

**STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
SUPERVISOR OF WELLS**

THE PETITION OF CORE ENERGY, LLC FOR AN ORDER)
FROM THE SUPERVISOR OF WELLS APPROVING A)
PLAN OF UNITIZATION FOR PRESSURE MAINTENANCE)
AND ENHANCED AND/OR SECONDARY RECOVERY OF) ORDER NO. 09-2010
OIL, GAS, AND RELATED HYDROCARBONS, AND)
ABROGATING EXISTING SPACING AND PRORATION)
ORDERS AND RULES IN PARTS OF CHESTER)
TOWNSHIP, OTSEGO COUNTY.)

OPINION AND ORDER

This case involves the Petition of Core Energy, LLC (Petitioner). The Petitioner is requesting (i) approval of a unitized operation of the Chester 5 Field (proposed Unit Area), pursuant to Part 617, Unitization, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); (ii) approval of a secondary recovery operation pursuant to Section 61506(i), Part 615, Supervisor of Wells, of the NREPA and R 324.612; and (iii) approval to operate the proposed Unit Area as an exception to the applicable spacing provisions of Part 615 of the NREPA, and its administrative rules. The proposed Unit Area consists of approximately 484.39 acres, and is described as the NW fractional 1/4, N 1/2 of SW 1/4, and SW 1/4 of SW 1/4 of Section 5; E 1/2 of SE 1/4 of Section 6; NE 1/4 of Section 7; and NW 1/4 of NW/4 of Section 8, T30N, R2W, Chester Township, Otsego County, Michigan.

JURISDICTION

The development of oil and gas in this state is regulated under Part 615, Supervisor of Wells; and Part 617, Unitization; of the NREPA, MCL 324.61501, *et seq.* and MCL 324.61701, *et seq.*, respectively. The purpose of Parts 615 and 617 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 May 13, 2010.

FINDINGS OF FACT

Petitioner specifically requests that the Supervisor issue an Order allowing Petitioner to inject water and other approved substances into the Guelph Dolomite/Ruff Formation, the productive zone, for purposes of secondary recovery and/or pressure maintenance and exempts 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: Robert G. Mannes, President; Kim Sanders, Land Manager; Allen Modroo, Geophysicist and Explorationist; and 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/protest in opposition to the Petition was filed by the Holewinski Family Partnership and Ralph and Rosemary Holewinske. No one appeared at the hearing on behalf of the Respondants. No other answers or protests were filed and no one appeared at the hearing in opposition to the Petition. 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. Unitization

Mr. Mannes testified Petitioner operates six active carbon dioxide (CO₂) enhanced oil recovery (EOR) units (Dover 33, Dover 35, Dover 36, Charlton 6, Charlton 30/31, and Chester 2). These units have collectively produced over a million barrels of oil through CO₂ EOR operations. In his opinion, Otsego County contains approximately 20 million barrels of recoverable stranded oil which has not and will not be recovered by primary operating techniques. Mr. Mannes testified the South Chester CO₂ removal

facility is the source of CO₂ and that, at present, Petitioner captures approximately 11 million cubic feet (MMCF) while 22 MMCF are vented to the atmosphere to this facility.

There are currently two productive wells drilled on the proposed Unit Area. These two wells are the Butler 3-5 well (PN 58926) and the Borowiak 2-6 well (PN 59237). The wells are permitted to Petitioner. All mineral interests in the proposed Unit Area are subject to valid oil and gas leases and all oil and gas leases are owned by Petitioner. Mr. Sanders testified that Petitioner's Plan of Unitization (Exhibit 2) constitutes a plan of unit operations containing all of the required terms and conditions as set forth in subsections 61705(a)-(j) of Part 617 of the NREPA, and expressly provides for the unitized operation of the proposed Unit Area for purposes of secondary recovery and pressure maintenance operations. The Plan of Unitization has been ratified by owners whose interests total 0.98037248 of all production from the proposed Unit Area.

Petitioner made at least two attempts to contact owners, including mailing of the Plan of Unitization. No objections to the Petition or Plan of Unitization were received from owners within the proposed Unit Area. The Protestants' lands are outside the proposed Unit Area. For the time being, Petitioner does not plan to drill additional wells and if additional wells are drilled in the future, they would be located at least 330 feet from the outside boundary of the proposed Unit Area.

I find that Petitioner is qualified to be named Unit Operator and has obtained sufficient approval to support entry of a final order approving the Plan of Unitization and approving unit operations pursuant to Part 617 of the NREPA.

II. Unit Area

Based on available well control and seismic data, Mr. Modroo prepared Exhibit 6, a subsea structure contour map of the field, from which he determined the Chester 5 Field consists of one Guelph Dolomite reef and the reef is entirely contained within the proposed Unit 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 base of the Lockport (Niagaran) Formation or the stratigraphic equivalent encountered in the Shell Western

Borowiak #1-6 well (PN 29067) located in the SE 1/4 of SE 1/4 of Section 6, T30N, R2W, Chester Township, Otsego County, Michigan.

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

III. Secondary Recovery

Mr. Pardini testified that eight wells have been drilled into the Chester 5 Field, of which two are presently producing. Total primary recovery has been 1,223 thousand barrels of oil (MBO) and 1,342 MMCF of gas (Exhibit 13). A minor amount of oil remains to be recovered with primary production operations, as the two producing wells in the field are producing at modest rates (Exhibit 16, Pgs. 5 and 6). 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 one of the existing wellbores. To reach initial fill-up (i.e. minimum miscibility pressure) Petitioner expects to inject approximately 2 billion cubic feet of carbon dioxide during a period of seven to fifteen months with the initial slug size being equal to approximately 30 percent of the hydrocarbon pore volume. Mr. Pardini estimated that carbon dioxide injection in the Chester 5 Field would result in incremental oil recovery of approximately 500 MBO over depletion of the reservoir by primary production (Exhibit 13). Mr. Pardini's enhanced oil recovery production forecast and estimated economics indicate the project will be profitable (Exhibit 14). He estimated the profit after taxes at 12.7 million dollars.

Mr. Pardini indicated no natural gas will be produced for sale from the unitized operations. All gas recovered in the production operation will be compressed for reinjection with carbon dioxide (Exhibit 10). Oil production from the Chester 5 Field will be handled at the Dover 36 Central Production Facility, and separate metering will be used to assure proper allocation.

Based on Petitioner's analysis, there is evidence of significant amounts of oil remaining in the reservoir. I find the testimony indicates the proposed Unit Area contains accumulation of hydrocarbons that will not be recovered by further primary

production of the wells in the field, but may be recovered by CO₂ pressure maintenance and secondary recovery operations conducted as a part of the unitized operation. I find the estimated additional cost of unitized operations will not exceed the value of the additional hydrocarbons recovered and the unitization requested is reasonably necessary to substantially increase recovery of oil from the proposed Unit Area.

The Plan of Unitization allocates unit production among the various tracts comprising the proposed Chester 5 Unit Area based on the percentage of the total original reservoir volume under each tract. It was Mr. Pardini's opinion that the tract factors represent each tract's fair, reasonable, and equitable share of future unit production.

I find the allocation of production to the separately owned tracts is fair, reasonable, and equitable as required by Section 61705 of Part 617 of the NREPA.

I find the type of operations contemplated by Petitioner are feasible, will prevent underground waste by recovering oil not otherwise recoverable, will decrease the amount of waste product carbon dioxide vented into the atmosphere, and will protect correlative rights. I find abrogation of the existing Special Order No. 1-73 and Supervisor's Order No. 06-2009 spacing, well location, and proration requirements is necessary to implement the Plan of Unitization and proceed with unitized 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.

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 and Supervisor's Order No. 06-2009.

2. The Supervisor shall issue an order providing for the unit operation of a Unit Area if he or she finds all of the following:

- (a) That the unitization requested is reasonably necessary to substantially increase the ultimate recovery of oil and gas from the Unit Area;
- (b) That the type of operations contemplated by the plan are feasible, will prevent waste, and will protect correlative rights.
- (c) That the estimated additional cost of conducting such operations will not exceed the value of the additional oil and gas so recovered. MCL 324.61704(4).

3. The Supervisor's Order may be declared effective if the Plan of Unitization has been approved by those persons who under the Supervisor's Order will be entitled to at least 90% of all production from the Unit Area or the proceeds of that production. MCL 324.61706.

4. 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).

5. 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).

6. 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).

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

8. 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 unitization is necessary to prevent waste and to 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 and the provisions of the Plan of Unitization, which is hereby incorporated by reference. The proposed Unit Area shall hereafter be known as the Chester 5 Unit.

2. Core Energy, LLC is appointed Unit Operator.

3. The Chester 5 Unit is described as:

Section 5: NW Fractional 1/4, N 1/2 of SW 1/4 and SW 1/4 of SW 1/4;

Section 6: E 1/2 of SE 1/4;

Section 7: NE 1/4;

Section 8: NW 1/4 of NW 1/4

T30N-R2W, Chester Twp, Otsego County, Michigan

4. The Unitized Formation is described as:

All formations lying between the top of the Ruff (A-1 Carbonate) Formation and the base of the Lockport (Niagaran) Formation, or the stratigraphic equivalents encountered in the Shell Western Borowiak #1-6 Well

(PN 29067) located in the SE 1/4 of SE 1/4 of Section 6, T30N, R2W, Chester 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 abandonment 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 Natural Resources and Environment.

6. Each tract within the Chester 5 Unit shall participate in the unit production and other benefits and burdens of unit operations in accordance with the Plan of Unitization.

7. Operation of the Chester 5 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 Chester 5 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.

8. 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 and through the commonly-used Dover 36 CPF, with the injection and recovery of the carbon dioxide, and the natural gas being intermixed with the carbon dioxide. After separation at the CPF, the mixture is used in one or more of Core's active CO₂ EOR units. Other substances may only be injected with written approval from the Supervisor. However, fresh water from a water well dedicated for that purpose may only be injected with approval from the Supervisor after a hearing.

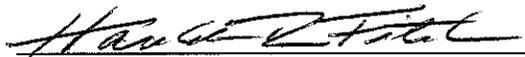
9. The Plan of Unitization, which constitutes the plan for unit operations, is hereby approved; and unit operations thereunder may be commenced as of the effective date determined by the Unit Operator consistent with Article 26 of the Plan of Unitization. Cessation of the unit operations shall be in accordance with the Plan of Unitization and only with the written approval of the Supervisor.

10. The Supervisor retains continuing jurisdiction over the Chester 5 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 and Part 617 of the NREPA.

11. This Order shall be effective immediately.

Dated: June 23, 2010



HAROLD R. FITCH
ASSISTANT SUPERVISOR OF WELLS
Office of Geological Survey
P. O. Box 30256
Lansing, MI 48909