# TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

**DRAFT Alternative Method of Control (AMOC) Plan**

## *Gulf Coast Growth Ventures, LLC*

**AMOC No.: AMOC-138**
**GCGV Complex Multi-Point Ground Flare (MPGF) System**
**Gregory, San Patricio County, Regulated Entity Number: RN109753731**

A. This AMOC Plan Authorization shall apply at the Gulf Coast Growth Ventures, LLC (GCGV), Olefins and Polyethylene Plants located near Gregory, San Patricio County. This site is identified by Regulated Entity Number RN109753731. Under Title 30 Texas Administrative Code (TAC) Section 115.910 (§115.910) this plan authorizes a multi-point ground flare (MPGF) system identified as EPN UFFLARE01. This plan is specific to the high-pressure operations of MPGF system which will be used intermittently during routine process operations, planned maintenance, start-ups, and shutdowns (MSS) including but not limited to operational transitions, catalyst change outs, grade changes, and unplanned emergency and upset situations.

B. A copy of the AMOC application and the AMOC Plan provisions must be kept on-site or at a centralized location and made available at the request of personnel from the TCEQ or any pollution control agency with jurisdiction. The AMOC application is defined by the application received December 19, 2019 and subsequent supporting information dated through *[date of PN certification].*

C. This authorization is granted under § 115.910 for emissions sources regulated by 30 TAC Chapter 115, Subchapter B: General Volatile Organic Compound Sources, Division 1: Storage of Volatile Organic Compounds and Division 2: Vent Gas Control.

This AMOC shall apply in lieu of the requirements listed above, as applicable. Compliance with this AMOC is independent of GCGV's obligation to comply with all other applicable requirements of 30 TAC Chapter 115, TCEQ permits, and applicable state and federal law. The monitoring and testing requirements of 30 TAC Chapter 115 shall continue to apply.

D. In accordance with § 115.913(c), all representations submitted for this plan, as well as the provisions listed here, become conditions upon which this AMOC Plan is issued. It is unlawful to vary from the emission limits, control requirements, monitoring, testing, reporting or recordkeeping requirements of this Plan.

E. The flare system is authorized under Permit Nos. 146425, PSDTX1518, and GHGPSDTX170 and subject to this AMOC plan. The flare system uses Zeeco Model MJ-4 burners controlling intermittent activities. When the high-pressure vent header sends waste gas to the MPGF, the burners will exceed the tip velocity portions of §60.18, §63.11, and 30 TAC Chapter 115. In these instances, the burners and stages will meet the requirements in paragraph F.

The MPGF system has 19 stages with a total of 630 burners with three (3) pilots per stage. All high-pressure stages are designed to operate as non-assisted. Operations of the MPGF burners will achieve a reduction in emissions at least equivalent to the reduction in emissions being controlled by a steam-assisted, air-assisted, or non-assisted flare complying with the requirements of §§ 115.122(a)(1)-(2) or 40 CFR 60.18(b).

F. When regulated flare vent gas is being sent to the flare and the burners exceed the tip velocity requirements of §60.18, §63.11, and 30 TAC Chapter 115, the burners must be operated such that the following are met:

1. **Operating Requirements**: The net heating value of the flare vent gas combustion zone ($NHV_{cz}$) is greater than or equal to 800 British thermal units per standard cubic foot (Btu/scf); or the combustion zone gas lower flammability limit ($LFL_{cz}$) is less than or equal to 6.5 percent by volume. The owner or operator must

demonstrate compliance with the $NHV_{cz}$ or $LFL_{cz}$ metric by continuously complying with a 15-minute block average. The operator must calculate and monitor for the $NHV_{cz}$ or $LFL_{cz}$ according to the following:

*a.* **Calculation of $NHV_{cz}$**

i. Option #1: If any owner or operator elects to use a monitoring system capable of continuously measuring, calculating, and recording the individual component concentrations present in the flare gas, the net heating value shall be determined using the following equation:

$$NHV_{vg} = \sum_{i=1}^{n} x_i \, NHV_i$$

Where:

$NHV_{vg}$ = Net heating value of flare vent gas, British thermal units per standard cubic foot (Btu/scf).
*Flare vent gas* means all gas found just prior to the MPGFs. This gas includes all flare waste gas (*i.e.,* gas from facility operations that is directed to a flare for the purpose of disposing of the gas), flare sweep gas, flare purge gas and flare supplemental gas, but does not include pilot gas.
*i* = Individual component in flare vent gas.
*n* = Number of components in flare vent gas.
$x_i$ = Concentration of component *i* in flare vent gas, volume percent (vol %).
$NHV_i$ = Net heating value of component *i* determined as the heat of combustion where the net enthalpy per mole of offgas is based on combustion at 25 degrees Celsius °C) and 1 atmosphere (or constant pressure) with water in the gaseous state from values published in the literature, and then the values converted to a volumetric basis using 20 °C for ‘‘standard temperature.’’ Table 1 summarizes component properties including net heating values.

ii. Option #2: If the owner or operator uses a continuous net heating value monitor, the owner or operator may, at their discretion, install, operate, calibrate, and maintain a monitoring system capable of continuously measuring, calculating, and recording the hydrogen concentration in the flare vent gas. The owner or operator shall use the following equation to determine NHVvg for each sample measured via the net heating value monitoring system.

$$NHV_{vg} = NHV_{measured} + 938\ X_{H2}$$

Where:

$NHV_{vg}$ = Net heating value of flare vent gas, BTU/scf.
$NHV_{measured}$ = Net heating value of flare vent gas stream as measured by the continuous net heating value monitoring system, BTU/scf.
$X_{H2}$ = Concentration of hydrogen in flare vent gas at the time the sample was input into the net heating value monitoring system, volume fraction.
938 = Net correction for the measured heating value of hydrogen (1,212 - 274 BTU/scf).

iii. For this MPGF, NHVvg = NHVcz.

b. **Calculation of $LFL_{cz}$**

(i) The owner or operator shall determine $LFL_{cz}$ from compositional analysis data by using the following equation:

$$LFL_{vg} = \frac{1}{\sum_{i=1}^{n}\left[\frac{\chi_i}{LFL_i}\right]} * 100\ \%$$

Where:

$LFL_{vg}$ = Lower flammability limit of flare vent gas, volume percent (vol %)
*n* = Number of components in the vent gas.
*i* = Individual component in the vent gas.
$\chi_i$ = Concentration of component i in the vent gas, vol %.
$LFL_i$ = Lower flammability limit of component *i* as determined using values published by the U.S. Bureau of Mines (Zabetakis, 1965), vol %. All inerts, including nitrogen, are assumed to have an infinite LFL (*e.g., LFLN2* = ∞, so that c*N2*/ *LFLN2* = 0). LFL values for common flare vent gas components are provided in Table 1.

ii. For this MPGF, LFLvg = LFLz.

c. Calculation of Vtip in not applicable to this MPGF.

d. The operator shall install, operate, calibrate and maintain a monitoring system capable of continuously measuring regulated flare vent gas volumetric flow rate ($Q_{vg}$) and the total steam volumetric flow rate ($Q_s$), as applicable.

i. The flow rate monitoring system must be able to correct for the temperature and pressure of the system and output parameters in standard conditions (i.e., a temperature of 20 degrees C (68 ° F) and a pressure of 1 atmosphere).

ii. Mass flow monitors may be used for determining volumetric flow rate of regulated flare vent gas provided the molecular weight of the regulated flare vent gas is determined using compositional analysis so that the mass flow rate can be converted to volumetric flow at standard conditions using the following equation:

$$Qvol = \frac{Qmass\ x\ 385.3}{MWt}$$

Where:

$Q_{vol}$ = volumetric flow rate in scf per second (scf/s).
$Q_{mass}$ = mass flow rate in pounds per second (lb/s)
385.3 = conversion factor scf per pound-mole
$MW_t$ = molecular weight of the gas at the flow monitoring location, pounds per pound-mole

e. The operator shall install, operate, calibrate and maintain a monitoring system capable of continuously measuring (i.e., at least once every 15-minutes) temperature consistent with the applicable requirements in 30 TAC Chapter 115 for purposes of correcting flow rate to standard conditions. The monitor must meet the accuracy and calibration specifications annually.

For each measurement produced by monitoring systems, the operator shall determine the 15-minute block average as the arithmetic average of all measurements made by the monitoring system within the 15-minute period.

f. The operator must follow the calibration and maintenance procedures according to Table 2. Monitor downtime associated with maintenance periods, instrument adjustments or checks to maintain precision and accuracy and zero and span adjustments may not exceed 5 percent of the time the flare is receiving regulated material. Calibration and maintenance procedures conducted when the flare is not receiving regulated material are excluded from the monitor downtime calculation.

g. During flare standby, the operator will maintain the net heating value at a minimum of 800 Btu/scf by applying a continuous ethane backflow purge into the flare charge header. Maintaining a high minimum BTU in the flare charge header will ensure proper flare operation (cross-lighting and flame stability) upon initiation of a flaring event. This continuous ethane backflow purge is set at a fixed flow rate which will be estimated using engineering calculations in lieu of continuous volumetric flow monitoring.

2. **Pilot Flame Requirements**:

a. The MPGF systems shall be operated with a flame present at all times when in use.

b. Each stage of MPGF burners must have at least two pilots with a continuously lit pilot flame.

c. Each pilot flame must be continuously monitored by a thermocouple or any other equivalent device (such as the video camera required for visible emission monitoring as outlined in 3 below), used to detect the presence of a flame.

d. The time, date and duration of any complete loss of pilot flame on any stage of burners must be recorded.

e. Each monitoring device must be maintained or replaced at a frequency in accordance with the manufacturer's specifications.

3. **Visible Emission Requirements**:

   a. When the flare is receiving regulated material, the flare system shall be operated with no visible emissions except for periods not to exceed a total of 5 minutes during any 2 consecutive hours.

   b. A video camera that is capable of continuously recording (*i.e.,* at least one frame every 15 seconds with time and date stamps) images of the flare flame and a reasonable distance above the flare flame at an angle suitable for visible emissions observations must be used to demonstrate compliance with this requirement.

   c. The owner or operator must provide real-time video surveillance camera output to the control room or other continuously manned location where the video camera images may be viewed at any time.

      Video camera downtime associated with maintenance periods and camera adjustments may not exceed 5 percent of the time the flare is receiving regulated material. Maintenance and adjustment procedures conducted when the flare is not receiving regulated material are excluded from the video camera downtime calculation.

4. **Pressure Monitor Requirements**:

   a. The operator of the flare system shall install and operate pressure monitor(s) on the main flare header, and

   b. a valve position indicator monitoring systems for each staging valve to ensure that the flare system operates within the range of tested conditions or within the range of the manufacturer's specifications.

   c. The pressure monitor shall meet the requirements in Table 2.

   d. Monitor downtime associated with maintenance periods, instrument adjustments or checks to maintain precision and accuracy and zero and span adjustments may not exceed 5 percent of the time the flare is receiving regulated material. Calibration and maintenance procedures conducted when the flare is not receiving regulated material are excluded from the monitor downtime calculation.

5. **Recordkeeping Requirements**:

   All data must be recorded and maintained for a minimum of five years or for as long as applicable rule subpart(s) specify flare records should be kept, whichever is longer. Records must be maintained onsite and made available upon request by authorized representatives of the executive director, U.S. EPA, and any local air pollution control agency with jurisdiction.

**6. Reporting Requirements**

   a. The information specified in (b) and (c) below should be reported in the timeline specified by the applicable rules for which the flare system will control emissions.

   b. Owners or operators should include the final operating requirements for each flare in their initial Notification of Compliance (NOC) status report (including but not limited to the items listed in F.6.d.).

   c. The owner or operator shall notify the Administrator of periods of excess emissions in their Periodic Reports.

   d. The owner/operator shall include the following in their NOC, reports, and records:

      i. Each 15-minute block during which there was at least one minute when regulated material was routed to the MPGFs and a complete loss of pilot flame on any stage or any individual burner(s) occurred.

      ii. Periods of visible emissions events (including time and date stamp) that exceed more than 5 minutes in any 2 hour consecutive period.

      iii. Each 15-minute block period for which an applicable combustion zone operating limit (*i.e., $NHV_{cz}$* or *$LFL_{cz}$*) is not met for the flare system when regulated material is being combusted in the flare. Indicate the date and time for each period, the *$NHV_{cz}$* and/or *$LFL_{cz}$* operating parameter for the period, the type of

monitoring system used to determine compliance with the operating parameters (*e.g.,* gas chromatograph or calorimeter), and the flare stages which were in use.

iv. Periods when the pressure monitor(s) on the main flare header show the flare burners are operating outside the range of tested conditions or outside the range of the manufacturer's specifications. Indicate the date and time for each period, the pressure measurement, the stage(s) and number of flare burners affected and the range of tested conditions or manufacturer's specifications.

v. Periods when the staging valve position indicator monitoring system indicates a stage of the flare system should not be in operation but is; or when a stage of the MPGF should be in operation but is not. Indicate the date and time for each period, whether the stage was supposed to be open but was closed or vice versa and the stage(s) and number of flare burners affected.

**Table 1 — Individual Component Properties**

| **Component** | **Molecular Formula** | **MWi (lb/ lb mol)** | **NHVi (Btu/scf)** | **LFLi (volume %)** |
|---|---|---|---|---|
| Acetylene | $C_2H_2$ | 26.04 | 1,404 | 2.5 |
| Benzene | $C_6H_6$ | 78.11 | 3,591 | 1.3 |
| 1,2- Butadiene | $C_4H_6$ | 54.09 | 2,794 | 2.0 |
| 1,3- Butadiene | $C_4H_6$ | 54.09 | 2,690 | 2.0 |
| iso-Butane | $C_4H_{10}$ | 58.12 | 2,957 | 1.8 |
| n-Butane | $C_4H_{10}$ | 58.12 | 2,968 | 1.8 |
| cis-Butene | $C_4H_8$ | 56.11 | 2,830 | 1.6 |
| iso-Butene | $C_4H_8$ | 56.11 | 2,928 | 1.8 |
| trans-Butene | $C_4H_8$ | 56.11 | 2,826 | 1.7 |
| Carbon Dioxide | $CO_2$ | 44.01 | 0 | ∞ |
| Carbon Monoxide | CO | 28.01 | 316 | 12.5 |
| Cyclopropane | $C_3H_6$ | 42.08 | 2,185 | 2.4 |
| Ethane | $C_2H_6$ | 30.07 | 1,595 | 3.0 |
| Ethylene | $C_2H_4$ | 28.05 | 1,477 | 2.7 |
| Hydrogen | $H_2$ | 2.02 | 1,212(*) | 4.0 |
| Hydrogen Sulfide | $H_2S$ | 34.08 | 587 | 4.0 |
| Methane | $CH_4$ | 16.04 | 896 | 5.0 |
| MethylAcetylene | $C_3H_4$ | 40.06 | 2,088 | 1.7 |
| Nitrogen | $N_2$ | 28.01 | 0 | ∞ |
| Oxygen | $O_2$ | 32.00 | 0 | ∞ |
| Pentane+ (C5+) | $C_5H_{12}$ | 72.15 | 3,655 | 1.4 |
| Propadiene | $C_3H_4$ | 40.06 | 2,066 | 2.16 |
| Propane | $C_3H_8$ | 44.10 | 2,281 | 2.1 |
| Propylene | $C_3H_6$ | 42.08 | 2,150 | 2.4 |
| Water | $H_2O$ | 18.02 | 0 | ∞ |

** The theoretical net heating value for hydrogen is 274 BTU/scf, but for the purposes of the flare requirement, a net heating value of 1,212 BTU/scf shall be used.*

**Table 2 — Accuracy and Calibration Requirements**

| Parameter | Accuracy requirements | Calibration requirements |
|---|---|---|
| Flare Vent Gas Flow Rate | ±20 percent of flow rate at velocities ranging from 0.1 to 1 feet per second.<br><br>±5 percent of flow rate at velocities greater than 1 foot per second. | Performance evaluation biennially (every two years) and following any period of more than 24 hours throughout which the flow rate exceeded the maximum rated flow rate of the sensor, or the data recorder was off scale.<br>Conduct monthly AVO fugitive emission monitoring on each connection point.<br>Visual inspections and checks of system operation every 3 months, unless the system has a redundant flow sensor.<br>Select a representative measurement location where swirling flow or abnormal velocity distributions due to upstream and downstream disturbances at the point of measurement are minimized. |
| Ethane Backflow Purge in Flare Charge Header Net Heating Value Monitored by Calorimeter | ±2 percent of span | Flare charge header net heating value will be monitored and continuously recorded by calorimeter. The net heating value will be output to the control room. The calorimeter will meet the accuracy and calibration requirements as listed below. |
| Pressure | ±5 percent over the normal range measured or 0.12 kilopascals (0.5 inches of water column), whichever is greater. | Review pressure sensor readings at least once a week for straight-line (unchanging) pressure and perform corrective action to ensure proper pressure sensor operation if blockage is indicated.<br>Performance evaluation annually and following any period of more than 24 hours throughout which the pressure exceeded the maximum rated pressure of the sensor, or the data recorder was off scale. Checks of all mechanical connections for leakage monthly. Visual inspection of all components for integrity, oxidation, and galvanic corrosion every 3 months, unless the system has a redundant pressure sensor. Select a representative measurement location that minimizes or eliminates pulsating pressure, vibration, and internal and external corrosion. |
| Net Heating Value by Calorimeter | ±2 percent of span | Calibration requirements should follow manufacturer's recommendations at a minimum.<br>Temperature control (heated and/or cooled as necessary) the sampling system to ensure proper year-round operation.<br>Where feasible, select a sampling location at least two equivalent diameters downstream from and 0.5 equivalent diameters upstream from the nearest disturbance. Select the sampling location at least two equivalent duct diameters from the nearest control device, point of pollutant generation, air in leakages, or other point at which a change in the pollutant concentration or emission rate occurs. |
| Net Heating Value by Gas Chromatograph | As specified in Performance Specification 9 of 40 CFR part 60 Appendix B. | Follow the procedure in Performance Specification 9 of 40 CFR Part 60 Appendix B, except that a single daily mid-level calibration check can be used, a triplicate mid-level check weekly, and the multi-point calibration can be conducted quarterly (rather than monthly), and the sampling line temperature must be maintained at a minimum temperature of 60 °C (rather than 120 °C). |
| Hydrogen Analyzer | ± 2% over concentration measured or 0.1 vol% whichever is greater | Specify calibration requirements in your site specific CPMS monitoring plan. Calibration requirements should follow manufacturer's recommendations at a minimum. Specify the sampling location at least 2 equivalent duct diameters from the nearest control device, point of pollutant generation, air in-leakages, or other point at which a change in the pollutant concentration occurs. |