

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION**

October 26, 2018

PERMIT TO INSTALL
579-95F

ISSUED TO
Core Energy – Chester 10 CO₂ Injection Facility

LOCATED AT
Section 10, T29N, R02W
Chester Township, Michigan

IN THE COUNTY OF
Otsego

STATE REGISTRATION NUMBER
N5798

The Air Quality Division has approved this Permit to Install, pursuant to the delegation of authority from the Michigan Department of Environmental Quality. 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: October 2, 2018	
DATE PERMIT TO INSTALL APPROVED: October 26, 2018	SIGNATURE:
DATE PERMIT VOIDED:	SIGNATURE:
DATE PERMIT REVOKED:	SIGNATURE:

PERMIT TO INSTALL

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Common Abbreviations / Acronyms

Common Acronyms		Pollutant / Measurement Abbreviations	
AQD	Air Quality Division	acfm	Actual cubic feet per minute
BACT	Best Available Control Technology	BTU	British Thermal Unit
CAA	Clean Air Act	°C	Degrees Celsius
CAM	Compliance Assurance Monitoring	CO	Carbon Monoxide
CEM	Continuous Emission Monitoring	CO _{2e}	Carbon Dioxide Equivalent
CFR	Code of Federal Regulations	dscf	Dry standard cubic foot
COM	Continuous Opacity Monitoring	dscm	Dry standard cubic meter
Department/ department	Michigan Department of Environmental Quality	°F	Degrees Fahrenheit
EU	Emission Unit	gr	Grains
FG	Flexible Group	HAP	Hazardous Air Pollutant
GACS	Gallons of Applied Coating Solids	Hg	Mercury
GC	General Condition	hr	Hour
GHGs	Greenhouse Gases	HP	Horsepower
HVLP	High Volume Low Pressure*	H ₂ S	Hydrogen Sulfide
ID	Identification	kW	Kilowatt
IRSL	Initial Risk Screening Level	lb	Pound
ITSL	Initial Threshold Screening Level	m	Meter
LAER	Lowest Achievable Emission Rate	mg	Milligram
MACT	Maximum Achievable Control Technology	mm	Millimeter
MAERS	Michigan Air Emissions Reporting System	MM	Million
MAP	Malfunction Abatement Plan	MW	Megawatts
MDEQ	Michigan Department of Environmental Quality	NMOC	Non-methane Organic Compounds
MSDS	Material Safety Data Sheet	NO _x	Oxides of Nitrogen
NA	Not Applicable	ng	Nanogram
NAAQs	National Ambient Air Quality Standards	PM	Particulate Matter
NESHAP	National Emission Standard for Hazardous Air Pollutants	PM ₁₀	Particulate Matter equal to or less than 10 microns in diameter
NSPS	New Source Performance Standards	PM _{2.5}	Particulate Matter equal to or less than 2.5 microns in diameter
NSR	New Source Review	pph	Pounds per hour
PS	Performance Specification	ppm	Parts per million
PSD	Prevention of Significant Deterioration	ppmv	Parts per million by volume
PTE	Permanent Total Enclosure	ppmw	Parts per million by weight
PTI	Permit to Install	psia	Pounds per square inch absolute
RACT	Reasonable Available Control Technology	psig	Pounds per square inch gauge
ROP	Renewable Operating Permit	scf	Standard cubic feet
SC	Special Condition	sec	Seconds
SCR	Selective Catalytic Reduction	SO ₂	Sulfur Dioxide
SNCR	Selective Non-Catalytic Reduction	TAC	Toxic Air Contaminant
SRN	State Registration Number	Temp	Temperature
TEQ	Toxicity Equivalence Quotient	THC	Total Hydrocarbons
USEPA/EPA	United States Environmental Protection Agency	tpy	Tons per year
VE	Visible Emissions	µg	Microgram
		µm	Micrometer or Micron
		VOC	Volatile Organic Compounds
		yr	Year

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

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 Environmental Quality, 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 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 R 336.1219 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 R 336.1219 and shall be sent to the District Supervisor, Air Quality Division, Michigan Department of Environmental Quality. **(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 conditions 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 R 336.1301, 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 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 R 336.1370(2). **(R 336.1370)**

13. The Department may require the permittee to conduct acceptable performance tests, at the permittee's expense, in accordance with R 336.2001 and R 336.2003, under any of the conditions listed in R 336.2001. **(R 336.2001)**

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 (Process Equipment & Control Devices)	Installation Date / Modification Date	Flexible Group ID
EUENGINE1	CAT 3608: 2225 HP natural gas fired reciprocating engine with catalyst emission control	May 1996	FGENGINES
EUENGINE2	CAT 3608: 2225 HP natural gas fired reciprocating engine (uncontrolled)	May 1996	FGENGINES
EUENGINE3	CAT 3612: 3550 HP natural gas fired reciprocating engine with catalyst emission control	March 2017	FGENGINES
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 SUMMARY TABLE

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

Flexible Group ID	Flexible Group Description	Associated Emission Unit IDs
FGENGINES	Natural gas fired engines used to power compressors to facilitate CO ₂ pressures and transportation for secondary oil production.	EUENGINE1, EUENGINE2, EUENGINE3
FGFACILITY	All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.	

The following conditions apply to:
FGENGINES

DESCRIPTION: Natural gas fired engines used to power compressors to facilitate CO₂ pressures and transportation for secondary oil production.

Emission Units: EUENGINE1, EUENGINE2, EUENGINE3

POLLUTION CONTROL EQUIPMENT: EUENGINE1 & EUENGINE3: Catalyst Control; EUENGINE2: None

I. EMISSION LIMITS

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. NO _x	15.34 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE1	SC VI.6 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
2. NO _x	17.82 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE2	SC VI.6 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
3. NO _x	11.88 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE3	SC VI.6 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
4. NO _x	1.0 g/HP-hr OR 82 ppmvd	Hourly	EUENGINE3	SC V.1, SC VI.2	40 CFR 60.4233(e), Table 1 of 40 CFR Part 60 Subpart JJJJ
5. CO	11.42 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE1	SC VI.7 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
6. CO	60.75 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE2	SC VI.7 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
7. CO	17.13 tpy	12-month rolling time period as determined at the end of each calendar month.	EUENGINE3	SC VI.7 and Appendix A	R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d)
8. CO	2.0 g/HP-hr OR 270 ppmvd	Hourly	EUENGINE3	SC V.1, SC VI.2	40 CFR 60.4233(e), Table 1 of 40 CFR Part 60 Subpart JJJJ
9. VOC ^A	0.7 g/HP-hr OR 60 ppmvd	Hourly	EUENGINE3	SC VI.2	R 336.1702(b), 40 CFR 60.4233(e), Table 1 of 40 CFR Part 60 Subpart JJJJ

^A Per footnote "d" of Table 1 of 40 CFR Part 60 Subpart JJJJ, when calculating emissions of VOCs, emissions of formaldehyde should not be included.

II. MATERIAL LIMITS

NA

III. PROCESS/OPERATIONAL RESTRICTIONS

1. The permittee shall operate and maintain EUENGINE3 so that it achieves the emission standards as required in SC I.4, SC I.8, and SC I.9 over the entire life of the engine. **(40 CFR 60.4234)**
2. The permittee shall not operate EUENGINE1 or EUENGINE3 unless the corresponding catalyst add-on control device is installed, maintained, and operated in a satisfactory manner. Satisfactory operation includes performing the manufacturer's recommended maintenance on the control device and operating in conjunction with the PM / MAP specified in SC III.4. **(R 336.1205(1)(a) & (3), R 336.1702(a), R 336.1910, R 336.2803, R 336.2804, 40 CFR 52.21(c) & (d))**
3. The permittee shall, to the extent practicable, maintain and operate the engine in a manner consistent with good air pollution control practice for minimizing emissions. **(40 CFR 60.4243(a)(2)(iii))**
4. The permittee shall not operate FGENGINES 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 the plan fails to address or inadequately addresses an event that meets the characteristics of a malfunction at the time the plan is initially developed, the owner or operator shall revise the plan within 45 days after such an event occurs and submit the revised plan for approval to the AQD District Supervisor. Should the AQD determine the PM / MAP to be inadequate, the AQD District Supervisor may request modification of the plan to address those inadequacies. **(R 336.1205(1)(a) & (3), R 336.1702(a), R 336.1910, R 336.1911, R 336.1912, 40 CFR 60.4243(2)(a)(iii))**

IV. DESIGN/EQUIPMENT PARAMETERS

1. The permittee shall install, calibrate, maintain and operate in a satisfactory manner a device to monitor and record the natural gas usage for each engine included in FGENGINES on a continuous basis. **(R 336.1205, 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. Upon request by the AQD District Supervisor, the permittee shall verify NO_x and CO emission factors used to calculate emissions from EUENGINE1 and EUENGINE2, by testing at owner's expense, in accordance with Department requirements. If a test has been conducted, any resulting increase in an emission factor shall be implemented to calculate NO_x and CO. **(R 336.1205(1)(a) & (3), R 336.2001, R 336.2003, R 336.2004, 40 CFR 52.21(c) & (d))**

2. Unless EUENGINE3 is a certified engine according to procedures specified in 40 CFR Part 60 Subpart JJJJ, and is maintained and operated as such, the permittee shall conduct performance testing every 8,760 hours of operation or three years from the previous performance test, whichever comes first, for EUENGINE3 to verify compliance with the emission limits in SC I.4, SC I.8, and SC I.9. No less than 30 days prior to testing, the permittee shall submit a complete test plan to the AQD Technical Programs Unit and District Office. The AQD must approve the final plan prior to testing. *Note that an initial or subsequent performance test(s) may be required if EUENGINE3 is replaced as described in SC VII.1.* **(R 336.1205(1)(a) & (3), R 336.2001, 40 CFR 52.21(c) & (d), 40 CFR 60.4243(a)(2)(iii) & (b)(2)(ii), 40 CFR 60.4244, 40 CFR 60.4245(d), 40 CFR Part 60 Subpart JJJJ)**

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 and make them available by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition. **(R 336.1205(1)(a) & (3))**
2. The permittee shall monitor and record, in a satisfactory manner, the natural gas usage for each engine included in FGENGINES on a continuous basis. **(R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d))**
3. The permittee shall keep, in a satisfactory manner, records of the cubic feet of natural gas fired in each engine included in FGENGINES on a monthly basis. **(R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d))**
4. The permittee shall keep records of the following information for EUENGINE3:
 - a. All notifications submitted to comply with this 40 CFR 60 Subpart JJJJ and all documentation supporting any notification.
 - b. Maintenance conducted on the engine.
 - c. Documentation that the engine meets the emission standards in SC I.4, SC I.8, and SC I.9. **(40 CFR 60.4243, 40 CFR 60.4245)**
5. The permittee shall keep, in a satisfactory manner, monthly and 12-month rolling time period NO_x emission calculation records for each engine included in FGENGINES, as required by SC I.1, SC I.2, and SC I.3 and Appendix A. The permittee shall keep all records on file at a location approved by the AQD District Supervisor and make them available to the Department upon request. **(R 336.1205(1)(a) & (3), 40 CFR 52.21(c) & (d))**
6. The permittee shall keep, in a satisfactory manner, monthly and 12-month rolling time period CO emission calculation records for each engine included in FGENGINES, as required by SC I.5, SC I.6, SC I.7 and Appendix A. The permittee shall keep all records on file at a location approved by the AQD District Supervisor and make them available to the Department upon request. **(R 336.1205(1)(a) & (3))**
7. The permittee shall maintain a log of all maintenance activities conducted according to the PM / MAP (pursuant to SC III.4). The permittee shall keep this log on file at a location approved by the AQD District Supervisor and make it available to the Department upon request. **(R 336.1205(1)(a) & (3), R 336.1702(a), R 336.1911, 40 CFR 52.21(c) & (d))**

VII. REPORTING

1. Except as provided in R 336.1285, if any engine included in FGENGINES is replaced with an equivalent-emitting or lower-emitting engine, the permittee shall notify the AQD District Supervisor of such change-out and submit acceptable emissions data to show that the alternate engine is equivalent-emitting or lower-emitting. The data shall be submitted within 30-days of the engine change out. **(R 336.1205(1)(a) & (3), R 336.1702(a), R 336.1911, 40 CFR 52.21(c) & (d))**
2. The permittee may need to submit an initial notification as required in §60.7(a)(1) for EUENGINE3 if EUENGINE3 is replaced as described in SC VII.1. The notification shall include the following information:
 - a. Name and address of the owner or operator;

- b. The address of the affected source;
 - c. Engine information including make, model, engine family, serial number, model year, maximum engine power, and engine displacement;
 - d. Emission control equipment; and
 - e. Fuel used.
- (40 CFR 60.4245(c))**

3. The permittee shall submit a copy of each performance test as conducted in §60.4244 for EUENGINE3 within 60 days after the test has been completed. **(40 CFR 60.4243, R 336.2001)**
4. If testing is required for EUENGINE1 and/or EUENGINE2, then no less than 60 days prior to testing EUENGINE1 and EUENGINE2, the permittee shall submit a complete test plan to the AQD. The AQD must approve the final plan prior to testing. Verification of emission rates includes the submittal of a complete report of the test results to the AQD within 60 days following the last date of the test. **(R 336.2001)**

VIII. STACK/VENT RESTRICTIONS

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

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)	Underlying Applicable Requirements
1. SVENGINE1	26	51	R 336.1225, 40 CFR 52.21(c) & (d)
2. SVENGINE2	26	53	R 336.1225, 40 CFR 52.21(c) & (d)
3. SVENGINE3	26	50	R 336.1225, 40 CFR 52.21(c) & (d)

^B SC IX.3 contains the date of compliance for the stack height.

IX. OTHER REQUIREMENTS

1. The permittee shall comply with all applicable provisions of the National Standards for Hazardous Air Pollutants, as specified in 40 CFR Part 63, Subpart A and Subpart ZZZZ for Stationary Reciprocating Internal Combustion Engines. **(40 CFR 63.6595, 40 CFR Part 63 Subparts A & ZZZZ)**
2. The permittee shall comply with all applicable provisions of the federal Standards of Performance for New Stationary Sources as specified in 40 CFR Part 60 Subpart A and Subpart JJJJ, as they apply to FGEngines. **(40 CFR Part 60 Subparts A & JJJJ)**
3. The permittee shall comply with the minimum height above ground and diameter for SVENGINE2 by January 31, 2019. **(40 CFR 52.21(c) & (d))**

Footnotes:

¹This condition is state only enforceable and was established pursuant to Rule 201(1)(b).

**The following conditions apply Source-Wide to:
 FGFACILITY**

DESCRIPTION: All process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment.

POLLUTION CONTROL EQUIPMENT: EUENGINE1 & EUENGINE3: Catalyst Control; Everything else: None

I. EMISSION LIMITS

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Testing / Monitoring Method	Underlying Applicable Requirements
1. CO	89 tpy ^a	12-month rolling time period as determined at the end of each calendar month.	FGFACILITY	SC VI.2 and Appendix A ^a	R 336.1205(1)(a) & (3)
2. Each Individual HAP	Less than 9 tpy	12-month rolling time period as determined at the end of each calendar month.	FGFACILITY	SC VI.3 and Appendix A	R 336.1205(3)
3. Aggregate HAPs	Less than 22.5 tpy	12-month rolling time period as determined at the end of each calendar month.	FGFACILITY	SC VI.3 and Appendix A	R 336.1205(3)

^a The potential CO emissions are limited by requiring the use of catalyst control for EUENGINE1 and EUENGINE3. In addition to SC VI.2 under FGFACILITY, permit conditions related to limiting CO emissions can be found under FGENGINES SC, III.2, III.4, V.1, V.2, VI.3, VI.6, and VI.7

II. MATERIAL LIMITS

- The permittee shall not burn any sour natural gas in FGFACILITY. Sour gas is defined as any gas containing more than 1 grain of hydrogen sulfide or more than 10 grains of total sulfur per 100 standard cubic feet. **(R 336.1205(3), R 336.1224, R 336.1225, 40 CFR 52.21(c) & (d))**

III. PROCESS/OPERATIONAL RESTRICTIONS

NA

IV. DESIGN/EQUIPMENT PARAMETERS

NA

V. TESTING/SAMPLING

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

- Verification of H₂S and/or sulfur content of the natural gas burned in FGFACILITY may be required upon request by the AQD District Supervisor. This condition is necessary to ensure compliance with SC II.1. **(R 336.1205(3))**

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 and make them available by the last day of the calendar month, for the previous calendar month, unless otherwise specified in any monitoring/recordkeeping special condition. **(R 336.1205(1)(a) & (3))**
2. The permittee shall keep, in a satisfactory manner, monthly and 12-month rolling time period Carbon Monoxide emission calculation records for FGFACILITY, as required by SC I.1 and Appendix A. The permittee shall keep all records on file at a location approved by the AQD District Supervisor and make them available to the Department upon request. **(R 336.1205(1)(a) & (3))**
3. The permittee shall keep, in a satisfactory manner, individual and aggregate HAP emission calculations determining the annual emission rate of each in tons per 12-month rolling time period as determined at the end of each calendar month, as required by SC I.2, I.3 and Appendix A. For the first month following permit issuance, the calculations shall include the summation of emissions from the 11-month period immediately preceding the issuance date. For each month thereafter, calculations shall include the summation of emissions for the appropriate number of months prior to permit issuance plus the months following permit issuance for a total of 12 consecutive months. The permittee shall keep all records on file at a location approved by the AQD District Supervisor and make them available to the Department upon request. **(R 336.1205(3))**

VII. REPORTING

NA

VIII. STACK/VENT RESTRICTIONS

NA

IX. OTHER REQUIREMENTS

NA

APPENDIX A
Procedures for Calculating Carbon Monoxide, NO_x, and VOC Emissions

The permittee shall demonstrate compliance with emission limits by keeping track of all fuel usage for all equipment using fuel at this facility and multiplying that fuel usage by an equipment-specific emission factor. The emission factors are typically expressed as the mass of pollutant per unit of fuel.

Each engine included in FGEngines:

The permittee shall use emission factors from vendor data or from source specific testing (stack testing), as available for each engine included in FGEngines. This also applies to engine(s) from engine change-out(s). If emission factors from other sources are used, the permittee shall obtain the approval of the AQD District Supervisor before using the emission factors to calculate emissions.

Fuel burning equipment at the facility:

The permittee shall use emission factors contained in the most recent AP-42 (Compilation of Air Pollutant Emission Factors) or the most recent FIRE (Factor Information Retrieval) database if vendor or stack testing data is not available. If emission factors from other sources are used, the permittee shall obtain the approval of the AQD District Supervisor before using the emission factors to calculate emissions.

The permittee shall document the source of each emission factor used in the calculations.

**Preventative Maintenance / Malfunction Abatement Plan (PM / MAP)
Content Checklist for Engines Required to Submit a PM / MAP**

PM / MAP Content		Location	
		Page	Section / Table
1	Contact Person		
Engines			
2	Engine Identification: Include the engine make / model and type of engine (i.e. rich or lean burn). Identify engines with add on control and AFRC. If add on control is present, identify type of control.		
3	Engine Operating Variables To Be Monitored. Include a copy of the normal engine maintenance log.		
4	Corrective procedures or operational changes that will be taken in the event of a malfunction.		
5	Major parts replacement inventory for engines.		
Add-On Controls			
6	Catalytic Converter operating variables to be monitored. Include the method and frequency of monitoring these variables; provide the normal operating range of these variables.		
7	Corrective actions to be taken in event of malfunction of the catalytic converter.		
8	AFRC O ₂ Sensor replacement schedule or operating variables to be monitored		
9	Corrective actions to be taken in event of malfunction of the AFRC		
10	Emission testing utilizing portable analyzer		
11	Scheduled maintenance of control equipment		
12	Major parts replacement inventory for add on control.		
13	Identify supervisory personnel responsible for overseeing inspection, maintenance and repair of add on controls.		
14	Recordkeeping and retention of records.		
15	Updates of PM / MAP as necessary.		

Guidance Document For Preventative Maintenance / Malfunction Abatement Plan (PM / MAP) Checklist

1. Contact Person: Include the name, title, telephone number (extension if applicable) and e-mail address for the person that may be contacted with questions regarding this Preventative Maintenance / Malfunction Abatement Plan (PM / MAP) with the transmittal letter accompanying the PM / MAP rather than within the body of the PM / MAP.

Engines

2. Engine Identification: For each engine at the facility, list the engine manufacturer, model and type of engine (rich burn or lean burn) and the type of add-on control equipment used (oxidation catalyst, three-way catalyst), if any. Also, identify each engine with an air to fuel ratio controller (AFRC).
3. Engine operating variables to be monitored: Provide the normal engine maintenance log.
4. Corrective procedures in the event of an engine malfunction: Provide a brief summary of the procedures that will take place in the event of an engine malfunction. A malfunction is defined in Rule 113(d) of the State of Michigan Air Pollution Control Rules which states, in part, 'any sudden, infrequent and not reasonable preventable failure of the equipment to operate in a normal or usual manner. Failures caused in part by poor maintenance or careless operations are not malfunctions.'
5. Major parts replacement inventory: Provide a list of major replacement parts that shall be maintained in inventory for quick replacement. If no replacement parts are kept on site provide a statement that no parts shall be kept.

Add-On Controls

6. Catalytic converter operating variables to be monitored: Provide the following:
 - a. A list of variables that will be monitored to measure catalytic converter performance including the catalytic converter inlet and outlet temperature, pressure differential across the catalytic converter, and any other relevant catalytic converter variables that are monitored.
 - b. The normal operating range that has been developed for each variable; acceptable ranges shall include documentation as to how the range was determined (i.e. manufacturer's recommendations or determined in the field with documentation or testing).
 - c. The method of monitoring the variables, and
 - d. The frequency of monitoring the variables.
7. Corrective procedures in the event of a malfunction of the catalytic converter: Malfunction is defined in number four above. Provide information on what steps shall be taken when a variable is out of range. This could include monitoring of emissions or cleaning and/or replacement of the catalytic converter.
8. AFRC O₂ sensor replacement schedule or operating variables to be monitored: Chose either (a) or (b).
 - a. O₂ sensor replacement interval or sensor life detector
 - b. If monitoring, provide:
 - i. A list of variables monitored to measure AFRC performance (i.e. millivolt output, O₂, and/or any other relevant AFRC variables that are monitored).
 - ii. The normal operating range that has been developed for each variable; acceptable ranges shall include documentation as to how the range was determined (i.e. manufacturer's recommendations or determined in the field with documentation or testing).
 - iii. The method of monitoring the variables.
 - iv. The frequency of monitoring the variables.
9. Corrective procedures in the event of a malfunction of the AFRC: Malfunction is defined in number 4 above. If choosing monitoring in paragraph 8.b above, provide information on what steps shall be taken when a variable is out of range.

10. Emission checks: Describe when a portable analyzer would be used and how it will be used.
 - a. Calibration of the analyzer will be conducted as required by manufacturer's specifications. Records shall be kept on file and made available to the Air Quality Division upon request.
 - b. Checks for both CO and NO_x.
 - c. Checks to be used to:
 - i. Check performance if monitored parameter is out of normal range, e.g. low inlet temperature (an engine specific minimum inlet temperature could then be established).
 - ii. When vendor cleaned catalyst is installed. This check will normally occur in the 12-18 month window as specified for routine cleaning.
 - d. Companies may choose to perform any of following the three valid methods:
 - i. Inlet and outlet checks and estimate destruction efficiency.
 - ii. Outlet testing and check for g/hp-hr compared to levels used for permitting.
 - iii. Outlet testing and use the uncontrolled vendor data to establish destruction efficiency.
11. Scheduled maintenance: Describe the scheduled cleaning and/or replacement of the catalytic converter.
 - a. Frequency of catalytic converter inspection and field catalyst media cleaning (vacuum catalyst face): Follow vendor recommendations, typically 12-18 months unless parameters (pressure drop, temperature deviations, etc) indicate otherwise.
 - b. Catalyst media removal and wash in chemical solution by manufacturer (if catalyst media does not respond to field cleaning). A replacement catalyst media will be used during the cleaning process.
 - c. Catalytic converter gasket replacement: Follow vendor recommendations, typically 12-18 months when catalyst is serviced.
 - d. Replace catalyst media if not functioning properly after vendor cleaning, or in lieu of vendor cleaning.
12. Major parts replacement inventory: Provide a list of major replacement parts that shall be maintained in inventory for quick replacement. If no replacement parts are kept on site provide a statement that no parts shall be kept.
13. Supervisory personnel responsible for maintenance of the control equipment: Include the contact information. This person or position can be a company employee or contractor and may or may not be the same person / position listed in number one above.
14. Retention of records: Records shall be kept on file and retained as described in the permit.
15. Updates of PM / MAP: Any updates to the plan shall be submitted to the AQD District Supervisor for written approval as required in the permit (the Department of Environmental Quality recommends the PM / MAP be reviewed annually).