

**MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY  
AIR QUALITY DIVISION**

February 14, 2024

**PERMIT TO INSTALL**  
15-24

**ISSUED TO**  
Kinder Morgan RNG

**LOCATED AT**  
3100 Empire Drive  
Zeeland, Michigan 49464

**IN THE COUNTY OF**  
Ottawa

**STATE REGISTRATION NUMBER**  
P1425

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environment, Great Lakes, and Energy. This permit is hereby issued in accordance with and subject to Section 5505(1) of Article II, Chapter I, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Pursuant to Air Pollution Control Rule 336.1201(1), this permit constitutes the permittee's authority to install the identified emission unit(s) in accordance with all administrative rules of the Department and the attached conditions. Operation of the emission unit(s) identified in this Permit to Install is allowed pursuant to Rule 336.1201(6).

DATE OF RECEIPT OF ALL INFORMATION REQUIRED BY RULE 203: <b>December 18, 2023</b>	
DATE PERMIT TO INSTALL APPROVED: <b>February 14, 2024</b>	SIGNATURE:
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

**PERMIT TO INSTALL**

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## COMMON ACRONYMS

AQD	Air Quality Division
BACT	Best Available Control Technology
CAA	Clean Air Act
CAM	Compliance Assurance Monitoring
CEMS	Continuous Emission Monitoring System
CFR	Code of Federal Regulations
COMS	Continuous Opacity Monitoring System
Department/department/EGLE	Michigan Department of Environment, Great Lakes, and Energy
EU	Emission Unit
FG	Flexible Group
GACS	Gallons of Applied Coating Solids
GC	General Condition
GHGs	Greenhouse Gases
HVLP	High Volume Low Pressure*
ID	Identification
IRSL	Initial Risk Screening Level
ITSL	Initial Threshold Screening Level
LAER	Lowest Achievable Emission Rate
MACT	Maximum Achievable Control Technology
MAERS	Michigan Air Emissions Reporting System
MAP	Malfunction Abatement Plan
MSDS	Material Safety Data Sheet
NA	Not Applicable
NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standard for Hazardous Air Pollutants
NSPS	New Source Performance Standards
NSR	New Source Review
PS	Performance Specification
PSD	Prevention of Significant Deterioration
PTE	Permanent Total Enclosure
PTI	Permit to Install
RACT	Reasonable Available Control Technology
ROP	Renewable Operating Permit
SC	Special Condition
SCR	Selective Catalytic Reduction
SNCR	Selective Non-Catalytic Reduction
SRN	State Registration Number
TBD	To Be Determined
TEQ	Toxicity Equivalence Quotient
USEPA/EPA	United States Environmental Protection Agency
VE	Visible Emissions

\*For HVLP applicators, the pressure measured at the gun air cap shall not exceed 10 psig

### POLLUTANT / MEASUREMENT ABBREVIATIONS

acfm	Actual cubic feet per minute
BTU	British Thermal Unit
°C	Degrees Celsius
CO	Carbon Monoxide
CO <sub>2</sub> e	Carbon Dioxide Equivalent
dscf	Dry standard cubic foot
dscm	Dry standard cubic meter
°F	Degrees Fahrenheit
gr	Grains
HAP	Hazardous Air Pollutant
Hg	Mercury
hr	Hour
HP	Horsepower
H <sub>2</sub> S	Hydrogen Sulfide
kW	Kilowatt
lb	Pound
m	Meter
mg	Milligram
mm	Millimeter
MM	Million
MW	Megawatts
NMOC	Non-Methane Organic Compounds
NO <sub>x</sub>	Oxides of Nitrogen
ng	Nanogram
PM	Particulate Matter
PM10	Particulate Matter equal to or less than 10 microns in diameter
PM2.5	Particulate Matter equal to or less than 2.5 microns in diameter
pph	Pounds per hour
ppm	Parts per million
ppmv	Parts per million by volume
ppmw	Parts per million by weight
psia	Pounds per square inch absolute
psig	Pounds per square inch gauge
scf	Standard cubic feet
sec	Seconds
SO <sub>2</sub>	Sulfur Dioxide
TAC	Toxic Air Contaminant
Temp	Temperature
THC	Total Hydrocarbons
tpy	Tons per year
µg	Microgram
µm	Micrometer or Micron
VOC	Volatile Organic Compounds
yr	Year

## GENERAL CONDITIONS

1. The process or process equipment covered by this permit shall not be reconstructed, relocated, or modified, unless a Permit to Install authorizing such action is issued by the Department, except to the extent such action is exempt from the Permit to Install requirements by any applicable rule. **(R 336.1201(1))**
2. If the installation, construction, reconstruction, relocation, or modification of the equipment for which this permit has been approved has not commenced within 18 months, or has been interrupted for 18 months, this permit shall become void unless otherwise authorized by the Department. Furthermore, the permittee or the designated authorized agent shall notify the Department via the Supervisor, Permit Section, Air Quality Division, Michigan Department of Environment, Great Lakes, and Energy, P.O. Box 30260, Lansing, Michigan 48909-7760, if it is decided not to pursue the installation, construction, reconstruction, relocation, or modification of the equipment allowed by this Permit to Install. **(R 336.1201(4))**
3. If this Permit to Install is issued for a process or process equipment located at a stationary source that is not subject to the Renewable Operating Permit program requirements pursuant to Rule 210 (R 336.1210), operation of the process or process equipment is allowed by this permit if the equipment performs in accordance with the terms and conditions of this Permit to Install. **(R 336.1201(6)(b))**
4. The Department may, after notice and opportunity for a hearing, revoke this Permit to Install if evidence indicates the process or process equipment is not performing in accordance with the terms and conditions of this permit or is violating the Department's rules or the Clean Air Act. **(R 336.1201(8), Section 5510 of Act 451, PA 1994)**
5. The terms and conditions of this Permit to Install shall apply to any person or legal entity that now or hereafter owns or operates the process or process equipment at the location authorized by this Permit to Install. If the new owner or operator submits a written request to the Department pursuant to Rule 219 and the Department approves the request, this permit will be amended to reflect the change of ownership or operational control. The request must include all of the information required by subrules (1)(a), (b), and (c) of Rule 219 and shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environment, Great Lakes, and Energy. **(R 336.1219)**
6. Operation of this equipment shall not result in the emission of an air contaminant which causes injurious effects to human health or safety, animal life, plant life of significant economic value, or property, or which causes unreasonable interference with the comfortable enjoyment of life and property. **(R 336.1901)**
7. The permittee shall provide notice of an abnormal condition, start-up, shutdown, or malfunction that results in emissions of a hazardous or toxic air pollutant which continue for more than one hour in excess of any applicable standard or limitation, or emissions of any air contaminant continuing for more than two hours in excess of an applicable standard or limitation, as required in Rule 912, to the Department. The notice shall be provided not later than two business days after start-up, shutdown, or discovery of the abnormal condition or malfunction. Written reports, if required, must be filed with the Department within 10 days after the start-up or shutdown occurred, within 10 days after the abnormal condition or malfunction has been corrected, or within 30 days of discovery of the abnormal condition or malfunction, whichever is first. The written reports shall include all of the information required in Rule 912(5). **(R 336.1912)**
8. Approval of this permit does not exempt the permittee from complying with any future applicable requirements which may be promulgated under Part 55 of 1994 PA 451, as amended or the Federal Clean Air Act.
9. Approval of this permit does not obviate the necessity of obtaining such permits or approvals from other units of government as required by law.
10. Operation of this equipment may be subject to other requirements of Part 55 of 1994 PA 451, as amended and the rules promulgated thereunder.

11. Except as provided in subrules (2) and (3) or unless the special conditions of the Permit to Install include an alternate opacity limit established pursuant to subrule (4) of Rule 301, the permittee shall not cause or permit to be discharged into the outer air from a process or process equipment a visible emission of density greater than the most stringent of the following. The grading of visible emissions shall be determined in accordance with Rule 303 (R 336.1303). **(R 336.1301)**
  - a) A six-minute average of 20 percent opacity, except for one six-minute average per hour of not more than 27 percent opacity.
  - b) A visible emission limit specified by an applicable federal new source performance standard.
  - c) A visible emission limit specified as a condition of this Permit to Install.
12. Collected air contaminants shall be removed as necessary to maintain the equipment at the required operating efficiency. The collection and disposal of air contaminants shall be performed in a manner so as to minimize the introduction of contaminants to the outer air. Transport of collected air contaminants in Priority I and II areas requires the use of material handling methods specified in Rule 370(2). **(R 336.1370)**
13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with Rule 1001 and Rule 1003, under any of the conditions listed in Rule 1001. **(R 336.2001)**

## EMISSION UNIT SPECIAL CONDITIONS

### EMISSION UNIT SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

Emission Unit ID	Emission Unit Description (Including Process Equipment & Control Device(s))	Installation Date / Modification Date	Flexible Group ID
EURNG	Renewable natural gas (RNG) plant to refine landfill gas to produce RNG, designed to process up to 3,000 scfm of landfill gas. The first part of the process is the Treatment System, consisting of H <sub>2</sub> S removal, particulate filtration, water removal, and compression. Treated landfill gas conditioning system is comprised of liquid and gas separation vessels and compressors are used to condition landfill gas into renewable natural gas (RNG) by removing compounds including sulfur compounds. Following the Treatment System, the gas goes through a series of adsorbers to remove siloxanes and VOC and CO <sub>2</sub> , and amine adsorber for final H <sub>2</sub> S adsorption and reactors to remove nitrogen and oxygen. The waste gas created by removal of these pollutants will be burned in the direct fired thermal oxidizer thermal oxidizer (EUDFTO).	TBD	FGRNGPLANT
EUFLARE	A 3,000 scfm capacity (106 MMBTU/hr) open flare that will burn treated landfill gas, waste gases or off specification renewable natural gas during startup, shutdown, and malfunctions of the RNG plant or when the gas is not pipeline quality.	TBD	FGRNGPLANT
EUDFTO	A 1,720 scfm (14.1 MMBTU/hr) direct fired thermal oxidizer for combusting waste gas created by removal of pollutants during the conditioning system.	TBD	FGRNGPLANT
EUARB	Amine reboiler with capacity of 1.26 MMBTU/hr heat input natural gas-fired boiler used to regenerate amine solution used in the acid gas, CO <sub>2</sub> and H <sub>2</sub> S adsorption process. The waste gas is routed to the DFTO.	TBD	FGRNGPLANT

Changes to the equipment described in this table are subject to the requirements of R 336.1201, except as allowed by R 336.1278 to R 336.1291.

## FLEXIBLE GROUP SPECIAL CONDITIONS

### FLEXIBLE GROUP SUMMARY TABLE

The descriptions provided below are for informational purposes and do not constitute enforceable conditions.

<b>Flexible Group ID</b>	<b>Flexible Group Description</b>	<b>Associated Emission Unit IDs</b>
FGRNGPLANT	<p>Renewable natural gas (RNG) plant to refine landfill gas to produce RNG, designed to process up to 3,000 scfm of landfill gas. The first part of the process is the Treatment System, consisting of compression, H<sub>2</sub>S removal, particulate filtration, and water removal. Following the Treatment System, the gas goes through a series of adsorbers and amine adsorption to remove siloxanes, VOC, CO<sub>2</sub>, and reactors for removal of nitrogen and oxygen.</p> <p>Emissions are controlled by, a 1,720 scfm direct fired thermal oxidizer, and a 3,000 scfm open flare.</p>	EURNG EUFLARE EUDFTO EUARB

**FGRNGPLANT  
FLEXIBLE GROUP CONDITIONS**

**DESCRIPTION**

Renewable natural gas (RNG) plant to refine landfill gas to produce RNG, designed to process up to 3,000 scfm of landfill gas. The first part of the process is the Treatment System, consisting of compression, H<sub>2</sub>S removal, particulate filtration, and water removal. Following the Treatment System, the gas goes through a series of adsorbers and amine adsorption to remove siloxanes, VOC, CO<sub>2</sub>, and reactors for nitrogen and oxygen.

**Emission Unit:** EURNG, EUFLARE, EUDFTO, EUARB

**POLLUTION CONTROL EQUIPMENT**

Emissions are controlled by, a 1,720 scfm direct fired thermal oxidizer (EUDFTO), and a 3,000 scfm open flare (EUFLARE)

**I. EMISSION LIMIT(S)**

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Underlying Applicable Requirements
1. H <sub>2</sub> S Concentration	25 ppmv	Instantaneous	Gas at inlet to conditioning system (after initial treatment system)	SC IV.8 SC IV.9 SC VI.3 SC VI.9	R 336.1205, R 336.1224, R 336.1225
2. Carbon Monoxide (CO)	26 tpy	12-month rolling time period as determined at the end of each calendar month	EUFLARE	SC VI.8	R 336.1205(1)(a)

**II. MATERIAL LIMIT(S)**

Material	Limit	Time Period / Operating Scenario	Equipment	Monitoring / Testing Method	Underlying Applicable Requirements
1. Treated landfill gas / Waste gas	1,272 MMBtu/day	Daily	EUFLARE	SC VI.4 SC VI.7	R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702, R 336.1901, 40 CFR 52.21(c) & (d)
2. Treated landfill gas / Waste gas / Off specification RNG*	201,643 MMBTU/yr	12-month rolling time period as determined at the end of each calendar month	EUFLARE	SC VI.4 SC VI.7	R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702, R 336.1901, 40 CFR 52.21(c) & (d)

\*Off specification RNG has been processed through at least H<sub>2</sub>S removal, siloxane removal, and VOC removal systems.

**III. PROCESS/OPERATIONAL RESTRICTION(S)**

1. No later than 30 days after the completion of installation of the equipment, the permittee shall submit to the AQD District Supervisor, for review and approval, a preventative maintenance/malfunction abatement plan (PM/MAP) for FGRNGPLANT. After approval of the PM/MAP by the AQD District Supervisor, the permittee

shall not operate FGRNGPLANT unless the PM/MAP, or an alternate plan approved by the AQD District Supervisor, is implemented, and maintained. The plan shall incorporate procedures recommended by the equipment manufacturer as well as incorporating standard industry practices. At a minimum, the plan shall include:

- a) Identification of the equipment and, if applicable, air-cleaning device and the supervisory personnel responsible for overseeing the inspection, maintenance, and repair.
- b) Description of the items or conditions to be inspected and frequency of the inspections or repairs.
- c) Identification of the equipment and, if applicable, air-cleaning device, operating parameters that shall be monitored to detect a malfunction or failure, the normal operating range of these parameters and a description of the method of monitoring or surveillance procedures.
- d) Identification of the major replacement parts that shall be maintained in inventory for quick replacement.
- e) A description of the corrective procedures or operational changes that shall be taken in the event of a malfunction or failure to achieve compliance with the applicable emission limits.

If at any time the PM/MAP fails to address or inadequately addresses an event that meets the characteristics of a malfunction, the permittee shall amend the PM/MAP within 45 days after such an event occurs. The permittee shall also amend the PM/MAP within 45 days if new equipment is installed or upon request from the AQD District Supervisor. The permittee shall submit the PM/MAP and any amendments to the PM/MAP to the AQD District Supervisor for review and approval. If the AQD does not notify the permittee within 90 days of submittal, the PM/MAP or amended PM/MAP shall be considered approved. Until an amended plan is approved, the permittee shall implement corrective procedures or operational changes to achieve compliance with all applicable emission limits. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702(a), R 336.1910, R 336.1911, R 336.1912, 40 CFR 52.21(c) & (d))**

2. The permittee shall burn only pipeline quality natural gas in EUARB. **(R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702(a))**
3. The permittee shall not route to EUFLARE or EUDFTO any gas that has not at a minimum been processed through the initial Treatment System consisting of compression, H<sub>2</sub>S removal, particulate filtration, and water removal. **(R 336.1205(1)(a) & (3), R 336.1224, R 336.1225, R 336.1702(a))**
4. EUFLARE must be operated with a flame present at all times. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702)**
5. The permittee shall not send any landfill gas or treated gas or RNG to Zeeland Farm Services (M4204) and can only send gases to the natural gas pipeline and the control devices as specified in this permit. **(R 336.1205(1)(a))**

#### **IV. DESIGN/EQUIPMENT PARAMETER(S)**

1. The maximum design heat input capacity for EUARB shall not exceed 1.26 MMBTU/hr on a fuel heat input basis. **(R 336.1205(1)(a), R 336.1225)**
2. The maximum design heat input capacity of EUDFTO shall not exceed 14.1 MMBTU/hr on a fuel heat input basis. **(R 336.1205(1)(a), R 336.1225)**
3. The nameplate capacity of EUFLARE shall not exceed 3,000 scfm as specified by the equipment manufacturer. **(R 336.1205(1)(a), R 336.1225, R 336.1702(a))**
4. The heat input capacity of EUFLARE shall not exceed a maximum of 106 MMBtu per hour as specified by the equipment manufacturer. **(R 336.1205(1)(a), R 336.1225, R 336.1702(a))**
5. The permittee shall install, calibrate, maintain, and operate in a satisfactory manner, a device to monitor and record the volumetric flow rate of gas burned in EUFLARE, on a continuous basis. Continuous shall be defined in this permit at least one reading every 15 minutes. **(R 336.1205, R 336.1224, R 336.1225)**
6. The permittee shall continuously operate EUDFTO at a minimum destruction temperature of 1,500 degrees Fahrenheit or a temperature approved in writing by the AQD District Supervisor. The permittee shall install,

calibrate, maintain and operate a device to monitor and record temperature of the combustion chamber on a continuous basis. Continuous shall be defined in this permit at least one reading every 15 minutes. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702(a), R 336.1910, R 336.1911, R 336.1912)**

7. The permittee must install, calibrate, maintain, and operate according to the manufacturer's specifications, a heat sensing device, such as an ultraviolet beam sensor or thermocouple, at the pilot light or the flame itself to indicate the continuous presence of a flame of EUFLARE. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702)**
8. The permittee shall install, calibrate, maintain and operate in a satisfactory manner, a device to monitor and record on a continuous basis the H<sub>2</sub>S concentration in the gases routed to either EUDFTO or EUFLARE. Continuous shall be defined in this permit at least one reading every 15 minutes while the control device is in operation. **(R 336.1205, R 336.1224, R 336.1225, R 336.1901, 40 CFR 52.21(c) & (d))**

#### **V. TESTING/SAMPLING**

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall verify the hydrogen sulfide (H<sub>2</sub>S) or total reduced sulfur (TRS) content of the gases routed to EUDFTO or EUFLARE semi-annually by gas sampling using an EPA approved method and laboratory analysis, at the owner's expense, in accordance with Department requirements. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205, R 336.1225, R 336.2001, R 336.2003, R 336.2004)**

#### **VI. MONITORING/RECORDKEEPING**

Records shall be maintained on file for a period of five years. **(R 336.1201(3))**

1. The permittee shall complete all required calculations in a format acceptable to the AQD District Supervisor by the end of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition. **(R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702(a), R 336.1910, R 336.1911)**
2. The permittee shall keep, in a satisfactory manner, all records related to, or as required by, the PM/MAP. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702(a), R 336.1910, R 336.1911, R 336.1912, 40 CFR 52.21(c) & (d))**
3. The permittee shall keep, in a satisfactory manner, all records of the H<sub>2</sub>S concentration monitoring and sampling results. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205, R 336.1224, R 336.1225)**
4. The permittee shall monitor and record at least every 15-minutes, in a satisfactory manner acceptable to the AQD District Supervisor, the hours of operation, volumetric flow rate, and the methane content of the gas burned in EUFLARE. This information shall be used to calculate the annual heat input. The permittee shall keep all records on file at the facility and make them available to the Department upon request. **(R 336.1205(1)(a), R 336.1224, R 336.1225)**
5. The permittee shall keep, in a satisfactory manner, continuous records of the combustion chamber temperature of EUDFTO. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702(a), R 336.1910, R 336.1911, R 336.1912)**
6. The permittee shall keep, in a satisfactory manner, manufacturer specifications for EUFLARE and EUDFTO. The permittee shall keep all records on file and make them available to the Department upon request. **(R 336.1205, R 336.1224, R 336.1225, R 336.1702, R 336.1910, R 336.1911, R 336.1912)**
7. The permittee shall calculate and keep, in a satisfactory manner, a record of the heat input on a daily, monthly and 12-month rolling time period basis as determined at the end of each calendar month for

EUFLARE. The permittee shall keep all records on file at the facility and make them available to the Department upon request. (R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702)

8. The permittee shall calculate and keep, in a satisfactory manner, a record of the CO emissions on a monthly and 12-month rolling time period basis as determined at the end of each calendar month for EUFLARE using the equation in Appendix A. The permittee shall keep all records on file at the facility and make them available to the Department upon request. (R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702)
9. The permittee shall keep, in a satisfactory manner, gas sampling records of the H<sub>2</sub>S concentration of the gases routed to EUFLARE. The permittee shall keep all records on file at the facility and make them available to the Department upon request. (R 336.1205(1)(a), R 336.1224, R 336.1225, R 336.1702(a), R 336.1910)

**VII. REPORTING**

1. Within 30 days after completion of the installation, construction, reconstruction, relocation, or modification authorized by this Permit to Install, the permittee or the authorized agent pursuant to Rule 204, shall notify the AQD District Supervisor, in writing, of the completion of the activity. Completion of the installation, construction, reconstruction, relocation, or modification is considered to occur not later than commencement of trial operation of FGRNGPLANT. (R 336.1201(7)(a))

**VIII. STACK/VENT RESTRICTION(S)**

The exhaust gases from the stacks listed in the table below shall be discharged unobstructed vertically upwards to the ambient air unless otherwise noted:

<b>Stack &amp; Vent ID</b>	<b>Maximum Exhaust Diameter / Dimensions (inches)</b>	<b>Minimum Height Above Ground (feet)</b>	<b>Underlying Applicable Requirements</b>
1. SVDFTO	66.12	50	R 336.225, 40 CFR 52.21(c) & (d)
2. SVARB.	16.2	24	R 336.225, 40 CFR 52.21(c) & (d)
3. SVFLARE	NA	45	R 336.225, 40 CFR 52.21(c) & (d)

**IX. OTHER REQUIREMENT(S)**

NA

## APPENDIX A Calculations for Criteria Pollutants

### CO Mass Emissions

The following calculation for CO emissions shall utilize the actual HHV of the gas, gas flow rate, and hours of operation.

$$\text{CO} = [(\text{HI}) \times (\text{EF})] = \text{pph} \times (\text{H}) = \text{pounds/month}$$
$$\text{HI} = (\text{HHV}) \times (\text{scfm}) \times (1/1.0\text{E}+06) \times 60 \text{ min/hr}$$

The following calculation for CO emissions shall utilize the actual methane percent of the gas, gas flow rate, and hours of operation.

$$\text{CO} = [(\text{FR}) \times (\text{EF})] = \text{pph} \times (\text{H}) = \text{pounds/month}$$
$$\text{FR} = (\text{CH}_4 \% / 100) \times (\text{scfm tail gas}) \times (1/1.0\text{E}+06) \times 60 \text{ min/hr}$$

### Where:

$\text{EF}_{\text{CO}} = 0.31 \text{ lb/MMBtu (flare)}$

$\text{EF}_{\text{CO}} = 750 \text{ lb/MMscf CH}_4 \text{ (Thermal Oxidizer and Recuperative Thermal Oxidizer tail gas)}$

$\text{EF}_{\text{CO}} = 0.08 \text{ lb/MMBtu (Amine Reboiler, Thermal Oxidizer and Recuperative assist gas)}$

scfm = standard cubic feet per minute gas flow

H = Actual Hours of Operation per month

HI = Heat Input (MMBtu/hr)

HHV = Average Hourly LFG Higher Heating Value (Btu/ft<sup>3</sup>)

CH<sub>4</sub> % = The percentage of methane in the tail gas

FR = Flow Rate (MMscf CH<sub>4</sub>/hr)