

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY

ORDER OF THE SUPERVISOR OF WELLS

IN THE MATTER OF

THE REQUEST OF MICHIGAN ENVIRONMENTAL)
TRUST LIMITED, MICHIGAN OIL AND GAS)
ASSOCIATION, ET AL., FOR THE ADOPTION OF) ORDER NO. (A) 14-9-94
A SPECIAL SPACING ORDER FOR ANTRIM SHALE)
FORMATION GAS WELLS IN 22 NORTHERN)
MICHIGAN COUNTIES.)

SECOND AMENDED OPINION AND ORDER

Order No. (A) 14-9-94 was originally issued in 1995. On November 14 and 15, 1994, January 17 and 18, 1995, and February 14, 1995, a contested case hearing was held before the Supervisor of Wells (Supervisor) and the Oil and Gas Advisory Committee regarding the above-captioned matter. The hearing was held under the authority of the Supervisor of Wells Act, 1939 PA 61, as amended, MCL 319.1 et seq.; MSA 13.139(1) et seq., and the administrative rules, 1979 AC, R 299.1101 et seq.¹ The hearing was conducted in accordance with the Administrative Procedures Act, 1969 PA 306, as amended, MCL 24.201 et seq.; MSA 3.560(101) et seq. The purpose of the hearing was to consider the request of Michigan Environmental Trust Limited, et al., for an order pertaining to the need or desirability of adopting a special spacing order for the location and spacing of wells and the development of units or pooled areas in the Antrim Shale Formation in 22 northern Michigan counties. Order No. (A) 14-9-94 was signed by Assistant Supervisor of Wells, R. Thomas Segall on June 20, 1995 and was given immediate effect.

Order No. (A) 14-9-94 was amended in 1999. On December 11, 1998, a contested case hearing was held before the Supervisor and the Oil and Gas Advisory Committee pursuant to Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); MCL 324.61501 et seq.; the administrative rules, 1996 AACRS, R 324.101 et seq., and Administrative Procedures Act, 1969 PA 306, as amended, MCL 24.201 et seq.; MSA 3.560(101) et seq. The purpose of the hearing was to consider the Petition of Trendwell Energy Corporation to drill more than two lateral

¹ By signature of the Governor May 23, 1995, the Supervisor of Wells Act, 1939 PA 61, as amended, MCL 319.1 et seq.; became Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA).

drainholes per well bore. The Supervisor enlarged the scope of the hearing to consider a statewide amendment to Order No. (A) 14-9-94.

Order No. (A) 14-9-94 was amended by Order No. (A) 20-12-98, issued March 9, 1999. In Order No. (A) 14-9-94, the Supervisor found two (2) lateral drainholes within the Antrim may be completed from any one well bore without a permit or a hearing provided the end point of the drainhole is no closer than 330 feet of the drilling unit line as shown on a well bore survey identifying the course and end point of the drain, and the operator obtains a Change of Well Status approval from the Supervisor. The original order stated additional drainholes would be allowed only after a hearing before the Supervisor. In Order No. (A) 20-12-98, the Supervisor found that more than two lateral drainholes drilled from the same well bore will not result in wasteful communication between wells and will not interfere with correlative rights of adjoining property owners. Section 5, Determination and Order, Order No. (A) 14-9-94 was amended in its entirety as follows:

5. Multiple lateral drainholes within the Antrim Shale Formation may be completed from any well bore, without obtaining an additional drilling permit, provided no lateral drainhole shall extend closer than 330 feet to the drilling unit or USP boundary, and each additional lateral drainhole shall receive "change of well status" approval prior to beginning lateral drainhole operations. Except as provided below, a survey identifying the course and end point of the drainhole, all wire line logs, strata evaluation logs, and other logs shall be filed with the Supervisor within 60 days of completion of a lateral drainhole. In accordance with the existing rules, a well shall not be produced until these records have been filed with the Supervisor. The Supervisor shall allow a lateral drainhole to be drilled and utilized without requiring a directional survey if the Supervisor or the authorized representative of the Supervisor grants an exemption in the Permit to Drill and Operate (for new wells) or the Application to Change Well Status (for existing wells), and the operator or his agent certifies that the length of the lateral drainhole does not exceed the distance from the vertical well bore to the closest point which is 330 feet from the nearest drilling unit or USP boundary.

On April 23, 2002, a contested case hearing was held before the Supervisor, and the Oil and Gas Advisory Committee pursuant to Part 615 of the NREPA, its administrative rules, and the Administrative Procedures Act, 1994 PA 451, as amended (NREPA); MCL 324.61501 et seq., the administrative rules, 1996 AACS, 2001 MR 2, R 324.101 et seq., and the Administrative Procedures Act, 1969 PA 306, as amended, MCL 24.201 et seq.; MSA 3.560(101) et seq. The

hearing was initiated by the Supervisor to receive testimony and evidence pertaining to the need or desirability of issuing an order amending Order No. (A) 14-9-94 and Order No. (A) 10-12-87. The purpose of the hearing was to consider expanding the rock interval subject to Order No. (A) 14-9-94 and Order No. (A) 10-12-87 to include the interval from the top of the Sunbury Shale Formation to the top of the Antrim Shale Formation and equivalent.

Timely answers to the Notice of Hearing on the April 23, 2002 hearing were filed by MCN Oil & Gas Company, Trendwell Energy Corporation, Ward Lake Energy and Muskegon Development Company. Staff of the Geological Survey Division (GSD) of the Department of Environmental Quality (DEQ) presented evidence in support of amending this Order and Order No. (A) 10-12-87. MCN Oil & Gas Company, Trendwell Energy Corporation, and Ward Lake Energy participating as full parties through their attorney, Mr. Gary Worman, also presented evidence in support of the proposed amendments. Representatives of Muskegon Development Company and T-Rex Resources made statements in support of the proposed amendments. No parties appeared in opposition to the proposed amendments.

FINDINGS OF FACT

1. In Order No. (A) 14-9-94, the Supervisor made the following Findings, which are reaffirmed and incorporated in this Second Amended Opinion and Order:

a. For the purposes of this Order, the Antrim comprises the rock interval from the base of the Berea-Bedford sequence to the top of the Traverse Group and includes all formations correlative to that interval including the Ellsworth Shale of western Michigan. Section 2, Findings of Fact, Opinion and Order No. (A) 14-9-94.

b. The Antrim is a part of the eastern Devonian shales sequence found throughout much of the Michigan, Appalachian, and Illinois basins. It is an organically rich shale of Devonian Age. In northern Michigan, the Antrim section ranges from 300 to 770 feet in thickness at subsurface depths ranging from less than 500 feet to approximately 1,500 feet. The Antrim is characterized by matrix permeability typically lower than one millidarcy. Extensive fracturing is required to create the necessary pathways for gas migration to the well bore. Economic production of gas is contingent on encountering such fracturing. Well logs show the presence or absence of fracturing is random. One well bore may reveal virtually no natural fractures, while

another well less than a mile away may show extensive fracturing throughout the Antrim. Current geological and geophysical means cannot identify fractured areas without drilling test wells. Mr. J. Michael Gatens III, a petroleum engineer for S.A. Holditch & Associates, Inc., testified the Antrim is an unconventional, complex and unique reservoir. His description of the Antrim is:

. . . a low-permeability, organic-rich matrix rock which contains gas in a sorbed state. Free gas also exists in conventional pore space within the shale matrix and in the natural fractures. The shale matrix typically has very low permeability; permeabilities have been measured on the order of 2×10^{-8} md. To achieve commercial production from these formations, natural fractures must exist (as a general rule) which allow the gas to migrate from the very low permeability matrix into the permeable natural fracture system, which then connect to the well bore and to induced hydraulic fractures created near the well bore.

I find, as a matter of fact, the Antrim is an unconventional, complex, and unique gas reservoir. Section 3, Findings of Fact, Opinion and Order No. (A) 14-9-94

2. At the April 23, 2002 hearing, GSD staff presented evidence in support of the proposed amendment through the testimony of Mr. Rick Henderson, Cadillac District Supervisor; Mr. D. Michael Bricker, Petroleum Geology and Production Unit Supervisor; and Mr. Thomas Wellman, Permit and Bonding Unit Supervisor.

a. Upon being sworn, Mr. Henderson testified:

(i) An Application for Change of Well Status was received from Dominion Energy in December 2001, stating the applicant intended to perforate the "upper Antrim" Formation. Upon review it was discovered the formations to be perforated were actually the Sunbury Shale and the Bedford Shale, and the application was subsequently denied.

(ii) An investigation by Cadillac District Staff found over 50 Antrim Shale Formation wells have been completed in the Sunbury

Shale or Berea Bedford. This number did not include wells originally completed in the Sunbury Shale or Berea Bedford zones.

(iii) Since December 2001, the Cadillac District Office has received approximately 20 applications to Change Well Status in the Sunbury Shale or Berea Bedford zones.

(iv) Amending Order No. (A) 10-12-87 and Order No. (A) 14-9-94 to include the Sunbury Shale and Berea Bedford would allow wells already drilled to be completed in the Sunbury Shale or Berea Bedford, will prevent waste, and will cause no economic or environmental harm.

(v) In the 50 plus wells that have been completed in the Sunbury above the Antrim, there have not been any problems. The shales of the Sunbury and Berea Bedford are shallow and behave much the same way as does the Antrim Shale; therefore, there should not be any problems.

b. Upon being sworn, Mr. Bricker testified:

(i) The Stratigraphic Nomenclature for Michigan (Exhibit 4) shows the Sunbury Shale as a separate formation above the Antrim Shale Formation.

(ii) Exhibit 6 is an electric log showing the original completion of a well in the Sunbury Shale Formation. The electric log shows completions in the normal Antrim zones of the Lachine Member and Norwood Member but also the Sunbury Shale and the Upper Antrim Member. This electric log demonstrates that even on original completions, not recompletions, these wells are being completed in zones other than strictly the Antrim Shale.

(iii) The inclusion of the interval between the Sunbury Shale and the Antrim Shale should apply only to gas wells, because the drainage characteristics between oil and gas are considerably different.

c. Upon being sworn, Mr. Wellman testified:

(i) Except for existing Berea fields in the subject counties, wells completed above the Antrim Shale Formation are subject to the general spacing provisions of R 324.301. Berea fields are spaced either on 10 acre units or have specific spacing orders.

(ii) Approximately 200 wells were found to be perforated above the Antrim Shale Formation.

(iii) The majority of the 10 acre spaced Berea fields were oil fields.

3. Mr. Robert Butka, Certified Petroleum Geologist, testified the Sunbury Shale is an organic rich black shale similar to the black Antrim Shales and should be included in orders addressing the Antrim Shale Formation with the exception of the Berea Sandstone, which is distinct from the shale reservoirs. Excluding sandstone from the Order would prevent waste by allowing shale gas to be produced from existing Antrim gas well bores and not restrict potential Berea development.

4. Mr. John G. Wilkinson, Senior Engineer, Ward Lake Energy testified reserves of between 270 and 450 billion cubic feet (Bcf) of gas are available in the upper shale formations, including the Bedford Shale, Sunbury Shale and Upper Antrim Formations. He further stated it would not be economic to drill new wells to recover resources from the Sunbury Shale, Bedford Shale and Upper Antrim Formations.

5. Mr. Michael Mesbergen of Muskegon Development Company and Mr. Dan McGuire of T-Rex Resources made statements in support of including the Sunbury Shale Formation with the Antrim Shale Formation in amendments to this Order and Order No. (A) 10-12-87.

6. I find the Sunbury Shale, Ellsworth Shale, and Bedford Shale Formations are sufficiently similar in characteristics to the Antrim Shale Formation and should be included in this Order and Order No. (A) 10-12-87.

7. I find the rock interval subject to this Order and Order No. (A) 10-12-87 should be expanded to include the interval from the top of the Sunbury Shale Formation to the top of the Antrim Shale Formation and equivalent, excluding the Berea Sandstone Formation.

8. I find the Berea Sandstone Formation means a fine-grained sandstone, some siltstone and shale, about 50 feet thick ranging upward to 100 feet thick (15.2-30.5 meters) in eastern and central Michigan, as described in the Stratigraphic Lexicon for Michigan (Exhibit 7).

CONCLUSIONS OF LAW

1. Section 61506(a) of Part 615 of the NREPA provides that the Supervisor shall prevent waste. To accomplish this purpose, the Supervisor is empowered:

To promulgate and enforce rules, issue orders and instructions necessary to enforce the rules, and to do whatever may be necessary with respect to the subject matter stated in this part to implement this part, whether or not indicated, specified, or enumerated in this or any other section of this part. MCL 324.61506(a)

2. Section 61513(2) and (3) of Part 615 of the NREPA states:

(2) To prevent the drilling of unnecessary wells, the supervisor may establish a drilling unit for each pool. A drilling unit, as described in this subsection, is the maximum area that may be efficiently and economically drained by 1 well. A drilling unit constitutes a developed area if a well is located on the drilling unit that is capable of producing the economically recoverable oil or gas under the unit. Each well permitted to be drilled upon any drilling unit shall be located in the approximate center of the drilling unit, or at such other location on the drilling unit as may be necessary to conform to a uniform well spacing pattern as adopted and promulgated by the supervisor after due notice and public hearing, as provided in this part. MCL 324.61513(2)

(3) The drilling of unnecessary wells is hereby declared waste because unnecessary wells create fire and other hazards conducive to waste, and unnecessarily increase the production cost of oil and gas to the operator, and therefore also unnecessarily increase the cost of the products to the ultimate consumer. MCL 324.61513(3)

3. R 324.302 of the administrative rules of Part 615 of the NREPA states:

The development of an oil or gas field after the completion of a discovery well may warrant the adoption of a drilling unit and well spacing pattern other than as specified in R 324.301. An interested person may request, or the supervisor may schedule, a hearing pursuant to part 12 of

these rules to consider the need or desirability of adopting a special spacing order to apply to a designated area, field, pool, or geological strata. The drilling unit established by the special spacing order may be smaller or larger than the basic 40-acre unit pursuant to R 324.301(1)(a). 1996 AACS, R 324.302

4. The Supervisor has jurisdiction over the subject matter and the persons interested therein. Due notice of the time, place and purpose of the hearing was given as required by law, and all interested parties were afforded an opportunity to be heard.

DETERMINATION AND ORDER

Based on the Findings of Fact and Conclusions of Law and in accordance with the recommendation of the Oil and Gas Advisory Committee, the Supervisor of Wells finds that an amendment to Order No. (A) 14-9-94 is necessary and desirable to prevent waste.

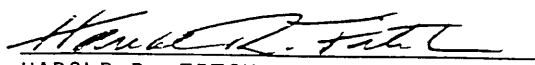
NOW, THEREFORE, IT IS ORDERED:

1. The rock interval subject to this Order is the interval from the top of the Sunbury Shale Formation to the base of the Antrim Shale Formation and includes all formations correlative to that interval, excluding the Berea Sandstone Formation.

2. All other provisions of the original Order No. (A) 14-9-94 are reaffirmed.

3. The Supervisor of Wells retains jurisdiction and any amendments or exceptions to the spacing and location requirements of this Order shall be by Order of the Supervisor of Wells after notice and hearing.

DATE: 7-2-02


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