DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

N579869898

FACILITY: Core Energy LLC - Chester 10 CO2 Recovery		**SRN / ID:** N5798
LOCATION: SW 1/4 SW 1/4 SEC 10 T29N R2W, CHESTER TWP		**DISTRICT:** Cadillac
CITY: CHESTER TWP		**COUNTY:** OTSEGO
CONTACT: Kathy Dungey , Operations and Engineering Assistant		**ACTIVITY DATE:** 10/12/2023
STAFF: Sharon LeBlanc	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: 2024 FCE site inspection and records review. sgl		
RESOLVED COMPLAINTS:		

On October 12, 2023, AQD District Staff mobilized to the Core Energy LLC (AKA Core) Chester 10 CO2 Injection Facility (N5798). The Facility is located in the SW/4, SW/4, Section 10, T29N, R2W, Chester Township, Otsego County, Michigan to conduct an unannounced, scheduled compliance inspection of the facility. The referenced facility presently operates under Permit to Install (PTI) No. 579-95F.

A records request was made electronically on September 8, 2023. Records were received electronically on October 4, 2023, and have been incorporated into this document.

The previous site inspection for the Facility were conducted on November 10, 2020. The Facility was reported to be shut down completely due low oil prices that had also shut down the CO2 source for the Facility (DCP Antrim, N2940). No compliance issues were documented.

FACILITY

The referenced facility is a gated, unmanned CO2 Injection Facility operated by Core. CO2 is transmitted to the facility through flow lines. The gas is compressed by NG-fired, internal combustion engine-driven compressors. Saturated water vapor is removed by glycol dehydration and the residue CO2 is pushed to nearby production fields for CO2 injection for enhanced oil recovery.

The Facility is located at the NE corner of the intersection of Old State Road (AKA F-38) and Turtle Lake Road, Johannesburg, Otsego County, Michigan. The entrance is off Old State Road. Adjacent properties as well as others in the immediate vicinity of Chester 10 include:

- Former DTE Michigan Holdings, Inc. now operated by DCP Antrim (North),
- DCP Antrim adjacent to the east (N2940),
- VCP Michigan SCV CPF located across Old State Road, and apx. ¼-mile east, just before the entrance to TransCanada South Chester Facility (N6446) and
- The TransCanada (formerly ANR) South Chester Pipeline Facility to the south across Old State and apx. ¼-mile east (B7219)

The permitted equipment onsite consists of a total of three Reciprocating Internal Combustion Engines (RICE) consisting of:

- one (1) uncontrolled 2,225 HP (1,000 rpm) Caterpillar 3608 lean burn compressor engine, EUENGINE2,

- one (1) controlled 2,225 HP (1,000 rpm) Caterpillar 3608 lean burn compressor engine, EUENGINE1, and
- one (1) controlled 3,550 HP (1,000 rpm) Caterpillar 3612 LE lean burn compressor engine, EUENGINE3.

Two dehydration systems are of record for the location (north and south units) remove moisture from the CO2 to be injected for enhanced oil recovery and are exempt from permitting.. Emissions would be limited to those of the reboiler. No emissions for this EU are reported as part of the annual emissions reporting.

NG burned onsite as fuel is of record as being purchased from DTE, and meets the sweet gas requirements.

A review of readily accessible aerials indicates that the initial Facility was constructed after May 1993, with the two initial compressor engines and dehy. The third engine and additional structures onsite were visible on aerials dated April 2020.

Weather conditions at the time of the October 12, 2023, site visit included partly cloudy skies, and temperature of approximately 48 degrees Fahrenheit.

REGULATORY

Permitting -The referenced facility operates under PTI No. 579-95F, which was issued to Core Energy on October 26, 2018. The PTI was issued as an opt-out permit allowing for replacement of the compressor engine with an equivalent or lower-emitting engine with notification to the AQD District Supervisor (SC 2.8).

Permits associated with the Facility include:

PTI No.	Issued	Voided	Modification
579-95	4/1/1996	1/8/1997	Unk
579-95A	1/2/1997	7/31/2007	Unk
579-95B	7/31/1997	4/9/2015	Unk
579-95C	4/9/2015	11/28/2016	Addition of 3rd compressor, requested limits <90% of Title V thresholds
579-95D	11/28/2016	NA	Stack height changes -note engine 3 not installed yet
579-95E	4/10/2018	10/26/2028	Increase in Nox limits based on stack test results
579-95F	10/26/2018	NA	Update EFs

Eval forms prepared by AQD Engineers at the time of permitting for indicated that EUENGINE3 as subject to 40 CFR Part 60, subpart JJJJ Spark Ignition internal combustion engines as well as 40 CFR Part 63 Subpart ZZZZ for all RICE.

EQUIPMENT

Review of District Files indicates that the following compressor engines are of record for the site:

ENGINE ID	ENGINE TYPE	INSTALLATION DATE	REMOVAL DATE	COMMENT
EUENGINE1 Unit 1034 Sn 4WF00034	CAT 3608 Lean Burn 2225 HP with CO Oxidation Catalyst and AFRC	May 1996	NA	No record of engine swing or swap
EUENGINE2 Unit 1033 Sn BEN00401	CAT3608 Lean Burn 2370 HP	May 1996	NA	Overhaul of record for 9/21/2017
EUENGINE3 Unit 1738-S Sn BKE00794	CAT 3612 Lean Burn 3550 HP with CO Oxidation Catalyst and AFRC	March 9, 2017	NA	Is not a certified engine per 40 CFR Part 60 Subpart JJJJ, therefore testing required for NOX, CO and VOC.

COMPLIANCE

At the time of the October 12, 2023, site visit, no visible emissions were noted to be coming from onsite stacks. Only heat shimmers were noted from exhaust stacks onsite.

MAERS- Annual reporting of emissions is conducted by the Facility, the most recent report for the calendar year 2022, was submitted on February 27, 2023. The submittal was found to be complete and timely.

FGENGINES –

FGENGINES consists of the three permitted NG-fired RICE onsite. No material limits exist in PTI 579-95F. Permit conditions for the engines include as follows:

Emission Limits –

NOx emission limits include 12-month rolling limits (as determined at the end of each calendar month) for each of the three engines on site. In addition, EUENGINE3 includes hourly NOx restrictions. NOx emissions and limits are summarized below:

12-month period ending	NOx Emissions (TPY) for EUENGINE1	NOx Emissions (TPY) for EUENGINE2	NOx Emissions (TPY) for EUENGINE3
December 31, 2022	11.0	7.5	6.3
2023 to date*	8.8	8.1	5.5
LIMIT	15.34 (SC I.1)	17.82 (SC I.2)	11.88 (SC I.3)

***August 31, 2023**

12-Month rolling CO emissions associated with the engines of FGENGINES are summarized below:

12-month period ending	CO Emissions (TPY) for EUENGINE1	CO Emissions (TPY) for EUENGINE2	CO Emissions (TPY) for EUENGINE3
December 31, 2022	7.8	41.3	4.8
2023 to date	6.3	44.3	4.2
LIMIT	11.42 (SC I.5)	60.75 (SC I.6)	17.13 (SC I.7)

***August 31, 2023**

In addition to the above referenced emission limits, EUENGINE3 also has hourly NOX, CO and VOC limits/emission standards. Compliance with these limits are

demonstrated by stack testing. These limits and hourly emissions reported are summarized below:

Date	NOx Emission Rate	CO Emission Rate	VOC Emission Rate
May 27, 2020	0.25 g/bhp-hr	0.41 g/bhp-hr	0.48 g/bhp-hr
Feb. 16, 2022	0.20 g/bhp-hr	0.52 g/bhp-hr	0.56 g/bhp-hr
Feb 7, 2023	0.25 g/bhp-hr	0.50 g/bhp-hr	0.53 g/bhp-hr
LIMIT	1.0 g/HP-hr or 82 ppmvd (SC I.4)	2.0 g/HP-hr or 270 ppmvd (SC I.8)	0.79 g/HP-hr or 60 ppmvd (SC I.9)

Note that SC II.1 requires that EUENGINE3 be operated and maintained such that it achieves the referenced emission standards over the life of the engine.

Process/Operational Restrictions -

The permittee is required to the extent practicable, maintain and operate all engines in a manner consistent with good air pollution control practices for minimizing emissions (SC III.3) AQD District Staff noted at the time of the inspection that the compressor engines appeared to be in good condition, no signs of oil leaks, smoke, etc. and maintenance records indicate that maintenance is conducted by contractors on a regularly scheduled maintenance program, as well as when needed. Records provided were sufficient and consisted not only of a maintenance log, but the contractor log sheet providing details of activities conducted.

In addition, the Permittee shall not operate FGENGINES unless a Preventative Maintenance (PM)/Malfunction Abatement Plan (MAP) is prepared, submitted to the AQD District Supervisor, approved by the AQD District Supervisor and the approved plan implemented and maintained by the Facility. The Plan is required to incorporate procedures recommended by the equipment manufacturer as well incorporate standard industry practices. (SC III.4) The most recent PM/MAP for the Facility of record is dated October 15, 2020, and is of record as having been approved by AQD Staff on November 12, 2020.

With respect to EUENGINE1 and EUENGINE3, both EUs are not allowed to operate unless their corresponding catalyst add-on control devices, have been installed, maintained and are operating in a satisfactory manner. (SC III.2) The installed catalysts were verified at the time of the site visit. The Facility reports that the EUENGINE1 and EUENGINE3 did not operate without a catalyst for 2022 or 2023

todate. Information provided indicate that the catalysts operating parameters are collected in conjunction with monthly maintenance visits to the site by Natural Gas Compression Systems. Catalyst cleaning and testing activities for the 2022 and 2023 calendar years were conducted and summarized below. CO destruction efficiency was reported for CO only, and for all events was >90%:

Date	Engine ID	Activity
April 6, 2022	EUENGINE1	Catalyst testing
April 11, 2023	EUENGINE1	Catalyst maintenance and emission testing
Dec. 29, 2021	EUENGINE3	Catalyst maintenance and emission testing
March 28, 2023	EUENGINE3	Catalyst testing

Engine preventative maintenance activities are scheduled to be completed every 1800 hours of operation. Equipment maintenance logs provided for all three engines were sufficient in detail to show compliance with the PM/MAP approved for the Facility.

Design/Equipment Parameters -

SC IV.1 requires the permittee to install, calibrate, maintain and operate in a satisfactory manner a device to continuously monitor and record NG usage for each engine in FGENGINES. The required devices have been installed and verified onsite. NG usage records are summarized later in this document.

Testing/Sampling -

SC V.1 required the permittee upon request by the AQD District Supervisor, shall verify NO_x and CO emission factors used to calculate emissions from EUENGINE1 and EUENGINE2, by testing at owner's expense. No such request is of record for the Facility and the requirement not applicable at this time. In addition, SC VII.3 which include submittal requirements for testing of EUENGINE1 and EUENGINE2 are also not applicable at this time.

EUENGINE3 if not a certified engine (and maintained and operated as such) is required to conduct performance testing every 8,760 hours of operation or three years from the previous performance test (whichever comes first) to show compliance with hourly limits for NOx, CO and VOCs (SC V.2). Test protocols are to be submitted no less than 30 days prior to testing (SC V.2), and stack test results to

be submitted no later than 60 days after test completion (SC. VII.3). As previously noted, the most recent testing was conducted on February 16, 2022. Test protocols for the referenced test date, and the test report were received in compliance with permit conditions. Test results have been summarized earlier in this document.

Test Date	Test Protocol Date	Test Report Date
5/27/2020	4/21/2020	6/5/2020
2/16/2022	1/4/2022	3/9/2023
2/7/2023	12/20/2022	2/13/2023
Requirement	30-day prior (SC V.2)	60-day after testing (SC VII.3)

Monitoring/Recordkeeping --

Under PTI 579-95F the permittee is required to monitor and record the natural gas usage on a continuous basis (SC VI.2) with totals for each engine recorded on a monthly basis (SC VI.3). Based on the information provided, it appears that NG usage is allocated based on the number of hours of operation for each fuel burning piece of equipment onsite. The totals are summarized below:

Period	EUENGINE1 NG Usage high (Mcf)	EUENGINE2 NG Usage high (Mcf)	EUENGINE3 NG Usage high (Mcf)
1/1/2022 – 8/31/2023	231.7 – 9959.7*	3192.3 – 10142.1**	4299.6 – 13339.6

***EUENGINE1 reported no operation for December 2022 and January 2023.**

****EUENGINE2 reported no operation for August 31, 2022.**

Per 40 CFR 60 Subpart JJJJ (SC VI.4) the permit is required to keep documentation supporting all notifications required under the subpart, as well as the maintenance records and documentation that the engine meets the emission standards. Records provided by the Facility indicated compliance with the referenced requirements.

Monthly and 12-month rolling mission calculations for NOx (SC VI.5) and CO (SC VI.6) is required to be completed for each engine within FGENGINES. 12-Month rolling emissions were reported previously in this document, and were in compliance with both monitoring/recordkeeping and emission limits within the permit.

Under SC VI.7, the permittee is required to maintain a log of all maintenance activities conducted according to the PM / MAP (pursuant to SC III.4). The records provided as part of the records request appeared to be complete and show compliance with the permit requirement.

Reporting -

SC VII.1 requires the permittee to notify the AQD District Supervisor if any engine included in FGENGINES is replaced with an equivalent-emitting or lower-emitting engine and submit acceptable emissions data to show that the alternate engine is equivalent-emitting or lower-emitting. The submittal is required within 30-days of the engine change out. The only exception would be for engines exempt under Rule 285. In addition to the above notification requirement, if EUENGINE3 is replaced submittal may also be required of an Initial notification as required in §60.7(a)(1) for the replacement engine (SC VII.2). As no engine replacement activities are of record, the above referenced requirements are not applicable at this time.

Stack/Vent Dimensions-

Observations made as part of the October 12, 2023, site visit indicated the stacks for the three permitted engines meet the below referenced stack dimensions:

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)
SVENGINE1	26	51
SVENGINE2	26	53
SVENGINE3	26	50

The exhaust gases from the stacks listed above for FGENGINES are discharged unobstructed vertically upwards to the ambient air.

OTHER REQUIREMENTS -

Other requirements under FGFACILITY include two high level citations. One specifying compliance with all applicable provisions of 40 CFR Part 63, Subpart A and Subpart ZZZZ (RICE MACT) (SC IX.1) and 40 CFR Part 60 Subpart A and Subpart JJJJ (SC IX.2).

FGFACILITY

This FG includes all process equipment source-wide including equipment covered by other permits, grand-fathered equipment and exempt equipment. The only pollution control devices include the catalyst controls for EUENGINE1 and EUENGINE3.

Emission Limits-

Source wide emission limits associated with PTI 579-95F, include 12-month rolling totals of 89 tons CO/12-month rolling time period (SC I.1), not to exceed individual HAP of 9 TPY (SC I.2) and aggregate HAP of 22.5 TPY (SC I.3). Emission and emission limits are summarized below:

12-month period ending	FGFACILITY CO emissions (TPY)	FGFACILITY Aggregate HAP emissions (TPY)
December 31, 2022	54	15
2023 to date*	55	14
LIMIT	89 TPY (SC I.1)	<22.5 TPY (SC I.3)

***August 31, 2023**

Material Limits -

SC II.1 restricts the permittee from burning sour 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. Based on the documentation indicating that the NG used for fuel is purchased, not processed onsite, verification testing as required under SC V.1 would not be applicable at this time.

Monitoring/Recordkeeping –

Monthly and 12-month rolling emission calculations for CO (SC VI.2) and aggregate HAP (SC VI.3) were provided by the Facility, and are summarized above. Information

received as part of the records review were sufficient to indicate compliance with the permit conditions.

SUMMARY

On October 12, 2023, AQD District Staff mobilized to the Core Energy LLC (AKA Core) Chester 10 CO2 Injection Facility (N5798). The Facility is located in the SW/4, SW/4, Section 10, T29N, R2W, Chester Township, Otsego County, Michigan to conduct an unannounced, scheduled compliance inspection of the facility. The referenced facility presently operates under Permit to Install (PTI) No. 579-95F.

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NG burned onsite as fuel is of record as being purchased from DTE, and meets the sweet gas requirements.

Based on observations made, and records reviewed the Facility appears to be in general compliance with the permit and permit conditions.

NAME Mason G LeBlanc DATE 1-29-24 SUPERVISOR Shane Nixon