CleanAir

CleanAir Engineering
500 W. Wood Street
Palatine, IL 60067-4975
cleanair.com

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

REPORT ON RATA & COMPLIANCE TESTING

Performed for:
MARATHON PETROLEUM COMPANY LP
DETROIT REFINERY

CCR CHARGE HEATER STACK (14H8-9)

Client Reference No: 4100356132
CleanAir Project No: 12783-1
Revision 0: September 14, 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.

Submitted by,

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

Reviewed by,

Scott Lehmann
Engineering Group Business Leader
slehmann@cleanair.com
(800) 627-0033 ext. 4660

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
AIR QUALITY DIVISION

RECEIVED
SEP 21 2015
AIR QUALITY DIVISION

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 Natural Resources and Environment, 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 7/21/2015 To 8/25/2015

Additional monitoring reports or other applicable documents required by the ROP are attached as described:

Submittal of the CCR Charge and InterHeater Compliance Testing 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

David Roland	MPC Investment LLC, its General Partner Deputy Assistant Secretary	313-843-9100
Name of Responsible Official (print or type)	Title	Phone Number
Signature of Responsible Official		9/18/2015 Date

* Photocopy this form as needed.

EQP 5736 (Rev 2-10)

PROJECT OVERVIEW

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.

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 (DEQ). 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
Chad Eilering – CleanAir
Medel Cendana – CleanAir

Test Program Parameters

Testing was performed at the CCR Charge Heater (Heater ID 14H8-9, Emission Unit ID EU14-CCRPLCHARHTR-S1, Stack ID SV14-H6) on July 21-22 2015, July 28, 2015 and August 25, 2015 and included the following emissions measurements:

- particulate matter (PM), assumed equivalent to filterable particulate matter (FPM) only
- volatile organic compounds (VOCs), assumed equivalent to total hydrocarbons (THCs) minus the following constituents:
  - methane (CH_4)
  - ethane (C_2H_6)
- nitrogen oxides (NO_X)
- carbon monoxide (CO)
- flue gas composition (e.g., O_2, CO_2, H_2O)
- flue gas flow rate

PROJECT OVERVIEW

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	CCR Charge Heater Stack	USEPA Method 5	FPM	07/21/15	10:48	12:54
2	CCR Charge Heater Stack	USEPA Method 5	FPM	07/21/15	14:19	16:25
3	CCR Charge Heater Stack	USEPA Method 5	FPM	07/21/15	17:09	19:17
1	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	10:55	11:16
2	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	11:32	11:53
3	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	12:12	12:33
4	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	13:01	13:22
5	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	13:59	14:20
6	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	14:59	15:20
7	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	15:37	15:58
8	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	16:20	16:41
9	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	17:02	17:23
10	CCR Charge Heater Stack	USEPA Method 3A/7E/10	$O_2/CO_2/NO_X/CO$	07/21/15	17:36	17:57
1	CCR Charge Heater Stack	USEPA Method 3A/18/25A	$O_2/CO_2/CH_4/C_2H_6/THC$	07/21/15	10:55	12:33
2	CCR Charge Heater Stack	USEPA Method 3A/18/25A	$O_2/CO_2/CH_4/C_2H_6/THC$	07/21/15	13:01	15:20
3	CCR Charge Heater Stack	USEPA Method 3A/18/25A	$O_2/CO_2/CH_4/C_2H_6/THC$	07/21/15	15:37	17:23
4	CCR Charge Heater Stack	USEPA Method 5	FPM	07/22/15	07:43	09:51
5	CCR Charge Heater Stack	USEPA Method 5	FPM	07/22/15	10:56	13:03
6	CCR Charge Heater Stack	USEPA Method 5	FPM	07/22/15	13:54	16:02
7	CCR Charge Heater Stack	USEPA Method 5	FPM	07/22/15	16:46	17:33
8	CCR Charge Heater Stack	USEPA Method 5	FPM	07/28/15	09:17	11:23
9	CCR Charge Heater Stack	USEPA Method 5	FPM	07/28/15	12:12	14:30
10	CCR Charge Heater Stack	USEPA Method 5	FPM	07/28/15	15:19	17:24
1	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	13:46	14:07
2	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	14:15	14:36
3	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	14:44	15:05
4	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	15:19	15:40
5	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	15:47	16:08
6	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	16:15	16:36
7	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	16:44	17:05
8	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	17:15	17:36
9	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	17:47	18:08
10	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	18:26	18:47
11	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	18:56	19:17
12	CCR Charge Heater Stack	USEPA Method 3A/10	$O_2/CO_2/CO$	08/25/15	19:26	19:47

091415 094841

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 2-12.

Table 1-2:
Summary of Emission Compliance Test Results

Source Constituent (Units)	Sampling Method	Average Emission	Permit Limit[1]
CCR Charge Heater Stack			
PM (lb/MMBtu)[2]	USEPA 5	0.0021	0.0019
PM (lb/MMBtu)[3]	USEPA 5	0.0018	0.0019
VOC (lb/MMBtu)	USEPA 18 / 25A	<7.1E-04	0.0055
NO_X (lb/MMBtu)	USEPA 7E	0.04	0.05
CO (lb/MMBtu)	USEPA 10	<4.6E-04	0.013

[1] Permit limits obtained from MDEQ Permit To Install No. 63-08D.
[2] Includes the average of 3 test runs performed during mobilization 1 on July 21-22, 2015 (Runs 1, 3-4).
[3] Includes the average of 3 test runs performed during mobilization 2 on July 28, 2015 (Runs 8-10).

091415 094841

Table 1-3:
Summary of RATA Results

Source Constituent (Units)	Reference Method (USEPA)	Applicable Specification	Relative Accuracy[1]	Specification Limit[2]
CCR Charge Heater Stack				
O_2 (% dv)[4]	3A	PS3	0.06	±1.0% dv
NO_X (lb/MMBtu)[4]	7E	PS2	0.0	20% of RM
O_2 (% dv)[5]	3A	PS3	0.2	±1.0% dv
CO (lb/MMBtu)[5]	10	PS4A[3]	0.0	5% of Standard

[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.
[3] For any sources emitting less than 200 ppmv of CO, PS4A applies. The PS4A RA limit is either < 10% of RM, < 5% of Standard, or ± 5 ppmv (abs. average difference plus 2.5 x confidence coefficient).
[4] RATA results from testing on 7/21/15.
[5] RATA results from testing on 8/25/15.

091415 114931

Discussion of Test Program

FPM Testing - USEPA Method 5

For this test program, PM emission rate is assumed equivalent to FPM emission rate. FPM testing occurred over two separate mobilizations.

Six (6) 120-minute and one (1) 45-minute Method 5 test runs were performed during the first mobilization on July 21-22, 2015. The original plan outlined a total of three (3) tests to be performed. Following test Runs 1 through 3 there were visible fragments of particulate on the front half filter samples. Upon review of the samples on-site MPC requested an additional three (3) test runs to be performed.

Following Run 6, MPC requested an additional 45-minute test run (Run 7) be performed. The front half filter and rinse samples of Run 7 were relinquished to MPC for their own tests. Run 7 sampled at a single point for the duration of the test per MPC's request. The raw data sheets from Runs 5 through 7 can be found in Appendix E.

In addition to the Run 7 front half filter and rinse samples, the Run 5 and Run 6 front half filter samples were also relinquished to MPC per their request. This disallowed CleanAir from performing gravimetric analysis on these samples. The front half acetone rinse from Runs 5 and 6 were analyzed, and the results can be found in Appendix J.

The front half filter samples from Runs 1 through 4 were mailed from the site to CleanAir's analytical laboratory for expedited analysis. Upon receiving the samples the laboratory discovered that the petri dish containing the Run 2 front half filter was cracked and sample loss may have occurred. Run 2 was not included in the final average result. The final result was expressed as the average of three (3) valid runs (Runs 1, 3, and 4) and was above the permit limit for PM.

During and following the test program, MPC explored reasoning on why particulate levels were higher than expected for this gas-fired heater. MPC performed a purge of the system prior to the second mobilization.

Three (3) 120-minute Method 5 test runs were performed during the second mobilization on July 28, 2015, (Runs 8-10). The final result was expressed as the average of three (3) valid runs and was below the permit limit for PM.

The lab report in Appendix J outlines samples for Runs 7 through 9 on the CCR Charge Heater, however this is an error and actually represents the samples for Runs 8 through 10. This is due to a logistic run number error in the field during the second mobilization.

PROJECT OVERVIEW

O_2, 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 O_2, NO_X and CO (dry basis) 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 facility's CEMS over an identical time interval in order to calculate relative accuracy (RA).

Ten (10) RATA test runs were performed at the CCR Charge Heater Stack on July 21, 2015. Following the post test bias check of RATA Run 5, the CEMS operator performed a new direct calibration on the CO analyzer because of a drift which was noticed on the analyzer. Following the direct calibration, the CEMS operator failed to perform an initial bias check before proceeding with RATA Run 6. The failure to have a pre and post bias check for Run 6 invalidates that test run.

Following completion of the RATA, MPC informed CleanAir that during Run 8, the facility data acquisition system experienced an unexplainable spike in several data points for a period of approximately 10-minutes. This left the final RATA with nine (9) valid test runs for O_2 and NO_X and eight (8) valid test runs for CO. The final results for the O2 and NO_X RATA from July 21, 2015, utilized 9 valid test runs and the results are as follows:

- For O_2, RA is expressed as the average absolute difference between the RM and facility CEMS runs. The final result was below the limit of ±1.0%dv set by PS3.
- For NO_X (ppmdv), RA is expressed as the percent difference between RM and facility CEMS runs. The final result was below the limit of 20% (as % of RM) set by PS2.
- For NO_X (lb/MMBtu), RA is expressed as the percent difference between RM and facility CEMS runs. The final result was below the limit of 20% (as % of RM) set by PS2.

A second mobilization occurred in order to perform a re-test for the O_2 and CO RATA. Twelve (12) RATA test runs were performed at the CCR Charge Heater Stack on August 25, 2015.

- For O_2, RA is expressed as the average absolute difference between the RM and facility CEMS runs. The final result was below the limit of ±1.0%dv set by PS3.
- For CO (ppmdv), the RA is expressed as the average absolute difference between the RM and facility CEMS runs, plus the 2.5% confidence coefficient. The final result was below the limit of ±5 ppmdv set by PS4A.
- For CO (lb/MMBtu), RA is expressed as the percent difference between RM and the facility CEMS. The final result was below the limit of 5% (as % of applicable emission standard) set by PS4A.

PROJECT OVERVIEW

Reference method and facility RATA test run averages which were negative were treated as zero when calculating the relative accuracy.

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.

RM NO_X and CO results from the RATA were used to demonstrate compliance with permit limits. The final results were expressed as the average of the 10 valid RM RATA runs for NO_X and 9 valid RM RATA runs for CO on July 21, 2015. The final results were below the permit limits for NO_X and CO.

CleanAir measured CO drift-corrected concentrations which were negative and consequently below the assumed detection limit of 1% of the instrument calibration span for all test runs. The worst-case concentration results used to calculate mass-based emissions in regards to the emission compliance test is defined as some number "less than" 1% of the calibration span.

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 CH_4 and C_2H_6, with each Method 18 sample collected over a period of about 63 minutes.

The Method 18 samples on the CCR Heater 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

VOC emission rate is normally equivalent to THC emission rate, minus CH_4 and C_2H_6 emission rate (lb/MMBtu for all constituents). For CH_4 and C_2H_6, a non-detectable result was obtained for all runs, so no correction was made to the THC results. Therefore, VOC emissions are equivalent to THC emissions. The final results were expressed as the average of three (3) valid runs and were below the permit limit.

Calculation of Final Results

Emission results in units of dry volume-based concentration (lb/dscf, ppmdv) were converted to units of pounds per million Btu (lb/MMBtu) 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.

Fuel gas analyses were performed by MPC on each test day, excluding July 22, 2015, and results were provided to CleanAir. The results from the July 21, 2015, gas analysis were utilized for the testing performed on July 22, 2015.

End of Section 1 – Project Overview

RESULTS

Table 2-1:
CCR Charge Heater Stack – FPM Emissions (USEPA 5) – Runs 1-4

Run No.		1	2*	3	4	Average
Date (2015)		Jul 21	Jul 21	Jul 21	Jul 22	
Start Time (approx.)		10:48	14:19	17:09	07:43	
Stop Time (approx.)		12:54	16:25	19:17	09:51	
Process Conditions						
P_1	Fuel gas flow rate (Mscf/day)	2,624	2,618	2,565	2,673	**2,620**
P_2	Charge rate (bpd)	17,998	18,000	18,000	17,999	**17,999**
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,313	8,313	8,313	8,313	**8,313**
H_i	Actual heat input (MMBtu/hr)	122	121	119	124	**121**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	8,760	**8,760**
Gas Conditions						
O_2	Oxygen (dry volume %)	7.8	7.7	7.7	7.8	**7.8**
CO_2	Carbon dioxide (dry volume %)	7.4	7.7	7.8	7.7	**7.6**
T_s	Sample temperature (°F)	368	367	366	369	**368**
B_w	Actual water vapor in gas (% by volume)	13.3	13.3	12.8	13.2	**13.1**
Gas Flow Rate						
Q_a	Volumetric flow rate, actual (acfm)	56,100	55,700	55,600	56,700	**56,100**
Q_s	Volumetric flow rate, standard (scfm)	34,700	34,500	34,500	35,300	**34,800**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	30,100	29,900	30,100	30,600	**30,300**
Q_a	Volumetric flow rate, actual (acf/hr)	3,360,000	3,340,000	3,330,000	3,400,000	**3,370,000**
Q_s	Volumetric flow rate, standard (scf/hr)	2,080,000	2,070,000	2,070,000	2,120,000	**2,090,000**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	1,810,000	1,800,000	1,800,000	1,840,000	**1,820,000**
Sampling Data						
V_{mstd}	Volume metered, standard (dscf)	81.76	81.57	81.29	84.12	**82.39**
%I	Isokinetic sampling (%)	98.8	99.1	98.3	99.8	**99.0**
Laboratory Data						
m_n	Total FPM (g)	0.00952	0.00429	0.00523	0.00291	
n_{MDL}	Number of non-detectable fractions	N/A	N/A	N/A	N/A	
DLC	Detection level classification	ADL	ADL	ADL	ADL	
FPM Results						
C_{sd}	Particulate Concentration (lb/dscf)	2.57E-07	1.16E-07	1.42E-07	7.63E-08	**1.58E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.463	0.208	0.256	0.140	**0.287**
$E_{T/yr}$	Particulate Rate (Ton/yr)	2.03	0.912	1.12	0.614	**1.26**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00341	0.00153	0.00187	0.00101	**0.00209**

Average includes 3 runs. * indicates that the run is not included in the average.

Detection level classifications are defined as follows:

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

090315 151613

RESULTS

Table 2-2:
CCR Charge Heater Stack – FPM Emissions (USEPA 5) – Runs 8-10

Run No.		8	9	10	Average
Date (2015)		Jul 28	Jul 28	Jul 28	
Start Time (approx.)		09:17	12:12	15:19	
Stop Time (approx.)		11:23	14:30	17:24	
Process Conditions					
P_1	Fuel gas flow rate (Mscf/day)	3,265	3,240	3,261	**3,255**
P_2	Charge rate (bpd)	21,000	20,999	20,999	**20,999**
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,297	8,297	8,297	**8,297**
H_i	Actual heat input (MMBtu/hr)	147	145	146	**146**
Cap	Capacity factor (hours/year)	8,760	8,760	8,760	**8,760**
Gas Conditions					
O_2	Oxygen (dry volume %)	6.4	5.7	5.5	**5.9**
CO_2	Carbon dioxide (dry volume %)	8.2	8.4	8.6	**8.4**
T_s	Sample temperature (°F)	383	381	380	**381**
B_w	Actual water vapor in gas (% by volume)	14.5	15.1	14.6	**14.8**
Gas Flow Rate					
Q_a	Volumetric flow rate, actual (acfm)	61,400	53,800	60,500	**58,600**
Q_s	Volumetric flow rate, standard (scfm)	37,700	33,000	37,300	**36,000**
Q_{std}	Volumetric flow rate, dry standard (dscfm)	32,200	28,100	31,900	**30,700**
Q_a	Volumetric flow rate, actual (acf/hr)	3,690,000	3,230,000	3,630,000	**3,520,000**
Q_s	Volumetric flow rate, standard (scf/hr)	2,260,000	1,980,000	2,240,000	**2,160,000**
Q_{std}	Volumetric flow rate, dry standard (dscf/hr)	1,930,000	1,680,000	1,910,000	**1,840,000**
Sampling Data					
V_{mstd}	Volume metered, standard (dscf)	86.08	59.27	89.43	**78.26**
%I	Isokinetic sampling (%)	100.9	102.0	100.1	**101.0**
Laboratory Data					
m_n	Total FPM (g)	0.01025	0.00342	0.00270	
n_{MDL}	Number of non-detectable fractions	N/A	N/A	N/A	
DLC	Detection level classification	ADL	ADL	ADL	
FPM Results					
C_{sd}	Particulate Concentration (lb/dscf)	2.63E-07	1.27E-07	6.66E-08	**1.52E-07**
$E_{lb/hr}$	Particulate Rate (lb/hr)	0.507	0.214	0.127	**0.283**
$E_{T/yr}$	Particulate Rate (Ton/yr)	2.22	0.938	0.558	**1.24**
E_{Fd}	Particulate Rate - F_d-based (lb/MMBtu)	0.00314	0.00145	7.50E-04	**0.00178**

Average includes 3 runs.

Detection level classifications are defined as follows:

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

090315 085328

RESULTS

Table 2-3:
CCR Charge Heater – THC, CH_4, C_2H_6 & VOC Emissions (USEPA 25A/18)

Run No.		1	2	3	Average
Date (2015)		Jul 21	Jul 21	Jul 21	
Start Time (approx.)		10:55	13:01	15:37	
Stop Time (approx.)		12:33	15:20	17:23	
Process Conditions					
P_1	Fuel gas flow rate (Mscf/day)	2,623	2,605	2,604	**2,611**
P_2	Charge rate (bpd)	17,996	17,999	18,000	**17,998**
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,313	8,313	8,313	**8,313**
H_i	Heat input (MMBtu/hr)	121	121	121	**121**
Gas Conditions					
O_2	Oxygen (dry volume %)	7.5	7.5	7.4	**7.5**
CO_2	Carbon dioxide (dry volume %)	7.9	7.9	8.0	**8.0**
B_w	Actual water vapor in gas (% by volume)[1]	13.3	13.3	13.3	**13.3**
THC Results					
C_{sd}	Concentration (ppmdv as C_3H_8)	<0.481	<0.481	<0.481	**<0.481**
C_{sd}	Concentration (lb/dscf)	<5.51E-08	<5.51E-08	<5.51E-08	**<5.51E-08**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<7.15E-04	<7.16E-04	<7.11E-04	**<7.14E-04**
Methane Results					
C_{sd}	Concentration (ppmdv)	<0.105	<0.105	<0.105	**<0.105**
C_{sd}	Concentration (lb/dscf)	<4.37E-09	<4.37E-09	<4.37E-09	**<4.37E-09**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<5.67E-05	<5.68E-05	<5.64E-05	**<5.67E-05**
Ethane Results					
C_{sd}	Concentration (ppmdv)	<0.0823	<0.0823	<0.0823	**<0.0823**
C_{sd}	Concentration (lb/dscf)	<6.42E-09	<6.42E-09	<6.42E-09	**<6.42E-09**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<8.34E-05	<8.35E-05	<8.29E-05	**<8.33E-05**
VOC Results					
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<7.15E-04	<7.16E-04	<7.11E-04	**<7.14E-04**

Average includes 3 runs. 080410 154528

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

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

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

For VOCs, '<' indicates at least one non-detectable fraction was used in the calculations. '<' values for methane and ethane a treated as the entire value of the anlytical detection limit.

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

RESULTS

Table 2-4:
CCR Charge Heater Stack – NO_X & CO Emissions (USEPA 7E/10) – 7/21/15

Run No.		1	2	3	4	5	6
Date (2015)		Jul 21	Jul 21	Jul 21	Jul 21	Jul 21	Jul 21
Start Time (approx.)		10:55	11:32	12:12	13:01	13:59	14:59
Stop Time (approx.)		11:16	11:53	12:33	13:22	14:20	15:20
Process Conditions							
P_1	Fuel gas flow rate (Mscf/day)	2,630	2,613	2,629	2,609	2,592	2,633
P_2	Charge rate (bpd)	17,998	17,999	17,996	17,996	17,998	17,997
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,313	8,313	8,313	8,313	8,313	8,313
H_i	Heat input (MMBtu/hr)	122	121	122	121	120	122
Gas Conditions							
O_2	Oxygen (dry volume %)	7.5	7.5	7.5	7.6	7.6	7.5
CO_2	Carbon dioxide (dry volume %)	8.0	7.9	7.9	7.9	7.9	8.0
Nitrogen Oxides Results							
C_{sd}	Concentration (ppmdv)	22.8	25.0	24.1	24.5	24.2	24.1
C_{sd-x}	Concentration @ 0% O_2 (ppmdv)	35.8	39.0	37.5	38.5	37.9	37.6
C_{sd}	Concentration (lb/dscf)	2.73E-06	2.98E-06	2.88E-06	2.93E-06	2.89E-06	2.88E-06
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	0.0355	0.0388	0.0372	0.0382	0.0376	0.0373
Carbon Monoxide Results							
C_{sd}	Concentration (ppmdv)	<0.489	<0.489	<0.489	<0.489	<0.489	<0.489
C_{sd-x}	Concentration @ 0% O_2 (ppmdv)	< 0.765	< 0.765	< 0.761	< 0.766	< 0.766	< 0.762
C_{sd}	Concentration (lb/dscf)	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<4.62E-04	<4.62E-04	<4.60E-04	<4.63E-04	<4.63E-04	<4.60E-04

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

Run No.		7	8	9	10	Average
Date (2015)		Jul 21	Jul 21	Jul 21	Jul 21	
Start Time (approx.)		15:37	16:20	17:02	17:36	
Stop Time (approx.)		15:58	16:41	17:23	17:57	
Process Conditions						
P_1	Fuel gas flow rate (Mscf/day)	2,653	2,615	2,572	2,546	**2,609**
P_2	Charge rate (bpd)	18,000	17,997	17,998	18,001	**17,998**
F_d	Oxygen-based F-factor (dscf/MMBtu)	8,313	8,313	8,313	8,313	**8,313**
H_i	Heat input (MMBtu/hr)	123	121	119	118	**121**
Gas Conditions						
O_2	Oxygen (dry volume %)	7.4	7.4	7.5	7.6	**7.5**
CO_2	Carbon dioxide (dry volume %)	8.0	8.0	8.0	7.9	**8.0**
B_w	Actual water vapor in gas (% by volume)[1]	13.3	13.3	13.3	13.3	**13.3**
Nitrogen Oxides Results						
C_{sd}	Concentration (ppmdv)	23.3	23.6	24.3	24.4	**24.1**
C_{sd-x}	Concentration @ 0% O_2 (ppmdv)	36.2	36.7	37.8	38.5	**37.5**
C_{sd}	Concentration (lb/dscf)	2.79E-06	2.82E-06	2.91E-06	2.92E-06	**2.87E-06**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	0.0359	0.0364	0.0376	0.0382	**0.0373**
Carbon Monoxide Results						
C_{sd}	Concentration (ppmdv)	<0.489	<0.489	<0.489	<0.489	**<0.489**
C_{sd-x}	Concentration @ 0% O_2 (ppmdv)	< 0.758	< 0.760	< 0.760	< 0.771	**<0.763**
C_{sd}	Concentration (lb/dscf)	<3.55E-08	<3.55E-08	<3.55E-08	<3.55E-08	**<3.55E-08**
E_{Fd}	Emission Rate - F_d-based (lb/MMBtu)	<4.58E-04	<4.59E-04	<4.59E-04	<4.66E-04	**<4.61E-04**

Average includes 9 runs for CO (Run 2 is not included in the average) and 10 runs for all other paramters.
For CO, '<' indicates a measured response below the detection limit (assumed to be 1% of the instrument calibration span).

RESULTS

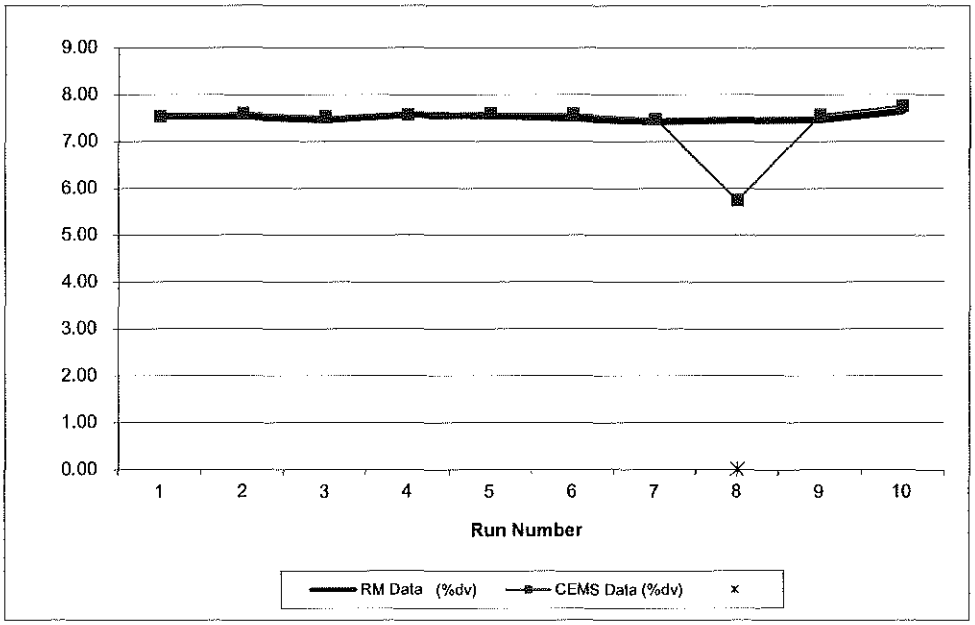
Table 2-5:
CCR Charge Heater Stack – O_2 RATA (USEPA 3A/PS3) – 7/21/15

Run No.	Start Time	Date (2015)	RM Data (%dv)	CEMS Data (%dv)	Difference (%dv)	Difference Percent
1	10:55	Jul 21	7.54	7.54	0.00	0.0%
2	11:32	Jul 21	7.53	7.60	-0.07	-0.9%
3	12:12	Jul 21	7.46	7.53	-0.07	-0.9%
4	13:01	Jul 21	7.56	7.56	0.00	0.0%
5	13:59	Jul 21	7.55	7.59	-0.04	-0.5%
6	14:59	Jul 21	7.49	7.58	-0.09	-1.2%
7	15:37	Jul 21	7.42	7.48	-0.06	-0.8%
8 *	16:20	Jul 21	7.45	5.74	1.71	23.0%
9	17:02	Jul 21	7.46	7.57	-0.11	-1.5%
10	17:36	Jul 21	7.64	7.76	-0.12	-1.6%
Average			**7.52**	**7.58**	**-0.06**	**-0.8%**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.043	
Confidence Coefficient (CC)	0.033	
t-Value for 9 Data Sets	2.306	
		Limit
Avg. Abs. Diff. (%dv)	**0.06**	**1.0**

RM = Reference Method (CleanAir Data) 090315 092556
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS

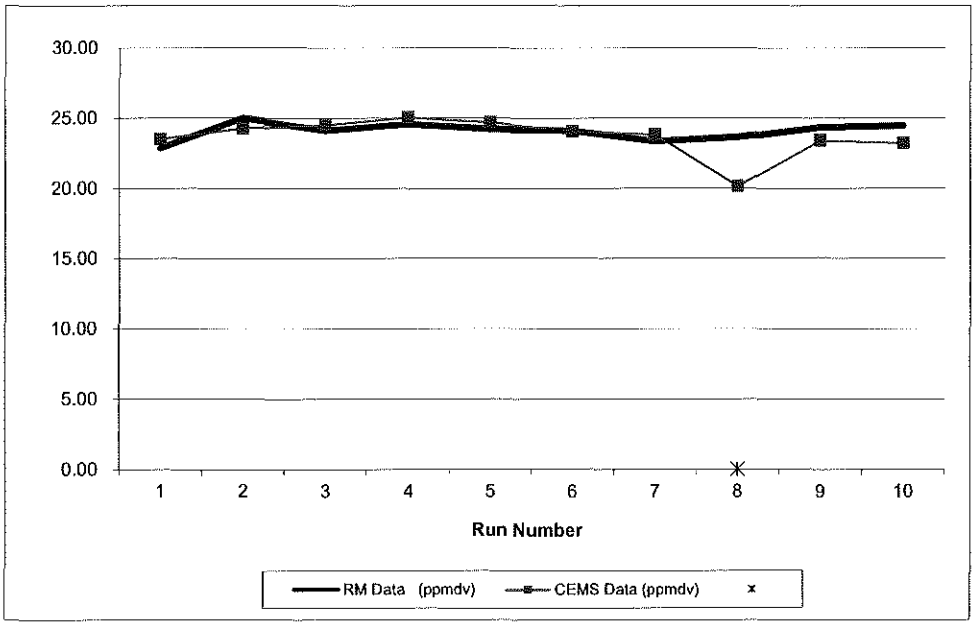
Table 2-6:
CCR Charge Heater Stack – NO_X (ppmdv) RATA (USEPA 7E/PS2) – 7/21/15

Run No.	Start Time	Date (2015)	RM Data (ppmdv)	CEMS Data (ppmdv)	Difference (ppmdv)	Difference Percent
1	10:55	Jul 21	22.85	23.50	-0.65	-2.8%
2	11:32	Jul 21	24.97	24.22	0.75	3.0%
3	12:12	Jul 21	24.09	24.49	-0.40	-1.7%
4	13:01	Jul 21	24.55	25.03	-0.48	-2.0%
5	13:59	Jul 21	24.20	24.66	-0.46	-1.9%
6	14:59	Jul 21	24.10	24.05	0.05	0.2%
7	15:37	Jul 21	23.35	23.82	-0.47	-2.0%
8 *	16:20	Jul 21	23.62	20.13	3.49	14.8%
9	17:02	Jul 21	24.34	23.40	0.94	3.9%
10	17:36	Jul 21	24.45	23.20	1.25	5.1%
Average			**24.10**	**24.04**	**0.06**	**0.2%**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.727	
Confidence Coefficient (CC)	0.559	
t-Value for 9 Data Sets	2.306	
		Limit
Relative Accuracy (as % of RM)	**2.6%**	**20.0%**

RM = Reference Method (CleanAir Data) 090315 092556
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS

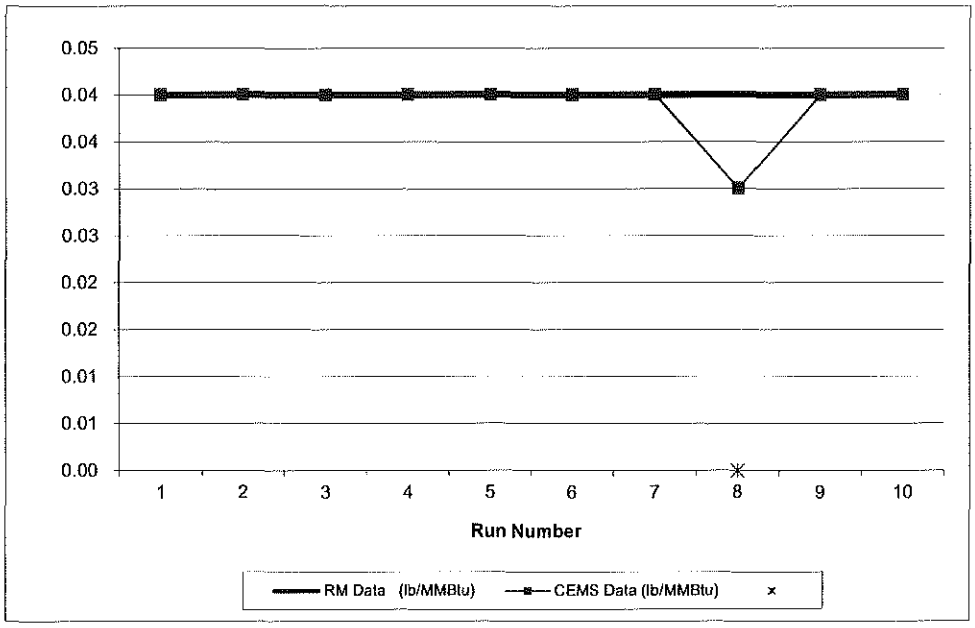
Table 2-7:
CCR Charge Heater Stack – NO_X (lb/MMBtu) RATA (USEPA 7E/PS2) – 7/21/15

Run No.	Start Time	Date (2015)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)	Difference Percent
1	10:55	Jul 21	0.04	0.04	0.00	0.0%
2	11:32	Jul 21	0.04	0.04	0.00	0.0%
3	12:12	Jul 21	0.04	0.04	0.00	0.0%
4	13:01	Jul 21	0.04	0.04	0.00	0.0%
5	13:59	Jul 21	0.04	0.04	0.00	0.0%
6	14:59	Jul 21	0.04	0.04	0.00	0.0%
7	15:37	Jul 21	0.04	0.04	0.00	0.0%
8 *	16:20	Jul 21	0.04	0.03	0.01	25.0%
9	17:02	Jul 21	0.04	0.04	0.00	0.0%
10	17:36	Jul 21	0.04	0.04	0.00	0.0%
Average			**0.04**	**0.04**	**0.00**	**0.0%**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 9 Data Sets	2.306	
		Limit
Relative Accuracy (as % of RM)	**0.0%**	**20.0%**
Relative Accuracy (as % of Appl. Std.)	**0.0%**	**10.0%**
Appl. Std. = 0.05 lb/MMBtu		

RM = Reference Method (CleanAir Data) 091415 114931
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 9 of 10 runs. * indicates the excluded run.



RESULTS

Table 2-8:
CCR Charge Heater Stack – CO (ppmdv) RATA (USEPA 7E/PS2) – 7/21/15

Run No.	Start Time	Date (2015)	RM Data (ppmdv)	CEMS Data (ppmdv)	Difference (ppmdv)
1	10:55	Jul 21	0.00	0.00	0.00
2	11:32	Jul 21	0.00	0.00	0.00
3	12:12	Jul 21	0.00	0.00	0.00
4	13:01	Jul 21	0.00	0.00	0.00
5	13:59	Jul 21	0.00	0.00	0.00
6 *	14:59	Jul 21	N/A	0.00	N/A
7	15:37	Jul 21	0.00	0.00	0.00
8 *	16:20	Jul 21	0.00	38.61	-38.61
9	17:02	Jul 21	0.00	0.00	0.00
10	17:36	Jul 21	0.00	0.00	0.00
	Average		**0.00**	**0.00**	**0.00**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 8 Data Sets	2.365	
		Limit
Avg. Abs. Diff. + CC (ppmdv)	**0.0**	**5.0**

RM = Reference Method (CleanAir Data) 090315 092556
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 8 of 10 runs. * indicates the excluded runs.

RESULTS

Table 2-9:
CCR Charge Heater Stack – CO (lb/MMBtu) RATA (USEPA 7E/PS2) – 7/21/15

Run No.	Start Time	Date (2015)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)
1	10:55	Jul 21	0.000	0.000	0.000
2	11:32	Jul 21	0.000	0.000	0.000
3	12:12	Jul 21	0.000	0.000	0.000
4	13:01	Jul 21	0.000	0.000	0.000
5	13:59	Jul 21	0.000	0.000	0.000
6 *	14:59	Jul 21	0.000	0.000	0.000
7	15:37	Jul 21	0.000	0.000	0.000
8 *	16:20	Jul 21	0.000	0.034	-0.034
9	17:02	Jul 21	0.000	0.000	0.000
10	17:36	Jul 21	0.000	0.000	0.000
Average			**0.000**	**0.000**	**0.000**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 8 Data Sets	2.365	
		Limit
Relative Accuracy (as % of Appl. Std.)	**0.0%**	**5.0%**
Appl. Std. = 0.013 lb/MMBtu		

RM = Reference Method (CleanAir Data) 090315 092556
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 8 of 10 runs. * indicates the excluded runs.

RESULTS

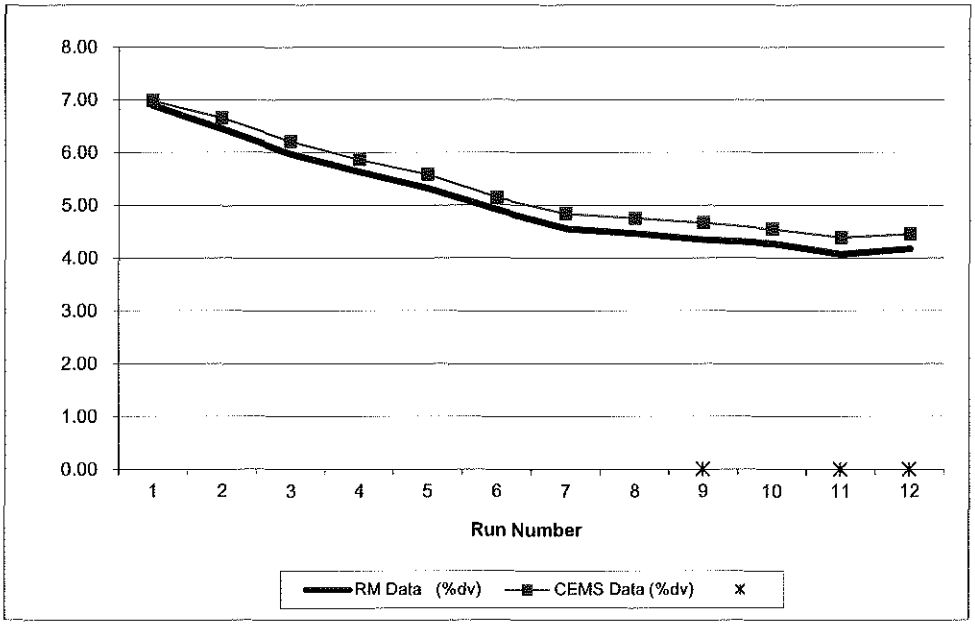
Table 2-10:
CCR Charge Heater Stack – O_2 RATA (USEPA 3A/PS3) – 8/25/15

Run No.	Start Time	Date (2015)	RM Data (%dv)	CEMS Data (%dv)	Difference (%dv)	Difference Percent
1	13:46	Aug 25	6.89	6.98	-0.09	-1.3%
2	14:15	Aug 25	6.44	6.65	-0.21	-3.3%
3	14:44	Aug 25	5.97	6.21	-0.24	-4.0%
4	15:19	Aug 25	5.63	5.86	-0.23	-4.1%
5	15:47	Aug 25	5.32	5.58	-0.26	-4.9%
6	16:15	Aug 25	4.91	5.14	-0.23	-4.7%
7	16:44	Aug 25	4.56	4.84	-0.28	-6.1%
8	17:15	Aug 25	4.46	4.75	-0.29	-6.5%
9 *	17:47	Aug 25	4.34	4.66	-0.32	-7.4%
10	18:26	Aug 25	4.28	4.55	-0.27	-6.3%
11 *	18:56	Aug 25	4.07	4.39	-0.32	-7.9%
12 *	19:26	Aug 25	4.17	4.45	-0.28	-6.7%
Average			**5.38**	**5.62**	**-0.23**	**-4.3%**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.060	
Confidence Coefficient (CC)	0.046	
t-Value for 9 Data Sets	2.306	
		Limit
Avg. Abs. Diff. (%dv)	**0.23**	**1.0**

RM = Reference Method (CleanAir Data) 090315 100038
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on 9 of 12 runs. * indicates the excluded runs.



RESULTS

Table 2-11:
CCR Charge Heater Stack – CO (ppmdv) RATA (USEPA 7E/PS2) – 8/25/15

Run No.	Start Time	Date (2015)	RM Data (ppmdv)	CEMS Data (ppmdv)	Difference (ppmdv)
1	13:46	Aug 25	0.00	0.00	0.00
2	14:15	Aug 25	0.00	0.00	0.00
3	14:44	Aug 25	0.00	0.00	0.00
4	15:19	Aug 25	0.00	0.00	0.00
5	15:47	Aug 25	0.00	0.00	0.00
6	16:15	Aug 25	0.00	0.00	0.00
7	16:44	Aug 25	0.00	0.00	0.00
8	17:15	Aug 25	0.00	0.00	0.00
9	17:47	Aug 25	0.00	0.00	0.00
10	18:26	Aug 25	0.00	0.00	0.00
11	18:56	Aug 25	0.00	0.00	0.00
12	19:26	Aug 25	0.00	0.00	0.00
Average			**0.00**	**0.00**	**0.00**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 12 Data Sets	2.201	
		Limit
Avg. Abs. Diff. + CC (ppmdv)	**0.000**	**5.0**

RM = Reference Method (CleanAir Data) 090315 100038
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on all 12 runs.

RESULTS

Table 2-12:
CCR Charge Heater Stack – CO (lb/MMBtu) RATA (USEPA 7E/PS2) – 8/25/15

Run No.	Start Time	Date (2015)	RM Data (lb/MMBtu)	CEMS Data (lb/MMBtu)	Difference (lb/MMBtu)
1	13:46	Aug 25	0.000	0.000	0.000
2	14:15	Aug 25	0.000	0.000	0.000
3	14:44	Aug 25	0.000	0.000	0.000
4	15:19	Aug 25	0.000	0.000	0.000
5	15:47	Aug 25	0.000	0.000	0.000
6	16:15	Aug 25	0.000	0.000	0.000
7	16:44	Aug 25	0.000	0.000	0.000
8	17:15	Aug 25	0.000	0.000	0.000
9	17:47	Aug 25	0.000	0.000	0.000
10	18:26	Aug 25	0.000	0.000	0.000
11	18:56	Aug 25	0.000	0.000	0.000
12	19:26	Aug 25	0.000	0.000	0.000
Average			**0.000**	**0.000**	**0.000**

Relative Accuracy Test Audit Results

Standard Deviation of Differences	0.000	
Confidence Coefficient (CC)	0.000	
t-Value for 12 Data Sets	2.201	
		Limit
Relative Accuracy (as % of Appl. Std.)	**0.0%**	**5.0%**
Appl. Std. = 0.013 lb/MMBtu		

RM = Reference Method (CleanAir Data) 090315 100038
CEMS = Continuous Emissions Monitoring System (Marathon Petroleum Company Data)
RATA calculations are based on all 12 runs.

End of Section 2 – Results