



## Eravista Explorations Ltd.

Application for Special Gas Well Spacing  
Medicine River Field

April 25, 2006

**ALBERTA ENERGY AND UTILITIES BOARD**

Decision 2006-035: Eravista Explorations Ltd., Special Gas Well Spacing, Medicine River Field

April 25, 2006

Published by

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**ALBERTA ENERGY AND UTILITIES BOARD**

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**Calgary Alberta**

**ERAVISTA EXPLORATIONS LTD.  
APPLICATION FOR SPECIAL GAS WELL SPACING  
MEDICINE RIVER FIELD**

**Decision 2006-035  
Application No. 1374936**

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**DECISION**

The Alberta Energy and Utilities Board has considered the findings and recommendations set out in the following examiner report, adopts the recommendations, and directs that Application 1374936 be approved and that the pool order for the Medicine River Edmonton K Pool be amended to include Sections 27 and 34 in Township 38, Range 2, West of the 5th Meridian.

DATED in Calgary, Alberta, on April 25, 2006.

**ALBERTA ENERGY AND UTILITIES BOARD**

*<original signed by>*

B. T. McManus, Q.C.  
Acting Chairman



# ALBERTA ENERGY AND UTILITIES BOARD

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Calgary Alberta

## EXAMINER REPORT RESPECTING ERAVISTA EXPLORATIONS LTD. APPLICATION FOR SPECIAL GAS WELL SPACING MEDICINE RIVER FIELD

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Decision 2006-035  
Application No. 1374936

### 1 RECOMMENDATION

Having considered all of the evidence, the examiners recommend that Application No. 1374936 be approved and that the pool order for the Medicine River Edmonton K Pool be amended to include Sections 27 and 34 in Township 38, Range 2, West of the 5th Meridian.

### 2 INTRODUCTION

#### 2.1 Application

Eravista Explorations Ltd. Applied to the Alberta Energy and Utilities Board (EUB/Board), pursuant to Section 79, Subsection 4, of the *Oil and Gas Conservation Act* and Sections 5.190 and 15.160 of the *Oil and Gas Conservation Regulations (OGCR)* for the suspension of the drilling spacing units and target area provisions and to establish a holding for the production of gas from sands in the Edmonton and Belly River Groups in Section 33 of Township 38, Range 2, West of the 5th Meridian (Section 33-38-2W5M). The applicant proposed that within the holding, a maximum of two wells per section would be produced from the same pool and that a producing well would be a minimum of 600 metres (m) from any other well producing from the same pool and a minimum of 300 m from the boundaries of the holding.

According to Alberta Corporate Registry records, on January 1, 2006, Eravista Explorations Ltd. amalgamated with another Alberta business corporation to form Anderson Energy Ltd. For the purposes of this proceeding, the applicant has been identified as Eravista. However, as EUB records now indicate that Anderson Energy Ltd. has succeeded to Eravista's interests, the Board's decision on this application should be reflected in an approval that is issued to Anderson Energy Ltd.

#### 2.2 Interventions

ARC Resources Ltd. (ARC) filed an objection to the application with respect to the Medicine River Edmonton K Pool (Edmonton K Pool). ARC had acquired the mineral interests in Section 32 offsetting the area of application to the west and had a well producing from the Edmonton K Pool at 00/03-32-038-02W5/0 (3-32 well). ARC had no objection to the requested holding for all other Edmonton sands not designated as the Edmonton K Pool or to the Belly River sands.

International Sovereign Energy Corp. filed an objection to the application regarding the Edmonton K Pool but later withdrew its objection and did not appear at the hearing.

## 2.3 Hearing

The application was considered at a public hearing on February 8, 2006, in Calgary, Alberta, by Board-appointed examiners G. W. Dilay, P.Eng. (Chair), W. Elsner, P.Geol., and G. A. Habib. Those who appeared at the hearing are listed in Appendix 1.

At the close of the hearing, Eravista committed to respond to a number of undertakings. These were completed on February 9, 2006, and therefore the examiners consider the hearing to have been closed on that date.

## 3 BACKGROUND

The Edmonton K Pool is a nonassociated gas reservoir currently defined by the EUB to consist of Sections 28, 29, 31, 32, and 33 in Township 38, Range 2 W5M, and Sections 35 and 36 in Township 38, Range 3 W5M (see Figure 1). The pool was discovered in 2003 and has been producing since that time. As shown in Table 1, eight wells have produced gas from the Edmonton K Pool. Within the currently defined EUB Edmonton K Pool, a holding similar to that applied for by Eravista has been approved for Section 29, and similar holdings have been approved for Sections 25, 34, and 35 in Township 38, Range 2 W5M.

Table 1. Information for Edmonton K Pool wells

Unique Well ID	Well licensee	Finished drilling date	On production date	Average gas production rate for January 2006 ( $10^3 \text{ m}^3/\text{d}$ ) <sup>a</sup>	Cumulative gas production to January 2006 ( $10^6 \text{ m}^3$ ) <sup>b</sup>
00/14-28-038-02W5/0	Viking Holdings Inc.	Oct 17, 2003	Jan 2004	2.3	2.24
00/13-29-038-02W5/0	Husky Oil Operations Ltd.	Dec 7, 2003	Jul 2004	2.6	0.84
00/01-31-038-02W5/0	International Sovereign Energy Corp	Jul 2, 2004	Sep 2004	4.2	3.4
00/03-32-038-02W5/0	ARC Resources Ltd.	Jun 11, 2004	Feb 2005	5.7	2.94
00/05-33-038-02W5/0	Anderson Energy Ltd.	Mar 7, 2005	Jul 2005	8.7	0.41
02/08-33-038-02W5/0	Anderson Energy Ltd.	Jul 11, 2003	Jul 2003	5.6	8.16
00/12-35-038-03W5/0	Enerplus Oil & Gas Ltd.	Jul 31, 2003	Aug 2003	5.0	6.11
03/10-36-038-03W5/0	FET Resources Ltd.	Sep 17, 2004	May 2005	4.3	1.19

<sup>a</sup> $10^3 \text{ m}^3$ —thousand cubic metres.

<sup>b</sup> $10^6 \text{ m}^3$ —million cubic metres.

## 4 ISSUES

The examiners consider that the requested holding would establish the equivalent of reduced gas well spacing and they therefore consider that the application must satisfy at least one of the requirements specified in Section 4.040(3) of the *OGCR*, which states that

The Board shall not grant an application for an order...that would reduce the size of drilling spacing units to less than the size of normal drilling spacing units unless the applicant shows that

- (a) improved recovery will be obtained,

- (b) additional wells are necessary to provide capacity to drain the pool at a reasonable rate that will not adversely affect recovery from the pool,
- (c) the drilling spacing units would be in a pool in a substantial part of which there are drilling spacing units of such reduced size, or
- (d) in a gas field, increased deliverability is desirable.

The examiners believe that the issues are

- whether the application meets one or more of the requirements set out in Section 4.040(3) of the *OGCR* for the establishment of reduced gas well spacing, and
- whether granting the requested holding would result in any unacceptable inequity.

## **5 CONSIDERATION OF THE APPLICATION**

### **5.1 Views of Eravista**

Eravista argued that its application satisfied the requirements of Section 4.040(3) of the *OGCR* and therefore the application should be approved. It stated that

- improved recovery would be obtained,
- additional wells were necessary to drain the pool at a reasonable rate that would not adversely affect recovery from the pool,
- the reduced spacing would be in a pool in a substantial part of which there were drilling spacing units of similar reduced size, and
- increased deliverability would be experienced.

Eravista submitted that there were currently two wells in Section 33 targeting the Edmonton Group. The 00/05-33-038-02W5/0 (5-33) well was tied in and had gone on production for a brief period, at which time the 02/08-33-038-02W5/0 (02/8-33) well was shut in to avoid compliance issues. Eravista stated that the 5-33 well was required to protect its equity rights in Section 33 and to increase overall recovery from the pool.

Eravista interpreted that the Edmonton K Pool sands were in the Upper Edmonton Formation and part of a significant channel valley system that is mapable for several townships and trends west to east in Township 38, Ranges 2 and 3 W5M. Eravista provided a net pay map for the Edmonton K Pool, and its northern and southern boundaries of the pool are shown on Figure 1. Eravista stated that the log characteristics identifying the sands did not correlate well between wells, as would be expected in a channel depositional system that would be made up of multiple sand bodies filling the valley. It pointed out that the flow system would not occupy the whole cross-section of the valley at any one time but would wander about through time as the system filled with sediments. It stated that although tighter silts, shales, and finer sands accompanied the more porous reservoir sands in the channel, these tighter sediments had some permeability, so there was communication between the sands. Eravista stated that the channel was a high sand content river system, so that any vertical section through the channel would encounter permeable

sand bodies, but not necessarily the same ones laterally, especially over the distances that the current wells were spaced.

Eravista said that in January 2006 it had completed a pressure buildup test on its 02/8-33 well. The test did not show any interference from 27 days of production at the 5-33 well located about 895 m away from the 02/8-33 well. Eravista did further pressure analysis, which predicted that there would be little drainage at any appreciable distance from the 5-33 well after about 420 days of production. Eravista concluded that the ability of the wells in the Edmonton K Pool to produce from large drainage areas was restricted because the different high-permeability sand lenses were not always continuous and because of the high compressibility of the system due to the low reservoir pressure, coupled with the low production rates.

With respect to the pressure reduction shown on the pressure test conducted on the 3-32 well in October-November 2004, Eravista submitted that the pressure reduction was caused by production from the nearby 13-29 and 1-31 wells, 718 m and 825 m away from the 3-32 well respectively. Eravista argued that the pressure reduction was not caused by production from its more distant 02/8-33 well, about 2350 m away from the 3-32 well.

Eravista submitted that gas reserves estimated from a plot of pressure divided by the gas compressibility factor (P/Z) versus cumulative gas production had limited meaning due to the ineffective communication in the Edmonton K Pool. The measured pressures only represented the average pressures in the drainage areas of the wells, not the average pool pressure, and consequently a plot of P/Z versus cumulative gas production resulted in an unrealistically low estimate of the gas in place. Eravista contended that complex pools such as the Edmonton K Pool could not be accurately assessed by a plot of P/Z versus cumulative gas production using only a few data points.

Eravista reported that it had conducted a reservoir simulation study of the Edmonton K Pool. In order to achieve a reasonable pressure history match, Eravista had determined that the Edmonton K Pool needed to be redefined to extend from Section 31 to the middle of Sections 27 and 34 in Township 38, Range 2 W5M. Eravista used its reservoir model to predict gas production from the redefined Edmonton K Pool for three different cases, as shown in Table 2. Eravista concluded from its simulation study that it could not effectively drain the gas reserves in Section 33 with just the 02/8-33 well. Adding the 5-33 well would reduce the drainage of gas from Section 33 by other wells in the pool and result in a net pool incremental recovery of 3.5 million cubic metres ( $10^6 \text{ m}^3$ ) after 10 years (Case 4 versus Case 2). The simulation study predicted that there would be an additional pool incremental recovery of  $8.0 \times 10^6 \text{ m}^3$  if a second well were drilled and produced from Section 32 (Case 5 versus Case 4).

Table 2. Summary of reservoir simulation predictions<sup>1</sup>

	<u>Case 2: 5-33 shut in</u>		<u>Case 4: 5-33 producing</u>		<u>Case 5: 5-33 &amp; 8-32 producing</u>	
	Cum prod ( $10^6 \text{ m}^3$ )	Rate at end ( $10^3 \text{ m}^3/\text{d}$ )	Cum prod ( $10^6 \text{ m}^3$ )	Rate at end ( $10^3 \text{ m}^3/\text{d}$ )	Cum prod ( $10^6 \text{ m}^3$ )	Rate at end ( $10^3 \text{ m}^3/\text{d}$ )
Section 29	3.7	0.4	3.4	0.3	3.3	0.3
Section 31	12.8	1.2	12.2	1.0	11.8	1.0
Section 32	12.5	1.3	11.6	1.1	18.5	2.0
Section 33	<u>19.0</u>	1.5	<u>24.3</u>	2.0	<u>25.9</u>	2.4
<b>TOTAL</b>	<b>48.0</b>		<b>51.5</b>		<b>59.5</b>	

<sup>1</sup> Predictions of cumulative gas production (Cum prod) and gas production rates (Rate at end) after 10 years.

Eravista submitted that reduced spacing of two wells per section had already been approved for the Edmonton and Belly River sands within the Edmonton K Pool and in the vicinity of the pool. Within the Edmonton K Pool, Sections 29 and 34 had been approved for two wells per section. Also, two wells per section had been approved for Section 25, which Eravista believed to be in the same channel as Section 33 but which the simulation study indicated was hydraulically separated from the Edmonton K Pool. Eravista stated that elsewhere within Township 38, Range 2 W5M, 15 sections had been approved for two wells per section. It added that reduced spacing of two wells per section had also been approved for 8 sections within Township 38, Range 1 W5M, for 23 sections within Township 37, Range 2 W5M, for 20 sections within Township 37, Range 1 W5M, and for one section within Township 39, Range 1 W5M. Eravista concluded that the reduced spacing precedents within the Edmonton K Pool supported its position that production from both the 5-33 and 02/8-33 wells was needed to effectively recover reserves from Section 33 and to protect itself from drainage, given that reduced spacing was already approved for the adjacent Section 34.

Eravista stated that it would not be opposed to an application by ARC to establish the same reduced spacing in Section 32 as that proposed by Eravista for Section 33 and that, as a partner in Section 32, Eravista would support drilling and producing a second well in that section. Eravista submitted that a second well in Section 32, appropriately positioned, would result in incremental recovery that would be economic. It further added that the fact that ARC did not view the drilling of a second well in Section 32 as satisfying its own economic criteria should not be a reason to prevent Eravista from the opportunity to produce what it considered to be economically recoverable reserves from its own land.

## 5.2 Views of ARC

ARC argued that Eravista's application for reduced gas well spacing for the Edmonton K Pool did not satisfy the requirements of Section 4.040(3) of the *OGCR*. It stated that

- there was considerable doubt as to what the magnitude of incremental recovery was, if any;
- the reduced spacing would cause the pool to be drained at an unreasonably quick rate;
- a low percentage of the pool had previously been approved for similar reduced spacing; and
- increased deliverability was not necessary because of the high permeability of the pool.

ARC argued that two wells per section were not needed to adequately drain the gas reserves in the Edmonton K Pool. If Eravista's application were approved, ARC maintained that its equity position in Section 32 would be compromised, as a second well in that section would not be economic.

ARC submitted that while many of the wells in the Edmonton Formation in Townships 34 to 40, Ranges 1 to 5 W5M were in low-permeability reservoirs that could require 2 to 4 wells per section to adequately drain the reservoirs, the Edmonton K Pool could not be put in this category. It maintained that the Edmonton K Pool was in a channel that could be mapped over 12 to 15 kilometres and that it had high permeability, as shown by the 120 millidarcies (md) and 185 md permeabilities calculated from the pressure tests conducted on the 02/8-33 and 3-32 wells respectively. ARC provided a net pay map for the Edmonton K Pool, and its northern and southern boundaries of the pool are shown on Figure 1. ARC agreed that the log characteristics that identified the sands did not correlate well between wells and that this would be expected in a

channel depositional system made up of multiple sand bodies. ARC also stated that it did not believe that the silts and shales in the reservoir acted as true reservoir seals.

ARC stated that its concern regarding the limited reserve life for the Edmonton K pool arose upon the completion of its 3-32 well, where the presence of reservoir communication was confirmed by the pressure buildup test, which indicated the initial pressure was about 50 kilopascals (kPa) lower than that of the other wells in the pool, and by the fact that the pressure dropped during the test. ARC added that the pressure taken at the 02/8-33 well in January 2006 substantiated its concern, since the reservoir pressure of 643 kPa was almost 25 per cent lower than the initial pressure of 820 kPa in spite of the fact that most of the wells in the pool had had less than 18 months of production. ARC submitted that the lack of interference between the 5-33 and 02/8-33 wells during the pressure test on the 02/8-33 well was more likely due to the limited production period of the 5-33 well, rather than because of poor reservoir connection between the wells.

ARC estimated the recoverable reserves for the Edmonton K Pool to be about  $85 \times 10^6 \text{ m}^3$ , based on a plot of P/Z versus cumulative gas production. With about  $24.0 \times 10^6 \text{ m}^3$  of gas being produced to date, ARC estimated the reserve life index of the pool to be about 6.5 years. However, ARC agreed with Eravista that if the decline in production rate with time were considered, the reserve life of the pool would be about 12 to 15 years. ARC further noted that the reserve life of the pool could be cut in half if the operators in the pool were allowed to downspace to two wells per section, as this could more than double the current total pool production rate. ARC acknowledged that there was a limited amount of pressure data with which to estimate the gas reserves from a P/Z versus cumulative gas production plot. However, it argued that this limitation also applied to Eravista's reservoir simulation study, since the study involved matching the same limited pressure data. ARC also noted the negligible amount of permeability variation contained in Eravista's model, which used a constant permeability of 120 md throughout the reservoir except for a permeability of 185 md in the southwest quarter of Section 32. ARC contended that the permeability would be reduced towards the south and north edges of the pool, which would result in more effective drainage in the east/west direction. ARC stated that it was questionable as to how much incremental reserves would be recovered by a second well in Section 33 and that most of the  $3.5 \times 10^6 \text{ m}^3$  of incremental reserves predicted by the simulation study was likely due to accelerated production.

ARC argued that only a small percentage of sections in the Edmonton K Pool had already been approved for the same reduced spacing as that requested by Eravista for Section 33. Based on the EUB's existing pool boundary, only one of seven sections had been approved for reduced spacing. ARC recognized that Sections 25 and 34 were within its interpretation of the pool, but even with that interpretation, there would still only be 3 out of 12 or 13 sections that had previously been approved for reduced spacing.

ARC stated that as an oil and gas trust, the factors that it considered in determining the economic viability of drilling a well might differ from those of Eravista's. ARC pointed out that its main interest was maintaining a long-term sustainable cashflow, while Eravista was more interested in accelerating production. While ARC recognized that it could be economic for Eravista to drill a well for  $3.5 \times 10^6 \text{ m}^3$  of additional gas reserves, that would not be the case for ARC. ARC also submitted that increasing the well density in the Edmonton K Pool would create a larger footprint of oil and gas activity for the landowners, which in this case was not warranted.

### 5.3 Views of the Examiners

The examiners agree with the interpretations by Eravista and ARC that the Edmonton K Pool is within an extensive channel system that trends in an east/west direction for several kilometres. The net pay maps for the Edmonton K Pool provided by both parties did not identify the eastern or western boundaries of the pool, although based on reservoir simulation, Eravista interpreted the pool to extend from Section 31 to the middle of Sections 27 and 34 in Township 38, Range 2 W5M. The EUB-designated Edmonton K Pool presently extends from Section 35, Township 38, Range 3 to Section 33, Township 38, Range 2 W5M inclusive. The examiners note that both parties interpret wells 00/13-27-038-02W5M, 00/03-34-038-02W5M, and 02/03-34-038-02W5M to be within the Edmonton K Pool. The examiners believe that this is a reasonable interpretation and therefore recommend that Sections 27 and 34 be included in the Edmonton K Pool.

The examiners agree with both parties that the reservoir is made up of multiple sand bodies within the channel system. The examiners also agree with both parties that the log characteristics that identify individual sand bodies do not correlate well between wells and that the intervening sediments identified as mudstones or tight/cemented intervals are not completely impermeable, and therefore that they do not act as true reservoir seals. The examiners agree with Eravista that the mudstones and tight/cemented intervals, combined with multiple sand deposits, would tend to compartmentalize the reservoir. The examiners believe reduced well spacing could potentially result in incremental production from poorly connected sands.

The examiners believe there are several limitations regarding the reservoir model study conducted by Eravista to evaluate the effect of reduced spacing on gas recovery. For one, there is likely an acceleration component to the predicted incremental gas recovery of  $3.5 \times 10^6 \text{ m}^3$  between Case 2 and Case 4, as shown in Table 2, since both cases were run for the same length of time. Furthermore, the model had very little heterogeneity with respect to permeability, and so it is questionable whether the model adequately represented the geology of the reservoir. In addition, the evidence submitted at the hearing indicated that the 00/14-28-038-02W5M well was producing gas from the Edmonton K Pool (as well as from other Edmonton intervals), but the model study failed to include a producing well in that part of the section despite the northern part of Section 28 being included in the study. Finally, the model prediction that cumulative gas production and the gas production rate at the end of the model runs for Section 33 would be higher when a second well is produced from Section 32 (Case 5 versus Case 4, as shown in Table 2) is questionable.

Considering the above, the examiners are not convinced that the model can be relied upon to evaluate the effect of reduced spacing on gas recovery. Notwithstanding this assessment, the examiners accept that there could be a modest increase in gas recovery from the pool by producing two wells in Section 33 because of the geological nature of the Edmonton K Pool, as previously described.

The examiners note that ARC and Eravista are in general agreement that a reserve life estimate for the Edmonton K Pool of 12 to 15 years is reasonable when production decline rates are taken into account. The examiners believe that 12 to 15 years is a reasonable time period to drain the pool and hence do not believe that providing the capacity to drain the pool at a faster rate is a strong basis on which to approve reduced spacing for Section 33.

With the examiners' recommendation to include Sections 27 and 34 in the Edmonton K Pool, two of the nine sections in the pool would have reduced spacing of two wells per section. One of the sections (Section 34) is directly adjacent to Section 33, while the other section (Section 29) is diagonally adjacent to Section 33. The examiners consider the number of sections with reduced spacing and the proximity of these sections to the area of application to result in a substantial part of the pool already having reduced spacing of two wells per section.

The examiners are not aware of any specific reason to conclude that increased deliverability is desirable for the Edmonton K Pool and therefore do not believe this to be a strong basis for approving reduced spacing for Section 33.

As to the issue of whether reduced spacing for Section 33 would result in an unacceptable inequity to ARC, the examiners believe that the requested reduced spacing would not result in any inequitable drainage of ARC's gas. If a second well is required to maintain its competitive position in the pool, ARC could apply for reduced spacing in Section 32. The examiners note that Eravista stated it would not oppose an application by ARC to establish the same reduced spacing in Section 32 as that proposed by Eravista in Section 33 and that, as a partner in Section 32, Eravista would support a second well in that section. The examiners acknowledge ARC's contention that a second well in Section 32 may not meet its economic criteria. However, the examiners believe that ARC's investment strategy should not determine how the pool should be competitively produced, nor should it preclude Eravista from the opportunity to produce from a second well on its land.

The examiners note that the minimum interwell distance, buffer distance, and well density provisions proposed by the applicant are consistent with reduced spacing already approved by the EUB in the Edmonton K Pool.

## **6 CONCLUSION**

Based on the above, the examiners believe that Eravista's application meets two of the criteria upon which the Board may grant reduced spacing. Specifically, reduced spacing would result in improved gas recovery from the pool and the reduced spacing would be in a pool in a substantial part of which the Board has already approved spacing units of such reduced size. Approval of the application would not result in an unacceptable inequity to ARC, as it has the opportunity of submitting an application to produce two wells in Section 32. The examiners therefore recommend that the application be approved.

Dated in Calgary, Alberta, on April 25, 2006.

**ALBERTA ENERGY AND UTILITIES BOARD**

*<original signed by>*

G. W. Dilay, P.Eng.

*<original signed by>*

W. Elsner, P.Geol.\*

*<original signed by>*

G. A. Habib

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\* Mr. Elsner was not available for signing but agrees with the contents of this report.

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**APPENDIX 1 HEARING PARTICIPANTS**

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**Principals and Representatives**  
(Abbreviations used in report)**Witnesses**

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Eravista Explorations Ltd. (Eravista)  
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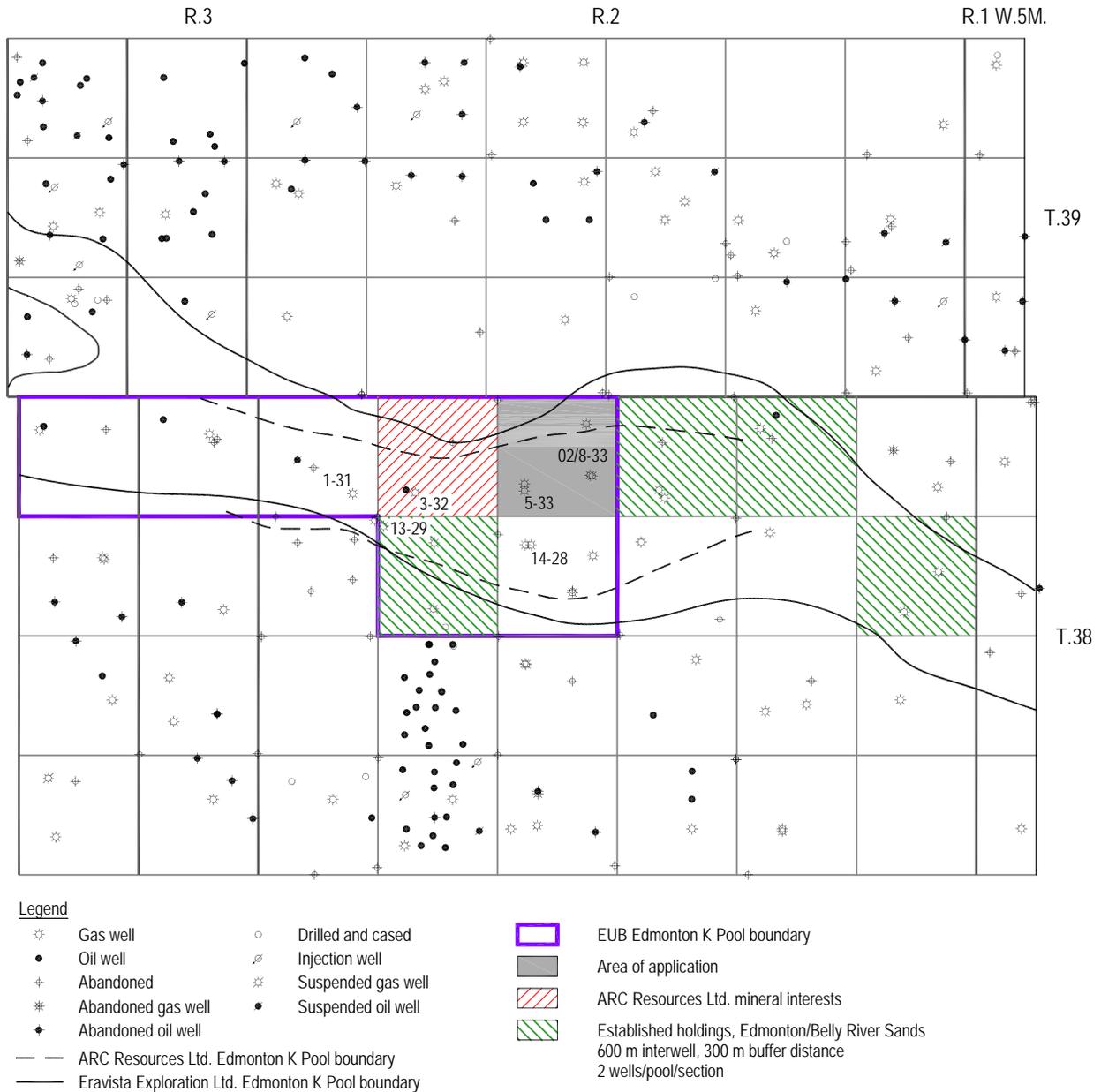


Figure 1. Medicine River Field