICHIGAN

**IV. TEST RESULTS**

The results of the volatile organic compound emissions performance testing are summarized in Table IV-1.

The test results indicated an average emissions rate of 2.70 milligrams/liter, as propane, of gasoline loaded for the duration of the test.

A total of 1,105,848 liters (292,166 gallons) of accountable gasoline was loaded into 35 separate trucks all with leak free compartments during the six hour test period October 16, 2013.

A summary of the emissions rate equations is presented in Appendix A.

All performance test field and calculation summary data for the Bay City Vapor Recovery Unit are presented in Appendix B.

All fuel dispensing and truck tank data with leaking compartments are presented in Appendix C.

The vapor collection and control system diagram are presented in Appendix D.

The instrument and test equipment calibration data are presented in Appendix E.

**VOLATILE ORGANIC COMPOUNDS EMISSIONS  
 COMPLIANCE TEST  
 BAY CITY TERMINAL VAPOR RECOVERY UNIT  
 MARATHON PETROLEUM COMPANY LP  
 TERMINAL, TRANSPORT AND RAIL  
 BAY CITY LOADING FACILITY  
 BAY CITY, MICHIGAN**

**SUMMARY OF PERFORMANCE TEST RESULTS**

**TABLE: IV-1**

**COMPANY: Marathon Petroleum Company LP, Bay City Terminal**

**SOURCE: Zink Vapor Recovery Unit**

**TEST DATE: October 16, 2013**

**TEST TIME: 0640-1240 Hrs**

<b>Total volume of fuel loaded (diesel &amp; gasoline), gallons</b>	<b>410,519</b>
<b>Total volume of fuel loaded (diesel &amp; gasoline), liters</b>	<b>1,553,814</b>
<b>Total volume of total gasoline loaded, gallons</b>	<b>292,166</b>
<b>Total volume of accountable gasoline loaded, gallons</b>	<b>292,166</b>
<b>Total volume of accountable gasoline loaded, liters</b>	<b>1,105,848</b>
<b>Average VOC PPM by volume concentration (propane equivalent)</b>	<b>1060</b>
<b>Total mass of emissions (as propane),mg</b>	<b>2,982,456</b>
<b>Emissions rate of VOC, total gasoline loaded, mg/l</b>	<b>2.70</b>
<b>Emissions rate of VOC, total volume loaded, mg/l</b>	<b>1.92</b>
<b>Stack gas volumetric flow rate, scfm</b>	<b>151.1</b>
<b>Displacement volume (ft<sup>3</sup>)</b>	<b>54,200</b>
<b>Displacement volume (scf)</b>	<b>54,382</b>
<b>Total test period, minutes</b>	<b>360</b>
<b>Emissions rate of VOC, lb/hr</b>	<b>1.10</b>
<b>Emissions rate of VOC, tons/yr</b>	<b>4.81</b>