

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

RENAISSANCE ENERGY LTD.

APPLICATIONS FOR REDUCED DRILLING SPACING UNITS,

HOLDINGS AND MISCELLANEOUS ORDER

CESSFORD AREA

Examiner Report E 96-10

Applications No. 1000465 and 1000466

1 INTRODUCTION

1.1 The Applications

On 12 March 1996, Renaissance Energy Ltd. (Renaissance) applied to the Alberta Energy and Utilities Board (EUB) pursuant to sections 4.040 and 5.190 of the Oil and Gas Conservation Regulations and section 71.4 of the Oil and Gas Conservation Act, for

- C reduced drilling spacing units (DSUs) of one legal subdivision (Lsd) with a central target area, for the production of Mannville oil from the North half of Section 36, Township 25, Range 13, West of the 4th Meridian (N 1/2-36-25-13 W4M) and the S 1/2 and NW 1/4-1 and the E 1/2-2-26-13 West of the 4th Meridian (**Application No. 1000466, see Figure No. 1**), and
- C eleven holdings and a Miscellaneous Order which would provide for the production of two wells per zone per Lsd, with a 50 metre (m) buffer zone surrounding lands of non-common ownership, from the Cessford Mannville C Pool (**Applications No. 1000465 and 1000466, see Figures No. 1 and 2**).

At the hearing, Renaissance amended Application No. 1000466 to delete Lsds 9 and 16-36-25-13 W4M. It also filed a corrected mineral ownership map.

1.2 The Intervention

On 30 May 1996, Lario Oil & Gas Company (Lario), an offset operator and working interest in the Cessford Mannville C Pool, objected to the subject applications.

1.3 The Hearing

The applications were considered at a public hearing in Calgary, Alberta on 10 September 1996 at the offices of the EUB before Board-appointed examiners J. R. Nichol, P.Eng., R. J. Willard, P.Eng., and M. J. Vrskovy, P.Geol. Those who appeared at the hearing are listed on the following table.

THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations Used in Report)

Witnesses

Renaissance Energy Ltd. (Renaissance)
D. A. Holgate

B. R. Graham, P.Eng.
J. Clarkson, P.Eng.

Lario Oil & Gas Company (Lario)
R. Graham, P.Eng.

R. Graham, P. Eng.

Alberta Energy and Utilities Board staff
C. Lochhead
E. Smith, P.Eng.

2 BACKGROUND

Renaissance's areas of application cover 4.125 sections within the Cessford Mannville C Pool. The existing DSUs in the area of Application No. 1000465 are one Lsd. The existing DSUs in the area of Application No. 1000466 are a mix of two Lsds and quarter section.

Lario controls 3.5 sections of land adjacent to or between the areas of Application No. 1000465 and Application No. 1000466. The existing DSUs are a mix of oneC and two Lsds.

The general area comprises the northern portion of the Cessford Mannville C Pool (C Pool). Pool development has largely occurred on oneC and two Lsd spacing, with the exception of a small area controlled by Crestar Energy Inc. in the North-east quarter of Section 35-25-12 and Lsds 4 and 5 of Section 1 and the South-East quarter of Section 2-26-12 W4M. This area recently received approval of Application No. 1000972 for the production of four wells per Lsd (two wells producing from the upper zone and two wells producing from the lower zone) with a 50 m buffer zone. Crestar's application was identical to the Renaissance applications.

The C Pool is a heavy oil pool, discovered in 1951 and now subject to good production practice. Geologically, the C Pool is recognized as a Glauconitic channel sequence consisting of two upper sands (upper zone) which are in communication with each other and lacking pressure support, and a lower sand (lower zone) which is pressure-supported by an active underlying aquifer and generally not in communication with the upper sands. Within the lower zone there are localized conglomerate sequences and structural variations. Artificial fracturing of the upper zone and commingling of production in some wellbores has led to some localized communication between the upper and lower zones. Board pressure records show that primary depletion has lowered the reservoir pressure in the upper and lower zones from 10 000 kPa initially, to approximately 3000 and 6000 kPa, respectively. Produced water is reinjected into the lower zone. Crestar operates a waterflood scheme in the upper zone to the south of Renaissance and Lario properties.

Oil rates within and surrounding the area of application generally average less than 5 cubic metres (m^3/d). There are a few wells drilled into what are deemed "sweet spots" within the pool which have rates as high as $15 \text{ m}^3/\text{d}$. Total production from the C Pool is some 3133.3 thousands cubic metres (10^3 m^3), or approximately 11 per cent of original oil-in-place. The Board has set a recovery factor of 15 per cent.

3 VIEWS OF THE APPLICANT

Renaissance stated that the C Pool is underperforming on the existing spacing, and conservation gains would be realized with an increase in well density. The effective drainage radius per well (in both zones) was calculated to be less than one-half legal subdivision (8 hectares). In the upper zone, the small drainage area is a result of lower permeability and pressure decline; in the lower zone a result of variable lithology and water-coning. Under one Lsd spacing, Renaissance estimated the recovery factor on its properties to be in the order of 10 per cent. In its experience, 10 per cent recovery is well below that achieved in similar Mannville pools in different areas of the Province. These pools were presented as analogous and have been developed on reduced spacing, down to one-quarter Lsd (4 hectares) or less. Resultant recoveries have been in the 40 per cent range. Under the requested spacing, Renaissance believes recovery from the areas of application would approximately double; with an additional $71.5 \times 10^3 \text{ m}^3$ being contributed from the upper zone and an additional $334 \times 10^3 \text{ m}^3$ being contributed from the lower zone.

Renaissance stated that the thicker lower zone is its primary target for development. If reduced spacing is approved, it indicated that up to 15 additional wells (some horizontal) would be drilled in this zone by year-end. The information gained from these additional wells would assist in a waterflood design for the upper zone. Renaissance believes waterflooding of the upper zone as quickly as possible is necessary to mitigate the ongoing pressure decline. As an interim measure, Renaissance has built the necessary facilities and applied for approval to dispose of water into the upper zone through three existing wells. Renaissance indicated it was very concerned about the extent of pressure depletion in the upper zone and stated that the longer production from this zone continues without pressure maintenance, the more detrimental it will be to ultimate recovery. It estimated that the upper zone incremental waterflood recovery would be approximately $162 \times 10^3 \text{ m}^3$.

Noting conservation improvement was its intent, Renaissance indicated that offsetting Lario's "sweet spot" was not a major interest. Renaissance did not believe approval of its application would result in any inequities as reduced spacing was appropriate for the entire area and would be consistent with that already granted for Application No. 1000972 (Crestar Energy Inc.). Accordingly, Renaissance believes Lario has opportunities to optimize the performance of its lands and maintain equity. Renaissance views the requested 50 m buffer zone as standard for lease-line protection and utilized throughout the Province for the requested spacing. Renaissance explained that the absence of a minimum interwell distance in its application, is a fairly common practice in this type of pool and would facilitate the drilling of horizontal wells between existing wells.

Finally, Renaissance agreed to the importance of working closely with Lario to achieve optimum recovery from their respective properties.

4 VIEWS OF THE INTERVENER

Lario did not dispute that portion of Application No. 1000466 that requested DSUs of one Lsd for oil production from the Mannville. Its concern was for reduced spacing resulting in a well density of more than one well per Lsd (per zone). It stated that its properties in the Cessford Mannville C Pool are the only ones it operates in the province and as such, its was concerned that Renaissance would offset a few of its wells which were producing from "sweet spots". The Lario wells would then have to compete with additional offset wells and ultimately would produce less. Another concern was the possible need to drill additional wells, which it may not otherwise drill, in order to compete with Renaissance. It referenced the well at 2-4-26-12 W4M as its best well; producing 15 m³/d. The well's cumulative production of 136 10³ m³ since its on-production date of 1971, indicated to Lario that it was draining at least two Lsds. Newer offset wells at 1-4, 7-4 and 8-4 produce at 4.0, 1.4 and 8.6 m³/d, respectively with much higher water volumes.

Lario did not agree with Renaissance's conservation estimates but did not provide any pool-specific information to refute the widespread need for additional wells. Lario could not provide a recovery factor for the current development on its lands.

During the hearing, Lario submitted decline plots for an area in one of the fields offered by Renaissance as analogous to the C Pool. Based on its assigned decline rates of 11 per cent and 40 per cent, for before and after infill drilling respectively, Lario submitted that in this example additional wells were detrimental to recovery. Lario could not provide any information on well or facility characteristics that would provide for analysis or rebuttal.

Lario indicated that it had commissioned an upper zone waterflood study but acknowledged delays. Lario estimated that it might be ready by year-end to decide on a depletion strategy. It noted its study was based on one Lsd spacing and had not been designed to address a greater well density. From the results available, Lario agreed that further pool optimization was likely feasible. It wanted however to pursue optimization under a one well per Lsd density and believed two wells per Lsd to be premature.

Lario stated that reduced spacing of less than one Lsd should have a buffer zone separation from the lease-line of 75 m, not 50 m. It also stated there should be a minimum interwell distance imposed of 75 m. Lario did not provide any evidence to support either of these positions except to note any additional wells should be kept slightly further away from its "sweet spots" than 75 m.

Lario conveyed a position that it may not have understood the nature of Application No. 1000972 (Crestar Energy Inc.) which approved two wells producing from the upper zone and two wells producing from the lower zone with a 50 m buffer zone and no minimum interwell distance. Lario did acknowledge that Crestar's application, while offset to Lario lands, was not immediately offset to one of its "sweet spots".

5 VIEWS OF THE EXAMINERS

The examiners note general geological concurrence between Renaissance and Lario and believe both parties accept the need for further optimization of this pool. While the parties jointly participated in a geological study, the examiners believe their respective decisions to investigate depletion options separately and at a different pace and with differing philosophies, has resulted in the current disagreement. The focus on "sweet spots" also appears to distract from what is required for the pool in general. Renaissance's and Lario's land position will require that the parties work closely together in achieving effective and efficient depletion in future.

The examiners, in reviewing this case, have identified the need to address two issues. Firstly, what is the appropriate spacing for this portion of the pool? Secondly, should the stage of primary depletion be a matter for EUB conservation concern; and if so, how might reduced spacing impact on this? The examiners note the latter was not part of the applications submitted to the EUB and information was very limited. However, the apparent extent of the question and overlapping impact of more producing wells compels the examiners to have regard for the waterflood potential of the upper zone and the effect any further reduction in spacing might have on the ultimate recovery from a waterflood scheme.

With regard to the lower zone, the examiners accept the evidence provided that two wells per Lsd would provide a conservation improvement and reflect an appropriate base level for development. Equity would be protected through the normal application of buffer zones. In this regard, the examiners find no basis to approve any variance from the 50 m buffer zone requested by Renaissance and typically approved by the EUB for reservoirs of this nature.

With regard to the upper zone, the examiners are concerned about the reported stage of pressure depletion and possible delays to finalizing the design and implementation of a waterflood. The examiners believe any production associated with a further reduction in spacing prior to implementation of a waterflood, could unnecessarily jeopardize ultimate recovery. The examiners believe that the additional infill wells in the lower zone would collect considerable information in the upper zone and not delay depletion planning. As both the applicant and intervener indicated that they were working on waterflood designs, and given our concern, the examiners believe it would be inappropriate to approve a reduction in spacing of less than one Lsd for the upper zone. The examiners conclude that a further reduction in spacing for this zone should be viewed in the context of the design and implementation of a waterflood scheme and therefore recommend that the portion of the applications respecting the upper zone be denied without prejudice.

6 RECOMMENDATIONS

The examiners recommend that:

- (1) the portion of Application No. 1000466, requesting drilling spacing units of 1-Lsd for Mannville oil be approved,

- (2) Application No. 1000465 and that portion of Application No. 1000466, requesting Holdings and a Miscellaneous Order which would permit production from two wells per Lsd per zone be approved for the lower zone, only,
- (3) Application No. 1000465 and that portion of Application No. 1000466, requesting Holdings and a Miscellaneous Order which would permit production from two wells per Lsd per zone be denied for the upper zone at this time, without prejudice to a future application(s),
- (4) the Oil Department of the EUB monitor the depletion optimization for both Renaissance and Lario portions of the Cessford Mannville C Pool.

DATED at Calgary, Alberta, on 31 October 1996.

[Original signed by]

J. R. Nichol, P.Eng.

[Original signed by]

R. J. Willard, P.Eng.

[Original signed by]

M. J. Vrskovy, P.Geol.