

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

ORDER OF THE SUPERVISOR OF WELLS

IN THE MATTER OF

THE PETITION OF MARATHON OIL COMPANY)
FOR AN ORDER FROM THE SUPERVISOR OF)
WELLS APPROVING A SECONDARY RECOVERY) ORDER NO. (A) 26-9-91
OPERATION AND A PLAN OF UNITIZATION)
FOR THE SOUTH STONEY POINT UNIT IN)
PART OF MOSCOW TOWNSHIP, HILLSDALE)
COUNTY)

SUPPLEMENTAL OPINION AND ORDER

On June 5, 1991, Marathon Oil Company (Marathon) filed its Verified Petition requesting that the Supervisor of Wells (Supervisor) form the South Stoney Point Unit (SSPU) pursuant to 1959 PA 197. Marathon's Petition requested that the Supervisor enter an initial order providing for unitized operations, and requested the scheduling of a supplemental hearing to determine whether the approvals required by 1959 PA 197, Section 7, have been obtained.

Following a public hearing on September 24, 1991, (Initial Hearing) the Assistant Supervisor entered his Opinion and Order dated October 17, 1991, (Initial Order) providing for the formation of the SSPU.

On October 30, 1991, after the service of notice, a supplemental public hearing was held before the Acting Assistant Supervisor to determine whether the percentage approvals required by 1959 PA 197, Section 7, have been obtained.

FINDINGS OF FACT

1. At the supplemental hearing, Marathon presented testimony indicating that the Unit Agreement (Marathon Exhibit No. 10 in the Initial Hearing) and the Unit Operating Agreement (Marathon Exhibit No. 11 in the Initial Hearing) have been approved in writing by persons who, under the Supervisor's Initial Order, will be entitled to 92.4% of all production from the SSPU or proceeds thereof. Included in this group are persons who will be entitled to 70.3% of the production from the SSPU, or proceeds thereof, which will be credited to interests which are free of cost. Accordingly, Marathon has obtained sufficient ratifications to meet the requirements of both Section 7 (b) and Section 7 (c) of 1959 PA 197.

2. The Unit Agreement and Unit Operating Agreement should be approved and declared effective.

CONCLUSIONS OF LAW

1. The Petition and these proceedings before the Supervisor are governed by 1959 PA 197, as amended, and 1939 PA 61, as amended.
2. Marathon is a proper applicant for an order of unitization because it is a lessee in the SSPU.
3. As previously detailed in the Findings of Fact in the Initial Order, the competent, material and substantial evidence in the record as a whole supports the conclusion that Marathon's Petition should be granted and meets the criteria of 1959 PA 197 and of 1939 PA 61.
4. As detailed in the Findings of Fact in this Supplemental Opinion and Order, the evidence supports the conclusion that Marathon has obtained the necessary approvals under both Section 7 (b) and Section 7 (c) of 1959 PA 197 so that a final order can be entered approving the SSPU and declaring it effective.

SUPPLEMENTAL DETERMINATION AND ORDER

NOW THEREFORE, based on the record for this proceeding,

IT IS ORDERED:

1. That the Initial Order of the Supervisor, dated October 17, 1991, is hereby incorporated by reference.
2. That this Order shall be considered a supplemental order providing for unitized operations, pursuant to 1959 PA 197, Section 8.
3. Subject to the terms of the Initial Order of the Supervisor, the Unit Agreement (Marathon Exhibit No. 10 in the Initial Hearing) and Unit Operating Agreement (Marathon Exhibit No. 11 in the Initial Hearing), which together comprise the Plan for Unit Operations, are hereby declared and made effective, and unit operations shall commence as of 7:00 a.m. on November 1, 1991.

DATED: October 30, 1991



SAMUEL L. ALGUIRE
ACTING ASSISTANT SUPERVISOR
OF WELLS

STATE OF MICHIGAN
DEPARTMENT OF NATURAL RESOURCES

ORDER OF THE SUPERVISOR OF WELLS

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THE PETITION OF MARATHON OIL COMPANY)
FOR AN ORDER FROM THE SUPERVISOR OF WELLS)
APPROVING A SECONDARY RECOVERY OPERATION) ORDER NO. (A) 26-9-91
AND A PLAN OF UNITIZATION FOR THE SOUTH)
STONE POINT UNIT IN PART OF MOSCOW)
TOWNSHIP, HILLSDALE COUNTY)

OPINION AND ORDER AND NOTICE OF SUPPLEMENTAL HEARING

A public evidentiary hearing was held before the Assistant Supervisor of Wells and the Advisory Board on September 24, 1991. The hearing was conducted pursuant to 1939 PA 61, as amended, the promulgated rules, and 1959 PA 197, as amended. The purpose of the hearing was to consider the Verified Petition of Marathon Oil Company (Marathon) to form the South Stoney Point Unit (SSPU), to permit the injection of gas into the Unitized Formation underlying the SSPU for the purpose of secondary recovery and to operate the SSPU as an exception to all spacing, location and proration requirements of 1939 PA 61, as amended, and the rules promulgated thereunder.

The verified petition sought an initial order providing for unitized operations, including the injection of gas into the Unitized Formation, and requested the scheduling of a supplemental hearing pursuant to 1959 PA 197, Section 8, for purposes of determining whether the approvals required by 1959 PA 197, Section 7, have been obtained. Accordingly, this order is preliminary and contingent upon the Supervisor's entry of a final order, after a supplemental hearing, finding that the approvals required by 1959 PA 197, Section 7, have been obtained.

FINDINGS OF FACT

1. Marathon offered the testimony of two witnesses and twenty-three exhibits in support of its petition. There was only one protestant to the petition, Jackhill Oil Company (Jackhill). Jackhill offered the testimony of one witness.

2. The first witness called by Marathon was Mr. Paul Lupardus, a Petroleum Engineer. Mr. Lupardus served as the secretary for the Working Interest Owners Committee which developed the proposed plan of unitization. He chaired the Technical Committee which evaluated developed and undeveloped reserves, potential drilling locations, and recommended a unit boundary. He also authored the SSPU feasibility study. Mr. Lupardus' testimony was accepted as expert testimony.

3. Mr. Lupardus testified that the boundary of the proposed unit encompasses twenty 40-acre tracts within Sections 16, 17, 21 and 22 of T5S-R2W, Hillsdale County, Michigan. The boundary of the unit was determined by including all 40-acre tracts south of the North Stoney Point Unit which have either current or historic commercial hydrocarbon production and are in pressure communication with one or both of the two known pressure areas in the SSPU. Because of the heterogeneity of the field and lack of closure, the only way to determine if a tract is underlain by the pool is to drill a successful well.

4. The proposed tracts within the unit are the existing 40-acre spacing units. The existing 40-acre spacing units were used since the interests within them have been pooled and therefore there is common ownership within each tract.

5. The proposed Unitized Formation is from the top of the Trenton Group to the depth 100 feet below the top of the Prairie du Chien formation. This interval was chosen because it contains all known commercial hydrocarbon producing formations within the Stoney Point Field.

6. Three types of operations are contemplated for the unit. First, reservoir energy will be conserved by producing wells at optimal rates. Second, additional reserves will be developed by drilling infill wells in strategic locations within the unit. Third, additional recovery will be achieved by implementing a gas injection, pressure maintenance program.

7. The main recovery mechanisms in the Stoney Point Field are solution gas drive and gas cap expansion. Waste of either of these energies through excessive gas production results in lower ultimate oil recoveries. Unitization will allow the shutting in of high gas-oil ratio (GOR) wells and the producing of low GOR wells at higher rates. Experience from the analogous North Stoney Point Unit shows that producing wells at optimal rates will substantially reduce the amount of gas produced per barrel of oil, thereby conserving reservoir energy pressure. Only through unitization can high GOR wells be shut in, low GOR wells produced at higher rates, and correlative rights still be protected.

8. Gas reinjection is a pressure maintenance operation. It is designed to offset or curb a reservoir's natural pressure decline due to production of reservoir fluids. The higher the pressure and the longer this pressure is maintained, the higher the percentage of original oil-in-place recovered. Unitization is necessary to implement a gas injection program.

9. Southern Michigan Trenton-Black River Reservoirs are very heterogeneous and do not lend themselves to rigorous spacing requirements. Rigorous spacing results in poorly drained areas, and untapped fracture networks. Unitization allows the drilling of properly placed infill wells which can tap these poorly drained areas and untapped fracture networks, thereby substantially increasing the ultimate recovery of oil. By eliminating spacing requirements, wells can be drilled in optimal locations and drilling can be limited to only those wells that are needed.

10. All three of the operations planned (optimized production, infill drilling and gas injection) are feasible.

11. Tract factors were developed using a five parameter formula. Thirty-five percent of each tract factor is based on current production, thirty-five percent on developed reserves, ten percent on undeveloped reserves, ten percent on cumulative production and ten percent on tract acreage. Current production was based on production from July 1, 1990 to December 31, 1990. Developed reserves were determined by the Technical Subcommittee using decline curve analysis, which is an industry standard and accepted practice. Undeveloped reserves were also determined by the Technical Subcommittee and represent the infill potential of each tract. Cumulative production represents the production from each tract through December 31, 1990. Each tract was credited with nominal surface acreage of 40 acres.

12. The weighting of each of the tract parameters was based on Technical Subcommittee analysis of developed and undeveloped potential reserves. The subcommittee projected remaining developed reserves at 1,885,000 barrels of oil equivalent (BOE) and undeveloped infill reserves at 800,000 BOE. Therefore, of the total subcommittee projected reserves, approximately seventy percent represents developed potential and thirty percent undeveloped potential. The seventy percent developed potential was allocated equally (35% each) to the two parameters which reflect currently developed reserves; current production and developed reserves. The thirty percent undeveloped potential was allocated equally (10% each) to the three parameters which are indicators of future potential; undeveloped reserves, cumulative production, and acreage.

13. The tract factors allocate to each tract its fair, reasonable and equitable share of production, taking into consideration the value of each tract for oil and gas purposes and its contributing value to the unit in relation to like values of all tracts in the unit. As a result, correlative rights within the unit will be protected.

14. The correlative rights of areas outside the proposed SSPU will also be protected. There is pressure separation between the SSPU and the North Stoney Point Unit. There are currently no productive wellbores to the east, south or west of the SSPU. A total of 15 nonproductive wells have been drilled on tracts immediately east, south and west of the SSPU. If a successful well is ever drilled to the east, south or west of the SSPU, it will not be adversely affected by unit operations. Such a well should benefit from any pressure maintenance project. If it is necessary that the unit coordinate operations with such a well, the unit and the owners of that well can enter into a cooperative agreement as permitted by the Unit Agreement.

15. The proposed Unit Agreement and Unit Operating Agreement contain all of the provisions required by Act 1959 PA 197 for a unit plan.

16. A delay in unitization will substantially reduce the amount of oil that is ultimately recovered from the SSPU. A mere reduction in the gas allowable for the SSPU is not an acceptable substitute for unitization.

17. The second witness called by Marathon was Mr. Brian Blackburn, a Petroleum Engineer. Mr. Blackburn is employed by Marathon and is currently working as a Reservoir Engineer, assigned primarily to the Stoney Point Field. Based on fundamental reservoir engineering concepts, North Stoney Point Unit results and computer simulations (or models) of reservoir performance, Mr. Blackburn testified that unitization will substantially increase the ultimate recovery of oil from the SSPU. He testified that the recovery of remaining reserves will be increased by approximately 1,750,000 barrels of oil by producing at optimal rates, drilling infill wells, and injecting gas.

18. Mr. Blackburn testified that he modeled five cases. His modeling work demonstrates that each of the proposed operations will substantially increase the ultimate recovery of oil from the SSPU. His studies indicate that producing wells at optimal rates, injecting gas and drilling infill wells will increase the ultimate recovery of oil from the South Stoney Point Unit by 1.769 million barrels of oil. The ultimate recovery of original oil-in-place will be increased from 42.4 percent to 63.9 percent. Mr. Blackburn testified that model results

indicate that ultimate recovery from the SSPU is reduced by 8,300 barrels for every month that unitization is delayed. He also testified that a reduction in the gas allowables is not an acceptable substitute for unitization.

19. Mr. Blackburn also studied the economic benefits of unitization. Mr. Blackburn testified that unitization will increase the remaining net present value (at a 15% discount rate) of the working interest share of the SSPU from 7.617 million dollars to 11.602 million dollars. On an undiscounted basis, Mr. Blackburn testified that unitization increases the total profit, (revenue less investments and expenses) of the working interest share from 11.043 million dollars to 22.286 million dollars. Mr. Blackburn included in his calculation a deduction for federal income taxes at the rate of forty-six percent.

20. Jackhill Oil Company presented the testimony of Mr. David Dzierwa. On cross-examination by the Advisory Board, Mr. Dzierwa agreed that Jackhill's primary, if not only, concern with unitization involves a private contractual dispute between Jackhill and Powell Production Company. In general, Mr. Dzierwa supported unitization of the SSPU and the plan of unit operations developed by the Working Interest Owners Committee. Royalty owners testified that representation of royalty interests on the Unit Operating Committee is desirable.

21. The Supervisor finds that the unitization requested is reasonably necessary to increase the ultimate recovery of oil and gas from the unit area, that it will prevent waste and protect correlative rights, and that the estimated additional cost of conducting the operation will not exceed the value of the additional oil and gas recovered.

22. The Supervisor further finds that an exception to all applicable spacing and proration requirements is necessary to implement unitization and secondary recovery.

CONCLUSIONS OF LAW

1. The Petition and these proceedings before the Assistant Supervisor of Wells are governed by the "Michigan Unitization Law", 1959 PA 197, as amended, and 1939 PA 61, as amended.

2. Marathon Oil Company is a proper applicant for an order of unitization because it is a lessee in the Unit Area.

3. As previously detailed in the Findings of Fact, the competent, material and substantial evidence in the record as a whole supports the conclusion that the application should be granted and meets the criteria of the "Michigan Unitization Law" and of 1939 PA 61.

4. As previously detailed in the Findings of Fact, abrogation of spacing and proration, as established by Order No. 4-4-84, as amended and Order No. 4-10-88, as amended, is necessary to implement unitized operations.

5. Rule 701, promulgated pursuant to 1939 PA 61, as amended, reads in part as follows: "Any person desiring to inject water, gas, air, or other fluid into a producing formation for the purpose of secondary recovery or pressure maintenance shall file an application for permission to the supervisor."

6. The Supervisor of Wells has jurisdiction of the subject matter and the persons interested therein; due notice of the time, place and purpose of the hearing were given as required by law and all interested parties were given an opportunity to be heard.

DETERMINATION AND ORDER

Now, therefore, based on the entire record in the proceeding, and following consultation with the Advisory Board and consideration of its recommendation to approve the petition and provide for royalty interest representation on the Unit Operating Committee, it is Ordered:

1. Subject to entry of a Final Order pursuant to 1959 PA 197, Section 8, establishing that the approvals as required by Section 7 have been acquired, the South Stoney Point Unit is hereby created in accordance with, and subject to, the terms, provisions and conditions of this Order and the plan of unit operations consisting of the Unit Agreement (Marathon Exhibit No. 10) and Unit Operating Agreement (Marathon Exhibit No. 11) which are incorporated herein by reference. Unit operations, as described in the Findings of Fact, shall not commence, and this order shall not be effective, until entry of a Supplemental Order under 1959 PA 197, Section 8, finding that the necessary ratifications have been obtained.

2. The South Stoney Point Unit shall be operated exclusive of, and as an exception to, all of the provisions of Order No. 4-10-88, as amended, Order No. 4-4-84, as amended, R 299.1201 and R 299.1202, provided, that no wellbore shall be completed closer than 330 feet from the unit boundary.

3. The Unitized Formation shall include all geologic strata from the top of the Trenton Group to a depth of 100 feet below the top of the Prairie du Chien Group within the Unit Area.

4. The Unit Area is described as:

The SE/4 of the NW 1/4 of Section 17, S 1/2 of the NE 1/4 of Section 17, N 1/2 of SE 1/4 and SE 1/4 of the SE 1/4 of Section 17, the S 1/2 of the NW 1/4 of Section 16, SW 1/4 of Section 16, NW 1/4 of Section 21, the NW 1/4 of NE 1/4 and S 1/2 of NE 1/4 of Section 21 and the SW 1/4 of NW 1/4 of Section 22 all in T5S,R2W, Hillsdale County, Michigan.

5. Each tract within the Unit Area shall participate in the unit production and other benefits, and shall bear the burdens of unit expense in accordance with the Unit Agreement and Unit Operating Agreement.

6. This order shall remain effective for a period of six (6) months after the date hereof unless its effectiveness is extended as provided for in 1959 PA 197, Section 8.

7. The Unit Operator shall make written reports of production and injection to the Supervisor of Wells on a quarterly basis. Such reports shall include the oil, gas and water volumes on a per well and a unit wide basis, and any pressure data collected during the quarter. Royalty owners may receive such data by visiting the Lansing office of the Geological Survey Division, or by requesting a copy from the Unit Operator. The Unit Operator shall provide a copy upon request.

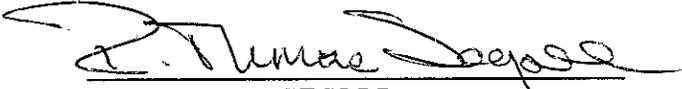
8. Any group of royalty owners who own more than 50 percent of the royalty interest in the SSPU may collectively appoint one (1) representative to the Unit Operating Committee. Such representative shall have voice but not vote. Such royalty owner group shall inform Unit Operator in writing of the names and addresses of the representative and alternate who are authorized to represent such royalty owners on the Unit Operating Committee. The representative or alternate may be changed by written notice to the Unit Operator. Both the representative and the alternate must own a royalty interest in the SSPU but shall not own a working interest in the SSPU.

9. Upon entry of a final order pursuant to 1959 PA 197, Section 8, the Unit Operator is hereby granted the Supervisor's permission to inject gas into the Unitized Formation.

10. The Supervisor of Wells retains continuing jurisdiction over the South Stoney Point Unit. A supplemental hearing shall be held on October 30, 1991, at 9:30 a.m. Eastern Standard Time in the Department of Natural Resources Hearing Room, Third Floor of Knapp's Office Centre, Corner of Washington Avenue and Washtenaw Street, Lansing, Michigan, to determine if the plan for unit operations has been approved as required by Section 7, 1959 PA 197. Further notice of the supplemental hearing in this matter will not be made.

DATED:

10/17/91


R. THOMAS SEGALL
ASSISTANT SUPERVISOR OF WELLS