



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

RECEIVED
AUG 15 2016
AIR QUALITY DIV.

REPORT ON RATA & COMPLIANCE TESTING

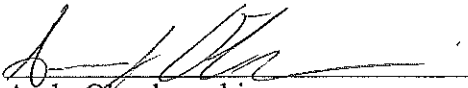
Performed for:
**MARATHON PETROLEUM COMPANY LP
DETROIT REFINERY**

**VACUUM 2 HEATER STACK (SV04-H2)
CRUDE/VACUUM HEATER STACK (SV04-H1-05-H1)**

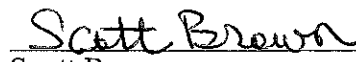
Client Reference No: 4100665755
CleanAir Project No: 13019
Revision 0: August 10, 2016

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.

Submitted by,


Andy Obuchowski
Midwest Engineering Group Leader
aobuchowski@cleanair.com
(800) 627-0033 ext. 4537

Reviewed by,


Scott Brown
Quality Director
sbrown@cleanair.com
(800) 627-0033 ext. 4544

REVISION HISTORY

REPORT ON RATA & COMPLIANCE TESTING

DRAFT REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
D0a	07/15/16	All	Draft version of original document.

FINAL REPORT REVISION HISTORY

Revision:	Date	Pages	Comments
0	08/10/16	All	Final version of original document

RECEIVED

AUG 15 2016



MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

AIR QUALITY DIV.

**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 Marathon Petroleum Company LP County Wayne

Source Address 1300 South Fort Street City Detroit

AQD Source ID (SRN) A9831 ROP No. MI-ROP-A9831-2012b ROP Section No. 01

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 06/14/2016 To 06/15/2016

Additional monitoring reports or other applicable documents required by the ROP are attached as described:
Submittal of Stack Test and RATA results.

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

MPC Investment LLC,
its General Partner
Deputy Assistant Secretary

David T. Roland
Name of Responsible Official (print or type)

Title

313-843-9100
Phone Number

Signature of Responsible Official

Date

* Photocopy this form as needed.

EQP 5736 (Rev 11-04)

PROJECT OVERVIEW

1-1

INTRODUCTION

Marathon Petroleum Company LP (MPC) contracted Clean Air Engineering (CleanAir) to perform emission measurements at the Detroit refinery for relative accuracy test audit (RATA) and compliance purposes.

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
Tom Maza – MDEQ
Andy Obuchowski – CleanAir

RECEIVED
AUG 15 2016
AIR QUALITY DIV.

Test Program Parameters

Testing was performed at the Vacuum 2 Heater Stack (Emission Unit ID No. EU04-VAC2HTR-S1; Stack ID No. SV04-H2) on June 14, 2016, and included the following emissions measurements:

- oxygen (O₂)
- carbon dioxide (CO₂)
- nitrogen oxides (NO_x)

Testing was performed at the Crude/Vacuum Heater Stack (Emission Unit ID No. EU05-CRUDEHTR-S1 and EU04-VACHTR-S1; Common Stack ID No. SV04-H1-05-H1) on June 15, 2016, and included the following emissions measurements:

- particulate matter (PM), assumed equivalent to filterable particulate matter (FPM) only
- nitrogen oxides (NO_x)
- flue gas composition (e.g., O₂, CO₂, H₂O)
- flue gas flow rate

PROJECT OVERVIEW
TEST PROGRAM SYNOPSIS

1-2

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	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	08:42	09:03
2	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	09:11	09:32
3	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	09:39	10:00
4	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	10:08	10:29
5	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	10:37	10:58
6	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	11:05	11:26
7	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	11:34	11:55
8	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	12:02	12:23
9	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	12:31	12:52
10	Vacuum 2 Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/14/16	13:01	13:22
1	Crude/Vacuum Heater Stack	USEPA Method 5	FPM	06/15/16	10:28	13:35
2	Crude/Vacuum Heater Stack	USEPA Method 5	FPM	06/15/16	14:22	16:32
3	Crude/Vacuum Heater Stack	USEPA Method 5	FPM	06/15/16	17:03	19:15
1	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	08:53	09:14
2	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	10:05	10:26
3	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	10:37	10:58
4	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	11:25	11:46
5	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	11:55	12:16
6	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	12:26	12:47
7	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	12:57	13:18
8	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	13:27	13:48
9	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	13:57	14:18
10	Crude/Vacuum Heater Stack	USEPA Method 3A/7E	O ₂ /CO ₂ /NO _x	06/15/16	14:29	14:50
1	Crude/Vacuum Heater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	06/15/16	08:53	10:58
2	Crude/Vacuum Heater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	06/15/16	11:25	12:47
3	Crude/Vacuum Heater Stack	USEPA Method 3A/18/25A	O ₂ /CO ₂ /CH ₄ /C ₂ H ₆ /THC	06/15/16	12:57	14:18

080816 160429

PROJECT OVERVIEW

1-3

Results Summary

Tables 1-2 and 1-3 summarize the results of the test program. A more detailed presentation of the test conditions and results of analysis are shown on pages 2-1 through 2-10.

**Table 1-2:
Summary of Emission Compliance Test Results**

Source	Constituent (Units)	Sampling Method	Average Emission	Permit Limit ¹
<u>Crude/Vacuum Heater Stack</u>				
	PM (lb/MMBtu)	USEPA 5	0.0020	0.0019
	VOC (lb/MMBtu)	USEPA 25A / 18	<7.2E-4	0.0055

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

071516 112356

**Table 1-3:
Summary of RATA Results**

Source	Constituent (Units)	Reference Method (USEPA)	Applicable Specification	Relative Accuracy(%) ¹	Standard Used	Specification Limit ²
<u>Vacuum 2 Heater Stack</u>						
	O ₂ (% dv)	3A	PS3	0.2	abs. diff.	±1.0%
	NO _x (ppm @ 0%O ₂)	7E	PS2	9.4	% of RM	20%
<u>Crude/Vacuum Heater Stack</u>						
	O ₂ (% dv)	3A	PS3	0.01	abs. diff.	±1.0%
	NO _x (lb/MMBtu)	7E	PS2	11.2	% of RM	20%
	NO _x (ppm @ 0%O ₂)	7E	PS2	5.9	% of RM	20%

¹ Relative Accuracy is expressed in terms of comparison to the reference method (% RM) or applicable emission standard (% Std.).

² Specification limits obtained from 40 CFR 60, Appendix B, Performance Specifications.

080816 160429

Discussion of Test Program**FPM Testing - USEPA Method 5**

For this test program, PM emission rate is assumed equivalent to FPM emission rate. Three (3) 120-minute Method 5 test runs were performed on June 15, 2016, at the Crude/Vacuum Heater Stack. The final result was expressed as the average of three (3) valid runs.

PROJECT OVERVIEW

1-4

O₂, NO_x, and CO Emissions / RATA Testing - USEPA Methods 3A, 7E, and 10; Performance Specifications 2, 3 and 4/4A

Minute-average data points for O₂ and NO_x were collected over a period of 21 minutes for each RATA Reference Method (RM) run. The average result for each RM run was calculated and compared to the average result from the facilities CEMS over an identical time interval in order to calculate relative accuracy (RA).

Ten (10) valid RATA test runs were performed at the Vacuum 2 Heater Stack on June 14, 2016.

Ten (10) valid RATA test runs were performed at the Crude/Vacuum Heater Stack on June 15, 2016.

The facility CEMS results as lb/MMBtu were calculated and provided by MPC along with all other applicable RATA and process data and can be found in Appendix H.

VOC Testing - USEPA Methods 25A and 18

VOC testing was performed concurrently with the RATA testing. Nine (9) 21-minute Method 25 test runs for THCs were performed concurrently with three (3) Method 18 bag collections for CH₄ and C₂H₆, with each Method 18 sample collected over a period of about 63 minutes.

The Method 18 samples on the Crude/Vacuum Heater were collected as follows:

- Method 18 Run 1: Collected during Method 25A Runs 1, 2 and 3
- Method 18 Run 2: Collected during Method 25A Runs 4, 5 and 6
- Method 18 Run 3: Collected during Method 25A Runs 7, 8 and 9

The VOC emission rate is normally equivalent to THC emission rate, minus CH₄ and C₂H₆ emission rate. The calculated emission rate of CH₄ and C₂H₆ detected through analysis of each Method 18 sample bag slightly exceeded the amount of THC measured by the on-line THC analyzer.

This is likely due to variations in the calibration standards, measurement and analytical technique. Therefore, VOC emissions are reported as a value "less than" 1% of the calibration span of THC instrument. The final results were calculated using the average of three valid test runs, all using a concentration of 1% of the instrument span and reported as "less than" the amount.

PROJECT OVERVIEW

1-5

Calculation of Final Results

Emission results in units of dry volume-based concentration (lb/dscf, ppm_{dv}) were converted to units of pounds per million Btu (lb/MMBtu), where applicable, by calculating an oxygen-based fuel factor (F_d) for refinery gas per USEPA Method 19 specifications. The heat content and F_d factor were calculated from percent volume composition analytical data provided by MPC and tabulated heating values for each of the measured constituents.

Two fuel gas analyses were performed by MPC on each test day (3:30 and 15:30). The analysis used to calculate the emissions results for each test run was selected by choosing the analysis performed nearest to each emissions test run interval.

End of Section 1 – Project Overview

RESULTS**Table 2-1:
Vac. 2 Heater Stack – NO_x Emissions (USEPA 7E)**

Run No.		1	2	3	4	5
Date (2016)		Jun 14	Jun 14	Jun 14	Jun 14	Jun 14
Start Time (approx.)		08:42	09:11	09:39	10:08	10:37
Stop Time (approx.)		09:03	09:32	10:00	10:29	10:58
Process Conditions						
P ₁	Charge rate (BPD)	133,188	133,497	135,048	135,067	134,970
Gas Conditions						
O ₂	Oxygen (dry volume %)	5.7	6.1	5.7	5.5	5.8
CO ₂	Carbon dioxide (dry volume %)	8.6	8.3	8.5	8.7	8.5
Nitrogen Oxides Results						
C _{sd}	Concentration (ppmdv)	24.3	24.1	24.0	24.1	24.2
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	33.4	34.0	33.0	32.7	33.4
C _{sd}	Concentration (lb/dscf)	2.90E-06	2.88E-06	2.87E-06	2.88E-06	2.88E-06

Run No.		6	7	8	9	10	Average
Date (2016)		Jun 14	Jun 14	Jun 14	Jun 14	Jun 14	
Start Time (approx.)		11:05	11:34	12:02	12:31	13:01	
Stop Time (approx.)		11:26	11:55	12:23	12:52	13:22	
Process Conditions							
P ₁	Charge rate (BPD)	134,205	131,871	131,454	132,898	133,926	133,612
Gas Conditions							
O ₂	Oxygen (dry volume %)	5.5	5.5	5.5	5.6	5.4	5.6
CO ₂	Carbon dioxide (dry volume %)	8.7	8.7	8.7	8.6	8.7	8.6
Nitrogen Oxides Results							
C _{sd}	Concentration (ppmdv)	23.8	23.6	23.6	23.7	23.4	23.9
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	32.3	32.0	32.1	32.5	31.6	32.7
C _{sd}	Concentration (lb/dscf)	2.84E-06	2.82E-06	2.81E-06	2.84E-06	2.80E-06	2.85E-06

Average includes 10 runs

RESULTS

**Table 2-2:
Vac. 2 Heater Stack – O₂ RATA (USEPA 3A / PS3)**

Run No.	Start Time	Date (2016)	RM Data (%dv)	CEMS Data (%dv)	Difference (%dv)	Difference Percent
1	08:42	Jun 14	5.70	5.93	-0.23	-4.0%
2	09:11	Jun 14	6.06	6.18	-0.12	-2.0%
3	09:39	Jun 14	5.69	5.84	-0.15	-2.6%
4	10:08	Jun 14	5.53	5.73	-0.20	-3.6%
5	10:37	Jun 14	5.78	5.92	-0.14	-2.4%
6	11:05	Jun 14	5.52	5.70	-0.18	-3.3%
7	11:34	Jun 14	5.50	5.68	-0.18	-3.3%
8	12:02	Jun 14	5.55	5.68	-0.13	-2.3%
9 *	12:31	Jun 14	5.61	6.03	-0.42	-7.5%
10	13:01	Jun 14	5.40	5.51	-0.11	-2.0%
Average			5.64	5.80	-0.16	-2.8%

Relative Accuracy Test Audit Results

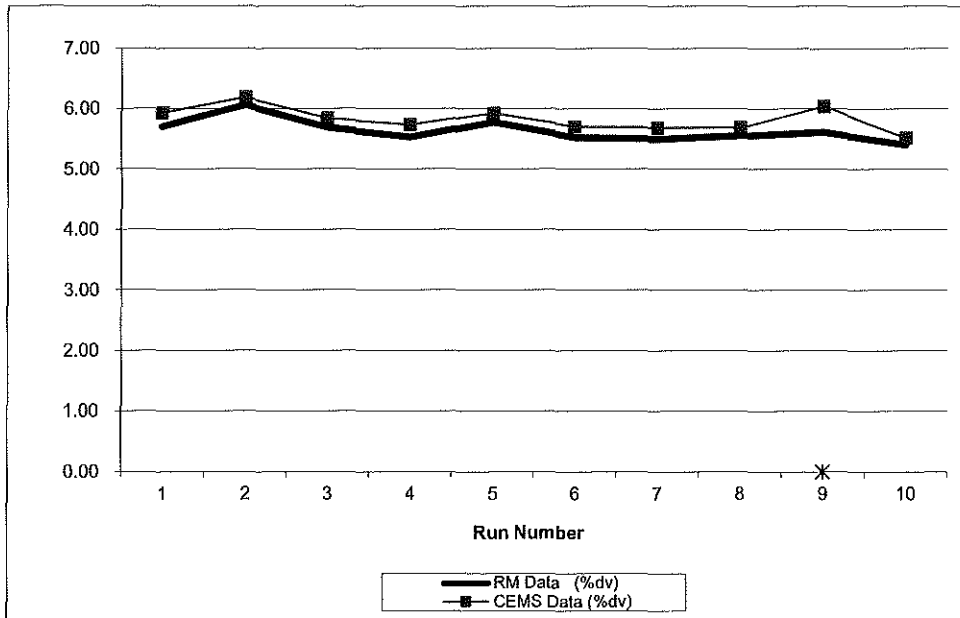
Standard Deviation of Differences	0.040	
Confidence Coefficient (CC)	0.031	
t-Value for 9 Data Sets	2.306	
Relative Accuracy (as % of RM)	3.4%	Limit 20.0%
Avg. Abs. Diff. (%dv)	0.16	1.0

RM = Reference Method (CleanAir Data)

071516 162459

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS

**Table 2-3:
Vac. 2 Heater Stack – NO_x (ppmdv @ 0% O₂) RATA (USEPA 7E / PS2)**

Run No.	Start Time	Date (2016)	RM Data (ppm@0%O ₂)	CEMS Data (ppm@0%O ₂)	Difference (ppm@0%O ₂)	Difference Percent
1	08:42	Jun 14	33.35	30.31	3.04	9.1%
2	09:11	Jun 14	33.98	30.79	3.19	9.4%
3	09:39	Jun 14	33.03	29.97	3.06	9.3%
4	10:08	Jun 14	32.75	29.91	2.84	8.7%
5	10:37	Jun 14	33.40	30.37	3.03	9.1%
6	11:05	Jun 14	32.33	29.41	2.92	9.0%
7	11:34	Jun 14	32.01	29.06	2.95	9.2%
8	12:02	Jun 14	32.07	29.00	3.07	9.6%
9 *	12:31	Jun 14	32.46	28.70	3.76	11.6%
10	13:01	Jun 14	31.61	28.95	2.66	8.4%
Average			32.73	29.75	2.97	9.1%

Relative Accuracy Test Audit Results

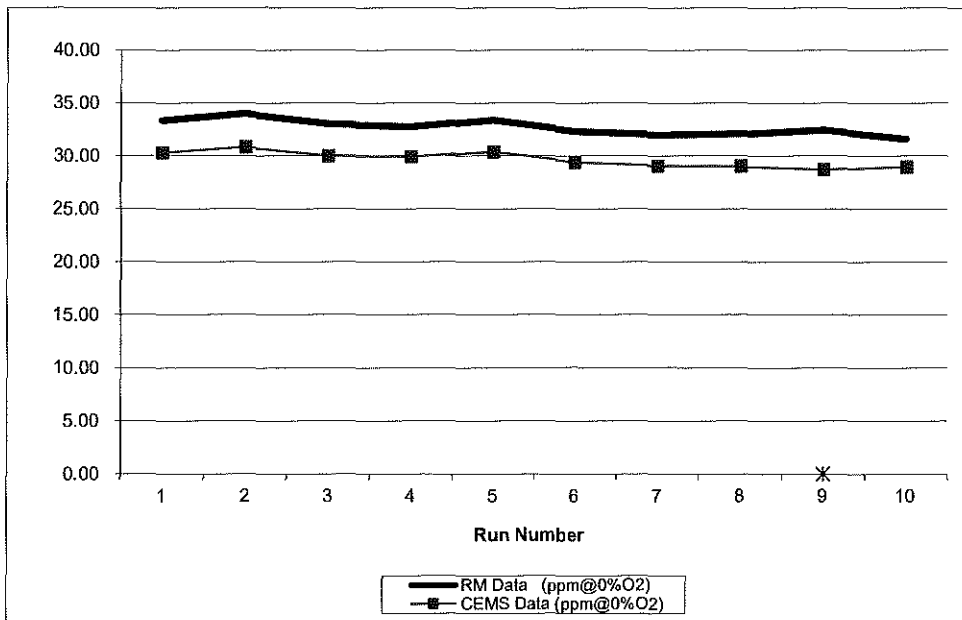
Standard Deviation of Differences	0.154	
Confidence Coefficient (CC)	0.119	
t-Value for 9 Data Sets	2.306	
		Limit
Relative Accuracy (as % of RM)	9.4%	20.0%
Relative Accuracy (as % of Appl. Std.)	7.7%	10.0%
Appl. Std. = 40 ppm@0%O ₂		

RM = Reference Method (CleanAir Data)

071516 162459

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS**Table 2-4:
Crude/Vac. Heater Stack – FPM Emissions (USEPA 5)**

Run No.		1	2	3	Average
Date (2016)		Jun 15	Jun 15	Jun 15	
Start Time (approx.)		10:28	14:22	17:03	
Stop Time (approx.)		13:35	16:32	19:45	
Process Conditions					
P ₁	Charge rate (BPD)	134,594	132,073	133,993	133,553
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,123	8,123	8,123	8,123
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760
Gas Conditions					
O ₂	Oxygen (dry volume %)	8.6	8.5	9.0	8.7
CO ₂	Carbon dioxide (dry volume %)	6.5	6.8	6.1	6.5
T _s	Sample temperature (°F)	290	288	289	289
B _w	Actual water vapor in gas (% by volume)	13.4	14.1	14.0	13.9
Gas Flow Rate					
Q _a	Volumetric flow rate, actual (acfm)	93,800	84,700	92,600	90,400
Q _s	Volumetric flow rate, standard (scfm)	64,300	58,200	63,500	62,000
Q _{std}	Volumetric flow rate, dry standard (dscfm)	55,700	50,000	54,600	53,400
Q _s	Volumetric flow rate, standard (scf/hr)	3,860,000	3,490,000	3,810,000	3,720,000
Q _{std}	Volumetric flow rate, dry standard (dscf/hr)	3,340,000	3,000,000	3,280,000	3,210,000
Sampling Data					
V _{mstd}	Volume metered, standard (dscf)	67.98	61.75	66.80	65.51
%I	Isokinetic sampling (%)	97.8	98.9	97.9	98.2
Laboratory Data					
m _n	Total FPM (g)	0.00475	0.00317	0.00504	
DLC	Detection level classification	ADL	ADL	ADL	
FPM Results					
C _{sd}	Particulate Concentration (lb/dscf)	1.54E-07	1.13E-07	1.66E-07	1.45E-07
E _{lb/hr}	Particulate Rate (lb/hr)	0.515	0.340	0.545	0.466
E _{T/yr}	Particulate Rate (Ton/yr)	2.25	1.49	2.39	2.04
E _{Fd}	Particulate Rate - F _d -based (lb/MMBtu)	0.00213	0.00155	0.00237	0.00202

Average includes 3 runs.

Detection level classifications are defined as follows:

ADL = Above Detection Level - all fractions are above detection limit

071516 141728

RESULTS

2-5

**Table 2-5:
Crude/Vac. Heater Uncertainty Analysis – FPM (USEPA 5)**

	FPM Results (lb/MMBtu)		FPM Results (lb/hr)		FPM Results (Ton/yr)	
Method	5		5		5	
Run No.	1	0.00213	1	0.515	1	2.25
	2	0.00155	2	0.340	2	1.49
	3	0.00237	3	0.545	3	2.39
SD	4.23E-04		0.1109		0.486	
AVG	2.02E-03		0.466		2.04	
RSD	21.0%		23.8%		23.8%	
N	3		3		3	
SE	2.44E-04		0.0640		0.280	
RSE	12.1%		13.7%		13.7%	
P	95.0%		95.0%		95.0%	
TINV	4.303		4.30		4.30	
CI +	0.00307		0.742		3.25	
AVG	0.00202		0.466		2.04	
CI -	9.67E-04		0.191		0.84	
TB +	0.00525		1.32		5.76	

AVG (average) is the mean value of the runs; N is the number of individual runs.

SD (standard deviation) and RSD (relative standard deviation) are measures of the variability of individual runs.

SE (standard error) and RSE (relative standard error) are measures of the variability of the average of the runs.

P (probability) is the confidence level associated with the two-tailed Student's t-distribution.

TINV (t-value) is the value of the Student's t-distribution as a function of P (probability) and N-1 (degrees of freedom).

CI (confidence interval) indicates that if the test is conducted again under the same conditions, the average would be expected to fall within the interval (CI- to CI+) about 95% of the time.

TB+ (upper tolerance bound) is the value below which 95% of future runs are expected to fall (assuming testing at the same conditions).

RESULTS**Table 2-6:
Crude/Vac. Heater – THC, CH₄, C₂H₆ & VOC Emissions (USEPA 25A/18)**

Run No.		1	2	3	Average
Date (2016)		Jun 15	Jun 15	Jun 15	
Start Time (approx.)		08:53	11:25	12:57	
Stop Time (approx.)		10:58	12:47	14:18	
Process Conditions					
P ₁	Charge rate (BPD)	134,663	134,665	136,095	135,141
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,123	8,123	8,123	8,123
Gas Conditions					
O ₂	Oxygen (dry volume %)	8.7	8.6	8.4	8.6
CO ₂	Carbon dioxide (dry volume %)	6.6	6.8	7.0	6.8
B _w	Actual water vapor in gas (% by volume) ¹	13.4	13.4	13.4	13.4
THC Results					
C _{sd}	Concentration (ppmdv as C ₃ H ₈)	0.220	0.217	0.224	0.220
C _{sd}	Concentration (lb/dscf)	2.52E-08	2.49E-08	2.56E-08	2.52E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	3.52E-04	3.42E-04	3.48E-04	3.47E-04
Methane Results					
C _{sd}	Concentration (ppmdv)	1.300	1.250	1.270	1.273
C _{sd}	Concentration (lb/dscf)	5.41E-08	5.20E-08	5.29E-08	5.30E-08
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	7.54E-04	7.16E-04	7.18E-04	7.30E-04
Ethane Results					
C _{sd}	Concentration (ppmdv)	<0.0918	<0.0918	<0.0918	<0.0918
C _{sd}	Concentration (lb/dscf)	<7.16E-09	<7.16E-09	<7.16E-09	<7.16E-09
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<9.98E-05	<9.86E-05	<9.73E-05	<9.86E-05
VOC Results					
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	<7.27E-04	<7.18E-04	<7.09E-04	<7.18E-04

Average includes 3 runs.

080410 154528

¹ Moisture data used for ppmwv to ppmdv correction obtained from nearly-concurrent M-5 runs.

For ethane, '<' indicates a measured response below the analytical detection limit determined by the laboratory.

For VOCs, '<' indicates a measured/calculated response below the detection limit (assumed to be 1% of the instrument calibration span).

For all calculated averages, "<" values are treated as the entire value of the detection limit.

RESULTS**Table 2-7:
Crude/Vac. Heater Stack – NO_x Emissions (USEPA 7E)**

Run No.		1	2	3	4	5
Date (2016)		Jun 15	Jun 15	Jun 15	Jun 15	Jun 15
Start Time (approx.)		08:53	10:05	10:37	11:25	11:55
Stop Time (approx.)		09:14	10:26	10:58	11:46	12:16
Process Conditions						
P ₁	Charge rate (BPD)	134,774	134,096	132,498	133,561	134,748
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,123	8,123	8,123	8,123	8,123
Gas Conditions						
O ₂	Oxygen (dry volume %)	8.6	8.7	8.8	8.6	8.5
CO ₂	Carbon dioxide (dry volume %)	6.8	6.6	6.5	6.9	6.8
Nitrogen Oxides Results						
C _{sd}	Concentration (ppmdv)	21.3	21.1	21.6	20.9	20.5
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	36.2	36.1	37.3	35.3	34.7
C _{sd}	Concentration (lb/dscf)	2.54E-06	2.51E-06	2.57E-06	2.49E-06	2.45E-06
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.0351	0.0351	0.0362	0.0343	0.0337

Run No.		6	7	8	9	10	Average
Date (2016)		Jun 15	Jun 15	Jun 15	Jun 15	Jun 15	
Start Time (approx.)		12:26	12:57	13:27	13:57	14:29	
Stop Time (approx.)		12:47	13:18	13:48	14:18	14:50	
Process Conditions							
P ₁	Charge rate (BPD)	135,633	136,690	136,618	134,854	133,449	134,692
F _d	Oxygen-based F-factor (dscf/MMBtu)	8,123	8,123	8,123	8,123	8,123	8,123
Gas Conditions							
O ₂	Oxygen (dry volume %)	8.6	8.5	8.4	8.3	8.4	8.5
CO ₂	Carbon dioxide (dry volume %)	6.7	6.8	7.1	7.0	7.0	6.8
Nitrogen Oxides Results							
C _{sd}	Concentration (ppmdv)	20.6	20.6	19.9	19.8	20.0	20.6
C _{sd-x}	Concentration @ 0% O ₂ (ppmdv)	35.0	34.8	33.1	32.8	33.3	34.9
C _{sd}	Concentration (lb/dscf)	2.46E-06	2.46E-06	2.37E-06	2.36E-06	2.39E-06	2.46E-06
E _{Fd}	Emission Rate - F _d -based (lb/MMBtu)	0.0339	0.0338	0.0321	0.0318	0.0323	0.0338

Average Includes 10 Runs

RESULTS

**Table 2-8:
Crude/Vac. Heater Stack – O₂ RATA (USEPA 3A / PS3)**

Run No.	Start Time	Date (2016)	RM Data (%dv)	CEMS Data (%dv)	Difference (%dv)	Difference Percent
1	08:53	Jun 15	8.60	8.61	-0.01	-0.1%
2	10:05	Jun 15	8.72	8.74	-0.02	-0.2%
3	10:37	Jun 15	8.82	8.83	-0.01	-0.1%
4	11:25	Jun 15	8.56	8.56	0.00	0.0%
5	11:55	Jun 15	8.54	8.54	0.00	0.0%
6	12:26	Jun 15	8.60	8.62	-0.02	-0.2%
7	12:57	Jun 15	8.54	8.54	0.00	0.0%
8	13:27	Jun 15	8.35	8.37	-0.02	-0.2%
9	13:57	Jun 15	8.30	8.31	-0.01	-0.1%
10 *	14:29	Jun 15	8.36	8.31	0.05	0.6%
Average			8.56	8.57	-0.01	-0.1%

Relative Accuracy Test Audit Results

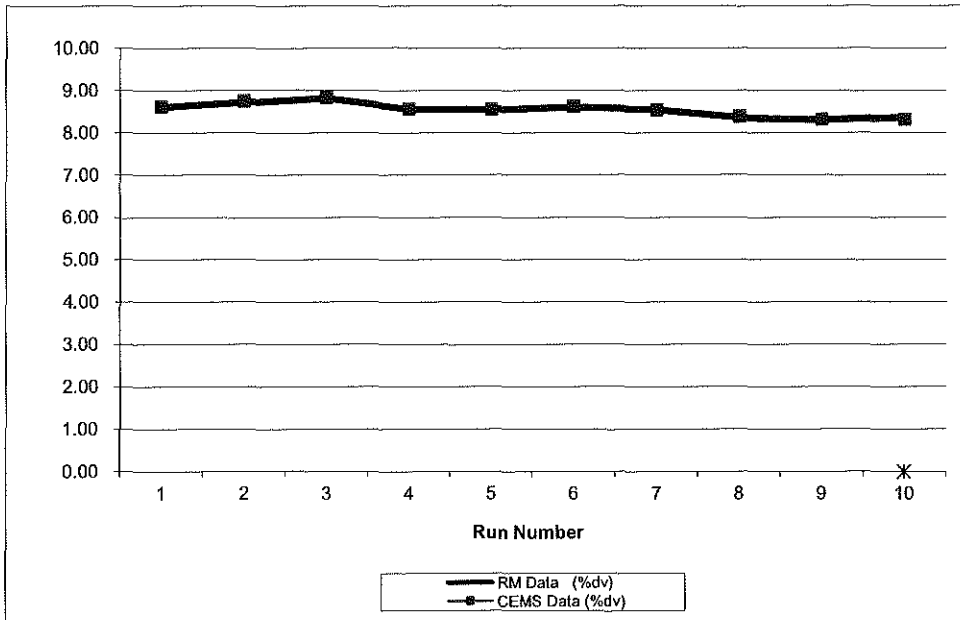
Standard Deviation of Differences	0.009	
Confidence Coefficient (CC)	0.007	
t-Value for 9 Data Sets	2.306	
		Limit
Relative Accuracy (as % of RM)	0.2%	20.0%
Avg. Abs. Diff. (%dv)	0.010	1.0

RM = Reference Method (CleanAir Data)

071516 142646

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS

**Table 2-9:
Crude/Vac. Heater Stack – NO_x (lb/MMBtu) RATA (USEPA 7E / PS2)**

Run No.	Start Time	Date (2016)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)	Difference Percent
1	08:53	Jun 15	0.035	0.039	-0.004	-11.4%
2	10:05	Jun 15	0.035	0.039	-0.004	-11.4%
3	10:37	Jun 15	0.036	0.040	-0.004	-11.1%
4 *	11:25	Jun 15	0.034	0.038	-0.004	-11.8%
5	11:55	Jun 15	0.034	0.037	-0.003	-8.8%
6	12:26	Jun 15	0.034	0.037	-0.003	-8.8%
7	12:57	Jun 15	0.034	0.037	-0.003	-8.8%
8 *	13:27	Jun 15	0.032	0.036	-0.004	-12.5%
9	13:57	Jun 15	0.032	0.035	-0.003	-9.4%
10	14:29	Jun 15	0.032	0.035	-0.003	-9.4%
Average			0.034	0.037	-0.003	-9.9%

Relative Accuracy Test Audit Results

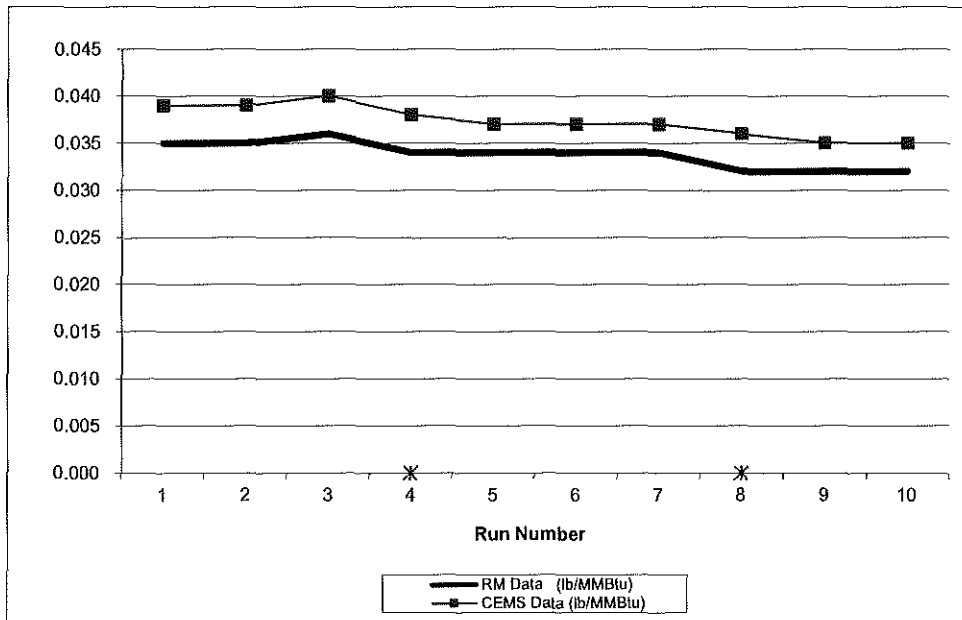
Standard Deviation of Differences	0.001	
Confidence Coefficient (CC)	0.000	
t-Value for 8 Data Sets	2.365	
		Limit
Relative Accuracy (as % of RM)	11.2%	20.0%
Relative Accuracy (as % of Appl. Std.)	7.6%	10.0%
Appl. Std. = 0.05 lb/MMBtu		

RM = Reference Method (CleanAir Data)

071516 142646

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 8 of 10 runs. * indicates the excluded runs.



RECEIVED
AUG 15 2016
AIR QUALITY DIV.

RESULTS

2-10

**Table 2-10:
Crude/Vac. Heater Stack – NO_x (ppmdv @ 0% O₂) RATA (USEPA 7E / PS2)**

Run No.	Start Time	Date (2016)	RM Data (ppm@0%O ₂)	CEMS Data (ppm@0%O ₂)	Difference (ppm@0%O ₂)	Difference Percent
1	08:53	Jun 15	36.21	38.30	-2.09	-5.8%
2	10:05	Jun 15	36.15	38.37	-2.22	-6.1%
3	10:37	Jun 15	37.30	39.05	-1.75	-4.7%
4 *	11:25	Jun 15	35.32	37.65	-2.33	-6.6%
5	11:55	Jun 15	34.71	36.42	-1.71	-4.9%
6	12:26	Jun 15	34.99	36.77	-1.78	-5.1%
7	12:57	Jun 15	34.85	36.72	-1.87	-5.4%
8	13:27	Jun 15	33.13	35.15	-2.02	-6.1%
9	13:57	Jun 15	32.80	34.59	-1.79	-5.5%
10	14:29	Jun 15	33.34	34.57	-1.23	-3.7%
Average			34.83	36.66	-1.83	-5.3%

Relative Accuracy Test Audit Results

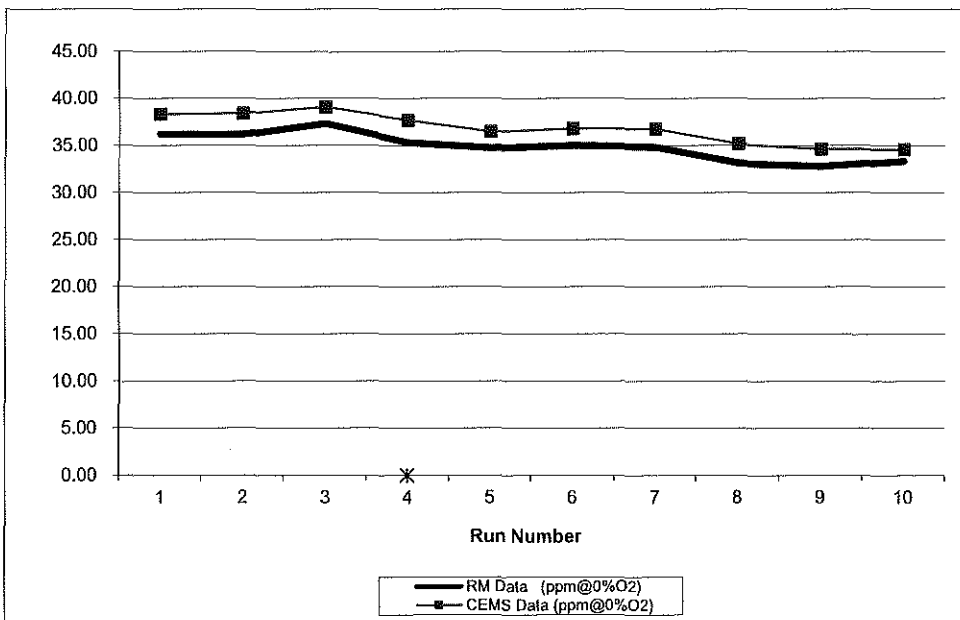
Standard Deviation of Differences	0.283	
Confidence Coefficient (CC)	0.218	
t-Value for 9 Data Sets	2.306	
		Limit
Relative Accuracy (as % of RM)	5.9%	20.0%
Relative Accuracy (as % of Appl. Std.)	5.1%	10.0%
Appl. Std. = 40 ppm@0%O ₂		

RM = Reference Method (CleanAir Data)

071516 142646

CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)

RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



End of Section 2 – Results