DEPARTMENT OF ENVIRONMENTAL QUALITY

ORDER OF THE SUPERVISOR OF WELLS

IN THE MATTER OF

THE PETITION OF THE MICHIGAN OIL AND GAS ASSOCIATION FOR AN ORDER FROM THE SUPERVISOR OF WELLS AUTHORIZING A SECOND ANTRIM SHALE FORMATION WELL IN ANY ANTRIM SHALE FORMATION DRILLING UNIT IN MONTMORENCY AND OTSEGO COUNTIES AS AN EXCEPTION TO ORDER NO. (A) 14-9-94.	) ORDER NO. (A) 24 -8-05) ON APPEAL

ORDER ON APPEAL

This matter involves the Petition of the Michigan Oil and Gas Association (MOGA) to obtain authorization to drill a second well on existing Antrim drilling units in Montmorency and Otsego Counties. The second well would provide gas production from a zone either beneath or above the formation currently subject to production. After an evidentiary hearing, the Assistant Supervisor of Wells issued a Final Determination and Order on February 17, 2006, that granted MOGA's petition, subject to a number of limitations. Certain parties challenged that Order in an Appeal to the Director.[1] MCL 324.61503(2) and R 324.1212. Those parties and MOGA filed briefs and participated in Oral Argument on May 15, 2006, in Gaylord. R 324.1212(3).[2]

During the hearing on September 27, 2005, there was an indication that a form of settlement was reached between MOGA and the other parties. That settlement was embodied in a series of two stipulations. The first series consisted of seven factual stipulations, which were read into the record. Tr. Vol. II, pgs. 229-231. These stipulations were offered by MOGA, the Otsego County Soil Conservation District, and other surface owners.[3] The second series consisted of four factual stipulations between MOGA, Mr. Sagasser, and Mr. Caple. *Id.* at pg. 233. This series was termed an "agreement in principle" and was read into the record. *Id.* at pgs. 233-242. Both series are attached in

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[1] The Appealing parties are: Susan Hlywa Topp; Charles E. Caple; Kevin D. Sagasser; Anthony Petrella; John Kurczewski; Gary Wikowski; and Jaime Long

[2] Due to his unavailability, Mr. Petrella submitted Written Argument in lieu of Oral Argument.

[3] The record is unclear on specifically which surface owners, besides Ms. Topp, entered into these stipulations

the Briefs on Appeal filed by Ms. Topp (Exhibits B and C) and Mr. Sagasser (Exhibit 5). After considering the stipulations, the Assistant Supervisor's Order rejected Stipulations 3, 6, and 7, from the first series, and all four from the second series, as either non-factual or immaterial to the merits of the case.[4] Order No. (A) 24-8-05, pg. 13. This Appeal challenges those determinations.

The importance and legal significance of stipulations is well established in Michigan:

> To the bench, the bar, and administrative agencies, be it known herefrom that the practice of submission of questions to any adjudicating forum, judicial or quasi-judicial on stipulation of fact, is praiseworthy in proper cases. It eliminates costly and time-consuming hearings. It narrows and delineates issues. But once stipulations have been received and approved they are sacrosanct. Neither a hearing officer nor a judge may thereafter alter them. This holding requires no supporting citation. The necessity of the rule is apparent. A party must be able to rest secure on the premise that the stipulated facts and stipulated ultimate conclusionary facts as accepted will be those upon which adjudication is based. Any deviation therefrom results in a denial of due process for the obvious reason that both parties by accepting the stipulation have been foreclosed from making any testimonial or other evidentiary record.
> *Dana Corp v. Employment Security Commission*, 371 Mich 107, 110; 123 NW2d 277 (1963).

Dana stands for the proposition that stipulated facts must be followed by the fact-finder in adjudicating the case, and the failure to do so violates the party's constitutional due process protections.[5] See US Const, Am XIV and Const 1963, art 1, § 1. However, *Dana* also obligates the fact-finder to reject stipulations that are incomplete or legally erroneous. *Id.* at 371 Mich 111. In this case, the Assistant Supervisor rejected the seven proffered stipulations after the hearing closed, which leads to the Appealing parties claim of a violation of due process. However, the first series of stipulations were read into the record

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[4] Stipulation 7 in the first series and Stipulation 1 in the second series both pertain to the formation of an *ad hoc* committee that would discuss issues/problems and offer suggestions/compromises. Putting this stipulation into effect is dependent on first obtaining approval of the MOGA Board.

[5] "Due process applies to any adjudication of important rights." *In Re LaFlure*, 48 Mich App 377, 385; 210 NW2d 482 (1973). See also *Board of Regents v Roth*, 408 US 564; 92 S.Ct. 2701; 33 L Ed2d 548 (1972)

during the hearing, after which MOGA proceeded with its case.[6] The second series of stipulations were characterized on the record as "agreement[s] in principle" that were not reduced to writing until after the hearing concluded. Tr., Vol. II, pgs. 233-234. As a result, the Assistant Supervisor of Wells was not in a position during the hearing to approve the stipulations. In fact, counsel for MOGA acknowledged the agreement was not binding on the Assistant Supervisor. *Id.* at 232. Given these circumstances, the rejection of the stipulations in the Assistant Supervisor's Order did not violate the Party's due process. This leaves the appropriateness of the rejected stipulations.

Dana requires that stipulations pertain to material facts, which is controlled by the nature of the case. In this matter, MOGA seeks an exemption to a 1995 Order covering the development of Antrim Formation natural gas in Montmorency and Otsego Counties. To that end, and consistent with Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, a contested case hearing was conducted to establish the legal rights, duties and responsibilities of MOGA and the Appealing Parties. MCL 24.203(3). The Assistant Supervisor's Order noted, from a policy perspective, the value of the steps proposed in the rejected stipulations. The Department of Environmental Quality (DEQ) is prepared, as stated in the Order, to assist in facilitating those agreements. However, for the purpose of this contested case, no basis exists to conclude that Stipulations 3, 6, and 7, from the first series are either factual and/or material to the determination of the legal rights, duties or responsibilities of the parties. The same is true for the stipulations listed in the second series. Therefore, this Appeal must be denied.

NOW, THEREFORE, IT IS ORDERED:

1. The Appeal of Susan Hlywa Topp; Charles E. Caple; Kevin D. Sagasser; Anthony Petrella; John Kurczewski; Gary Wikowski; and Jaime Long is DENIED.

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[6] One of the Appealing parties, Ms Long, also put on a case by calling a DEQ employee as a witness All of the witnesses offered after the stipulations were discussed were subject to cross-examination

2 The Assistant Supervisor's Order of February 17, 2006, is ADOPTED and INCORPORATED into this Order on Appeal.

3. This Order on Appeal constitutes the final agency decision on the Petition filed by the Michigan Oil and Gas Association.

DATED: 6/15/06

STEVEN E. CHESTER
SUPERVISOR OF WELLS

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
SUPERVISOR OF WELLS

IN THE MATTER OF:

THE PETITION OF THE MICHIGAN OIL AND GAS ASSOCIATION FOR AN ORDER FROM THE SUPERVISOR OF WELLS AUTHORIZING A SECOND ANTRIM SHALE FORMATION WELL IN ANY ANTRIM SHALE FORMATION DRILLING UNIT IN MONTMORENCY AND OTSEGO COUNTIES AS AN EXCEPTION TO ORDER NO (A) 14-9-94.	)	ORDER NO (A) 24 -8-05

at a session of the Department of Environmental Quality held at Lansing, Michigan, on April 4, 2006, Harold R. Fitch, Assistant Supervisor of Wells, Presiding

ORDER ON MOTION FOR RECONSIDERATION

On March 15, 2006, Susan Hlywa Topp, on behalf of herself and Mr. Charles Caple, filed a Motion for Reconsideration of Order No. (A) 24-8-05, approving Michigan Oil & Gas Association's request for a second Antrim Shale Formation well on drilling units in Montmorency and Otsego Counties. The Motion specifically requests the Supervisor: incorporate Respondents stipulations into the Order; or alternatively, rescind the Order and schedule a rehearing to allow presentation of testimony, witnesses, and cross-examination by all Respondents; and stay the issuance of any permit on the application of a second well until resolution of this matter.

Also on March 15, 2006, Ms. Topp, on behalf of herself and Mr. Caple, filed a Petition for Appeal with the Director of the Department of Environmental Quality (DEQ) pursuant to R 324 1212. The relief requested of the Director in the Petition for Appeal is identical to that requested in the Motion for Reconsideration As the requests made in the Motion for Reconsideration are currently being processed as an appeal to the Director under R 324.1212, I find a Reconsideration of Order No. (A) 24-8-05 is not appropriate.

NOW, THEREFORE, IT IS ORDERED:

The Motion for Reconsideration filed by Ms. Susan Topp on March 15, 2006, is DENIED.

Dated: April 25, 2006

HAROLD R FITCH
Assistant Supervisor of Wells
Office of Geological Survey
P.O. Box 30256
Lansing, MI 48909-7756

DEPARTMENT OF ENVIRONMENTAL QUALITY

ORDER OF THE SUPERVISOR OF WELLS

IN THE MATTER OF

THE PETITION OF THE MICHIGAN OIL AND GAS ASSOCIATION FOR AN ORDER FROM THE SUPERVISOR OF WELLS AUTHORIZING A SECOND ANTRIM SHALE FORMATION WELL IN ANY ANTRIM SHALE FORMATION DRILLING UNIT IN MONTMORENCY AND OTSEGO COUNTIES AS AN EXCEPTION TO ORDER NO. (A) 14-9-94.	)	ORDER NO. (A) 24-8-05

FINAL DETERMINATION AND ORDER

This case involves the Petition of the Michigan Oil and Gas Association (MOGA) requesting that the Supervisor of Wells (Supervisor) allow two wells to be drilled and produced on the same Antrim drilling unit. The basis for this request is the existence of at least two distinct reservoir zones capable of production in Antrim drilling units. Provided it can be accomplished without waste, production from both zones is currently achieved by utilizing the same well bore. This process is known as commingling. In its Petition, MOGA asserts, in developed areas, commingling is not a practicable approach to producing these two distinct reservoir zones. Therefore, MOGA seeks approval for a second well on certain existing Antrim units in Montmorency and Otsego Counties [1]

JURISDICTION

The development of oil and gas in this state is regulated under Part 615, Supervisor of Wells, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. 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. MCL 324.61502. To that end, the Supervisor can establish drilling units and uniform spacing plans. MCL 324.61513. In Montmorency and Otsego County, 80-acre

[1] The second well is referred to in the oil and gas industry as a "twin well", or "twinning."

Antrim drilling units with one well are required under Order Number (A) 14-9-94 (Antrim Order).[2] As an alternative, the Antrim Order provides for Uniform Spacing Plans (USPs), which are larger tracts with multiple wells subject to specified spacing conditions. In filing its Petition, MOGA seeks an exception to the Antrim Order by allowing two Antrim wells on a drilling unit in Montmorency and Otsego Counties, or by twinning existing wells in a USP. 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 also R 324.1203. After proper notice, the hearing in this matter was held on August 30 and September 27, 2005, in Gaylord, Michigan.

PARTIES

MOGA is represented by Mr. Gary L. Worman. During the hearing MOGA presented testimony from John Wilkinson, Director of Operations, DTE Gas and Oil Company; Nelson Fairchild, Eastern Regional Manager, Quicksilver Resources; James Mills, petroleum engineer, Dominion E & P; Allen Hackman, petroleum engineer, Dominion E & P; Kevin Ringwelski, environmental consultant; and Raymond Barnhart, Regional Operations Manager-expert in petroleum engineering, Dominion E & P.

The other Parties involved are: the Otsego County Soil Conservation District; Mr. Anthony Petrella; Mr. John Kurczewski; Mr. Charles Caple; Mr. Kevin Sagasser; Mr. Gary Witkowski; Ms. Deborah Liddy; and Ms. Jamie Long The Otsego County Conservation District is represented by Ms. Susan Topp, while the individuals all appeared *pro se*. Ms. Long offered the testimony of Mr. Rick Henderson, District Supervisor, of the Department of Environmental Quality (DEQ), Office of Geological Survey (OGS). Other than Mr. Henderson, the District and pro se Parties did not offer any witnesses, but limited their involvement to cross-examining MOGA's witnesses.

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[2] See IN THE MATTER OF THE REQUEST OF MICHIGAN ENVIRONMENTAL TRUST LIMITED, MICHIGAN OIL AND GAS ASSOCIATION, ET AL. Order No (A) 14-9-94, June 20, 1995 1995 WL 374797 (Mich.Dept.Nat.Res.)

FINDINGS OF FACT

To provide context to the Petition and relief sought, it is helpful to examine the history of Antrim Shale Formation gas development in Montmorency and Otsego Counties. The activity in this area began in earnest in the 1980's. During the early stage of development, most wells were drilled to the Lower Antrim Formation, which is comprised of the Norwood and Lachine Members, on 40-acre drilling units. In 1995, the Supervisor issued the Antrim Order, *supra*, fn 2. The Antrim Order defined the Antrim Shale Formation as the rock interval from the base of the Berea-Bedford to the top of the Traverse Group. The Order required that all Antrim Shale Formation wells be drilled on 80-acre units or in an approved USP.

Subsequent to the entry of the Antrim Order, operators indicated an interest in producing gas from the Upper Member of the Antrim Formation, the Sunbury Shale, and the Bedford Shale, collectively referred to herein for purposes of this Order as the "Upper Shales." Production from the Upper Shales was originally thought to be economically viable by opening the Upper Shale interval in an existing Lower Antrim well, i.e. commingling. To allow that production, the Antrim Order was amended in 2002 to include the Sunbury Shale and Bedford Shale. Subsequently, MOGA's members have sufficient experience producing gas from both zones through one well bore. Based on that experience, MOGA contends that commingling production from these distinct reservoirs is wasteful, and the Upper Shales can be produced without waste by allowing a second well. Therefore, it seeks an amendment to the Antrim Order that allows a second well on Antrim drilling units, and twinning of Antrim wells in USPs, in Montmorency and Otsego Counties. This contested case is to determine whether that amendment is warranted under Part 615.

Production Qualities of the Upper Shales

John Wilkinson, an expert in petroleum engineering, testified in support of the MOGA Petition. Mr. Wilkinson has substantial experience in the development of the

Antrim Formation in the two counties with Ward Lake Energy and DTE Gas and Oil Company. Likewise, he has substantial experience with the Upper Shales and with attempting completions in this zone. Exhibit I is an Upper Shale completion summary for 56 wells operated by Ward Lake Energy in the subject counties. Over an average 95-day testing period, the average production of these 56 wells was 48 thousand cubic feet of gas per day (MCFD) and 70 barrels of water per well. Exhibits 2, 3 and 4 show long-term production from Upper Shale completions on three Ward Lake Energy wells where the Lower Antrim was bridge plugged while the Upper Shales were produced.[3] Two of the three wells show long-term production at or above 100 MCFD and the third well averages approximately 60 MCFD. Given the volume of gas produced by these wells, Mr. Wilkinson opined that the Upper Shales in these counties have the potential to make commercially viable gas wells under the present economic conditions Tr. p. 42.

This opinion is supported by the testimony and experience of the two other operators of Antrim wells in the two counties. Nelson Fairchild, a petroleum engineer with Quicksilver Resources, testified about Quicksilver's experience with the Elmer Fudd A-1 project. This project is in Oscoda County near the southern border of Montmorency County and, according to Mr. Fairchild, is substantially similar to the Antrim zones in Montmorency and Otsego Counties. Tr., p. 137. The Elmer Fudd A-1 project had 30 wells completed in the Lower Antrim that were producing a total of approximately 2.2 million cubic feet of gas per day (MMCFD). In 2001, Quicksilver tested three of these wells in the Upper Shales by placing a bridge plug to isolate that zone from the Lower Antrim, similar to the method used by DTE. These wells were tested for approximately 30 days and produced an average of 32 MCFD per well. Exhibit 14

The other witness on this issue was James Mills, a petroleum engineer with Dominion E & P. He testified that the State Briley A2-27 well was tested over a long

[3] A bridge plug is a device placed in the well that separates and isolates different zones of production

term in the Upper Shale zone by setting a bridge plug between it and the Lower Antrim Over a period of almost two years, the isolated Upper Shales produced an average of 90 MCFD. Later in the test period, another Upper Shale zone was completed yielding an additional 20 MCFD of gas. Exhibit 18. Mr. Mills found the Upper Shales to produce commercially sustainable volumes of gas.

Based on this testimony and the data presented in the Exhibits, I find the Upper Shales zone has sufficient quantities of gas to make it a commercially viable reservoir in and of itself.

The Problem with Commingling

As noted, the 2002 amendment of the Antrim Order allowed production of the Upper Shales zone through commingling. During the hearing on that matter, Mr. Wilkinson testified that it would not be economically efficient to drill a second well to recover resources from that zone. Rather, at that time his opinion was that these resources could be recovered from one well bore simultaneously with the Lower Antrim zone However, based on his experience with dual completions since the 2002 amendment, Mr. Wilkinson is now of the opinion that in most cases both the Upper Shales and Lower Antrim cannot be produced simultaneously through one well bore without causing waste. Tr. p. 104. The basis of this opinion is the large disparity in pressure between the two zones. Mr. Wilkinson testified that most of the current Lower Antrim wells are produced at approximately 40 pounds per square inch (psi). In contrast, the pressure in the Upper Shales where no production has occurred is generally over 500 psi.[4] This is typical of his observation that in areas where the Upper Shales zone has not been produced and the Lower Antrim has been produced, there is roughly a 400-psi difference between the two zones. As a practical matter, Mr. Wilkinson testified the large pressure disparity between the two producing zones makes it difficult or impossible to produce them simultaneously.

[4] The static pressure of a Otsego County well completed in a virgin area of the Upper Shales is 530 7 psi Exhibit 5

The data from two wells support Mr. Wilkinson's position. Specifically, Exhibits 6 and 7 show the results of a well that was producing an average of 120 MCFD of gas from the Lower Antrim. A bridge plug was placed in the well separating the upper and lower zones and the upper zone was completed. During a three-week test period in 1998, the upper zone produced 160 MCFD of gas. The bridge plug separating the two zones was then removed and production from the well monitored and tested. According to Mr. Wilkinson, one would expect the combined production to average 280 MCFD of gas; however, during the test period it produced only 198 MCFD. Producing both zones from the same well bore resulted in a loss of over 80 MCFD. Mr. Wilkinson testified that an analysis of the gas from the combined flow supports the conclusion that the Lower Antrim contributed little to the gas stream when commingled. Gas produced from the Lower Antrim contains a field-wide average carbon dioxide (CO2) content of 22 percent while the Upper Shales contain an average of slightly less than 2 percent. Exhibit 8. The commingled gas contained slightly more than 4 percent of CO2. Exhibit 9. A second well tested in a similar manner produced substantially the same results. Exhibits 10, 11, 12 and 13. In Mr. Wilkinson's opinion, these results support the conclusion that the commingled gas contained no significant contribution from the Lower Antrim zone. Tr. p. 41. He reasons that opening the Upper Shales causes water to fall down hole to the Lower Antrim because of its lower pressure gradient. This results in flooding the Lower Antrim, and thereby shutting off the flow of gas.

Nelson Fairchild's experience with the Elmer Fudd A-1 project for Quicksilver Resources resulted in similar problems with commingling production from the upper and lower zones. When separated from the Lower Antrim with bridge plugs, the wells were tested and produced from the Upper Shales for an average of 32 MCFD. Armed with this data, Quicksilver decided it would be economic to re-complete all 30 wells in the project and produce the gas from the two zones commingled. It also drilled an additional five in-fill wells that were completed in both zones. As a result, Quicksilver expected to produce an additional 800 MCFD from the existing wells and another 200 MCFD from the 5 new wells. Tr., p. 139.

Mr. Fairchild testified that as a result of re-completing and drilling five new wells, water production jumped from 150 to 2,000 bpd while gas production dropped from 2.2 to 1.9 MMCFD. After re-completion, the decline rate increased from 4.5 to 5.5 percent. Tr., p. 142. As can be seen from Exhibit 15, by January of 2005, the water production rate declined but gas production never rebounded to pre re-completion rates. The Elmer Fudd project, once re-completed in both zones, produced 1.0 MMCFD less than that anticipated by Quicksilver. In Mr. Fairchild's opinion, the Lower Antrim fracture system became water blocked because of flooding that zone with Upper Shales water. Tr., p. 144. The result is that the Lower Antrim in the Elmer Fudd project was "severely damaged" by the water block. Tr., p. 167. In Mr. Fairchild's experience, he has seen no successful dual completions where one zone was previously produced; and, in his opinion, there is no technical solution at this time to produce and commingle both the upper and lower zones. Tr., p. 185 and 210.

Mr. Mills, a petroleum engineer, testified Dominion's experience commingling and producing both the Upper Shales and Lower Antrim tracked that detailed by Mr. Wilkinson and Mr. Fairchild. The wells he tested had been produced in the Lower Antrim for some time and had a significantly lower pressure than that of the Upper Shales. When the Upper Shales zone was isolated from the Lower Antrim and re-completed, it produced significant quantities of gas over the test period. When the two zones were commingled, total production was either less than or slightly greater than that previously produced from the Lower Antrim itself. The gas analysis performed on the commingled wells support his conclusion that most of the gas produced came from the Upper Shales and the Lower Antrim was damaged by water coming from the upper zone Tr., p. 253. Exhibits 23 and 24 illustrate the effects of commingling the two zones in the Chester Field in Otsego County Gas and water production and CO2 content in this field are similar to the experiences related by Mr. Wilkinson and Mr. Fairchild. In Mr. Mill's opinion, commingling does not work on wells where there is a significant pressure differential between the Upper Shales and Lower Antrim zones. Allen

Hackman and Raymond Barnhart, both petroleum engineers for Dominion, share in this opinion. Tr., p.283 and 317, respectively

I find, as a Matter of Fact, where the Lower Antrim has been produced for a period of time it has a much lower formation pressure than that of the Upper Shales where no production has occurred. I find that because of the significant pressure differential in the two zones coupled with large amounts of water in the Upper Shales, commingling production from these two zones is not practicable. I find that commingling production from the two zones with these characteristics cause waste by damaging the production potential of the Lower Antrim.

Alternatives to Commingling

Mr. Wilkinson testified that the preferred approach to producing the Upper Shales and Lower Antrim would be to deplete the Lower Antrim to the point it is no longer commercial, and then come up hole and produce the Upper Shales where possible. Tr. p. 114. The benefit of this approach is its cost effectiveness and minimal disruption to the surface. However, its drawback is the length of time necessary to drain the Lower Antrim of commercial quantities of gas. This time span, coupled with the time it would take to subsequently drain the Upper Shales, is beyond the useful life of the infrastructure, including the compressors and flow lines. Mr. Barnhart testified that it could take 10 to 15 years to drain the Lower Antrim and another 10 to 15 years to drain the Upper Shales. Tr., p. 315. Both Mr Barnhart and Mr. Mills agree that the pressure differential problem between the two zones is a long-term problem. For the same reasons, shutting in the Lower Antrim and producing the Upper Shales to equalize pressure is not viable in that the existing infrastructure will need to be replaced. Tr., p. 321. According to Mr. Wilkinson, the result is substantially increased costs required to replace the existing surface equipment and this is not cost effective.

Another alternative method of capturing gas from the upper and lower zones through one well bore is to use two or three separate tubing strings in the well casing. However, most producing Antrim wells do not have adequately sized casing to

accommodate two tubing strings. Tr., p. 159, Exhibits 25, 26 & 27. In Mr Fairchild's opinion, where there has been production in the Antrim, there is technically no alternative to drilling a second well to optimally produce both the upper and lower zones Tr., p. 197 See also, Hackman, Tr., p. 285-288 and Barnhart, Tr., p. 320.

The only other alternative to producing both the Upper Shales and Lower Antrim contemporaneously in situations where there is a large pressure disparity between the two zones is to drill a second well to the Upper Shales. The MOGA Petition requests that a second well be allowed in these situations and that it be located within 25 to 200 feet of the existing Lower Antrim well. Mr. Wilkinson testified that producing both zones with separate wells provides a means to produce each of them as efficiently as possible. Tr. p. 104. Further, placing a second well on an existing drilling unit and within 25 to 200 feet from the existing well will cause little surface disturbance. Specifically, the second well will, in most cases, not require additional surface facilities, which minimizes surface impact. Mr Ringwelski, an environmental consultant, testified that surface impacts would be minimal using the existing well pad. In his opinion, impacts to groundwater are minimal because the second well would use the existing water flow lines, tanks and water injection wells. He testified that noise at the wellhead would increase during drilling, but that would be short-term. Nuisance noise during production is regulated under Part 615. In Mr. Wilkinson's opinion, the benefit of the additional gas recovered far outweighs the minimal surface impact of drilling a second well under the arrangement proposed in the MOGA Petition. Mr. Mills testified that the best candidate for a twin well is a location with Lower Antrim production and significant pressure differential between it and the Upper Shales Tr., p. 254. In Mr. Mill's opinion, a twin well in these situations is a necessary option to efficiently and effectively extract gas from the upper zone. Tr., p. 255.

Mr. Barnhart testified regarding the advantages of producing the Upper Shales from a second well on the drilling unit. One of the biggest advantages is that a twin well adds production when the existing infrastructure has the capacity to handle it. Sharing in these costs helps to spread them out over higher volumes of gas. With twinning,

there is also less surface waste than drilling a well at a different location. The existing roads, flow lines, well pad, and other surface facilities could be used for the twin well, eliminating the need for duplication. Tr., p. 322-324. However, in limited instances, some flow lines may need to be upgraded. The result of producing both the upper and lower zones simultaneously is that once both zones are drained, the surface facilities can be removed and the sites restored. As a result, twinning will result in the equipment being on a parcel for a much shorter period of time. Tr., p. 314.

Mr. Barnhart also provided an economic analysis of placing a twin well on an existing Antrim drilling unit. Exhibits 29, 30, 31 and 32. Exhibit 28 summarizes his findings. His model provided the following assumptions: 1) capital costs of $185,000; 2) a production rate of 40 MCFD peak with a 5% expected decline; 3) operating costs of $500/month; 4) gross reserves of 150MMCF and; 5) net reserves of 120MMCF. The only variable in the model was the gas price per MCF, and he factored four alternatives: $2.50, $3.50, $4.50 and $8.32. At $2.50 per MCF, the after tax rate of return was -0- after a payout life of approximately 16 years. The after tax rate of return at $8.32 per MCF was 29.05% and the after tax payout occurred between years 3 and 4. See Exhibit 28. In Mr. Barnhart's opinion, the twin well infrastructure and cost sharing would result in more gas being produced from the Lower Antrim before it is deemed non-commercial. In his opinion, twinning would have a positive impact on the economy in the state by increasing severance taxes and royalties and creating additional jobs.

The Parties also entered into a stipulation regarding the location of the twin well on the drilling unit:

> With respect to the wellhead location for any twin well, operator will attempt to stay in the footprint of the existing pad; and also operator will attempt to avoid expansion of the footprint of the existing well pad. If there is a need to expand the footprint of the existing pad, operator will submit documentation justifying the need to expand the footprint when the permit is applied for.
> Stipulation 1 (Tr., p. 229-230).

A second stipulation was entered on the location and use of mud pits.

> In an attempt to minimize mud pits; operator will, where practical, submit a plan that consolidates cuttings from up to four (4) wells in one pit. The +/- (3) wells without a pit will utilize a closed system. The cuttings will not be consolidated in one location without consent from the surface owner. Any pit will not be built without first identifying the location of the prior pit. In the event it is not feasible to have a consolidated pit, operator, upon demonstration to the DEQ, may have a pit for each well it can not (sic) consolidate.
> Stipulation 2 (Tr., p. 230).

I find that these stipulations are based in fact and adopt both as findings.

Based on this record, I find, as a Matter of Fact, if a twin well is permitted on a drilling unit, it must be located between 25 and 75 feet from the existing well. I find this requirement will provide the best protection against surface waste. I find that an operator may request a twin well location greater than 75 feet from an existing well, due to the proximity of surface equipment or for other reasons. The request must be accompanied by documentation justifying the alternative location.

Limits on Twin Wells

There are inherent physical limitations on drilling a second well on a drilling unit. First, Mr. Fairchild testified twinning is unfeasible in areas of both Counties where the Upper Shales cover depth is 150 feet or less. Regulations require that the well's surface casing be set 100 feet below the base of the glacial drift and that no zone within 50 feet of the casing's bottom may be fractured. Therefore, if the Upper Shale zone to be opened has 150 feet or less of cover, no completions could occur in that zone. Tr., p 146. Exhibit 16 is a map of Otsego and Montmorency Counties identifying the 150-foot cover line. Those areas north of the line would generally not be conducive to producing the Upper Shales under the existing rules. Additionally, both Mr. Fairchild and Wilkinson testified that twinning is unnecessary in areas where the Antrim Formation had not been extensively produced because the zones would not have a significant pressure differential. In these virgin areas, new wells could be configured to

produce both zones from one well bore and twinning would be unnecessary. See Tr., p. 186.

The Parties also entered into a stipulation regarding this issue.

> Petitioner will request that the scope of the Petition and Order be limited to the south 3 tiers of townships, excluding the northern tier of townships in Otsego and Montmorency County (sic). Exceptions could be granted in northern tier upon application for an exception and DEQ approval. Stipulation 4 (Tr., p 230).

This stipulation is a request, by MOGA, to limit the scope of its Petition as identified. The stipulation is accepted as an amendment to the Petition. I find, as a Matter of Fact, twinning may occur only in the south 3 tiers of townships in the two counties I find, the Supervisor may grant exceptions only if documentation justifies it is warranted. No well, whether a twin well or other, shall be perforated or have an open interval in a zone that does not have 150 feet or more of cover over the zone. I further find, as a Matter of Fact, in areas where production from the Antrim Formation has not significantly reduced the reservoir pressure, twinning would not be necessary because a new well could be configured to produce both zones.

Spacing Issues

Certain spacing issues will arise regarding spacing of twin wells where the Antrim was developed on 40-acre spacing versus that developed on 80-acre spacing under the Antrim Order. The Parties entered into a stipulation regarding this issue.

> 80-acre spacing, per 14-4-94 (sic) will control location of twin wells, even in areas developed on 40-acre spacing.
> Stipulation 5 (Tr., p 231).

The spacing of twin wells shall be in conformance with the Antrim Order, which is on 80-acre drilling units or in accordance with a USP approved by the Supervisor. In areas of the two counties where the Antrim Formation was developed on 40-acre spacing, a question arose on the location of twin wells. One approach would be to disallow twin wells on immediately adjoining 40-acre parcels to the north, east, south and west of a

40-acre parcel that is twinned. Only those 40-acre parcels touching the twinned 40-acre parcel on the diagonal would be eligible for a second well. Another approach would be to allow twin wells on 80-acre units comprised of immediately adjoining 40-acre parcels with a 1320-foot setback between wells. I find the spacing and location conditions under the Antrim Order adequately address this issue. In all instances involving wells on 40 acre units, operators are encouraged to submit a plan of development If an offset operator has concerns that it is not protected by a particular proposal, the offset operator may petition the Supervisor for relief.

Other Stipulations

The Parties placed several other stipulations on the record. Stipulation 3 pertains to a hypothetical question regarding any requested expansion of the scope of this order by MOGA, and evidence it agrees to proffer if it does seek other relief. Tr., p. 230. Stipulation 6 requests that certain individuals meet to discuss soil conservation issues and make suggestions to the DEQ. Tr., p. 231. Stipulation 7 discusses the formation of an Ad Hoc Committee made up of MOGA and private citizens in the Counties to hear issues and problems regarding oil and gas operations. Tr., p. 231. Mr. Sagasser, Mr. Caple, and MOGA also agreed to the concept of an Ad Hoc Committee to address oil field practice issues and concerns. They agreed, in principle, that operators should conduct a thorough engineering evaluation of the well and pipeline network prior to drilling a twin well. Further, they agreed that obsolete piping would be removed concurrently with installation of any new piping and not be abandoned in place.

Although these stipulations have merit, and the Supervisor strongly encourages this interaction, these are not stipulations of fact or matters that concern the merits of this case. That being said, it would be extremely fruitful for both the industry and citizens of these two counties to engage in an open dialog addressing concerns and implementing suggestions for improving oil and gas operations

CONCLUSIONS OF LAW

Based on the stipulations and the findings of fact, I conclude, as a Matter of Law:

1. Producing the Upper Shales by commingling production with previously produced Lower Antrim damages the Lower Antrim reservoir and causes underground waste. MCL 324.61501(q)(i).

2. To prevent the drilling of unnecessary wells, the Supervisor may establish a drilling unit for each pool. A drilling unit is the maximum area that may be efficiently and economically drained by one well. MCL 324.61513(2).

3. An 80-acre drilling unit is the maximum area that may be efficiently and economically drained by Antrim Shale Formation wells. Order No. (A) 14-9-94

4. Drilling unnecessary wells in the Antrim Shale Formation would cause waste. MCL 324.61513(3).

5 Twin wells will prevent excessive surface waste because the existing infrastructure is utilized and surface facilities and equipment would be removed much earlier than if the Upper and Lower Antrim were drained sequentially. MCL 324.61501(q)(ii).

DETERMINATION AND ORDER

Based on the Findings of Fact and Conclusions of Law, the Supervisor of Wells determines that to prevent waste, it is necessary to amend Order No. (A) 14-9-94 to allow twin wells on an Antrim drilling unit or within a USP in Montmorency and Otsego Counties.

NOW, THEREFORE, IT IS ORDERED:

1 The Petition of MOGA is GRANTED, consistent with the following limitations:

a. Twin wells are permitted only in those circumstances where alternative methods of production are, for the reasons set forth in this Order, wasteful.

b Drilling units are established as follows:

i. For an established USP, the USP boundary shall remain the same and each well within the USP is eligible to be twinned.

ii. Where a USP has not been established, the drilling unit size for twin wells is 80 acres. For wells with existing 80-acre units, pursuant to Order (A) 14-9-94, the unit for the Upper Shales shall consist of the same 80 acres.

iii. For wells drilled on existing 40-acre units prior to Order (A) 14-9-94, the unit for the twin well shall consist of two adjoining 40-acre units having a common 1320-foot boundary.

c. A twin well must be located between 25 and 75 feet from the existing well and be consistent with the intentions of Stipulation 1.

d. A twin well on an existing drilling unit must be at least 330 feet from the drilling unit boundary;

e. Mud pits shall be consolidated consistent with Stipulation 2

f. A twin well may be drilled in only the southern three tiers of townships in Montmorency and Otsego Counties, i.e., Townships 29N, 30N, and 31N.

g. This order is for the purpose of establishing well spacing only and neither establishes a right, nor diminishes any independent right, of the Petitioner to operate on the surface or subsurface lands of a surface or mineral owner.

2. To ensure greater flexibility in locating wells, and to minimize both surface waste and drilling of unnecessary wells, administrative exceptions to the drilling unit size (80 acres) and distance from the existing well (25-75 feet) may be granted by the Supervisor of Wells if warranted under Part 615. All other requirements of Order No. (A) 14-9-94, as amended, shall apply to twin wells.

Dated: Feb. 17, 2006

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