



Marathon Petroleum Company LP
1300 South Fort Street
Detroit, MI 48217

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REPORT ON COMPLIANCE TESTING

Performed for:
**MARATHON PETROLEUM COMPANY LP
DETROIT REFINERY**

**NHT STRIPPER/REBOILER STACK (SV16-H3)
NHT CHARGE HEATER STACK (SV16-H4)**

Client Reference No: 4100048779
CleanAir Project No: 12734-1
Revision 0: July 2, 2015

To the best of our knowledge, the data presented in this report are accurate, complete, error free, legible and representative of the actual emissions during the test program. Clean Air Engineering operates in conformance with the requirements of ASTM D7036-04 Standard Practice for Competence of Air Emission Testing Bodies.

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PROJECT OVERVIEW

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INTRODUCTION

Marathon Petroleum Company LP (MPC) contracted Clean Air Engineering (CleanAir) to perform continuous emissions monitoring system (CEMS) testing at the Detroit Refinery to demonstrate compliance with permit limits.

All testing was conducted in accordance with the regulations set-forth by the United States Environmental Protection Agency (USEPA) and the Michigan Department of Environmental Quality (MDEQ). The permit limits are referenced in Michigan Department of Environmental Quality, Air Quality Division Permit to Install No. 63-08D, issued May 12, 2014.

Key Project Participants

Individuals responsible for coordinating and conducting the test program were:

Crystal Davis – MPC
Joe Reidy – MPC
Medel Cendana – CleanAir

Test Program Parameters

The testing was performed at the NHT Stripper/Reboiler Stack (Emission Unit ID No. EU16-NHTSTRIPREBOIL-S1; Stack ID No. SV16-H3) on May 12, 2015, and at the NHT Charge Heater Stack (Emission Unit ID No. EU16-NHTCHARHTR-S1; Stack ID No. SV16-H4) on May 13, 2015, and included the following emissions measurements:

- nitrogen oxides (NO_x)
- oxygen (O₂)

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PROJECT OVERVIEW

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TEST PROGRAM SYNOPSIS**Test Schedule**

The on-site schedule followed during the test program is outlined in Table 1-1.

**Table 1-1:
Schedule of Activities**

Run Number	Location	Method	Analyte	Date	Start Time	End Time
1	NHT Stripper/Reboiler Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/12/15	09:57	10:57
2	NHT Stripper/Reboiler Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/12/15	11:08	12:08
3	NHT Stripper/Reboiler Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/12/15	12:15	13:15
1	NHT Charge Heater Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/13/15	09:11	10:11
2	NHT Charge Heater Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/13/15	10:18	11:18
3	NHT Charge Heater Stack	USEPA Method 3A/7E	O ₂ /NO _x	05/13/15	11:24	12:24

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Results Summary

Table 1-2 summarizes the results of the test program. A more detailed presentation of the test conditions and results of analysis are shown on page 2-1.

**Table 1-2:
Summary of RATA Results**

Source	Constituent (Units)	Sampling Method	Average Emission	Permit Limit ¹
<u>NHT Stripper/Reboiler Stack</u>				
	NO _x (lb/MMBtu)	USEPA 7E	0.12	0.20
<u>NHT Charge Heater Stack</u>				
	NO _x (lb/MMBtu)	USEPA 7E	0.15	0.20

¹ Permit limits obtained from MDEQ Permit To Install No. 63-08D.

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PROJECT OVERVIEW

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Discussion of Test Program***O₂ and NO_x Emissions Testing - USEPA Methods 3A and 7E***

Minute-average data points for O₂ and NO_x (dry basis) were collected over a period of 60-minutes for each test run.

Emission results in units of dry volume-based concentration (ppmdv) were converted to units of pounds per million Btu (lb/MMBtu) by calculating an oxygen-based fuel factor (F_d) for refinery gas from percent volume composition analytical data provided by MPC and tabulated heating values for each of the measured constituents per Method 19.

NO_x results (lb/MMBtu) were used to demonstrate compliance with the permit limit. The final results were expressed as the average of the three (3) runs. The final results for NHT Stripper/Reboiler Stack and NHT Charge Heater Stack were below the permit limit.

Upon review of the data following the test program, CleanAir found an error in the data entry of the High NO_x cylinder gas value utilized by the CEMS operator on-site. A NO_x cylinder gas value of 243 ppm was utilized while on-site however, the actual NO_x cylinder gas value was 251 ppm.

Upon re-entry of the correct NO_x cylinder gas value, it was found that the initial direct calibration error performed on the NO_x analyzer prior to testing on May 12 and May 13, 2015, did not meet the full QA/QC criteria. On both test dates the analyzer calibration error for the high NO_x calibration gas was in excess of the 2% allowed by Method 7E.

While the full calibration error criteria were not met, CleanAir believes the data collected to be valid. The calibration error for the Zero NO_x cylinder value and the Mid NO_x cylinder value (121 ppm) passed all necessary criteria. All of the data points collected during the test program were less than the Mid NO_x cylinder value of 121ppm.

The raw data for calibrations and test runs can be found in Appendix E.

End of Section 1 – Project Overview

RESULTS**Table 2-1:
NHT Stripper/Reboiler Stack – NO_x Emissions**

Run No.		1	2	3	Average
Date (2015)		May 12	May 12	May 12	
Start Time (approx.)		09:57	11:08	12:15	
Stop Time (approx.)		10:57	12:08	13:15	
Process Conditions					
P ₁	Feed rate (bpd)	28,047	28,036	27,982	28,022
P ₂	Fuel gas flow rate (Mscf/day)	731	675	725	710
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,317	8,317	8,317	8,317
Gas Conditions					
O ₂	Oxygen (dry volume %)	4.5	4.5	4.5	4.5
Nitrogen Oxides Results					
C _{sd}	Concentration (ppmdv)	95.7	94.2	93.8	94.6
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	122	120	120	121
C _{sd}	Concentration (lb/dscf)	1.14E-05	1.12E-05	1.12E-05	1.13E-05
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.121	0.119	0.119	0.120

Average includes 3 runs.

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**Table 2-2:
NHT Charge Heater Stack – NO_x emissions**

Run No.		1	2	3	Average
Date (2015)		May 13	May 13	May 13	
Start Time (approx.)		09:11	10:18	11:24	
Stop Time (approx.)		10:11	11:18	12:24	
Process Conditions					
P ₁	Feed rate (bpd)	32,566	33,749	34,016	33,444
P ₂	Fuel gas flow rate (Mscf/day)	1,390	1,423	1,421	1,411
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,305	8,305	8,305	8,305
Gas Conditions					
O ₂	Oxygen (dry volume %)	6.2	5.8	5.8	5.9
Nitrogen Oxides Results					
C _{sd}	Concentration (ppmdv)	108	112	113	111
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	154	156	156	155
C _{sd}	Concentration (lb/dscf)	1.29E-05	1.34E-05	1.35E-05	1.33E-05
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.153	0.154	0.155	0.154

Average includes 3 runs.

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End of Section 2 – Results