

**STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SUPERVISOR OF WELLS**

THE PETITION OF CORE ENERGY, LLC FOR AN ORDER)
FROM THE SUPERVISOR OF WELLS APPROVING A)
PRESSURE MAINTENANCE OPERATION FOR RECOVERY)
OF OIL, GAS, AND RELATED HYDROCARBONS, AND) CAUSE NO. 15-2014
ABROGATING EXISTING SPACING AND PRORATION)
ORDERS AND RULES IN THE CHARLTON TOWNSHIP,)
OTSEGO COUNTY, MICHIGAN.)

OPINION AND ORDER

This case involves the Petition of Core Energy, LLC (Petitioner), requesting (i) formation of the 320-acre Charlton 19 Unit Area; (ii) approval of a secondary recovery operation in the Charlton 19 Pool pursuant to Section 61506(i), Part 615, Supervisor of Wells, of the NREPA and R 324.612 of the rules promulgated pursuant to Part 615; and (iii) approval to operate the proposed Unit Area as an exception to the proration allowables of Special Order No. 1-73. The proposed Unit Area consists of approximately 320 acres, and is described as the E 1/2 of SW 1/4 and W 1/2 of SE 1/4, Section 18; NE 1/4 of NW 1/4, NW 1/4 of NE 1/4, and S 1/2 of NW 1/4, Section 19, T31N, R1W, Charlton Township (North), Otsego County, Michigan.

JURISDICTION

The development of oil and gas in this state is regulated under Part 615, Supervisor of Wells, MCL 324.61501, *et seq.* The purpose of Part 615 is to ensure the orderly development and production of the oil and gas resources of this state, with a view to the ultimate recovery of the maximum production of these natural resources. MCL 324.61502. To the end of maximizing recovery, the Supervisor of Wells (Supervisor) regulates secondary recovery methods for oil and gas, including the introduction of substances into producing formations for purposes of enhancing production. MCL 324.61506(i). A person proposing secondary recovery by injection of a fluid into a producing formation must file a petition for a public evidentiary hearing. 1996 MR 9, R 324.612. The evidentiary hearing is governed by the applicable

provisions of the Administrative Procedures Act, 1969 PA 306, as amended, MCL 24.201, *et seq.* See 1996 MR 9, R 324.1203. The evidentiary hearing in this matter was held on September 16, 2014.

FINDINGS OF FACT

The Petitioner specifically requests that the Supervisor issue an Order forming a 320-acre Unit Area; and allow the Petitioner to inject carbon dioxide and other approved substances into the Guelph Dolomite/Ruff Formation, the productive zone, for purposes of secondary recovery and/or pressure maintenance; and exempt the proposed Unit Area from the applicable spacing and proration rules and orders.

In support of its case, the Petitioner offered the testimony of the following employees: Mr. Robert G. Mannes, President; Mr. Kim Sanders, Land Manager; Mr. Allen Modroo, Geophysicist and Explorationist; and Mr. Rick Pardini, Petroleum Engineer. Mr. Modroo and Mr. Pardini were accepted as experts in their respective fields.

The Administrative Law Judge determined the Notice of Hearing was properly served and published. One answer in opposition to the Petition was filed by Mr. Robert B. LeBlanc and Ms. Joan S. LeBlanc. Mr. and Mrs. LeBlanc appeared at the hearing on their own behalf. Mr. LeBlanc cross examined witnesses and made a statement on the record. The Supervisor designated the hearing to be an evidentiary hearing pursuant to R 324.1205(1)(b) and directed evidence be presented in the form of oral testimony.

I. Unit Area

Mr. Sanders testified three Charlton 19 Pool wells were drilled on 80-acre drilling units pursuant to Special Order No. 1-73; the El Mac Hills 1-18 (PN 41801), El Mac Hills 2-18 (PN 42766), and El Mac Hills 1-19D (PN 57261). The El Mac Hills 2-18 unit was voluntarily expanded to a 160-acre drilling unit. These three drilling units make up the proposed Unit Area. Mr. Sanders testified Petitioner became operator of the three

wells effective January 1, 2014, and all three wells remain on primary production subject to the provisions of Special Order No. 1-73.

Mr. Sanders testified all owners of oil, gas, and minerals in the proposed Unit Area, are known and are subject to valid and fully effective oil and gas leases. After the order in this matter is issued, Petitioner plans to record its Pooling Declaration to establish the 320-acre Unit Area (Exhibit 2). Unit production will commence after the effective date, when CO₂ injection commences. Mr. Sanders testified Petitioner owns or controls 100 percent of all working interest in all oil and gas leases in the unitized formation in the Unit Area and is qualified to be unit operator.

Based on available well control and seismic data, Mr. Modroo testified the Charlton 19 Pool consists of one reef and the reef is entirely contained within the proposed Unit Area. (Exhibits 5, 7, 8, 9, 10, 11, 12). In addition, Mr. Modroo testified there are no reefs within 0.25 miles of the Unit Area and the 3D seismic clearly shows separation of the Charlton 19 reef from all other reefs in the area.

Mr. Modroo testified that Petitioner plans to conduct unitized operations within a Unitized Formation described as the stratigraphic equivalent of all formations between the top of the Ruff (A-1 Carbonate) Formation and the top of the Gray Niagaran Formation or the stratigraphic equivalent of the interval from 5,099 feet measured depth to 5,424 feet measured depth on the El Mac 1-18 well, Permit Number 41801, located in the SW 1/4 of SE 1/4 of Section 18, T31N, R1W, Charlton Township, Otsego County, Michigan.

Mr. Modroo testified that whereas the El Mac Hills 1-18, 1-19, 1-19D, and 2-18 wells are reef wells with reef thicknesses in excess of 280 feet; well logs and formation tops indicate the Emma LeBlanc 1-24, LeBlanc 1-19 and LeBlanc 1-19A wells are regional wells exhibiting thickness in the formation less than 13 feet. In his opinion, this shows the reef underlying the proposed Unit Area does not exist in the LeBlanc wells. (Exhibits 23, 24, and 25). Mr. Pardini agreed with Mr. Modroo's assessment of the LeBlanc wells, stating they are what the industry typically refers to as inter-reef wells, where the Brown Niagaran thickness is generally flat and very thin, not associated with

reefal material or build up. He characterized the LeBlanc wells as being very different geologically from the four producing wells in the Charlton 19 Pool, which are in the reef build up, as evidenced by the amount of Brown Niagaran that was penetrated.

I find the Unitized Formation as proposed by the Petitioner is reasonable and appropriate and should be approved. I find the boundaries of the proposed Unit Area are appropriate and all productive portions of the reservoir are within the proposed Unit Area.

II. Secondary Recovery

Mr. Pardini testified that seven wells have been drilled into the Charlton 19 Field, of which four were completed and produced, the El Mac Hills 1-18, 1-19, 2-18, and 1-19D. Mr. Pardini indicated the Field Production History show the field is near the end of its primary producing life. The El Mac Hills 1-18 well is currently producing approximately four barrels of oil per day and 11 thousand cubic feet of gas (MCF); the 2-18 is temporarily abandoned; and the 1-19D produces two to three barrels of oil per day and 11 MCF of gas per day.

Mr. Pardini testified total primary recovery from the three wells has been 1.072 million barrels of oil (MMBO) (Exhibit 16). The two producing wells in the field are producing at marginal rates and without the implementation of enhanced oil recovery technology, the field is very near the end of its primary producing life. Mr. Pardini discussed the unique trends in the pressure data between the Charlton 19 Field and the nearby Charlton 7 Field and concluded they are two separate and distinct reservoirs (Exhibit 17).

The Petitioner believes significantly more oil will be recovered as a result of carbon dioxide injection based on the positive results of carbon dioxide injection in nearby CO₂ EOR Units. Petitioner initially proposes to inject carbon dioxide into the field utilizing the El Mac Hills 1-18 well. Petitioner plans to inject a volume of CO₂ that will raise the reservoir pressure above the anticipated minimum miscibility pressure as a means for maximizing production and ultimate recovery. In order to avoid fracturing the reservoir and to minimize the risk for migration beyond the sealed boundaries of the

reef, the surface injection pressure shall not exceed the pressure permitted by the United States Environmental Protection Agency (USEPA), which is anticipated to be 1735 pounds per square inch (psi). The initial injection period is estimated to take from 18-30 months.

Mr. Pardini referred to the Charlton 19 Pool as a closed system, which he explained is a reservoir where fluid is trapped and does not go beyond the boundaries of the reservoir. This was evidenced by a decline in pressure in the reservoir as oil and gas were removed from the producing wells during primary production. It is Mr. Pardini's opinion based on his experience with CO₂ injection in carbonate reservoirs, that the CO₂ injected into the Charlton 19 Field will not migrate outside the reservoir. Mr. Pardini further testified Petitioner intends to follow all rules and regulations regarding injection and enhanced recovery operations set forth by the USEPA and MDEQ. In his opinion, compliance with all rules and regulations assures injection can be done safely and without harm to any adjoining or nearby lands or formations.

Mr. Pardini testified oil production will be handled either at the Dover 36 Central Production Facility (CPF) or the Charlton 19 CPF, and separate metering will be used to assure proper allocation. CO₂ for the project will come from Petitioner's Chester 10 compression facility in Chester Township and be reinjected with any residual natural gas after being separated from the oil. (Exhibit 20).

Mr. Pardini testified that having studied the production performance of Petitioner's other CO₂ EOR projects has enabled him to obtain a reasonable prediction of future performance for the Charlton 19 Field. He estimates that carbon dioxide injection in the Charlton 19 Field would result in incremental oil recovery of approximately 350 thousand barrels of oil over depletion of the reservoir by primary production (Exhibits 21 and 22).

In response to Mr. and Mrs. LeBlanc's concerns about migration of CO₂ due to natural fractures in the formation, Mr. Pardini testified if natural fractures existed that

would allow oil and gas to migrate out of the reservoir, they would have been apparent in the 3D seismic and would have resulted in no production in the field.

Mr. LeBlanc testified that he believes the CO₂ injected by Petitioner will not be contained within the 320-acre proposed Unit Area but will migrate under his property, extracting oil and gas that he will not be compensated for. No relevant evidence was admitted to support Mr. LeBlanc's testimony, which was received as opinion under the Michigan Rules of Evidence.

After review of all testimony and evidence on the record, I find the type of operations contemplated by Petitioner are feasible, will prevent underground waste by recovering oil not otherwise recoverable, and will protect correlative rights. I find abrogation of the existing Special Order No. 1-73 spacing, well location, and proration requirements is necessary to proceed with enhanced recovery operations, except no well shall be completed in the Unitized Formation at a location closer than 330 feet from the outside boundary of the proposed Unit Area. I further find the testimony and evidence show the reservoir is contained within Petitioner's proposed 320-acre Unit Area and Petitioner's proposed EOR project will be confined to the proposed Unit Area.

CONCLUSIONS OF LAW

Based on the findings of fact, I conclude, as a matter of law:

1. The applicable spacing, well location, and proration requirements for the proposed Unit Area are established by Special Order No. 1-73.
2. The Supervisor may regulate the secondary recovery methods of oil and gas, including pulling or creating a vacuum and the introduction of gas, air, water, and other substances into the producing formations. MCL 324.61506(i).

3. A person desiring to inject water, gas, or other fluids into a producing formation or use other technology for the purpose of increasing the ultimate recovery of hydrocarbons from a reservoir shall file a petition for hearing. 1996 MR 9, R 324.612(1).

4. The operator of a secondary recovery project shall keep accurate records of all oil, gas, and brine produced, volumes of fluids injected, and injection pressures. The operator shall file reports of the data and other data as may be required with the Supervisor at regular intervals, as specified. 1996 MR 9, R 324.612(2).

5. The Supervisor has jurisdiction over the subject matter and the persons interested therein.

6. Due notice of the time, place, and purpose of the hearing was given as required by law, and all interested persons were afforded an opportunity to be heard. 1996 MR 9, R 324.1204.

DETERMINATION AND ORDER

Based on the Findings of Fact and Conclusions of Law, the Supervisor determines the proposed secondary/enhanced oil recovery project will prevent waste and maximize the recovery of hydrocarbons from the proposed Unit Area.

NOW, THEREFORE, IT IS ORDERED:

1. The Petition of Core Energy, LLC is granted, and the proposed Unit Area is created in accordance with, and subject to, this Order. The proposed Unit Area shall hereafter be known as the Charlton 19 Unit.

2. Core Energy, LLC is appointed Unit Operator.

3. The Charlton 19 Unit is described as:

Section 18: E 1/2 of SW 1/4 and W 1/2 of SE 1/4

Section 19: NE 1/4 of NW 1/4, NW 1/4 of NE 1/4, and S 1/2 of NW 1/4, T31N, R1W, Charlton Township (North), Otsego County, Michigan.

4. The Unitized Formation is described as:

The stratigraphic equivalent of all formations between the top of the Ruff (A-1 Carbonate) Formation and the top of the Gray Niagaran Formation or the stratigraphic equivalent of the interval from 5,099 feet measured depth to 5,424 feet measured depth on the El Mac 1-18 well, Permit Number 41801, located in the SW 1/4 of SE 1/4 of Section 18, T31N, R1W, Charlton Township, Otsego County, Michigan.

5. Core Energy, LLC shall notify the Supervisor between 30 and 60 days prior to the commencement of injection operations, and between 30 and 60 days prior to the anticipated date of permanent cessation of injection operations. Petitioner shall comply with the filing requirements of R 324.610, R 324.612, and R 324.806 of the administrative rules of Part 615 of the NREPA and shall obtain such approvals as are necessary from the Department of Environmental Quality.

6. Operation of the Charlton 19 Unit shall be conducted exclusive of and as an exception to all applicable spacing orders and rules, except no well may be completed in the Unitized Formation at a location closer than 330 feet from the outside boundaries of the Charlton 19 Unit Area. Core Energy, LLC is authorized to produce wells on the Unit Area at rates that result in the maximum efficient recovery of hydrocarbons. All other parts of Special Order No. 1-73 and the administrative rules of Part 615 of the NREPA shall be adhered to.

7. The unitized operations shall initially be accomplished by the injection of carbon dioxide. During recycling, whatever native natural gas is left in the Unitized Formation that becomes intermixed with carbon dioxide may be cycled into and out of the Unitized Formation. Other substances may only be injected with written approval from the Supervisor.

8. The Supervisor retains continuing jurisdiction over the Charlton 19 Unit in order that the Supervisor may exercise such administrative control as is consistent with the powers and duties of the Supervisor, as established by Part 615 of the NREPA.

9. This Order shall be effective immediately.

Dated: Oct. 31, 2014



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