Andrea B. McMillen
Sr. Environmental Professional

Marathon Oil Permian LLC
5555 San Felipe Street
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Marathon Oil

July 27, 2018

Director: Air, Pesticides and Toxics
EPA Region 6
1445 Ross Avenue
Dallas, TX 75202-2733

RE: Marathon Oil Permian, LLC
40 CFR Part 60 Subpart OOOOa – Combustor Performance Test Notification

To Whom It May Concern:

Marathon Oil Permian, LLC is notifying EPA of the initial performance test to be conducted on a combustor subject to 40 CFR Part 60, Subpart OOOOa. Site and equipment specific information pertinent to the testing is provided below. The testing will take place the week of August 27, 2018.

Facility	Unit Number	Serial Number	Make/Model	Location
Kyle 34 Federal No 5H	COMB	BGR 24 190517-01	Black Gold Rush 24HP/LP	Eddy County, New Mexico

For information regarding the enclosed protocol contact Don Haynes, NORDON Corporation, by phone at (512) 633-6003 or by email at dhaynes@nordoncorp.com. For information regarding the combustor or location information, please contact me by phone at (713) 296-1952 or by email at amcmillen@marathonoil.com.

Sincerely,

Andrea B. McMillen

:abm

Enclosures

EMISSION PERFORMANCE TEST PROTOCOL

SOURCE(S)

Unit#	Make/Model	S/N	Manufacture Date
COMB	Black Gold Rush Industries / BGR-24HP/LP	BGR 24 190517-01	May 19, 2017

SOURCE(S) PROCESS DESCRIPTION

Crude oil, natural gas, and produced water are produced from the well on the Marathon Oil Permian LLC, Kyle 34 Federal 5H facility. Crude oil is separated from the gas then processed in the heater treater. Oil from the heater treater flows to the oil storage tanks on location. Vapors from the tanks are routed to a combustor for oxidation. Both the inlet and exhaust of the combustor are to be tested to demonstrate meeting the performance requirements of 40 CFR 60.5412a(a)(1).

LOCATION

Facility Information	Coordinates (as available)	Directions (as available)
Marathon Oil Permian LLC Kyle 34 Federal 5H	32°10'01.7"N, 104° 04' 10.9"W or 32.167147N 104.069684W	On the east side of Highway 285, 4.3 miles south of the intersection of Hwy 285 and 720 in Malaga, Eddy County, New Mexico

REGULATION(S)

NMED AQB Permit # NOI 7669R1
40 CFR 60, Subpart OOOOa

PRIMARY TEST PARTICIPANT INFORMATION

Owner/Operator	Test Contractor
Marathon Oil Permian LLC 5555 San Felipe Street Houston, Texas 77056 Ms. Andrea McMillen Sr. Environmental Professional Email: amcmillen@marathonoil.com OFFICE: (713) 296-1952	NORDON Corporation P.O. Box 1415 Round Rock, TX 78680 Attn: Don Haynes Email: don@nordoncorp.com OFFICE: 512-355-3786 FAX: 512-355-3785

PROPOSED TEST DATE

Week of August 27, 2018

Test Protocol

TEST MATRIX

Test Load Target	Testing will be conducted at highest achievable load
Number of Test Runs	A minimum of three test runs will be performed
Test Run Duration	Each test run will be a minimum of 60 minutes in duration
Test Location(s)	
Combustor Inlet Parameters:	NMNEVOC, heat content, and volumetric flow rate
	Centroid of 4" pipe
Combustor Outlet Parameters:	O_2, CO_2, NMVOC, visible emissions, exhaust moisture and volumetric flow rate
	Sampling shall be conducted using three traverse points at 16.7%, 50%, and 83.3% of the stack diameter.

TEST METHODOLOGY

Combustor Outlet

Parameter	Test Method	Description
Traverse Point Layout	EPA RM 1	Determine sample point location
Combustor Gas Velocity Stack Gas Velocity	EP RM 2	Determine stack gas velocity and combustor gas velocity using S-type pitot tube
O_2	EPA RM 3A	O_2 will be measured using an analyzer that utilizes an electro-chemical cell, or a paramagnetic sensor. O_2 will be measured on a dry basis.
CO_2	EPA RM 3A	CO_2 will be measured using an analyzer that uses infra-red technology.
Moisture	EPA RM 4 Or	Stack moisture will be calculated using F-factor calculations per EPA Method 4 Section 16 or
	ASTM D6348-03	FTIR Measurement of moisture
Mass Emission Rates	EPA RM 19	Emission rates for pollutants will be determined by using stoichiometric calculations if Method 2 will not work.
Visible Emissions	EPA RM 22	One (1) observation period of 15 minutes will be made.
NMVOC	EPA RM 25A	NMVOC will be measured using an analyzer that utilizes a flame ionization detector to continuously measure both methane and non-methane VOC concentrations on a wet basis and will be converted to a dry basis.

Combustor Inlet

Parameter	Test Method	Description
Combustor Inlet Flow	EPA RM 2	S-Type pitot tube.
Combustor Gas Analysis	EPA ALT-100	NMNEVOC, heat content, and volumetric flow rate.

Ambient conditions - Nordon personnel will collect ambient temperature, humidity and absolute pressure measurements during testing. An aircraft-type aneroid barometer (altimeter) or a digital barometer will be used to measure absolute atmospheric pressure.

QUALITY ASSURANCE / QUALITY CONTROL

QA/QC

Parameter	QA/QC
O_2 and CO_2	– Control gases used to calibrate instruments will be analyzed and certified by the compressed gas vendors to ±1% accuracy for all calibration gases. – Analyzer calibration error check performed prior to data collection – System bias checks performed before and after each test run. – Determination of analyzer drift
NMVOC	– Control gases used to calibrate instruments will be analyzed and certified by the compressed gas vendors to ±2% accuracy for all calibration gases. – Analyzer calibration error check performed prior to data collection – Determination of analyzer drift
Gas Velocity	– Leak checks will be performed prior to each measurement – Pitot tube measurement specifications will be compared with tolerance criteria

OPERATIONAL DATA

Operational data will be supplied by the owner/operator, per test run, as applicable/available for the source.

a. Waste gas flow rate
b. Combustor stack temperature(s)
c. Other data as available and pertinent

TEST REPORT

a. Summary of Test Results
   i. Measured concentrations
   ii. Calculated mass emission rates and control efficiency
   iii. Operational data
b. Description of Analytical techniques
   iv. Sample System Diagram
   v. Table of Analytical Instrumentation
c. Description of Quality Assurance Activities
d. Documentation
   vi. Field data sheets
   vii. Data acquisition records
   viii. Quality Assurance Activities
e. Engine Operational Data
f. Process Description

*Control efficiency determined by the following calculation:

$$\text{Control Efficiency (\%)} = \frac{\left(E_i - E_o\right)}{E_i} \times 100$$

Where:

E_i = uncontrolled VOC (lb/hr) to combustor
E_o = non-methane VOC combustor emissions (lb/hr) determined from test

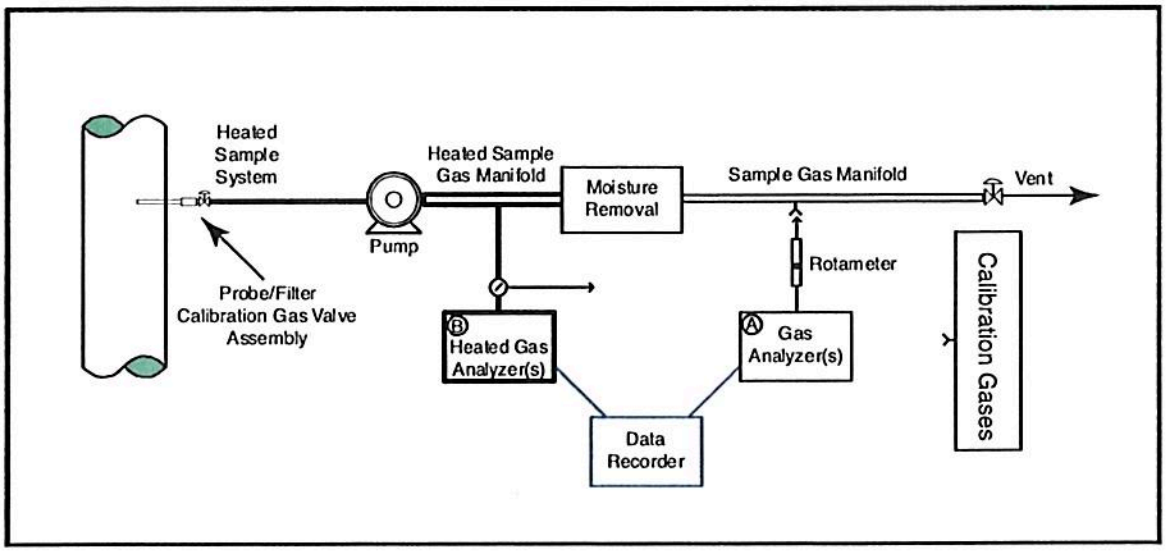
DEVIATIONS

An attempt will be made to measure exhaust flow rate using Method 2; however, due to previous experience with vapor combustors, the exhaust flow rates are generally too low to be reliably measured even with low-flow measuring equipment and/or the high temperature exhaust may not allow velocity measurements to be made safely. If this is the case, EPA Method 19 will be utilized to determine emission rates and control efficiency.

ENCLOSURES

Example Sample System Diagram and Analytical Instrumentation

Example Sample System Diagram and Analytical Instrumentation



(A) Gas Analyzers – CO, O_2, CO_2 (B) non-methane VOC

Analyzer Make	Analyzer Model	Detection Principle
O_2 Analyzer(A): Teledyne	320A	Electrochemical Cell
CO_2 Analyzer(A): Sick Maihak	S700	Non-dispersive Infra-red
HC Analyzer (B): Thermo Environmental	55i	Flame Ionization Detector
FTIR (B) MKS	MultiGas 2030	FTIR (Fourier Transform Infrared)

NORDON CORPORATION
P.O. Box 1415 Round Rock, Texas 78680 **Phone:** 512-355-3786 **Fax:** 512-355-3785 www.nordoncorp.com

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

MAY 07 2013

OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

Mr. Bryan D. Tyler
Enthalpy Analytical, Inc.
800-1 Capitola Dr.
Durham, NC 27713

Dear Mr. Tyler:

This letter is in response to your request of November 21, 2012, and subsequent communications in January and March of 2013, for approval of alternative sampling and analysis procedures for flare gas fuel heat content (BTU value) measurement under 40 CFR 60.18(f)(3). The requested alternatives would apply to Method 18 (40 CFR Part 60, Appendix A), which is required to be used to measure the organic content in order to determine the BTU content of the flare gas. In your request, you also requested broad applicability for these alternatives to measure BTU content of flare gas fuels.

In summary, you requested alternatives to the requirements in Method 18 in four areas:

1) Sampling flare gas fuel streams using electro-polished stainless canisters.
2) Applying heating values to unknown hydrocarbons based on retention times of the unknown chromatographic peaks relative to the hydrocarbons used to calibrate your analysis method.
3) Relaxation of the spike recovery requirement in Method 18 for fuel gas BTU analysis.
4) Relaxation of the requirement for triplicate analysis of samples to quantify compounds for BTU determination.

Regarding your first alternative request, you requested the use of an electro-polished 3L stainless steel container for sample collection to meet the requirements of 40 CFR 60.18(f)(3). Your rationale includes reference to EPA Method 18, which allows canisters only for pre-survey purposes. When used for compliance testing, Method 18 requires sample collection in Tedlar bags, direct interface, or adsorbent sampling. You propose the alternative use of stainless steel containers since flare gas is being used as a fuel, is collected prior to being combusted, and is composed of hydrogen, carbon monoxide, and various hydrocarbons rather than combustion "emissions". The requirements in 40 CFR 60.18(f)(3) for flare fuel gas sample collection and analysis are intended to demonstrate that the BTU/SCF of the flare gas are <u>above a minimum</u> requirement as opposed to demonstrating that volatile organic emission level is <u>below a regulated emission limit</u>. Thus, if some portion or component of the organic sample were to be lost to the walls of the canister, the result would negatively impact the BTU/SCF demonstration.

You also provided data demonstrating that hydrocarbon fuel samples typically consist of hydrocarbon components containing 6 or less carbons. You assert that these hydrocarbons are stable VOC, and are not subject to the same stainless steel canister wall effects as combustion samples, considering the volatility, relative inertness, and the absence of water vapor and acid gases in these flare fuel gas samples. To support this contention, you supplied data comparing the results of samples collected simultaneously in Tedlar bags and stainless steel canisters. These data were provided to EPA to show that electro-polished stainless steel container results compare well with Tedlar bag sample results for fuel gas hydrocarbon analysis.

In addition, your request includes reference to shipping safety issues, and you provided a short description of the prime safety reasons for use of electro-polished canisters including:

- The Federal Aviation Administration (FAA) requirement that flammable gases be shipped in hard sided containers for commercial air shipments, and
- Department of Transportation (DOT) requirement that flammable gas, which you contend most all flare samples are, be shipped in a hard sided container for commercial ground shipments.

You noted that electro-polished stainless steel containers would meet both the FAA and DOT safety requirements for sample transportation.

Regarding your second request for alternative sample analysis, you requested an approach for quantifying the BTU content that includes assigning quantitative values to unknown compounds detected during analysis of flare gas fuel samples. You requested unknown hydrocarbon compounds eluting near one of the C2 through C6 n-alkanes be reported based on the calibration response for the nearest alkane. You provided background, rationale, and justification for this request based on the following information:

- Your calibration consists of using each of the C1 through C6 n-alkanes (methane through hexane).
- Your capability to extend calibration to n-dodecane (C12) using NIST- traceable calibration standards.
- Your field sample data demonstrate that other branched, unsaturated or cyclic hydrocarbons that are not in the calibration mixture can contribute significantly to the heat content of the fuel.
- One cannot calibrate for unknown hydrocarbons before sample analysis.

Regarding your third alternative request, you requested relief from the Method 18 spike and recovery procedure for the 40 CFR 60.18 flare gas heat content measurement requirements. You assert that Method 18 spike and recovery quality control requirements to assess the stability of the analyte and the appropriateness of the collection technique are not practical for unknown compounds. Since C1 through C6 calibration compounds are both stable and sufficiently volatile, and that canisters are received under pressure and at such high concentrations, you contend that spike recovery of the calibration compounds is not practical.

Regarding the fourth alternative request, you requested reducing the requirement for triplicate injections in Method 18 to duplicate injections with +/-5% reproducibility to be consistent with ASTM Method D 1946-90.

We have reviewed your requests as well as the requirements of 40 CFR 60.18 and approve/disapprove your four proposed testing alternatives as explained:

1) Regarding sampling with stainless steel electro-polished canisters, we agree that for safety reasons, the use of stainless steel electro-polished canisters, SUMMA passivated canisters, or silica lined stainless steel canisters or cylinders is an acceptable alternative for hydrocarbon flare fuel gas sample collection. Your results demonstrated an average difference in hydrocarbon concentration between Tedlar bags and stainless steel cylinders of approximately 13%. This alternative is approved provided that the fuel gas is under pressure and is primarily composed of combustible hydrocarbons, which are inert to reaction with ambient temperature stainless steel.

2) Section 60.18(f)(3) requires that the net heating value of the gas being combusted in a flare shall be calculated using the sum of the individual compound contributions to BTU content. We agree that it may be impractical to identify and quantify all unknown compounds in the potentially complex mixtures of hydrocarbons present in flare fuel gas. For purposes of hydrocarbon fuel BTU analysis, the fundamental heating value is a function of the number of carbon atoms. Gas chromatographic retention times for both known and unknown compounds under the conditions of this analysis is a function of vapor pressure. Therefore, you may use the response factor for the nearest normal hydrocarbon (i.e., n-alkane) in your calibration mixture to quantify unknown components detected in your BTU analysis. This approval is predicated on the requirement that you calibrate for this analysis using standard(s) containing normal hydrocarbons C1 through C7 that meet Method 18 calibration standard requirements. Unknown compounds that elute after n-heptane must either be identified and quantified using an identical compound standard, or you must extend your calibration range to include the additional normal hydrocarbons necessary to perform the unknown hydrocarbon quantitation procedure described elsewhere in this alternative test method approval.

3) We agree that, in lieu of the spike recovery requirement in Method 18, you may report calibration results that demonstrate linear response of each calibration compound up to the highest concentration that you measure in each flare fuel gas sample.

4) We do not approve relaxation of the requirement to perform triplicate analysis of BTU samples. ASTM D1946-90 is not included in the rule requirements as an alternative method for analysis of hydrocarbons to determine BTU. While duplicate analysis simplifies the analysis procedure, we believe triplicate analysis of a canister sample is necessary to evaluate the consistency of the compound recovery from the canister as the pressure changes, and thus should be a continued practice for this rule.

To use the approved alternative sampling and analysis approaches for flare fuel gas heat content measurement:

- You must demonstrate that each batch of stainless steel canisters cleaned for fuel gas BTU determination has a Flame Ionization Detector response less than 1 percent or less than 3 BTU/SCF, whichever is less, of the value of the samples subsequently collected and analyzed from a certified batch of clean canisters.
- You must follow the requirements of Method 18 for sample collection substituting electro polished stainless steel canisters or SUMMA passivated canisters, or silica-lined stainless steel canisters/cylinders for the Tedlar bag required in the method.
- You must calibrate your gas chromatograph with C1 through C7 normal hydrocarbons certified by the gas vendor to meet Method 18 requirements.
- You must follow the calibration and quality control procedures found in Sections 8.2.1.5, 10.0, and 13.0(a) of Method 18.

This approval does not include or approve using stainless steel canisters for collection or analysis of combustion samples. Steel canisters are not appropriate for direct sampling of combustion gas samples potentially containing acid gases and moisture. Stainless steel canisters are also not approved for sampling and analysis of oxygenated fuels containing percent levels of ethanol or other oxygenated additives. Stainless steel canisters are not appropriate for sampling and analysis of reduced sulfur compounds in flare gas. However, for safety reasons, we agree that reduced sulfur compounds may be sampled with silica-lined stainless steel canisters or cylinders under 40 CFR 60.18 for the purpose of BTU determination when the reduced sulfur species are a significant component of the flare gas heat content.

We will announce on EPA's website (at http://www.epa.gov/ttn/emc/approalt.html) that our approval of this alternative is broadly applicable to testing the heat content of flare fuel gas under 40 CFR 60.18.

If you need further assistance, please contact Ray Merrill of my staff at (919) 541-5225, or merrill.raymond@epa.gov.

Sincerely,

Connie Oldham

Conniesue B. Oldham, Ph.D., Group Leader
Measurement Technology Group

cc: Mike Hutcheson, METCO Environmental
Brian Dickents, Region 5
Daniel Hoyt, Region 6
Mike Hutcheson, METCO Environmental
John Smith, TCEQ