

ALBERTA ENERGY AND UTILITIES BOARD

IN THE MATTER OF THE ENERGY RESOURCES
CONSERVATION ACT, Ch. E-10 OF THE REVISED
STATUTES OF ALBERTA 2000;

AND IN THE MATTER OF PROCEEDING NO. 1457147
RESPECTING A REVIEW HEARING IN CONNECTION WITH
THE ISSUANCE OF CERTAIN WELL LICENCES, AND
COMPULSORY POOLING AND SPECIAL SPACING ORDERS
IN THE CLIVE, EWING LAKE, STETTLER AND WIMBORNE
FIELDS

PART 2

FURTHER WRITTEN ARGUMENT OF
DEVON CANADA CORPORATION

February 12, 2007

TABLE OF CONTENTS

| | |
|--|---|
| I. INTRODUCTION..... | 1 |
| II. RESPONSE TO ENCANA SURREBUTTAL | 1 |
| III. THE SEQUESTRATION PATENT | 4 |
| IV. THE EXCERPTS FROM WHITSON AND BRULE..... | 5 |
| V. THE GAS RESEARCH INSTITUTE REPORT..... | 7 |
| VI. SUMMARY | 8 |

I. INTRODUCTION

1. This further written argument is submitted in response to a letter from the Board¹ dated January 31, 2007 in which certain parties were informed that they would be allowed to make further written submissions. Specifically, the Board has allowed Devon to:
 - respond to EnCana's Surrebuttal Argument²;
 - address the arguments made by CDP and EnCana in respect of the Sequestration Patent;
 - respond to the excerpts from the Whitson and Brule text on Phase Behavior that were submitted by EnCana with its argument; and,
 - provide written responses to specific arguments from CDP that reference the Gas Research Institute Report titled "A Guide to Coalbed Methane Reservoir Engineering."

II. RESPONSE TO ENCANASURREBUTTAL

2. The EnCana Surrebuttal Argument asserts that the reasoning in *Continental Resources of Illinois Inc. v. Illinois Methane LLC* suggests a similar disposition here, i.e., a determination that a lease of "gas" does not include natural gas in coal.³ However, in advancing that position, EnCana has either overlooked or ignored several important matters that distinguish *Continental Resources* from the present dispute.
3. First, the entitlement to natural gas in coal in *Continental Resources* did not turn on the vernacular meaning of "coal."
4. Second, it is apparent from the *Continental Resources* decision that property law in Illinois differs fundamentally from that of Alberta. As the court stated, in Illinois:

Oil and gas are incapable of ownership until actually found and produced.⁴

No such limitation would be imposed by Alberta law and this "rule of capture" has been expressly rejected in Canada in the context of split title disputes.⁵

¹ Abbreviations and terminology used herein are consistent with those in Devon's Written Argument and Reply Argument.

² "Surrebuttal Argument of EnCana Corporation" dated January 4, 2007.

5. Notwithstanding EnCana's protestations to the contrary, it is abundantly clear that the rule of capture was integral to the Illinois court's disposition of the claims to ownership of the natural gas in the coal under the leased lands. Specifically, the court stated:

We therefore conclude that coalbed methane gas found in coal seams and /or mine voids is controlled by the coal estate. Under the rule of capture, coalbed methane gas cannot be owned until it is reduced to possession. Consequently, Continental does not and cannot own the coalbed methane gas at issue here.⁶

6. As is apparent from the decision and as further discussed below, it was determined in *Continental Resources* that the lease permitted the lessee to drill *through* the coal seams but not to drill *into* the coal and *develop* coalbed methane. The court reasoned that, since under Illinois law natural gas cannot be owned until it is captured, and the lessee was incapable of capturing the relevant gas without a right to drill *into* the coal seams, the lessee did not and could not own that gas.
7. Third, EnCana claims that ". . . the material lease wordings here are virtually indistinguishable from those [in *Continental Resources*]." ⁷ However, this is simply, and obviously, not the case.
8. To begin, the lessee in the *Continental Resources* case was granted ". . . all such rights as LESSOR has so to do" in respect of ". . . exploring, drilling, mining and operating for oil, all gases, liquid hydrocarbons and their respective constituent products . . . [etc.]" while the lessee under the Calgary and Edmonton Railway Company form is granted ". . . all the petroleum and natural gas, natural gasoline and related hydrocarbons other than coal . . . which may be found within, upon or under the said lands . . . together with the exclusive right and privilege to explore, drill for, . . . [etc.]" In other words, the Illinois lease grants rights to explore, drill and operate. The Alberta lease does that as well but, importantly, also grants an interest in the resource.

³ EnCana Surrebuttal, para. 2.

⁴ *Continental Resources*, at p. 901.

⁵ *Anderson v. Amoco Oil & Gas*, [2004] S.C.C. 49, at paras. 36-39.

⁶ *Continental Resources*, at p. 902

⁷ EnCana Surrebuttal, at para. 7.

9. The *Continental Resources* lease also specifically required the lessee to protect "coal veins" and "coal mine workings" and to case and cement holes drilled in or through "coal seams." It was the presence of these provisions in the lease that led the Illinois court to conclude that the lessee was allowed to drill through, but not into, the coal. The leases that are relevant in this case do not require the lessee to take any special measures with respect to coal seams and therefore could not support the conclusion that was reached in *Continental Resources*.
10. EnCana notes the lessee's obligation to cement wells, which is found in the "operations" clause of the relevant Alberta leases⁸ and argues that ". . . [the] covenant to cement, which the lessees expressly agreed to here, means that they are not entitled to CBM from the coals as in *Continental Resources*: if the lessees were entitled to 'all gases' flow between zones would not be prohibited by the leases."⁹ With respect, the referenced clause is in no way inconsistent with the position of the gas producers in this case. The obligation of the lessee is to ". . . properly shut or cement any wells drilled or being drilled . . . to prevent any flow of water into any porous strata or to prevent flow of any substances from one stratum to another" and the obvious purpose – indeed the stated purpose – is to protect the lessor's vested interest in preventing dissipation of the leased substances.¹⁰ The existence of these obligations in the leases cannot reasonably support the conclusion that EnCana urges upon the Board.
11. Finally, it should be noted that the *Continental Resources* decision is but one further example in which a state court in the United States has considered the peculiar wording of a particular lease. As Dean Percy observes, such decisions ". . . are of little

⁸ See for example the "Operations" clause in the first lease contained in Exhibit 05-066e-2006-08-25

⁹ EnCana Surrebuttal, at para. 9.

¹⁰ See for example the "Operations" clause in the first lease contained in Exhibit 05-066e-2006-08-25, which obligates the lessee to generally conduct all its operations on the leased lands in a "diligent, careful and workmanlike manner with a view to maximum total recovery of the leased substances . . ." and continues on to specify cementing and other requirements "without limiting the generality" of the foregoing obligation. See also Ballem, J., *The Oil and Gas Lease in Canada* (3rd ed., University of Toronto Press, Toronto, 1999), at p. 229: "The lessor retains a vested interest in the minerals; he is entitled to a royalty and if the minerals are lost or dissipated through the negligence of the lessee, the lessor has suffered damages."

precedential value because they depend heavily on the often idiosyncratic wording of the deed in dispute in a particular case."¹¹

III. THE SEQUESTRATION PATENT

12. CDP attempts to impeach Mr. Mavor's credibility by implying that there are inconsistencies between his evidence in this proceeding and the Sequestration Patent. CDP has suggested that the Board should "examine" Mr. Mavor's arguments ". . . in light of the statements made in the Sequestration Patent." Any such examination would confirm the value and credibility of Mr. Mavor's evidence.
13. For example, Mr. Mavor's evidence is that, from a reservoir engineering standpoint, natural gas flow through coal seams shares very similar characteristics with natural gas flow through other rock types.¹² CDP implies that this evidence is somehow inconsistent with the following discussion in the Sequestration Patent:

However, there are several reasons why conventional oil and gas stimulation techniques, most notably hydraulic fracturing techniques, either cannot be translated to CBM recovery or gas sequestration, or, if at all translatable, require significant modifications. *Generally, these reasons relate to differences in fracture pressure, formation stiffness, fracture geometry, and swelling of the distinctly different types of rocks from which conventional oil and gas deposits versus CBM are produced.*¹³
[emphasis added by CDP]

14. There is no inconsistency here. Rather, CDP is inappropriately comparing discussions of disparate topics. Mr. Mavor's evidence clearly refers to the *flow* of CBM while the relevant parts of the Sequestration Patent refer to hydraulic fracture stimulation methods, the pressure during hydraulic fracturing, rock mechanical properties and swelling of rock in *conventional* reservoirs.
15. Mr. Mavor's evidence is that the presence of adsorption phenomena and low permeability make coal seams unconventional gas reservoirs.¹⁴ As Mr. Mavor explained, natural gas

¹¹ Percy report, Attachment "A" to Exhibit 18-003-2006-09-29, at p. 18. See also the discussion at Percy report, pp. 16-18.

¹² Mavor report, at pp. 2 and 20.

¹³ CDP Final Argument, at para. 99.

¹⁴ Hearing transcript, Day 3 at p. 0411, ll. 3-25.

is adsorbed in coal but adsorption is not unique to coal. Similarly, gas diffusion is not unique to coal reservoirs¹⁵ nor is dual porosity. Moreover, the description of the porosity systems in coal included in Mr. Mavor's report is entirely consistent with the excerpt from the Sequestration Patent that appears in paragraph 100 of the CDP Argument.¹⁶ Simply stated, the Sequestration Patent is entirely consistent with Mr. Mavor's evidence in this proceeding.

IV. THE EXCERPTS FROM WHITSON AND BRULE

16. The Appendix to the EnCana Argument includes excerpts from Whitson and Brule that were not introduced as evidence in the hearing. EnCana's purpose would seem to be to attempt to support its assertions that ". . . the critical temperature of pure methane is relevant specifically to describing the phase behaviour of pure methane, but not of CBM as it is not pure methane"¹⁷ and that ". . . there is no substance to the CNG producers' assertion that it is 'impossible for natural gas stored in coal to be a liquid'. "¹⁸ Two observations are warranted.
17. First, EnCana seems again to be striving to create confusion and complication where none should exist. The science is clear and irrefutable but EnCana stubbornly refuses to accept it – although it is noteworthy that it has at least conceded the relevance of the critical temperature of methane to its phase behaviour.
18. There is no disputing that the cricondenthem temperature of natural gas in coal may be higher than the critical temperature of pure methane. However, that cricondenthem temperature would still be far, far, below the temperatures of Alberta's Ardley, Mannville and Horseshoe Canyon coals. It is disingenuous of EnCana to suggest otherwise.
19. Second, it must also be said that the introduction of new evidence in the EnCana Argument has created a quandary for Devon. On the one hand, Devon remains respectful of the Board's process. On the other, Devon bears a responsibility to ensure that the Board is not misled by the new evidence that appeared in the EnCana Argument.

¹⁵ Hearing transcript, Day 3 at p. 0390, ll. 15-24.

¹⁶ Mavor report, Attachment "A" to Exhibit 18-001-2006-08-25 at pp. 6-10.

¹⁷ EnCana Argument, Appendix, at p. 1.

¹⁸ EnCana Argument, Appendix, at p. 4.

Unfortunately, in order to discharge that responsibility it is necessary for Devon to offer the information that appears in the following two paragraphs.

20. The EnCana Argument references Figure 3.14 from the Whitson and Brule text in support of the claim that methane can exist as a liquid above its critical temperature.¹⁹ However, what EnCana fails to explain is that the density values for both methane and ethane that are provided in the referenced Figure are fictitious – as so-characterized by the originator of the Figure.
21. Standing and Katz published the original version of the Figure in 1942.²⁰ Standing discussed it in detail in 1952.²¹ According to Standing, the Figure was designed as an intermediate step to calculate the density of crude oil at elevated (*in situ*) pressure and temperature conditions using a variation of ideal solution theory.²²
22. The following passages are taken from Standing (1952) and speak to the density values that appear in Whitson and Brule Figure 3.14:

When applying the ideal solution method to liquid systems that contain large quantities of dissolved gases it is apparent immediately that is impossible for such systems to continue to be all liquid when brought to atmospheric pressure and temperature. However, this physical limitation does not impair the mathematical use of atmospheric liquid densities of methane and ethane in an ideal solution calculation, because the "pseudo-liquid density" of the system at atmospheric conditions is only a stepping stone to the evaluation of the density at elevated pressure and temperature.

In other words, the apparent liquid densities of methane and ethane are *fictitious* densities and are the values which, used in an ideal solution calculation with the true liquid densities of other compounds, give an atmospheric system density that can be corrected to elevated pressures and temperatures by suitable compressibility and thermal expansion factors. [emphasis added]

¹⁹ The Figure is captioned "Apparent liquid densities of methane and ethane (from Standing); see the excerpt from Whitson and Brule attached to EnCana Argument, Appendix, at p. 30. See also EnCana Argument, Appendix, at pp. 2-3.

²⁰ Standing, M.B. and Katz, D.L.: "Density of Crude Oil Saturated with Natural Gas," *Transactions*, AIME 146, 159 (1942)).

²¹ Standing, M.B.: *Volumetric and Phase Behaviour of Oil Field Hydrocarbon Systems*, Reinhold Publishing Corporation, New York (1952), at p. 33 ("Standing (1952)").

²² Ideal solution theory says that mixing two liquids together results in a liquid that has a volume that is the sum of the volume of each of the original liquids.

V. **THE GAS RESEARCH INSTITUTE REPORT**

23. The CDP Final Argument includes an excerpt from Chapter 4 of "A Guide to Coalbed Methane Reservoir Engineering" published by the Gas Research Institute²³ and implies that Mr. Mavor's evidence in this proceeding is inconsistent with these earlier writings. Nothing could be further from the truth.

24. The excerpt from the GRI Report included in the CDP Argument is as follows:

The density of the gas in the free state is computed from the real gas law as a function of composition, temperature and pressure. The density of the *gas* in the sorbed state is either *assumed* to be equal to the density at the boiling point or computed from an equation of state. The liquid densities for methane, nitrogen, and carbon dioxide used in this relationship are 0.421 g/cm³, 0.808 g/cm³, and 1.18 g/cm³, respectively. [emphasis added]²⁴

25. The claim by CDP is that:

Notwithstanding his expressed concerns during this Proceeding, in the GRI Report, Mr. Mavor assumed that the density of sorbed CBM equalled that of liquid CBM. It is difficult to imagine anything more "liquid like" in terms of density.²⁵

26. However, CDP conveniently ignores the fact that the passage from the GRI Report refers to the density of the adsorbed *gas* – which is entirely consistent with Mr. Mavor's evidence that NGC is a gas *in situ* in an undisturbed reservoir.

27. Similarly, CDP ignores Mr. Mavor's testimony that there are reasons to believe that the density of the adsorbed gas is quite a bit lower than the liquid density.²⁶ It also fails to acknowledge that the relevant passage in the GRI Report refers to "*assumed*" values for the adsorbed densities used in a specific relationship and did not characterize the adsorbed molecules as being in the liquid state.

²³ GRI Report, CDP Final Argument, Appendix "A".

²⁴ CDP Final Argument, at para. 91.

²⁵ CDP Final Argument, at para. 92.

²⁶ Hearing transcript, Day 3, pp. 0357, 1. 2 -0359, 1. 12.


28. Finally, it is worth re-emphasizing in this context that Dr. Levine's estimates of the density of "sorbed" methane in coal are substantially greater than the values listed in the excerpt from the GRI Report upon which CDP now seems to place so much reliance.²⁷

VI. SUMMARY

29. *Continental Resources* is a decision of a state court in the United States that concerns the peculiar wording of a particular lease. As such, it is of little precedential value. Further, its facts can be readily distinguished from those of the present case. It certainly does not suggest a similar disposition here.

30. A careful and fair reading of each of the Sequestration Patent, the excerpt from Whitson and Brule, and the GRI Report, confirms the credibility and value of Mr. Mavor's evidence. The Board should reject any suggestion to the contrary and give that evidence the substantial weight and consideration that it deserves.

ALL OF WHICH IS RESPECTFULLY SUBMITTED FEBRUARY 12, 2007.



Douglas E. Crowther
Thomas P. O'Leary
Counsel for Devon Canada Corporation

²⁷ On this and related points, see the Joint Argument of ConocoPhillips Canada Resources Corp., Devon Canada Corporation, Fairborne Energy Ltd., Quicksilver Resources Canada Inc., Canpar Holdings Ltd. and Centrica Canada Limited dated November 15, 2006, at paras. 31-37.