

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

**CABRE EXPLORATION LTD.
GAS INJECTION/RATEABLE TAKE
COMMON CARRIER/COMMON PROCESSOR
KAKWA A CARDIUM A POOL**

**Decision D 96-6
Application No. 950490**

1 INTRODUCTION

1.1 Application and Hearing

The subject application was considered at a public hearing by examiners appointed by the Board on 21 and 22 November 1995, and 5 December 1995. The examiners' recommendations respecting the disposition of the application are set out in Examiner Report E 96-3, dated 13 March 1996. The Board considered the examiners' recommendations and decided to further review the matters raised by means of a public Board hearing before making a final disposition of the application. In particular, the Board invited interested parties to file additional submissions providing quantitative analyses of the effect on conservation and equity of the following cases:

- the well with the unique identifier of 02/09-16-063-06W6 (the 9A-16 well) produces from the Kakwa A Cardium A Pool (the A Pool) without voidage replacement at the adjusted volumes recommended by the majority of examiners in Report E 96-3, while the Kakwa Cardium A Unit (the Unit) produces at the volumes suggested by the majority of the examiners in the report and continues to replace voidage through currently-existing injection wells for only its own production (Case 1),
- the 9A-16 well and the Unit produce at the unadjusted volumes suggested by the majority of the examiners in Report E 96-3, with the Unit providing full voidage replacement for both the 9A-16 well and for its own production through currently-existing injectors (Case 2), and
- the 9A-16 well remains shut in until blowdown while the Unit continues to produce and inject as it has historically done (Case 3).

Submissions were filed by Cabre Exploration Ltd., the owner of the 9A-16 well, and by Unocal Canada Resources, on behalf of the Unit.

At a public hearing held in Calgary, Alberta on 25, 26, and 27 June 1996, the Board heard further evidence and arguments respecting the matters raised in the application and in the additional material filed.

Those who appeared at the hearing and abbreviations used in the report, are listed in the following table:

THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations Used in Report)	Witnesses
Cabre Exploration Ltd. (Cabre) H. R. Ward	W. C. Farquhar, P.Eng., MBA J. D. Kay R. C. Bachman, P.Eng., MSc. of SIMTECH Consulting Services Ltd.
Unocal Canada Resources B. K. O'Ferrall	L. M. Doyle, P.Eng. L. Rice-Naas, MSc. C. C. Fortems, P.Eng., MSc. of Scientific Software-Intercomp R.D.A. Pike, P.Eng. of Can Tek Projects Inc.
Alberta Energy and Utilities Board staff M. J. Bruni H. L. Longworth, P.Eng. L. D. Martinuzzi, P.Eng. A.E.M. Wiechert, P.Geol.	

1.2 Preliminary Matters

At the opening of the hearing, the Unit requested a postponement of the hearing. It submitted that unitization is the best solution to the conservation and equity issues raised by the Cabre application. The Unit argued that the Board has an obligation to encourage unitization, and this would be achieved by the denial of the Cabre application on the condition that unitization takes place. The Unit offered to put the Cabre well on production at the rate supported by the majority of the examiners in Report E 96-3 under a fee structure identical to an earlier offer by Cabre. The Unit offer was for a 6-month period during which time a unitization agreement would be negotiated. If a unitization agreement was not achieved in that time period, the outstanding issues would be resolved by binding arbitration.

The Unit also argued that the hearing was premature because the parties have not been able to provide the information required for the Board to make an informed decision on the application. It submitted that a compositional model study would be required to adequately address the issues raised in the notice of hearing. However, it was not possible for such work to be completed for

this hearing in the time frame provided by the Board. The Unit indicated that it was prepared to proceed with a compositional model study.

Cabre opposed any postponement of the hearing. It submitted that unitization is always an option to resolve the matters in question, but it is not the only means to do so. The applicant noted that the Oil and Gas Conservation Act (the Act) has specific sections authorizing the Board to issue the requested orders.

Cabre was concerned that it would be at a disadvantage in unitization negotiations because the Unit is the sole source of information with respect to almost every aspect of unit operations. On the basis of its past experience, Cabre considered it unlikely that there would be complete disclosure by the Unit in negotiations. Further, it was Cabre's perception that its position and that of the Unit were so far apart on a number of issues that negotiations were likely to be fruitless. It concluded, given its past experience, that there would be no way of avoiding arbitration under the Unit proposal. Cabre considered that arbitration of unitization would require an unnecessary duplication of the evidence presented in its application. It also said that in any event, it would not be prepared to accept an arbitrator's decision on such a matter as environmental liability for the period prior to the Cabre lands being included in the Unit.

Cabre considered it inappropriate to postpone the hearing on the basis that the information filed was inadequate to allow a decision. It contended that the material it filed was responsive to the Board's request. Cabre also argued that a compositional model study was unnecessary, and could not be justified for a single well in a large pool.

The Board saw a need for the hearing, and decided to continue with the hearing as scheduled to receive evidence on the issues raised respecting the Cabre application.

2 ISSUES

The Board considers the issues to be

- the conservation issues associated with the three cases noted above,
- the equity considerations associated with the three cases in question, and
- the need for the applied-for gas injection, rateable take, common carrier and common processor orders.

3 BASIS FOR CONSIDERATION OF CONSERVATION AND EQUITY ISSUES

Both Cabre and the Unit presented tank reservoir models for discussion at the hearing. The parties used different assumptions on some matters and drew the conclusions summarized below.

3.1 Views of Cabre

Cabre presented a conventional reservoir model (a tank model) and maintained the results to be accurate within ± 10 per cent. In terms of engineering effort, that level of accuracy would probably be an acceptable number. The applicant considered that a compositional model would provide no more accuracy than a conventional model in this case, because adding a small percentage of pore volume to the fringe area of the pool would have an insignificant effect on the study. It argued that in this case, the preparation of an expensive and time-consuming compositional model would not be justified, and the Board already has sufficient evidence.

3.2 Views of the Unit

The Unit argued that a tank model was inadequate to provide a true quantitative analysis of the three cases raised by the Board. It maintained that the number of assumptions made for the model were subject to a significant amount of variation, leaving the results suspect. The Unit estimated a tank model in this case to be accurate within ± 40 to 50 per cent.

The Unit submitted that only a compositional model could provide an adequate quantitative analysis for the three cases in question. It disagreed with Cabre that adding the Cabre land on the fringe of the pool would not significantly affect the results of the study. In the Unit's opinion, the model would account for Cabre's land because there is a well on the land to provide data for input into the model. The Unit estimated the level of confidence for a compositional model to be between ± 10 to 20 per cent.

Because of the constraints imposed by the scheduling of the hearing, the Unit had not done a compositional model analysis of the three cases raised by the Board. However, the Unit intended to proceed with the model, as the results would be needed in any event to assist in determining appropriate management of the pool.

3.3 Views of the Board

While the Board is uncertain about the relative level of confidence that may be placed on the tank versus the compositional model results, it accepts the argument that a compositional model would be useful in determining some of the conservation and equity issues.

4 CONSERVATION CONSIDERATIONS

4.1 Views of Cabre

Cabre presented an analysis which showed that the liquid recovery from the pool would be 2667 thousand cubic metres, (10^3 m^3), $2691 \times 10^3 \text{ m}^3$, and $2652 \times 10^3 \text{ m}^3$ for Cases 1, 2, and 3, respectively. It was the applicant's opinion that retrograde losses would be very small under Cases 1 and 2, and the maximum reduction in oil production due to production of the 9A-16 well would be about 3400 m^3 . The applicant concluded that conservation is an issue from the

standpoint that the 9A-16 well should produce to effectively recover reserves on the fringe of the pool which may not be recovered if the well remained shut in; on an overall pool basis, the primary issue of concern in this situation is equity.

4.2 Views of the Unit

Although the Unit presented a tank reservoir model, it did not present any specific estimates of the effects on conservation of the three cases in question. It argued that a compositional model was required to provide a quantitative assessment of the conservation issue.

The Unit's estimates of reservoir pressure at the time of blowdown of the pool indicated that pressures would not be low enough to result in retrograde losses. However, the only way to clearly address this issue would be to use a compositional model.

The Unit also submitted that one question that should be examined was whether displacement of oil into the pressure sink caused by production of the 9A-16 well could result in conservation losses. However, it did not attempt any analysis of this issue, but maintained that a compositional model would be required to address the matter.

4.3 Views of the Board

The Board believes conservation to be an issue in this application. While it accepts from Cabre's evidence that the absolute level of recovery is uncertain, it believes that the relative level of recovery shows material conservation gains if the 9A-16 well is produced rather than shut in. The Board considers it reasonable that sweep efficiency would improve as more wells are added to the periphery of the pool. The Board believes that from a conservation standpoint, the 9A-16 well should be placed on production to provide a more effective sweep of, and recovery of reserves from, that portion of the pool. More specifically, producing the 9A-16 well should result in additional recovery of liquids from the pool. The Board therefore finds Case 3, where the 9A-16 well remains shut in, to be an unacceptable means of resolving the situation from a conservation perspective.

The Board also notes that significant additional conservation gains are made through voidage replacement. The Board agrees with the two parties that all efforts should be directed to resolve the issues that include the replacement of voidage during the cycling period.

5 EQUITY CONSIDERATIONS

5.1 Views of Cabre

Cabre noted that under the current arrangement, its reserves are being drained. The applicant considered Case 3, where its well remains shut in until blowdown while the Unit continued to produce and inject as it has done historically, to be unacceptable from an equity standpoint because of the ongoing drainage of its reserves that would occur in this scenario. The applicant

estimated that 8 per cent of its reserves would be drained by Unit operations if the 9A-16 well remained shut in. The rate of drainage for liquids was calculated to be 20.8 cubic metres per day (m^3/d). This situation would not represent a level playing field for all parties.

Under Case 1, the Cabre well would be allowed to produce, without voidage replacement, at one third of the rate it would produce under Case 2 (see below). Therefore, only one third of the drainage that would occur if the well were shut in would be mitigated. Although some drainage would continue to occur in this situation, Cabre was prepared to produce its well in this manner.

It was Cabre's opinion that under Case 2, where the 9A-16 well would produce with full voidage replacement, there would be no inequitable drainage occurring. The applicant considered this case as the optimum scenario, and subject to a fair arrangement with the Unit, to be the preferred option for resolving this issue.

5.2 Views of the Unit

The Unit accepted that some drainage of Cabre's reserves is occurring at the present time. It argued however that a tank reservoir model analysis provides only a relative sense of the equity issues in this situation and, prior to reaching agreement on the equity interests, a more precise compositional analysis was necessary.

The Unit's analysis showed that for either Case 1 or 2, production of the 9A-16 well would cause a pressure sink in the area of the well, and some 39.8 million (10^6) m^3 and some $128.3 \times 10^6 \text{m}^3$ of Unit fluids would migrate to the Cabre well for Cases 1 and 2, respectively. The Unit argued that any production from the 9A-16 well would therefore be inequitable.

In Case 3, the Unit estimated that some $4.1 \times 10^6 \text{m}^3$ of fluids would migrate from the Cabre lands to Unit wells. However, the Unit contended that such migration was not inequitable, because any production from the 9A-16 well would create more than ten times the inequity of keeping the well shut in. The Unit also argued that although its analysis showed a migration of fluids from Cabre's lands under Case 3, there is no equity issue, because Cabre has not been denied an opportunity to recover its reserves. In the Unit's opinion, if Cabre wanted to produce its well, it could do so immediately by accepting the Unit's offer for unitization (as described in section 1.2 of the report).

5.3 Views of the Board

The Board accepts that there continues to be on-going drainage of Cabre's reserves as a result of Unit operations. In the Board's view, equity issues would be satisfactorily resolved only if the parties were able to reach agreement to unitize the pool. Inevitably, to satisfy all parties this will require more disclosure about pool performance and study of the remaining resources attributed to the Unit and Cabre lands.

The Board does not accept the Unit's contention that any production from the 9A-16 well will necessarily result in inequitable drainage of Unit reserves. The Board agrees that if the 9A-16 well is producing, some Unit reserves may migrate to the Cabre lands and be produced from the Cabre well; however, some Cabre reserves may equally also be swept towards Unit lands and be produced from Unit wells. Providing that each of Cabre and the Unit receive an equitable share of reserves, the Board believes it is irrelevant as to whether the molecules being produced from a specific well originated on Unit lands or Cabre lands. The Board therefore finds Case 3, where the 9A-16 well remains shut in, to be unacceptable from an equity viewpoint.

The Board notes that the limited production, fluid analyses, and pressure data available to date for the 9A-16 well have required that both Cabre and the Unit make numerous assumptions in their respective case studies presented at the hearing. In addition, current information on the state of the cycling scheme is sparse, resulting in more assumptions. Therefore, while the production allocations proposed in Report E 96-3 may well be suitable, the Board recognizes that additional data from the cycling scheme and the 9A-16 well would be useful in reaching a reasoned solution for unitization of the pool.

Accordingly, the Board concludes that the 9A-16 well should be produced, fluid analyses and corresponding pressures (representative of reservoir conditions) should be taken from the 9A-16 well and Unit wells within the affected area around the 9A-16 well, and validated studies showing the effect of production of the 9A-16 well on equity should be done. The Board expects that the Unit's proposed compositional simulation model would be one of the studies undertaken, and if properly conducted with sufficient and accurate data, this study should provide a better understanding of the state of the cycling scheme and the impact of production from the 9A-16 well.

6 NEED FOR ORDERS

6.1 Views of Cabre

Cabre has been unable to resolve the impasse with the Unit and place its well on production. The applicant submitted that voluntary unitization has been an option to resolve the situation in question, and it would continue to be an option if the applied-for orders were issued. It has attempted to negotiate a mutually acceptable agreement with the Unit for a considerable period of time but has been unable to do so. This impasse prompted Cabre to seek a regulatory solution. In Cabre's view, the Act has specific provisions authorizing the Board to issue the requested orders that would allow fair production of the 9A-16 well. Indeed, given the inability of the parties to resolve the matter, the applicant concluded that these orders are the only means available of resolving the situation. No application for unitization has been filed, and the Board would be unable to deal with such an application.

Cabre submitted that, with the failure of negotiations to produce a mutually acceptable voluntary arrangement, it is not able to alleviate the on-going drainage of its reserves by Unit operations without the applied-for orders. The applicant said that it had met the requirements for these

orders, as indicated by the majority examiner view set out in Report E 96-3. Cabre considered that a rateable take order would be required under either its preferred option, Case 2, or under Case 1. In addition, common carrier and common processor orders would be required to provide unequivocal and equitable access to the Unit facilities. Cabre also submitted that, because significant drainage of its reserves has occurred over a long period of time, the effective date of the orders should be the date of the Cabre application, 27 June 1995. The orders should in any event be effective no later than 13 March 1996, the date of Report E 96-3.

6.2 Views of the Unit

The Unit acknowledged that the parties have been unable to reach a mutually acceptable voluntary arrangement. However, in the Unit's opinion, there was no need for the requested orders. Providing that Cabre accepted the Unit's offer respecting arbitrated unitization (as described in section 1.2 of the report), the Unit was prepared to immediately place the 9A-16 well on production, and to transport and process Cabre's gas without discrimination.

The Unit argued that unitization was the only equitable and realistic solution to the matters in question. Further, given the history of failed negotiations between the parties, unitization with use of a third-party arbitrator represented a workable method for expansion of the Unit.

In view of the foregoing, the Unit requested that the Board deny the Cabre application. In the Unit's view, this action would encourage both parties to negotiate.

The Unit opposed the issuance of a rateable take order, but if one were issued, it submitted that allocation under the order should account for the whole Unit, if not the whole pool, because this entire area appears to be in communication.

6.3 Views of the Board

The Board is satisfied that all reasonable attempts have been made to reach a voluntary arrangement. In the absence of such agreement and after an application is filed, the Board is bound by the statute to address the issues of conservation and equity if the issues persist. Given the ongoing drainage and potential conservation effects involved, the Board is prepared to issue the required orders to allow production from the Cabre well. In the Board's view, the most significant issue outstanding is the production rate to be attributed to the 9A-16 well. Given the conflicting studies presented by Cabre and the Unit and the paucity of reliable data, the Board is unable to verify the production rate attributed to the 9A-16 well by the examiners in Report E 96-3. It is not in a position to do that with confidence without production data from the 9A-16 well, fluid and pressure samples, and model studies as identified in section 5.3 of this report. Without this information, the Board is not prepared to issue the applied-for orders at this time.

The Board believes it should have reasonably sound evidence to attribute production rates for Cases 1 and 2. However, after hearing the evidence and arguments presented at the hearing, the Board believes that the numerous assumptions made in the case studies provided at the hearing

leave the results open to some question. Therefore, although directionally there should be a conservation advantage to producing the 9A-16 well as noted above, it is difficult to quantify these effects for Cases 1 and 2 because of the lack of convincing analyses.

While the provisions of the Act authorize the Board to issue the requested orders, it continues to strongly favour a negotiated settlement in these circumstances. In the Board's view, unitization would offer the most satisfactory solution to the matters raised in the Cabre application. Notwithstanding that preference, the Board is prepared to accept a resolution of the impasse based on either the premise of full voidage replacement or not.

The Board notes that Cabre has an offer to produce to Unit facilities with full voidage replacement subject to binding arbitration if unitization negotiations fail. The Board would recommend that Cabre accept the offer by the Unit to produce the 9A-16 well in good faith, based on the volumes proposed by the majority of examiners in Report E 96-3. The Board further recommends the parties negotiate a suitable agreement based on the additional data gathered on the 9A-16 well, and any model studies undertaken. The Board also notes the concerns by Cabre to reach an equitable solution in the absence of full disclosure by the Unit. The Board expects the above-noted additional data and model studies to provide sufficient information to redress that concern. The Board also accepts that Cabre should have the right to reject binding arbitration as part of its negotiation with the Unit. In the absence of a negotiated agreement the Board is prepared to consider all available data and modelling results and issue the requested orders based on either Case 1 or 2 that would allow production from Cabre's well.

Although the Board is not prepared to issue all of the requested orders at this time, it is prepared to issue an interim order which would allow production from the Cabre well under either Case 1 or Case 2, while negotiations for unitization continue.

7 CONCLUSIONS

The Board is of the view that a negotiated settlement, with immediate production from the 9A-16 well with full voidage replacement, offers the most optimum solution. To achieve that solution, the Board believes that up to a 12-month period, commencing with the date of this report, should be provided to allow for additional negotiations, the gathering of additional performance data, and for a compositional model study to be prepared by the Unit to address the conservation and equity implications of Cases 1 and 2. The compositional model should include data from the 9A-16 well and affected Unit wells, and Cabre should be permitted to take part in the study. It would be the Board's expectation that the Unit would honour its commitment to take production from the 9A-16 well at the unadjusted volume suggested by the majority of the examiners in Report E 96-3, with the Unit providing full voidage replacement for production from the well, for the period during which negotiations would take place to expand the Unit to include the Cabre lands.

The Board notes that Cabre's reserves have been drained for some time, and considers that Cabre should not be adversely affected by either the additional proceedings that have occurred or the

proposed delay for final disposition of its application. Therefore, subject to sections 37 and 42 of the Act, the Board is prepared to make a provision that the effective date of any allocation determined should be the date of Report E 96-3, 13 March 1996.

If a negotiated unitization is not achieved, or an impasse is reached by the parties in the interim, the matter may be returned to the Board by either party, together with all relevant data and study results, and a description of the positions which lead to the impasse. The Board would make a final disposition of Application No. 950490, based on the findings in this report and consideration of conservation and equity.

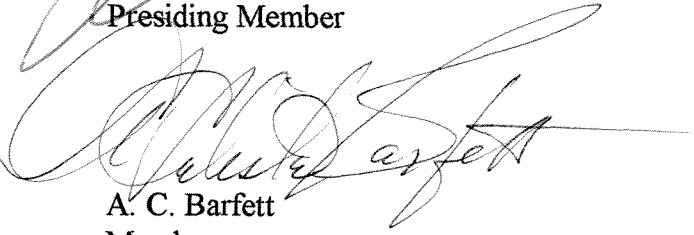
If the matter is brought back to the Board for decision, the Board would make a final disposition on each of the matters raised in the Cabre application, including an appropriate allocation for the Cabre well. If it is found that the rate at which the Cabre well has been producing is inappropriate, an adjustment will be made to compensate for any under or over-production.

DATED at Calgary, Alberta, on 26 September 1996.


ALBERTA ENERGY AND UTILITIES BOARD



E. J. Mink
Presiding Member



A. C. Barfett
Member



E. G. Fox
Acting Member