

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION

FCE Summary Report

Facility : LINN Operating, Inc. - Dover 36 CPF	SRN : N6135
Location : SW4 NW4 T31N R2W SEC 36	District : Gaylord
	County : OTSEGO
City : DOVER TWP State: MI Zip Code : 49735	Compliance Status : Compliance
Source Class : SM OPT OUT	Staff : Sharon LeBlanc
FCE Begin Date : 1/24/2017	FCE Completion Date : 1/24/2018
Comments : Scheduled site inspection for synthetic minor facility operated by Linn Energy LLC.	

List of Partial Compliance Evaluations :

Activity Date	Activity Type	Compliance Status	Comments
01/24/2018	Scheduled Inspection	Compliance	Scheduled site inspection of synthetic minor site located NE of Gaylord, Michigan. Facility was part of larger facility operated by Mercury Exploration Co. But has since been divided into two facilities, the other portion of the site is presently operated by Core Energy under SRN P0446.
10/16/2017	Malfunction Abatement Plan	Compliance	Malfunction Abatement Plan (MAP) was submitted by Linn Energy for engine replacement activities reported to be conducted on September 15, 2017. Submittal package included emission summary for the replacement of the existing Caterpillar 399TA with a lower horsepower Caterpillar 399NA. The new engine is also reported to be a remote engine, with the same ZZZZ requirements as the previous engine. The Malfunction Abatement Plan (MAP) submitted met the requirements of the PM/MAP content checklist. The approval letter will be issued the week of October 16, 2017.
02/02/2017	MAERS	Compliance	2016 MAERS, See MAERS for any review comments

Name: Sharon LeBlanc Date: 1/29/2018 Supervisor: SN

**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection**

N613543112

FACILITY: LINN Operating, Inc. - Dover 36 CPF		SRN / ID: N6135
LOCATION: SW4 NW4 T31N R2W SEC 36, DOVER TWP		DISTRICT: Gaylord
CITY: DOVER TWP		COUNTY: OTSEGO
CONTACT: Diane Lundin , Senior EHS Representative		ACTIVITY DATE: 01/24/2018
STAFF: Sharon LeBlanc	COMPLIANCE STATUS: Compliance	SOURCE CLASS: SM OPT OUT
SUBJECT: Scheduled site inspection of synthetic minor site located NE of Gaylord, Michigan. Facility was part of larger facility operated by Mercury Exploration Co. But has since been divided into two facilities, the other portion of the site is presently operated by Core Energy under SRN P0446.		
RESOLVED COMPLAINTS:		

On January 24, 2018, AQD District Staff mobilized to the Linn Operating LLC – Dover 36 CPF (N6135), located in SW ¼, NW ¼, Section 36, T31N – R 2E, Dover Township, Otsego County, Michigan to conduct a self-initiated compliance inspection of the facility. The referenced facility presently operates under Permit to Install No. 693-96. A records request was made electronically on December 20, 2017, and the requested information was received on January 8, 2018.

The most recent site inspection activities were conducted on July 11, 2014. No compliance issues were noted in association with the visit's compliance evaluation.

At the time of the site inspection, Linn Operator Mark Koronka was onsite, and answered general questions regarding site operations.

FACILITY

The referenced facility is a gated, unmanned CPF station operated by the Linn Operating LLC (AKA Linn). The station is reported to service Antrim Formation wells in the area (27 wells was reported by the Linn operator). At the time of permitting, the location consisted of both Oil and Gas production activities. Distinct petroleum odors were noted upon entering the Facility.

In correspondence dated January 11, 1999, MDEQ AQD was notified that oil production emission units and activities had been sold, and that Mercury Exploration, Inc. retained only the gas production equipment. This includes separation of gas and brine from the incoming gas stream and compression of the gas in the lines. The referenced facility has historically been operated by:

Previous Owner	Date of Notification	New Owner
Mercury Exploration Company	Feb. 2004	Quicksilver Resources Company
Quicksilver Resources, Inc.*	Feb. 18, 2008	High Mount Midwest Energy LLC
High Mount Midwest Energy LLC	May 25, 2010	Linn Operating, Inc.
Linn Operating, Inc.	April 20, 2017	Linn Operating, LLC

*Information provided by Linn, indicated that the Facility was acquired by Breitburn prior to acquisition by High Mount Midwest Energy LLC.

The Facility is located at 693 Kubacki Road, Dover Township, and was visited by AQD Staff by traveling from the Gaylord MDEQ Office east on M-32 to the intersection of M-32 and Turtle Lake Road. Staff turned left (north) onto Turtle Lake Road, and traveled approximately one mile to Kubacki Road. Upon reaching Kubacki Road, Staff turned right and continued to travel east for approximately 2-miles, at that point Kubacki Road curves to the north. The site is on the righthand side of the road, approximately ½-mile north of the curve. There are two entrances to the site, the Linn entrance is the northern one, and Linn equipment is located to the back (east side) of the facility. There is a Linn Energy LLC sign on the east side of the storage building along the east side of the property.

It should be noted that the remainder of the facility is operated by Core Energy under State Registration Number (SRN) P0446. The Linn reports that they operate the brine tank and disposal well, both companies share the brine tank and disposal well located at the north end of the Facility. Separate

records maintained for each company, the Core water is metered in, and the volumes reported to EPA and MDEQ.

REGULATORY

Permitting -The referenced facility operates under Permit to Install (PTI) No. 363-96, which was issued in 1996 to the Mercury Exploration, Inc. The PTI was issued as an opt-out permit, but not a Rule 201 permit and was issued around the same time as other Michigan Oil and Gas Association (MOGA) permits that did not undergo 201 reviews. The PTI conditions were generic and refer to the stationary source as a whole rather than conditions that address individual pieces of equipment. The referenced permit limits the emissions to 89 tons per year for NOx, CO and VOCs.

At the time of permitting the facility consisted of two Cat 399 Natural Gas (NG) fired, 930 HP compressors retrofitted with a catalytic converter, two glycol dehydration units with reboiler, one 25 MBTU/hr heater, one 350 MBTU/hr heater, and 11 750-MBTU/hr heater treaters. In 1999, the facility reported retaining the following equipment:

- One Cat 399 TA, 930 HP compressor engines
- One 250 MBTU/Hr glycol-reboiler and associated Kimray 4015 dehydrator

Linn Staff confirmed that only one compressor was located onsite when they took over the Facility in 2008. The RICE associated with the compressor was a Cat 399, 830 HP, high compression model. Linn reports that the emission factors used at that time were higher than actual.

In 2006, Quicksilver Resources reported in a voluntary disclosure that it had been determined that the catalytic converters had not been maintained to ensure satisfactory operation. The document went on to state that a vendor had been contracted for the purpose of evaluating whether air to fuel ratio controllers and catalytic converters should be replaced or installed, and that a schedule of replacement or installation would be developed.

On October 5, 2017, the facility submitted notification to the AQD District office of replacement of the RICE onsite. Linn reported that the engine change out was insignificant, and provided documentation verifying that no significant change in emissions would occur. Preventative Maintenance/Malfunction Abatement Plans (PMMAP) of record at the District Office include:

DATE	COMPRESSOR ENGINE	HP	CONTROL	PARAMETERS TO MONITOR
April 17, 2008	Cat 399 TA (SN 35b362 or 35b00362)	830 (930 in other records)	3-way Catalyst and AFRC	Catalyst inlet temp, Catalyst outlet temp, diff pressure across catalyst
Oct. 5, 2017	Cat 399 NA (SN 49C1275)	660	3-way Catalyst and AFRC	Catalyst inlet temp, Catalyst outlet temp, diff pressure across catalyst

Though not identified in the permit, the facility may be subject to Federal Regulation. Subparts frequently associated with oil and gas facilities are identified below. Note however, that compliance with these subparts has not been determined as part of this inspection.

Federal Regulations - The referenced facility does not process, or store petroleum liquids onsite and therefore appears to not be subject to 40 CFR Part 60 (New Source Performance Standards AKA NSPS) Subparts;

- K, Ka or Kb (Storage vessels for Petroleum Liquids);
- KKK (Equipment Leaks of VOC from onshore NG Processing Plants);
- VV (Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry);

In addition, the existing engine has a manufacture date prior to 2006 which would exempt them from being subject to NSPS Subparts IIII and JJJJ for Compression Ignition (CI) RICE and Spark Ignition (SI) RICE, respectively.

Subpart OOOO would apply to onshore affected facilities that are constructed, modified or reconstructed after August 23, 2011. Based on available information it appears that the referenced subpart is not applicable at this time but that future changes may be subject to the referenced subpart.

With respect to 40 CFR Part 63 (Maximum Achievable Control Technology Standards) the following Subparts may apply:

- Subpart HH (HAPS from Oil and NG Production Facilities)
- Subpart ZZZZ (RICE)

With respect to Subpart HH, the affected unit is believed to be the dehy unit. The files contain a January 18, 2016 evaluation of Linn facilities with respect to Antrim gas dehydrators. The document reported that the Dover 36 Facility has natural gas flows of less than 3 MMcf/day and are exempt from emission control requirements under the subpart

With respect to Subpart ZZZZ, Linn Staff have reported that the existing engine is a remote engine subject to the subpart.

EQUIPMENT

At the time of the January 24, 2018, site visit AQD Staff identified one compressor (with catalytic converter), one glycol dehydrator with reboiler, one slop tank and one brine tank with lined-secondary containment were present onsite. Each of the referenced pieces of equipment are housed separately. Despite the 100 percent cloud cover, steam plumes were noted from the glycol dehydrator stack, no emissions were noted from the stack associated with the RICE.

A review of District Files and MAERs records indicates the following equipment having been associated with the facility.

EQUIPMENT	DESCRIPTION	INSTALL DATE	DISMANTLE DATE	OTHER
Cat 399 Engine	830 (or 930) HP, with catalytic converter	5/1/1993	9/15/2017	MAERS source. Documentation in District Files shows 2 different HPs.
Cat 399 Engine	830 HP with catalytic converter	UNK	UNK	2005 MAERS Report review
Cat 399 NA Engine	660 HP with catalytic converter	9/15/2017		
Glycol Dehydrator	Antrim Formation	5/1/1993		
Heaters				2012 monthly emission spreadsheet -shows no emissions

The Linn operator indicated that the facility is visited on a daily basis by Linn Staff, and that Natural Gas Compression Systems staff is onsite to inspect and conduct any required maintenance activities at least twice per week. A review of the daily log sheets for the compressor onsite confirmed that schedule. Log sheets are sent to the corporate office by the operator upon completion of the month. No previous month's log sheets were available onsite for review. The logsheets onsite appeared to be consistent with those identified in the MAP for the facility.

A slop tank in secondary containment is located to the west of the dehydrator building. The Linn operator reports that the oil and water collected in the tank are allowed to separate, and that when the tank reaches a certain volume of fluids that the water is pumped into a tanker and transported across the site to the brine tank where it is disposed of via a disposal well. Oils from the slop tank are reported to be pumped out and transported off site for disposal

The dehydrator and heater are located in the same building. A steam plume was clearly visible from the dehydrator stack. Strong odors (assumed to be associated with the operation of the equipment) were noted inside the building, but not outside the building. Chemical storage tanks (on elevated stands inside secondary containment) were noted in the Linn buildings, but all appeared to be tidy, labeled and properly maintained.

COMPLIANCE

MAERS- Reporting of actual emissions for CO, NOx, VOCs and HAPs is required under special condition 18 of the permit. A review of the most recent MAERS submittal for the facility (received on February 1, 2017 for emissions associated with the calendar year 2016) included emissions for one engine and one glycol dehydrator onsite.

Permit Conditions -Special conditions associated with Permit No. 693-96 are limited to record keeping, reporting and emission limits. Emission limits for the facility are defined in special conditions 13 and 14. These two conditions limit CO, VOC and NOx emissions to 89 tons/year for each referenced parameter as well as individual HAPs to below 9 tons/year and total HAPs to below 22.5 tons/year.

Calculation of actual emissions on a monthly and 12-month rolling total for CO, NOx, VOC and HAPS are required under special condition 15. The PTI specifies that emissions will be determined using emission factors from Appendix A. It should be noted that Appendix A does not list HAPs for Antrim units.

NOx, CO and VOC annual emissions are determined by Linn using manufacturer data and standard control efficiencies for a catalytic converter. SO2 and PM10 are calculated using EPA emission factors. Total emissions in tons per year (tpy) reported for the calendar years since the last site inspection were:

CALENDAR YEAR	NOX (tpy)	CO (tpy)	VOC (tpy)	HAPs (tpy)
2016	4.65	7.84	1.94	0.47*
2015	4.34	7.33	1.81	0.45*
2014	4.02	6.78	1.67	0.41*
LIMIT	89	89	89	9

*Reflects AQD calculated formaldehyde emissions. Note that for the calendar year 2016 AQD calculated emissions also reflected 4.63 tpy methane emissions.

Data from "Engine Specification Calculation spreadsheets" provided by Linn reported the following emissions for the compressor engine, the principal emission source:

12-month Rolling Time Period Ending	ENGINE OPERATING	NOX (tpy)	CO (tpy)	VOC (tpy)	HAPs (tpy)
December 2015	Cat 399, 830 HP with catalyst	4.34	7.33	1.81	-
December 2016	Cat 399, 830 HP with catalyst	4.65	7.84	1.94	-
November 2017	Cat 399, 830 HP, then the Cat 399 660 HP both with catalyst	4.65	8.39	0.91	-
LIMIT		89	89	89	9

Special condition No. 16 and/or 17 require monthly records of:

- Fuel consumption, in million cubic feet (MMcf)
- Crude/condensate throughput to the tank in barrels (bbls)
- Hydrocarbon liquid trucked offsite (bbls), and

Oil and gas processed onsite

Upon district request and in compliance with permit requirements Linn provided the applicable requested records. As previously noted the facility does not produce or process liquid hydrocarbons onsite. Fuel consumption and other equipment operational data provided in response to the request indicated consistent operation of the equipment over time, and with operational data recorded during the January 24, 2018, site visit.

Special condition 19 requires the owner or operator of the source to conduct all necessary maintenance and make all necessary attempt to keep all components of the process equipment in proper working order and maintain a log of significant maintenance activities and all repairs made to the equipment. Per request, Linn provided copies of maintenance reports for the NG compressors and associated engine conducted by Natural Gas Compression Systems.

Copies of maintenance records provided by Linn, were reviewed and appear to reflect despite fluctuations, operation of the RICE in a consistent manner and consistent with the temperature and differential catalyst operating ranges outlined in the MAP. Select catalyst temperatures and differential pressures recorded on maintenance log sheets provided by Linn as well as data recorded as part of the January 24, 2018 site inspection are summarized below:

DATE	PRE-CATALYST TEMP	POST-CATALYST TEMP	PRE-CATALYST PRESSURE	POST-CATALYST PRESSURE	RPMS
1/24/2018*	1142	975	NR	NR	1140
10/5/2017	1062	995	8.7	2.9	1180
5/8/2017	1066	1122	11.0	4.0	1177
1/10/2017	1053	1100	10.5	3.5	1177
5/19/2016	1058	1077	9.2	0.6	1177
12/4/2015	1056	1097	9.5	3.5	1169

*The air to fuel ratio at the time of the site visit was set to an auto of 0.729.

Linn provided contracted engine maintenance service logs, including catalyst testing activities with a portable emissions analyzer (per MAP). A review of the maintenance service logs indicated that at minimum of bi-monthly visits occur for maintenance purposes in compliance with the MAP. The data provided indicated that catalyst testing activities have conducted on annually since as early as 2012 and are summarized below:

DATE	PRE-CATALYST NOx	POST-CATALYST NOx	NOx Control Efficiency	PRE-CATALYST CO	POST-CATALYST CO	CO Control Efficiency	RPMs
10/05/2017	1898.8	161.1	91.5	5074	627	87.6	1180
6/7/2017	1377.5	68.2	95.04	4027	600	85.1	1177
10/10/2016	1187.8	93.1	92.16	3377	255	92.44	1177
6/14/2016	1067	1113	92.16	10.3	3.2	93.34	1177
6/23/2015	830.9	86.8	89.55	3919	628	83.98	1100
4/17/2014	1607.9	118.2	92.65	4923	531	89.21	1053
11/15/2013	1482.2	19.2	98.7	4749	350	92.53	1023
11/14/2012	13332.1	53.1	96.01	5270	418	92.07	1058

A review of emissions reporting records provided by Linn indicates that NOx and CO control efficiencies of 90% and 80%, respectively have been used by the Facility to determine emissions. The results of field verification activities confirm that appropriate control efficiencies are being achieved by the catalyst, and being used in emissions reporting.

Special condition 20 applies to crude oil or condensate storage tanks greater than or equal to 952 barrels, and the liquid having a true vapor pressure of greater than 1.5 psia. This condition is not applicable as the facility does not store crude or condensate onsite.

MACES- Activity Report

Special condition 21 applies to malfunction of a pollution control device and limits bypass of the control device for a period not to exceed 48 hours per event nor a total of 144 hours per calendar year. Linn reported that they have no records of the engine operating without the catalyst for the past 5 years.

Special condition 22 requires the owner or operator of an oil-gas facility constructed on or after January 20, 1984 to determine if they are subject to Federal standards in 40 CFR, Part 60, Subpart KKK. No hydrocarbon liquids are reported to be produced at the facility, so the facility is reported not to be subject to the referenced Subpart.

Special condition 23 refers to requirements associated with verification stack testing for CO, VOC, NOx or HAP. No request for verification testing was found in District Files, so the condition is not applicable at the time of the report preparation.

Special condition 24 requires the facility to only process sweet gas as defined in Rule 119. Linn provided copies of hydrogen sulfide analysis dated October 23, 2011. The data reported that the hydrogen sulfide contents of the sample from the dehy inlet was below the 1 ppm detection limit. During discussions regarding sampling, Linn staff indicated that the company has a program for annual sampling at the individual wells, but not at the CPFs. This was confirmed by the Facility operator during the site inspection. This program helps the company monitor and identify H₂S in the gas stream. Linn has indicated that they will be evaluating the program to better address permit requirements.

SUMMARY

On January 24, 2018, AQD District Staff mobilized to the Linn Operating LLC – Dover 36 CPF (N6135), located in SW ¼, NW ¼, Section 36, T31N – R 2E, Dover Township, Otsego County, Michigan to conduct a self-initiated compliance inspection of the facility. The referenced facility presently operates under Permit to Install No. 693-96. A records request was made electronically on December 20, 2017, and the requested information was received on January 8, 2018. At the time of the site inspection, Linn Operator Mark Koronka was onsite, and answered general questions regarding site operations.

The referenced facility is a gated, unmanned CPF station operated by the Linn Operating LLC (AKA Linn). The station is reported to service Antrim Formation wells in the area. At the time of permitting, the location consisted of both Oil and Gas production activities. Distinct petroleum odors were noted upon entering the Facility.

The most recent site inspection activities were conducted on July 11, 2014. No compliance issues were noted in association with that visit's compliance evaluation. Based on information provided, both onsite and electronically indicate that the facility is operating in general compliance with their permit.

NAME Sharon LeBlanc

DATE 1/29/2018

SUPERVISOR SN