



AIR EMISSIONS TESTING FOR INDUSTRY

Relative Accuracy Test Audit

for

Marathon Petroleum Company LP

at the

Detroit Refinery in Detroit, Michigan

on the

East Plant Fuel Gas

subject to

Permit No. MI-ROP-A9831-2012c

&

40 CFR Part 60, Appendix F



**Marathon
Petroleum Company LP**

Test Date: November 19, 2024

Erthwrks Project No. 9565.1.D1



Endorsement Page

This report was developed in accordance with the requirements designated in the applicable regulatory permit(s) and or regulatory rules. To the best of my knowledge the techniques, instrumentation, and calculations presented in this report will serve to accurately and efficiently detail the results of the test campaign requirements.

Erthwrks, Inc.

Name: Jason Dunn

Title: QAQC Manager

Signature: 

This report has been reviewed for accuracy and completeness. The actions presented in this report are, to the best of my knowledge, an accurate representation of the results and findings of the test campaign. Erthwrks, Inc. operates in conformance with the requirements on ASTM D7036-04 Standard Practice for Competence of Air Emission Testing Bodies and is accredited as such by the Stack Testing Accreditation Council (STAC) and the American Association for Laboratory Accreditation (A2LA).

Erthwrks, Inc.

Name: John Wood

Title: Technical Director

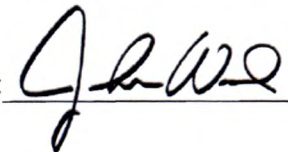
Signature: 

TABLE OF CONTENTS

1.0	INTRODUCTION	4
1.1	Identification, location and dates of tests	4
1.2	Purpose of Testing.....	4
1.3	Contact Information	4
2.0	SUMMARY OF RESULTS	5
3.0	SOURCE DESCRIPTION.....	5
3.1	Description of the process	5
3.2	Applicable permit and source designation	5
4.0	SAMPLING AND ANALYTICAL PROCEDURES.....	6
4.1	Gaseous Sampling – H ₂ S.....	6
4.2	RATA Procedures	6
4.3	Discussion of sampling procedure or operational variances.....	7

List of Tables:

Table 2.1:	East Plant Fuel Gas RATA Results	5
Table 3.1:	East Plant Fuel Gas CEMS Description	5

ATTACHMENTS

- A. Detailed Results of Emissions Test
- B. Calibration, QAQC, and Raw Data
- C. Certificates
- D. Example Calculations
- E. CEMS Data

1.0 INTRODUCTION

1.1 Identification, location and dates of tests

Erthwrks, Inc. was contracted to conduct a relative accuracy test audit (RATA) on the hydrogen sulfide (H₂S) continuous emissions monitoring system (CEMS) associated with the East Plant Fuel Gas in operation at the Detroit Refinery, located in Detroit, Michigan. The RATA test was conducted on November 19, 2024.

1.2 Purpose of Testing

This RATA was conducted to demonstrate the accuracy and reliability of the CEMS monitor installed for the East Plant Fuel Gas used to demonstrate the continuous emission compliance of the unit. All testing and audit procedures were conducted in accordance with the requirements set forth in 40 CFR, Part 60, Appendix B and F, which defines the CEMS performance specifications and testing procedures.

1.3 Contact Information

Marathon Petroleum Company LP

Emily Mattson
Environmental Professional
Michigan Refining Division
313-236-1501
EGMattson@marathonpetroleum.com

Erthwrks, Inc.

Luke Morrison
Project Manager
P.O. Box 150549
Austin, TX 78715
512-962-7661
lmorrison@erthwrks.com

Erthwrks, Inc.

Jason Dunn
QC Specialist
P.O. Box 150549
Austin, TX 78715
540-512-3558
jdunn@erthwrks.com

Facility Location:

1300 South Fort Street
Detroit, MI 48217

2.0 SUMMARY OF RESULTS

Table 2.1: East Plant Fuel Gas RATA Results

Pollutant Measured	Performance Specification	Relative Accuracy	Applicable Limit	Pass/Fail
H ₂ S	Performance Spec. 7	0.5% RA_{AS}	<10%	Pass

3.0 SOURCE DESCRIPTION

3.1 Description of the process

The fuel system is equipped with an H₂S monitoring system as required by the refinery Title V Permit and associated State and Federal regulations.

Table 3.1 East Plant Fuel Gas CEMS Description

Pollutant Measured	Analyzer Manufacturer	Analyzer Model	Detection Principle	Serial Number
H ₂ S	Siemens	Maxum II	Gas Chromatography	HOU 3008065259-0010

3.2 Applicable permit and source designation

The Detroit Refinery operates the East Plant Fuel Gas monitoring system under Permit No. MI-ROP-A9831-2012c, 40 CFR Part 60 Subpart Ja, and the CEMS quality assurance procedures delineated in the 40 CFR Part 60, Appendix F. Under these regulations, the Detroit Refinery is required to conduct an annual RATA to demonstrate the relative accuracy of the CEMS associated with this unit.

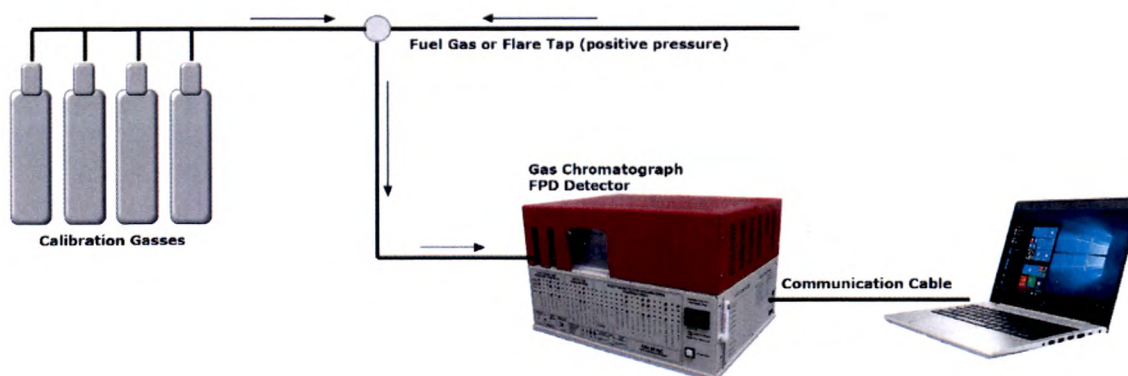
4.0 SAMPLING AND ANALYTICAL PROCEDURES

Erthwrks completed this CEMS audit project utilizing all applicable test methods specified in the USEPA Title 40 CFR Part 60, Appendix A and B. Specifically, this emission testing program entailed the execution of the 40 CFR Part 60, Appendix B, Performance Specifications 7. These documents define the specifications and test procedures for H₂S CEMS. The RATA required by these regulations was conducted utilizing a mobile emission testing laboratory.

4.1 Gaseous Sampling – H₂S

The analysis of the sample stream was conducted following all procedures as specified in USEPA Method 15. For this, Erthwrks utilized an SRI Model 8610 Gas Chromatograph (GC) equipped with an FPD detector. This instrumentation is able to separate and analyze separately each individual component. Three calibration gas concentrations, using a calibration gas dilution system, were sent to the GC and analyzed in triplicate. These triplicate values were recorded and averaged. A graphical plot of concentration versus the calibration area values was created and used to calculate the concentration of the sample. All data from this analysis and all raw gas chromatograph shots are found in Attachment B. Post-test analysis of the mid-calibration standard was performed and found to be within 5% of the original curve, therefore no additional quality assurance measurements were necessary.

The figure below summarizes the Erthwrks GC Sampling System:



4.2 RATA Procedures

The RATA test is a direct comparison of the CEMS monitoring data with that data collected from an independently operated EPA reference method tests for each pollutant, following all the quality assurance and quality control procedures as required in the particular method. As required by the RATA test procedures, a minimum of nine (9) EPA reference method tests were conducted for each pollutant monitored by the CEMS system. Each of these test runs were conducted for a minimum duration of thirty (30) minutes. The results of these reference method tests were compared to CEMS measurement data from the

facility data acquisition and handling system (DAHS) from the same time periods to determine the relative accuracy of the CEMS. The results of the RATA test are considered acceptable if the calculated relative accuracy when compared directly to the reference method does not exceed 20.0%. Alternatively, for affected units where the average of the reference method measurements is less than 50 percent of the emission standard, as in this case, the relative accuracy should not exceed 10% with respect to the applicable standard.

4.3 Discussion of sampling procedure or operational variances

Erthwrks, Inc. conducted the emission testing with no sampling or procedural variances. The East Plant Fuel Gas operated with no operational variances.

Attachment A
Detailed Results of Emission Test

Erthwrks Relative Accuracy Test Audit--H₂S RATA **Performance Specification 7**

East Plant FG	H ₂ S RATA--Performance Specification 7
---------------	--

Test Run	Run 1	Run 2	Run 3	Run 4	Run 5	Run 6	Run 7	Run 8	Run 9
Date	11/19/2024	11/19/2024	11/19/2024	11/19/2024	11/19/2024	11/19/2024	11/19/2024	11/19/2024	11/19/2024
Start Time	15:11	15:41	16:11	16:41	17:11	17:41	18:11	18:41	19:11
End Time	15:41	16:11	16:41	17:11	17:41	18:11	18:41	19:11	19:41
RM H ₂ S (ppmvw)	0.46	1.30	0.91	0.74	0.72	1.15	0.71	0.67	1.63
CEMS H ₂ S (ppmvw)	0.33	0.47	0.83	0.32	0.40	0.34	0.33	0.31	0.34
Abs. Diff.	0.13	0.83	0.08	0.42	0.32	0.81	0.38	0.36	1.29
Accept or Reject	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept	Accept

149.45

Applicable Standard (ppmv)	162
Mean of the Difference (d _{avg})	0.51
Standard Deviation (S _d)	0.39
Confidence Coefficient (CC)	0.30
Relative Accuracy via AS, RA_{AS}	0.50% ← Pass

†RA_{AS} (Applicable Standard) must be less than 10%

Attachment B
Calibration, QAQC, and Raw Data

Erthwrks GC Calibration and Analysis Data (pre-test curve)

Date: 11/19/2024
Client: Marathon
Facility: Detroit Refinery
Location: Detroit, MI
Unit ID: East Plant FG
Erthwrks Tech: Luke Morrison

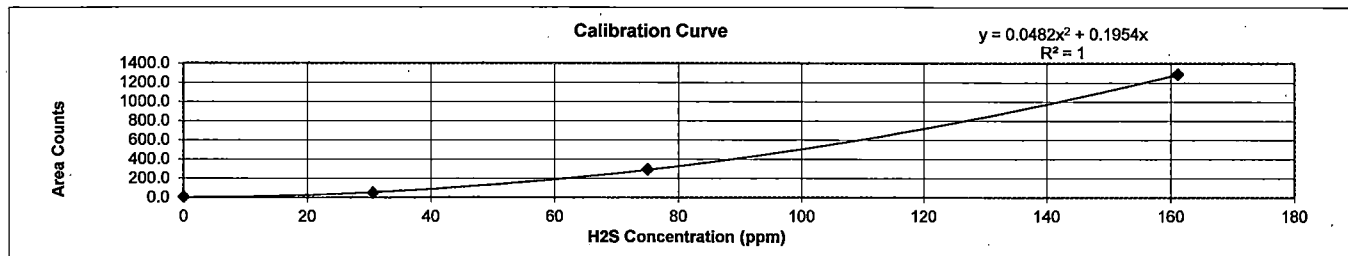
Initial Calibration

H2S Concentration	0						
GC Results	0.1	0.2	0.3	0.2	0.2	0.1	0.1
Average Response	0.17						
Standard Deviation	0.05						
MDL (3 times standard deviation)	0.16						

H2S Concentration	161.1		
GC Results	1291	1269	1289
% Diff	-0.60%	1.08%	-0.49%
Average Response	1283		

H2S Concentration	75.03		
GC Results	293.011	288.986	288.676
% Diff	-0.96%	0.43%	0.53%
Average Response	290		

H2S Concentration	30.62		
GC Results	44.597	45.015	44.903
% Diff	0.54%	-0.39%	-0.14%
Average Response	45		



Data from Calibration Curve

a:	0.0482	0.16 MDL
b:	0.1954	
R ² :	1.0000	
c:	0	

Test Runs

	START	END	
Run 1 Time	15:11	15:41	
Run 1 GC Response	0.1	0.1	0.1
Average Response	0.1		
Run Result	0.46 ppm		0.46 ppm

	START	END	
Run 2 Time	15:41	16:11	
Run 2 GC Response	0.3	0.3	0.1
Average Response	0.3		
Run Result	1.30 ppm		1.30 ppm

	START	END	
Run 3 Time	16:11	16:41	
Run 3 GC Response	0.3	0.3	0.1
Average Response	0.2		
Run Result	0.91 ppm		0.91 ppm

Erthwrks GC Calibration and Analysis Data (pre-test curve)

Date: 11/19/2024
Client: Marathon
Facility: Detroit Refinery
Location: Detroit, MI
Unit ID: East Plant FG
Erthwrks Tech: Luke Morrison

Run 4 Time	START 16:41	END 17:11	
Run 4 GC Response	0.2	0.2	0.1
Average Response	0.2		
Run Result	0.74 ppm		0.74 ppm

Run 5 Time	START 17:11	END 17:41	
Run 5 GC Response	0.2	0.2	0.1
Average Response	0.2		
Run Result	0.72 ppm		0.72 ppm

Run 6 Time	START 17:41	END 18:11	
Run 6 GC Response	0.3	0.3	0.3
Average Response	0.3		
Run Result	1.15 ppm		1.15 ppm

Run 7 Time	START 18:11	END 18:41	
Run 7 GC Response	0.2	0.1	0.2
Average Response	0.2		
Run Result	0.71 ppm		0.71 ppm

Run 8 Time	START 18:41	END 19:11	
Run 8 GC Response	0.2	0.2	0.1
Average Response	0.2		
Run Result	0.67 ppm		0.67 ppm

Run 9 Time	START 19:11	END 19:41	
Run 9 GC Response	0.6	0.5	0.3
Average Response	0.4		
Run Result	1.63 ppm		1.63 ppm

Run 10 Time	START 19:41	END 20:11	
Run 10 GC Response	0.2	0.3	0.3
Average Response	0.3		
Run Result	1.02 ppm		1.02 ppm

Post Cal GC Response	299.9	301.8	300.4
Average Response	300.7		
% Difference	-3.61%	PASS Post Test Calibration Check	

Erthwrks Raw Data

<u>Unit</u>	<u>Date</u>	<u>Time</u>	<u>Test Period</u>	<u>Analyte</u>	<u>Retention Time</u>	<u>Area Count</u>
ChannelOne-5241.chr	11/18/2024	14:56:32		H2S	1.006	1290.6905
ChannelOne-5242.chr	11/18/2024	14:57:56		H2S	1.016	1269.1408
ChannelOne-5243.chr	11/18/2024	14:59:20		H2S	1.006	1289.3352
ChannelOne-5246.chr	11/18/2024	15:03:32		H2S	1.006	293.0105
ChannelOne-5247.chr	11/18/2024	15:04:56		H2S	1.016	288.986
ChannelOne-5248.chr	11/18/2024	15:06:20		H2S	1.003	288.6756
ChannelOne-5253.chr	11/18/2024	15:13:21		H2S	1.016	44.5972
ChannelOne-5254.chr	11/18/2024	15:14:45		H2S	1.006	45.0148
ChannelOne-5255.chr	11/18/2024	15:16:09		H2S	1.006	44.9026
ChannelOne-5256.chr	11/18/2024	15:17:33		H2S	1.016	42.871
ChannelOne-5258.chr	11/18/2024	15:20:22		H2S	0.96	0.1186
ChannelOne-5259.chr	11/18/2024	15:21:46		H2S	1.023	0.1503
ChannelOne-5260.chr	11/18/2024	15:23:10		H2S	1.036	0.2581
ChannelOne-5261.chr	11/18/2024	15:24:34		H2S	1.036	0.1635
ChannelOne-5262.chr	11/18/2024	15:25:58		H2S	0.926	0.2164
ChannelOne-5263.chr	11/18/2024	15:27:22		H2S	0.926	0.1195
ChannelOne-5264.chr	11/18/2024	15:28:46		H2S	0.986	0.1432
ChannelOne-5530.chr	11/19/2024	15:11:53		H2S	1.063	0.1265
ChannelOne-5531.chr	11/19/2024	15:21:53		H2S	1.046	0.1159
ChannelOne-5532.chr	11/19/2024	15:31:53		H2S	1.063	0.0604
ChannelOne-5533.chr	11/19/2024	15:41:53		H2S	1.046	0.3344
ChannelOne-5534.chr	11/19/2024	15:51:54		H2S	1.056	0.338
ChannelOne-5535.chr	11/19/2024	16:01:54		H2S	1.053	0.106
ChannelOne-5536.chr	11/19/2024	16:11:54		H2S	1.076	0.2982
ChannelOne-5537.chr	11/19/2024	16:21:54		H2S	0.986	0.3038
ChannelOne-5538.chr	11/19/2024	16:31:54		H2S	1.033	0.0502
ChannelOne-5539.chr	11/19/2024	16:41:54		H2S	1.028	0.1722
ChannelOne-5540.chr	11/19/2024	16:51:54		H2S	1.06	0.1954
ChannelOne-5541.chr	11/19/2024	17:01:54		H2S	1.04	0.1424
ChannelOne-5542.chr	11/19/2024	17:11:55		H2S	1.051	0.1571
ChannelOne-5543.chr	11/19/2024	17:21:55		H2S	1.043	0.2004
ChannelOne-5544.chr	11/19/2024	17:31:55		H2S	1.046	0.1362
ChannelOne-5545.chr	11/19/2024	17:41:55		H2S	1.063	0.2746
ChannelOne-5546.chr	11/19/2024	17:51:55		H2S	1.06	0.3074
ChannelOne-5547.chr	11/19/2024	18:01:55		H2S	1.05	0.2877
ChannelOne-5548.chr	11/19/2024	18:11:55		H2S	1.04	0.1748
ChannelOne-5549.chr	11/19/2024	18:21:55		H2S	0.986	0.1301
ChannelOne-5550.chr	11/19/2024	18:31:55		H2S	1.046	0.185
ChannelOne-5551.chr	11/19/2024	18:41:56		H2S	1.04	0.1666
ChannelOne-5552.chr	11/19/2024	18:51:56		H2S	1.053	0.219
ChannelOne-5553.chr	11/19/2024	19:01:56		H2S	1.07	0.0724
ChannelOne-5554.chr	11/19/2024	19:11:56		H2S	1.036	0.58
ChannelOne-5555.chr	11/19/2024	19:21:56		H2S	1.043	0.4954
ChannelOne-5556.chr	11/19/2024	19:31:56		H2S	1.066	0.261
ChannelOne-5557.chr	11/19/2024	19:41:56		H2S	1.063	0.1678
ChannelOne-5558.chr	11/19/2024	19:51:56		H2S	1.056	0.291
ChannelOne-5559.chr	11/19/2024	20:01:57		H2S	1.083	0.2934
ChannelOne-5636.chr	11/20/2024	7:16:53		H2S	1.01	299.9226
ChannelOne-5637.chr	11/20/2024	7:18:12		H2S	1.013	301.7555
ChannelOne-5638.chr	11/20/2024	7:19:30		H2S	1.013	300.384