DEQ

RENEWABLE OPERATING PERMIT APPLICATION
AI-001: ADDITIONAL INFORMATION

This information is required by Article II, Chapter 1, Part 55 (Air Pollution Control) of P.A. 451 of 1994, as amended, and the Federal Clean Air Act of 1990. Failure to obtain a permit required by Part 55 may result in penalties and/or imprisonment. Please type or print clearly. Refer to instructions for additional information to complete this form.

	SRN: 5831	Section Number (if applicable): 1

1. Additional Information ID
AI-CAM

Additional Information

2. Is This Information Confidential? ☐ Yes ☒ No

Attached is a Complaince Assurance Monitoring Applicability summary for EUENGINE6.

Page of

Compliance Assurance Monitoring (CAM) Plan
Breitburn Operating Company, L.P.
Wilderness/Hayes 29 Facility
EUENGINE6

I. BACKGROUND

Emission Units

Description: Waukesha L 7042 GSI compressor engine, rated at 1,478 hp, and equipped with a 3-way catalyst to control emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOCs).

Identification: EUENGINE6

Facility: Breitburn Operating Company, L.P. (Breitburn) – Wilderness/Hayes 29 Facility
Section 29, T29N, R4W
Hayes Township, Otsego County, Michigan

Applicable Regulation, Emission Limit, Monitoring Requirements

MI-ROP-N5831-014b FGWAUKENGINES FLEXIBLE GROUP CONIDITONS. I, lists the applicable regulations as R336.1205(3), R336.1225, R336.1702(a), and R336.1910.

Emission Limits:

EUENGINE6
NO_x: 24.6 tons/year
CO: 41.1 tons/year

Control Technology

A 3-way catalyst is used to control NO_x, CO, and VOC emissions from the Waukesha compressor engine. The pre-control device potential emissions of NO_x and CO are greater than 100 tons per year for the Waukesha engine, which makes this unit subject to the CAM requirements. However, the pre-control device potential VOC emissions from the unit are less than 100 tpy.

II. MONITORING APPROACH

Pressure drop across the 3-way catalyst, and inlet and outlet temperatures are all monitored. These parameters represent the most important parameters for proper operation of the catalytic converter. The compliance assurance monitoring approach is summarized in Table 1.

Table 1

Device Description	Operating Variable	Monitoring Method	Frequency	Normal Operating Range	Excursion Indicator	Remedial Action
Catalyst	2" WC Change in ΔP @ normal operating conditions	Gauge or manometer	Monthly	Varies by engine. Recorded in database	2.5 times the ΔP @ normal operating conditions	Check sample lines, check rpm verses ΔP and compare to previous months readings, remove catalyst and replace gaskets as necessary; if still 1.5 times the normal range then catalyst would be removed and washed. Also see Table 2 of the approved PM/MAP
Catalyst	Inlet and Outlet temperatures	Thermocouple	Daily	Must be below 1350 degrees F. For 3-way catalysts only: Outlet temperature must be equal to or greater than the catalytic inlet temperature.	Temperature less than 800°F Differential temperature greater than 150°F above normal (not to exceed 1350°F)	Check loading on engine, check for faulty gauge or temperature probe, and check for proper operation of the ignition system Automatic engine shutdown Also see Table 2 of the approved PM/MAP

Appendix A, attached to this CAM Plan, describes the inlet and outlet catalyst temperature data that will be recorded on a daily basis.

No in-situ continuous emission monitoring systems are employed to measure actual emissions from this engine.

Quality assurance and quality control will include following the approved preventative maintenance/malfunction abatement plan (PM/MAP) developed for the engine and catalytic converter. The PM/MAP for this facility requires periodic replacement of various components within specified times. Manufacturer recommendations will be followed to ensure proper operation of the engine and control device.

III. JUSTIFICATION

The Monitoring Approach described above was determined during extensive communication between the MDEQ-AQD, the control equipment vendor, and the oil and gas industry regarding proper compliance assurance monitoring of the catalytic converter. It was determined that the pressure drop across the catalyst bed, and the inlet and outlet temperatures are critical parameters necessary to measure catalytic converter performance. The parameter ranges listed in Table 1 are used to determine that the catalytic converter is being operated and maintained to achieve the targeted control efficiencies for NO_x and CO, and therefore provide the compliance assurance required. A high pressure drop may be an indication of plugging of the catalyst, and a very low one may indicate the catalyst bed has leakage around or through it. A high outlet temperature may also be an indication of the need to shut down the unit to prevent burnout of the catalyst. Typical operating temperature ranges for 3-way catalysts are 750 degrees F to 1350 degrees F. The PM/MAP requires certain actions to be taken in the event that there would be a monitored parameter outside of the values indicated in the above table.

Regarding the oxygen sensor for the AFRC, Breitburn has determined that the oxygen sensor is difficult to predict for any range that would define an excursion point. The same sensor can vary considerably depending on the engine's RPM, loading, and other factors, and for this reason it is not practical, nor value added, to identify any range that would identify excursion point(s). The PM/MAP for the facility's engines successfully addresses the requirements for proper operation of the AFRC, and associated oxygen sensor, for this engine. For this reason, it is not practical to identify an excursion level for the AFRC's oxygen sensor. Even if the oxygen sensor experiences difficulties, monitoring the catalytic converter using the pressure differential and temperatures as indicators are more important as monitoring parameters.

Therefore, Breitburn has determined that sufficient monitoring is being performed to satisfy the requirement pursuant to the CAM regulations and requirements, 40 CFR Part 64.

Appendix A

Breitburn Operating Company, L.P.
Exhaust Emissions Field Report

		lb/hr	g/BHP-Hr
PRE	NOx Lbs/Hr =	0.00	#DIV/0!
PRE	CO Lbs/Hr =	0.00	#DIV/0!
POST	NOx Lbs/Hr =	0.00	#DIV/0!
POST	CO Lbs/Hr =	0.00	#DIV/0!
	BMEP =	#DIV/0!	

EXTERRAN

ENGINE EMISSIONS ANALYSIS

Customer:	BreitBurn	Engine CID:	0
Location:	0	Engine RPM:	0
Unit:	0	BMEP Calc:	#DIV/0!
Serial Number:	0	Amb Temp F:	0
Engine Model:	0	Date of Test:	01/00/00
		Engine Timing:	0

DATA OBSERVED

ENGINE		CONVERTER	
NOx Observed - PPM	0	NOx Observed - PPM	0
CO Observed - PPM	0	CO Observed - PPM	0
O2 Observed - %	0.0		
Engine Horsepower	0		
Fuel Used - cu-ft/hr	0		
Fuel Analysis - BTU/cu-ft	0		

CALCULATED RESULTS

	g/BHP-Hr	lbs/hr	TPY
ENGINE NOx	#DIV/0!	0.00	0.00
ENGINE CO	#DIV/0!	0.00	0.00
CONVERTER NOx	#DIV/0!	0.00	0.00
CONVERTER CO	#DIV/0!	0.00	0.00

NOx CONVERSION	CO CONVERSION
#DIV/0!	#DIV/0!

RATIO:	NO	/	NO2
	#DIV/0!	/	#DIV/0!

Calculated results are derived from a series of emissions readings from the identified engine at the conditions listed. Test instrument reads NO and NO2 separately with NOx based on the combined total and calculated as NO2. Concentrations in PPMv are given at the observed O2 levels with no correction factor made. Engine loading is confirmed using WPI proprietary software and / or driven equipment loading. Test instrument is spanned with known gas concentrations before each series of tests. Printout of the raw data is attached. Test instrument is an electro-chemical cell type. Method of calculation is per EPA Method 19 based on fuel usage and analysis.

DATA INPUT AREA	
Customer:	BreitBurn
Location:	
Unit:	
Engine Serial Number:	
Engine Model:	
Engine CID:	
Engine RPM:	
Ambient Temp - deg F:	
Test Date - m/d/yr	
Engine NO Observed - PPM:	
Engine NO2 Observed - PPM:	
Engine CO Observed - PPM:	
Exhaust O2 Observed - %:	
Engine Horsepower:	
Fuel Flow - cu-ft/hr	
Fuel Analysis - BTU/cu-ft	
Converter NO Observed - PPM:	
Converter NO2 Observed - PPM:	
Converter CO Observed - PPM:	
Engine Timing:	

Permit Limits;

NOX; 90%	CO; 80%

Catalyst temps;

In;	
Out;	
Diff;	0

Catalyst pressure;

In;	
Out;	
Diff;	0

Exhaust Flow

02 Target

Catalyst Model: