

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

CASE RESOURCES INC.

ENHANCED OIL RECOVERY SCHEME

OIL WELL EFFLUENT AND WATER PIPELINES

CARROT CREEK FIELD

Decision 2002-032

Applications No. 1072552, 1072554, 1096705

1 DECISION

The Alberta Energy and Utilities Board (EUB/Board), having considered all the evidence and the commitments made by the applicant, approves Application No. 1096705 for an amendment of Approval No. 7947 as conditioned in the attached appendix. Further, the Board denies Applications No. 1072552 and 1072554 for the water and oil well effluent pipelines without prejudice to any future application. The reasons for the Board's decision are presented below.

2 INTRODUCTION

2.1 Applications, Intervention, and Hearing

Case Resources Inc. (Case) filed

- Application No. 1072552, pursuant to Part 4 of the Pipeline Act, to construct and operate approximately 4 kilometres (km) of pipeline with a maximum outside diameter (OD) of 88.9 millimetre (mm) extending from an existing battery located in Legal Subdivision 12 of Section 12, Township 53, Range 13, West of the 5th Meridian (LSD 12-12-53-13W5M) (12-12 battery) to an existing well in LSD 16-15-53-13W5M (16-15 well), for the purpose of transporting produced and fresh water;
- Application No. 1072554, pursuant to Part 4 of the Pipeline Act, to construct and operate three pipelines approximately 6.6 km in total combined length with a maximum OD of 88.9 mm extending from existing oil wells in LSD 14-11-53-13W5M, LSD 8-14-53-13W5M, and LSD 12-15-53-13W5M (the 14-11, 8-14, and 12-15 wells respectively) to the 12-12 battery, for the purpose of transporting oil well effluent; and
- Application No. 1096705, pursuant to Section 39(1)(a) of the Oil and Gas Conservation Act, to amend Approval No. 7947 respecting an existing scheme for the enhanced recovery of oil by water injection in a part of the Carrot Creek Cardium GG Pool (the GG Pool), by adding the 16-15 well as an injector for the scheme.

The proposed pipelines and wells associated with the enhanced oil recovery scheme are shown on Figure 1.

Bruce and Elizabeth Webb (the Webbs) filed a submission opposing the applications, citing concerns about the impact on domestic and livestock water supplies, the route selection of pipelines, constraints that pipelines put on their use of their lands, inadequate communications with Case, and problems with current operations. The Webbs own or lease property in the area of the proposed scheme, as shown on Figures 1 and 2.

The applications were considered at a public hearing on December 13, 2001, at Niton Junction, Alberta, before a panel comprising G. J. Miller (chair), Board Member, and Acting Board Members R. J. Willard, P.Eng., and R. G. Evans, P.Eng.

Following the public hearing, the EUB sent a letter dated February 11, 2002, requesting clarification of some statements made by Case at the hearing. Case provided additional information dated February 13, 2002, with the EUB and the Webbs. The Webbs then filed a response dated February 21, 2002, and Case filed additional comments on February 27, 2002.

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

THOSE WHO APPEARED AT THE HEARING

Principles and Representatives (Abbreviations Used in Report)	Witnesses
Case Resources Inc. (Case) Patrick Keck	Roger Clissold, of Hydrogeological Consultants Ltd. Patrick Keck Kelly Nichol Sye O'Malley
Bruce Webb and Elizabeth Webb (the Webbs)	Bruce Webb Elizabeth Webb
Alberta Environment ¹ (AENV) Edward Hoyes	Edward Hoyes Robert George
Alberta Energy and Utilities Board staff J. P. Mousseau, Board Counsel P. Derbyshire K. Fisher B. Roy	

¹ AENV appeared as a Friend of the Board to explain groundwater allocation policy for oilfield injection and answer questions about the water licence that Case has under the Water Act.

2.2 Background

The GG Pool was discovered in 1983 with the drilling of a well in LSD 6-15-53-13W5M and is currently designated as shown on the figures. The multiwell pool began producing in 1983, and by February 1995 the 13 wells that had produced were either abandoned or shut in because of low oil flow rates. Cumulative production during this period totalled 54.2 thousand cubic metres (10^3 m^3) of oil and 44.1 million m^3 of gas.

In 1996, Murwell Resources Ltd. (Murwell) applied for an enhanced oil recovery scheme by water injection into the wells in LSD 16-11 and 12-12-53-13W5M (16-11 and 12-12 wells). The EUB granted the application by the issuance of Approval No. 7947 in April 1996 for the pool area shown on Figures 1 and 2.

EUB records indicate that water injection commenced in both wells in May 1996. Injection was suspended in the 16-11 well in May 2000 and continues in the 12-12 well. There are currently three producing oil wells located in LSD 16-1, 6-12, and 8-12-53-13W5M. Since the scheme began operating, an additional $14 \times 10^3 \text{ m}^3$ of oil and $500 \times 10^3 \text{ m}^3$ of gas have been produced from the GG Pool, as reported to the EUB as of November 2001.

The water injected into the 12-12 well is usable² groundwater obtained from a well located at the 12-12 battery (the Case water source well) and reinjected produced water. Murwell obtained Licence No. 19960429 from AENV, which allows the use of a maximum of 19.3 million imperial gallons ($87.7 \times 10^3 \text{ m}^3$) of water obtained from the well annually at a maximum pump rate of 40 imperial gallons (0.182 m^3) per minute for injection into the GG Pool.

An observation water well located near the Case water source well is used for monitoring purposes pursuant to the water diversion licence (the 12-12 observation well).

Case acquired an interest in the GG Pool in 1999 from Murwell's successors in the pool and has continued to operate the waterflood scheme.

3 ISSUES

The Board considers the issues respecting the applications to be

- the need for the amendment to the enhanced oil recovery scheme and, if needed, the impacts, including the proposed water source;
- the need for the proposed pipelines and, if needed, the routing of the pipelines; and
- other matters.

² EUB *Statistical Series (ST) 55: Alberta's Usable Groundwater Database* defines an aquifer containing usable groundwater as a stratum capable of producing water with a total dissolved solids content less than 4000 milligrams per litre.

4 CONSIDERATION OF APPLICATION NO. 1096705 FOR AMENDMENT OF THE EXISTING ENHANCED RECOVERY SCHEME

4.1 Views of the Applicant

Case submitted that the purpose of the subject application was to allow the recovery of additional oil from the GG Pool. It said that there was a need for additional oil reserves in Alberta, as provincial oil reserves continued to decline while demand increased.

The applicant noted that the GG Pool had recovered only 3.5 per cent (%) of the oil in place. Data from analogous Cardium pools showed that an additional 8 to 10% could be recovered with the implementation of water injection schemes. An additional 10% recovery from the GG Pool would equate to incremental recovery of 1.2 million barrels (bbl) ($190.7 \times 10^3 \text{ m}^3$) minus 81.3 10^3 bbls ($12.9 \times 10^3 \text{ m}^3$), the volume that had been recovered since the commencement of the existing waterflood scheme in 1996. Case submitted that these reserves would not be recovered if the proposed additional injection of water into the reservoir did not proceed. It estimated that the project would cost in the vicinity of \$2 million and might net some \$10 million in today's dollars over a 15-year life.

Case submitted that the performance of the southern portion of the GG Pool where water was being injected into the 12-12 well had demonstrated that water injection was beneficial for this pool. It said that the combined oil production from the three producing wells had increased from 6 bbl/day (bbl/d) ($0.95 \text{ m}^3/\text{d}$) to about 100 bbl/d ($15.9 \text{ m}^3/\text{d}$) since the waterflood was implemented in 1996. While the pressure in the southern portion of the pool was maintained by water injected into the 12-12 well, the northern portion of the pool had not responded to the water injection, and, therefore, additional water injection was required in that specific area of the pool. Case indicated that most oil reservoirs required more than one injection well to efficiently sweep the reservoir and that the GG Pool was no exception. The applicant proposed the 16-15 well as the additional injector, as it was suitably located in the reservoir. It noted that the well also met the technical requirements for an injection well as set out in EUB *Guide 51: Injection and Disposal Wells, Well Classifications, Completion, Logging and Testing Requirements*.

The applicant indicated that production from the 14-11, 8-14, and 12-15 wells in the northern portion of the pool would occur only after the reservoir in that area had been repressurized. Case anticipated that it would take about 320×10^3 bbl ($50.8 \times 10^3 \text{ m}^3$) of water injected over a period of 8 to 10 months to repressure the northern portion of the GG Pool from current levels of 200 to 300 pounds per square inch (psi) (1379 to 2068 kilopascals) (kPa) to near initial levels of 1500 to 2000 psi (10 342 to 13 790 kPa). As injected water migrated to the pumping oil wells and was produced, the produced water would be reinjected, thereby reducing the daily make-up water injection needs. The total volume of fresh water required to maintain the reservoir pressure thereafter would be about equal to the volume of oil produced.

Case proposed that water injected into the 16-15 well for the enhanced recovery scheme be taken from the Case water source well under the provisions of its existing AENV water diversion licence. It submitted that investigations undertaken in 1996 prior to the development of the Case water source well and the 12-12 observation well had determined that there were no alternative water sources, such as surface water or saline groundwater, that could provide enough water for

the injection scheme. Case also noted that the water proposed for injection was not potable, as it had 2.78 parts per million (ppm) fluoride, which was in excess of the Canadian standard for drinking water of 1.5 ppm.

The applicant further indicated that using fresh water from the Case water source well for injection would not cause any adverse effects. It noted that the producing aquifer from 64.6 to 82.9 m in the Case water source well was below the producing aquifer of all domestic and stock water wells in the area, including the Webb domestic water well (located 1395 m northwest of the Case water source well), which was 21.3 m deep. Taking into account the surface elevations, the producing interval of the Webb well was 43.3 m higher than that of the Case water source well. Case stated that given this difference in elevation of the aquifers, there was no reason to believe that there was any connection between the aquifers in the Case water source well and Webb water wells. Hence, pumping the Case water source well would not have any impact on the Webb wells. The applicant submitted that the groundwater investigations done in 1996 when the water levels in the Webb domestic well and three other wells in the area were monitored while the Case water source well was pumped and then shut in showed no evidence that the Case water source well had any impact on the Webb well. The applicant said that a graph taken from an analog recorder placed on the Webb well at the time showing declines in water level at the well in each 12-hour interval were unusual readings and indicated malfunctioning equipment rather than actual declines in water level. Case said that a data logger also placed on the Webb well at the time functioned during the test and did not record any impacts resulting from the pumping of the Case water source well.

Case indicated that the recharge of aquifers would be from precipitation and would occur in a downward migration, so that withdrawing water from the deeper Case water aquifer should not affect the aquifer associated with the shallower Webb water well. The applicant also argued that the drying up of springs and muskeg, as noted by the Webbs, was probably related to diminishing annual rainfall rather than to pumping of the Case water source well.

Case submitted that changes noted by the Webbs in the hardness of their water were not caused by its operations. It said that every case was different but that the most common cause of change in water quality was a hole in the surface casing of a well that allowed water from a shallower aquifer into the well. Case also indicated that the sulphur odour that the Webbs noticed in their water on occasion was likely due to sulphate-reducing bacteria commonly found in many water wells in Alberta. The bacteria were not harmful and could be treated by shock chlorination.

Finally, Case submitted that it had agreed during previous discussions with the Webbs to undertake semi-annual monitoring of the water levels in their domestic and stock water wells and testing of the quality of their water. In response to questioning at the hearing, the applicant agreed that a 1988 water quality test conducted on the Webb well would be a good baseline against which to compare future tests.

4.2 Views of the Interveners

The Webbs were not convinced that the proposed enhanced recovery scheme was practical, as water injection into the 12-12 well did not work. They believed the proposed project was yet another attempt by yet another company to get the wells in the pool to produce. The Webbs

argued that it was not crucial to try to recover what would likely be very little oil. They maintained that the project did not justify the prolonged adverse effect it would cause to the environment and to their peace, safety, and enjoyment, as well as to the potential development of their land.

The Webbs were convinced that the existing diversion of water from the Case water source well had adversely affected their water well, and accordingly they were opposed to any expansion of the scheme. They said that they became concerned about the effect of the water diversion in 1996 during aquifer testing of the Case water source well. At that time the water levels in their well were monitored, and they observed graphs showing an extreme drop in the water level in the well that lasted several hours each day. The Webbs submitted that the declines in water level shown on the graphs were not due to household water use or cattle drinking, as had been suggested to them by a representative of the company handling the monitoring. This was because during the period from 6 p.m. to 6 a.m., when the drop in the water level was the greatest, very little water was used. Furthermore, the measurements showing drops in water level could not have been due to power outages, as was also suggested, as this occurred during the calving season, when Mr. Webb was continually outside during the night and would have noticed if the power had been interrupted. The Webbs reported that their requests for more information and explanation about the tests went unanswered and this was further evidence that the company could not be trusted.

The Webbs also became concerned about water diversion into the GG pool waterflood scheme when they noticed changes in the quality of the water from their well starting in 1996 shortly after the aquifer tests on the Case water source well. They periodically noticed a sulphur smell in their water and that periodically their water had gotten softer. The Webbs made their concerns about their water well known to the EUB and AENV in 1996, but to date they had not had any further testing done on their well. They submitted that since 1996 they had wanted further testing of the quality of their water and monitoring of the water levels in their well. They noted that there was a water quality test done in 1988 that could be used as a baseline for comparison to future tests. The Webbs indicated that such testing and monitoring would help to satisfy their concerns about their water supply.

The Webbs also said that the water diversion had resulted in the drying up of springs and muskeg on their land and in lower levels of water in the beaver pond on their property. They submitted that they depended on this water for their cattle and therefore it was essential to their livelihood. They also noted that they had worked with the county to protect the beaver pond from possible damage during road maintenance. The Webbs explained that their cattle were pastured on the north half of Section 11-53-13W5M (Section 11), where the springs and beaver pond were located for about half the year. For the remaining part of the year, the cattle were in the south half of Section 14-53-13W5M (Section 14).

Finally, the Webbs submitted that it was not environmentally responsible to allow millions of gallons of water to be contaminated in an attempt to obtain what in all likelihood would be very little oil.

4.3 Views of AENV

AENV did not specifically comment on the need for the proposed amendment to the enhanced recovery scheme.

With respect to the water proposed for injection, AENV said that there appeared to be a low probability of any hydraulic connection between the aquifer in the Case water source well and the Webb well, given the significant difference in elevation of the aquifers in the wells. On that basis, it considered it unlikely that taking water from the Case water source well would drain or have any direct impact on the aquifer in the Webb well. Furthermore, AENV indicated that the aquifer that Case was using was not part of the hydraulic flow regime providing water to the springs located on the Webb property and therefore it was unlikely that Case had affected the springs.

AENV noted that since the issuance of the 1990 groundwater allocation policy for oilfield injection purposes, an applicant for a water diversion licence was expected to carry out an appropriate level of investigation into the use of surface water, nonpotable groundwater, and nonwater alternatives prior to submitting an application for diversion of a potable groundwater source. This would have been part of the application review prior to issuance of water diversion Licence No. 19960429. In response to questions, AENV confirmed that neither Case nor its predecessors had ever been in violation of the water diversion licence pertaining to the Case water source well.

AENV explained that there were provisions in the Water Act that would require Case to conduct investigations if there appeared to be some adverse impact from use of the Case water source well and to mitigate any impacts. If the Webbs became concerned about a problem relating to the Case water well in the future, they could contact AENV or Case. If they contacted AENV, they would be asked to outline their concerns in writing and AENV would provide a copy of their letter to Case and ask Case to investigate the problem.

AENV stated that Case's water diversion licence was set to expire on December 31, 2003, but noted that Case could apply for a renewal of the licence for a five-year term. AENV indicated that the renewal would be granted unless it was demonstrated that the renewal would result in an adverse effect to another groundwater user. Because AENV was aware of public concerns related to the licence, however, it would likely require Case to advertise or otherwise provide public notice of its renewal application. Interested parties would then be provided with an opportunity to submit a statement of concern prior to AENV making a decision on the renewal. Should a statement of concern be filed, AENV testified that it would likely require Case to conduct an investigation into those concerns and prepare a report detailing the investigation and its results.

AENV indicated that if requested by Case or the EUB, AENV had the authority to amend a water diversion licence to require the licensee to conduct monitoring of water levels and testing of water quality in other water wells.

4.4 Views of the Board

The EUB has a mandate under Section 4(a) of the Oil and Gas Conservation Act to effect the conservation of Alberta's energy resources. Enhanced recovery by water injection is a widespread oilfield practice, and where effective, it often increases the ultimate recovery of oil from a pool by two to three times. The EUB requires companies to fully investigate enhanced recovery feasibility for new pools and can require its timely implementation where technical, economic, and impact issues warrant.

The Board considers the GG pool to be technically suited to waterflood optimization. Early well response to injection in the southern portion of the pool is positive and the proposed northern injector should provide direct pressure support and corresponding well response sufficient to support a viable scheme. The Board recognizes that more than one injection well is commonly required for an enhanced recovery scheme and in this case the 16-15 well appears to be suitably located to inject water into the northern area of the pool. The well also meets the wellbore integrity requirements set out in *Guide 51*.

The Board must express some disappointment with the scheme's untimely commencement. Operators are expected to implement a pressure maintenance scheme before pressure declines result in large increases in gas/oil ratios. EUB oil rate administration is in place to provide production controls to promote timely feasibility reviews and decisions on how best to optimize recovery. For the GG Pool, the previous operator continued primary production to such an advanced depletion point that there are two negative consequences. First, with the release and production of much of the solution gas, the waterflood will provide less incremental recovery than equivalent pools undergoing earlier waterflood commencement. Second, a more timely commencement would have significantly reduced the amount of water needed to be injected to repressure the pool. The Board concludes, nonetheless, that there is a need to continue and expand the waterflood, provided that there are no serious adverse impacts from doing so.

Clearly, Alberta's water and energy resources must both be well managed in the long-term interests of Albertans. In this regard, the Board notes that the jurisdiction and management of our provincial water resources are with AENV. To address its broad public interest mandate respecting the province's energy resources, the EUB must take into account the province's public policy on multi-use of water resources and how site-specific water licences are managed. For this reason, the Board is appreciative of the participation of AENV in the hearing to explain water policy and answer questions about the specific water licence involved. The Board notes that AENV will have an opportunity to review Case's licence when it applies for renewal prior to December 31, 2003. Based on the comments made by AENV, the Board is comfortable that the Webbs will be provided notice of Case's renewal application and will have a further opportunity to comment on this issue at that time.

The Board notes that the type of water used in waterflood projects need not necessarily be fresh or potable water. The chief criteria for the type of water used are the chemical and biological compatibility of the water with the formation rock and fluids, adequacy of supply, and the economic aspects of obtaining and handling the water. On the basis of the evidence of both Case and AENV, the Board notes that alternative water sources for the enhanced recovery scheme

were reviewed prior to the issuance of water diversion Licence No. 19960429 and Case's use of the water from the well involved is regulated by the terms of this licence.

The Board notes that evidence from both Case's consultant and AENV support the conclusion that withdrawals of water from the Case water source well have not and are unlikely to have any adverse impact on the level or the quality of water in the Webb wells or on the springs and beaver pond on the Webb property. The Board does not believe that there is a link between the sulphur odour and changes in the hardness of the water in the Webb well and the withdrawal of water from the Case water source well. The Board encourages the Webbs to further investigate remedial actions on their domestic water well in the light of the explanations made by both Case's consultant and AENV.

On the basis of the foregoing, the Board concludes that using water from the Case water source well should not have any adverse impacts on the water wells or surface water on the Webb property. Accordingly, the Board believes the amendment to waterflood Approval No. 7947 is in the public interest and should be approved, noting the following:

- Given the Webbs' continuing concerns and their interest in the monitoring of water levels and the testing of water quality in their wells, the Board expects Case to carry out its previous commitment to undertake semi-annual monitoring and testing of the Webbs' domestic and stock water wells, using the 1988 water quality test on the Webbs' domestic well as a baseline against which to compare future tests. To reinforce this commitment, the Board expects Case to ask AENV to amend its diversion licence to include these monitoring and testing requirements. In addition, Case should provide the results of monitoring and testing the wells to the Webbs in a timely manner. The Board considers the lack of open communication by both parties as one of the root causes of the dispute between Case and the Webbs and, therefore, considers it particularly important that Case provide the results of monitoring and testing the wells to the Webbs without delay.
- It is a normal requirement for operators to monitor the reservoir pressure in a waterflood scheme. In this case, the Board requires annual pressure surveys to be done in accordance with EUB *Guide 40: Pressure and Deliverability Testing Oil and Gas Wells* on the pool to monitor the progress of the scheme. Results are to be filed with the EUB as normally required and scheme performance discussed with the Webbs, if requested.

5 CONSIDERATION OF APPLICATIONS NO. 1072552 AND 1072554 FOR WATER AND OIL WELL EFFLUENT PIPELINES

5.1 Views of the Applicant

Case stated that the water pipeline was required to transport produced and source water from the 12-12 battery and the Case water source well to its recently completed 16-15 water injection well for water flooding operations, and that the oil well effluent pipelines were required to transport produced fluids from its existing 14-11, 8-14, and 12-15 oil wells to the 12-12 battery.

The applicant submitted that the 14-11 and 8-14 wells were located on the Webb property and therefore pipelines across those lands would be required to tie those wells into the 12-12 battery. Case explained that the proposed routings (as shown on Figure 1) were selected because they were the shortest and most direct, therefore minimizing surface impact. Additionally, part of the routing would accommodate both an oil effluent and water injection pipeline in the same trench and would be a significant benefit in terms of reduced cost and surface impact.

Case stated that it had examined the feasibility of other routes, such as circumventing the Webbs' lands as much as possible (shown as alternative routes A and B on Figure 2), but ruled out these alternatives as being impractical and far too costly. Case did not submit detailed comparisons between alternatives. In response to questions, it indicated that the northern route (alternative A) would be about a mile and a quarter longer (about 2 km) and cost 20 to 30% more. Case also noted the presence of corrals on the neighbour's land, which would have to be considered in any pipeline routing. Case did not cost out the southern route (alternative B), as it was an even longer, arduous route.

In response to questioning at the hearing, Case submitted that an existing pipeline and pipeline right-of-way (ROW) across the southern portions of the Webbs' lands (Figure 2) was licensed to Tom Brown Resources for the purpose of transporting natural gas and was therefore not considered an acceptable alternative for technical reasons. Case said that it had not investigated an alternate routing parallelling that existing pipeline.

The applicant further submitted that it had not considered trucking of the oil effluent as a viable option, as that would require setting up several single-well batteries, which it believed the EUB strongly discouraged and which would cause a significant increase in the amount of truck traffic in the area. Further, drilling a new water source well and constructing the associated facility dedicated to the northern 16-15 injector would not be a viable alternative to pipelining produced and fresh water for cost and surface impact reasons. Case submitted that the operation of the project would be more efficient with centralized facilities wherever possible.

Case recognized that the Webbs had concerns regarding the proposed pipeline routing in the northwest quarter of Section 11 in close proximity to springs and a beaver pond. The applicant said that it had adjusted its original proposed pipeline route adjacent to the east/west road allowance to a more southern route that would swing around the beaver pond. After consulting with Mr. Webb and walking the route in winter, Case further adjusted the proposed pipeline route by moving it approximately 200 m south to what it thought was an acceptable location to Mr. Webb.

Case discussed the potential of surface construction disturbances to redirect and even stop flow from the springs. It acknowledged that it did not map the springs in the area of application but believed the proposed pipeline route was shifted sufficiently southward to avoid interfering with the springs. Case saw no additional benefits from moving the line farther south. Case stated that construction on the Webb property would occur over 10 to 15 days, weather permitting. The surface would be reseeded and reclaimed.

To address the concerns the Webbs had around the possibility of a pipeline leak in the vicinity of the beaver pond and springs, Case stated that the pipeline pressure would be monitored daily to

detect any fluctuations, which would be investigated within a 24-hour time period. It further stated that the pipeline ROW would be visually inspected frequently during the first six months of operation. It claimed that if there were a construction problem, it would be identified within this time line. Regarding the concern the Webbs had about the potential for access restrictions across the pipeline ROW, Case said reasonable access would be permitted and, further, that it would deal with any settling that occurred, as required by AENV.

Case concluded from its evaluations that the applied-for pipeline routes would have minimal impact on the Webbs and their lands.

5.2 Views of the Interveners

In general, the Webbs questioned the need to disrupt their lands by constructing pipelines for a project that they did not consider viable.

If pipelines had to be built, the Webbs believed they should be built as much as possible off their property. They noted that the proposed pipeline route from the 12-12 battery to the 8-14 well was not a concern, because it would follow existing surface access road disturbances. However, the Webbs objected to the proposed pipeline route across Section 11 from the 12-12 battery to the 14-11 well and west to the section boundary, because it would have the potential to interfere with the springs feeding the beaver pond in the northwest quarter of Section 11. They considered the beaver pond to be an environmentally sensitive area, although it had no official designation as such, and identified the springs to be a critical water source for the cattle that graze on the particular quarter. They stated that they had been in contact with the staff of the municipal district and Alberta Fish and Wildlife for support to preserve the beaver pond as a required water source not only for their cattle but also for the wildlife in the area.

Further, the Webbs were concerned that the proposed pipeline route across Section 11 from the 12-12 battery to the 14-11 well and west to the section boundary would place land-use limitations on a possible future building site. The Webbs also questioned whether Case could withhold permission to cross the ROW and thus interfere with their use of the southernmost grazing lands. The Webbs explained that while they had no specific plans to build, Case's proposed 66-foot (20.1 m) pipeline ROW would restrict them, as landowners, from use and enjoyment of their property. They cited as examples that one of their children may in the future want to build close to home or that they may want to build a bed and breakfast operation in their retirement years to take advantage of the adjacent beaver pond natural area.

The Webbs also raised concerns regarding the possibility of pipeline leaks occurring in the vicinity of the springs in the area and causing irreparable damage.

The Webbs questioned why Case had not fully investigated a pipeline route adjacent to the existing surface disturbance of the existing Tom Brown Resources pipeline that traverses the north portion of Section 11 (see Figure 2). They believed that this routing would have a much-reduced impact on their use of their lands. They identified alternative route B as their preferred route, as it would be off their lands as much as possible.

5.3 Views of AENV

AENV did not present comments on either the need for the pipeline or the location of the proposed or alternative routes.

5.4 Views of the Board

Having decided to approve the applied-for amendment to the waterflood scheme, the Board must ensure that the infrastructure to implement the scheme is appropriate, having consideration for land use, cost, and technical issues. The alternative of trucking produced fluids from separate well batteries could have far greater potential impacts than pipelines on the landowners in this area. In addition, the Board does not consider that duplicating the water source well and injection facilities at 16-15 is a practical alternative. The Board concludes that pipelines for water and produced fluids are appropriate and supports Case's proposal for multiple pipelines in the same trench for much of the project as a good design to minimize surface impacts. Selecting the most appropriate pipeline route is the outstanding issue.

The Board understands that the shortest and most direct route is a common industry selection criterion, as noted by Case, but emphasizes that minimizing impact and finding the optimum route involves additional considerations beyond length and cost. The optimum route must account for variations in land use and the potential for differing consequences from alternative routes. Routing along existing disturbances, across lower-value land, and to some degree landowner preferences are examples of additional selection criteria.

The Board accepts that the pipeline routing from the 12-12 battery to the 8-14 well is not an issue for the Webbs.

The applied-for pipeline route across the north portion of Section 11 does raise considerable land-use concerns. The Board accepts that the springs and beaver pond in the area of the proposed pipeline route are critical water sources for the Webbs' farming operations and believes that all reasonable consideration should be given to minimizing negative impacts from any pipelines built. While Case made adjustments to its proposal to try to account for the springs and beaver pond, the Board is concerned that not enough work was done to understand the nature and location of the springs and how they may be affected. In particular, the Board is concerned that walking the route after freeze-up is unlikely to have given Case a complete appreciation of the matter.

In looking at the alternatives for routing of the pipelines discussed at the hearing, the Board was hindered by the lack of detailed route comparison, survey information, and offset landowner views. The Board has used the available information to make certain assessments. There were three alternative pipeline routes that should be considered.

A northern pipeline route (alternative A) going parallel to and outside the east and north boundary of the Webbs' property would avoid the beaver pond and springs entirely by eliminating the pipelines immediately west of the 14-11 well. From the limited evidence available, however, there appears to be similar land use along this general northern route, and in the absence of other landowner views and detailed survey information, the Board sees no

advantage to having the pipeline on an offset property as opposed to the Webbs' property. It notes a sizable increase in cost for this alternative route, which is significant for this small waterflood, and the Board is interested in seeing if a lower-cost alternative is available. Additionally, this alternative does not address tying in the 14-11 well.

The Webbs preferred the southern option (alternative B) of routing the pipeline to be parallel to the east and south boundaries of their property and then run northwards, but this is the most costly option for Case. Again, this option did not directly address tying in the 14-11 well.

With respect to the tie-in of the 14-11 well, the Board notes that a pipeline route from the 14-11 well directly east to the 12-12 battery would avoid the springs and beaver pond but raises questions for the Webbs regarding future access and possible building sites. Another option (not shown on Figure 2) would be to route a pipeline south of the 14-11 well and then east roughly parallel to the Tom Brown Resources pipeline into the 12-12 battery. The Board notes that pursuant to EUB *Informational Letter (IL) 80-11: Joint Use of Right of Way*, pipeline applicants are required to evaluate the availability of shared ROW as an alternative to the creation of an entirely new ROW. The Board had no detailed evidence on the options for the tie-in of the 14-11 well but notes that either option in combination with alternative A or B would add incremental costs to the two alternatives.

The third option for overall routing of the pipelines that the Board wants to comment on is a variation of the proposed route, which traverses all of Section 11, including the area west of the 14-11 well where the springs and beaver pond are located. While Case has indicated that it shifted the routing southward to minimize the possible impacts on the springs and beaver pond, the Board considers that an option with a greater shift to the south should be reviewed. The Board does not have any evidence to evaluate whether shifting another 100 or 200 m achieves an optimum route. However, it notes that the presence of the Tom Brown Resources pipeline in that area has apparently not affected the springs. This routing could require a short pipeline from the 14-11 well to tie into any pipeline running south of the well, but still could be less costly than other alternatives.

In reviewing the options for routing the pipelines, the Board wants to minimize the potential impact on the springs and beaver pond, as noted previously, but it is not convinced that other impacts of a pipeline on the Webbs' use of their property warrant costly solutions. The Board recognizes that development of Alberta's energy resource places a burden on individual landowners; however, there must be a balance for both parties. In this regard, avoiding any pipeline ROW between the 14-11 well and the 12-12 battery is not considered crucial. The Webbs' building plans are speculative in nature, and the opportunity to build up to the edge of the ROW should allow the Webbs some sites, albeit reduced. The Board also believes that the Webbs' concerns that a pipeline ROW could result in unreasonable restrictions in accessing their property are not valid. Construction and access constraints across pipeline ROW are for safety reasons, and industry's practices in this regard are generally fair and reasonable. Finally, no clear reasons have been identified as to why either the northern or the southern pipeline option (alternatives A and B) should be on or off the Webbs' property.

The Board concludes that Case has not fully investigated alternative routes that may result in a better project, considering all issues. In the absence of such detailed information, the Board finds

it cannot reach a proper decision on the optimum route. For this reason it must deny the current application without prejudice to a future application.

Case must thoroughly explore alternative pipeline routes with the Webbs prior to filing any new application with the EUB for the pipelines needed to implement the proposed next phase of the enhanced recovery scheme. Should the Webbs continue to have concerns regarding the pipeline routing proposed by Case in any new application, the Board would expect the Case application to include detailed alternative route comparisons, economics, surveys, and offset landowner comments on all of the options discussed above.

6 OTHER MATTERS

The Board notes that during the hearing the Webbs raised concerns about the existence of weeds and the borrow pit left by the previous operator and about the difficult communications between themselves and Case representatives. Case explained how it had attempted to clean up the weeds but through apparent miscommunications between the parties a weed control program had not yet been successfully implemented. The Webbs stated that they would like this matter rectified before Case continues with its project. The Board finds it unacceptable that the weed issue has not been addressed in a more timely manner and expects Case's commitment at the hearing to address this issue to be fully implemented. Further, the Board expects Case to look into the Webbs' concerns regarding the borrow pit.

Case further recognized that there had been communication problems with the Webbs in the past but stated its willingness to work cooperatively with them in the future to overcome those problems. The Webbs also conceded that there were difficulties in communicating with Case and its staff leading up to the hearing and identified ways that they felt would improve the communications between both parties. The Board recognizes that both parties made a commitment to improving communications and strongly emphasizes the importance of the parties achieving a more effective ongoing dialogue.

Finally, the Board also has some issues regarding the representation of the Case panel. The Board believes that Case should have been better prepared to answer detailed questions on how it had evaluated the best pipeline routing for this project. Additionally, upon reviewing material presented by Case, the Board identified inaccuracies in Case's evidence, such as referring to the existing pipeline across the north half of Section 11 as a natural gas pipeline licensed to Tom Brown Resources when the EUB public record identifies that particular pipeline as being licensed to Northrock Resources for the purposes of transporting oil well effluent. These inaccuracies were later shown to be the result of failure by other companies to update these records. The Board notes that, as the industry and public rely heavily upon EUB records when developing or reviewing a project, it is imperative that all companies update the EUB record and strongly urges all companies to file complete, timely, and accurate information with the EUB on an ongoing basis to avoid inaccuracies or delays.

The Board strongly encourages any company relying on EUB records to confirm that the information is up to date and accurate, especially when relying on that information to determine the scope and key aspects of its project.

The Board expects that any future pipeline applications filed by Case for this project will include more detail, as discussed previously, be submitted with accurate, up-to-date information, and be discussed with any affected landowners prior to filing.

7 CONCLUSION

In summary, the Board believes that approval of the requested amendment to the enhanced recovery scheme would result in the additional recovery of oil that would otherwise not be produced. As discussed in the report, the Board considers it unlikely that the use of groundwater under AENV Licence No. 19960429 for the enhanced recovery scheme as proposed will affect either the water wells or the surface water on the Webbs' property. However, given that the Webbs would like the quality and level of water in their domestic and stock wells tested and monitored, the Board expects Case to meet the commitment it made to carry out such monitoring and testing and to report the results to the Webbs, as indicated in the attached appendix.

With respect to the pipeline applications, the Board is not convinced that Case has sufficiently investigated alternative pipeline routes that may provide for greater protection for the surface water on the Webbs' property. In this regard, the Board would require that any future application for a pipeline include proposed construction techniques, survey, cost, technical, and consultative evidence, and timing of construction for the options discussed elsewhere in this report.

DATED at Calgary, Alberta, on March 21, 2002.

ALBERTA ENERGY AND UTILITIES BOARD

<original signed by>

G. J. Miller
Board Member

<original signed by>

R. J. Willard, P.Eng.
Acting Board Member

<original signed by>

R. G. Evans, P.Eng.
Acting Board Member

APPENDIX TO DECISION 2002-032

SUMMARY OF THE APPLICANT'S COMMITMENTS AND CONDITIONS TO APPROVAL OF APPLICATION NO. 1096705

Commitments

The Board notes that throughout the proceeding, Case undertook to conduct certain activities in connection with the proposed right-of-way that are not strictly required by the EUB's regulations or guidelines. These undertakings are described as commitments and they are summarized below. It is the Board's view that when companies make commitments of this nature, they have satisfied themselves that the activities will benefit both the project and the public, and the Board takes these commitments into account when arriving at its decision. The Board expects the applicant, having made the commitments, to fully carry out the undertaking or advise the Board if, for whatever reasons, it cannot fulfill the commitments. It is at that time that the Board will assess whether the circumstances of the failed commitments may be sufficient to trigger a review of the original approval. The affected party also has the right to ask the Board to review an approval if commitments made by an applicant remain unfulfilled.

Case committed to the following during the course of the proceeding:

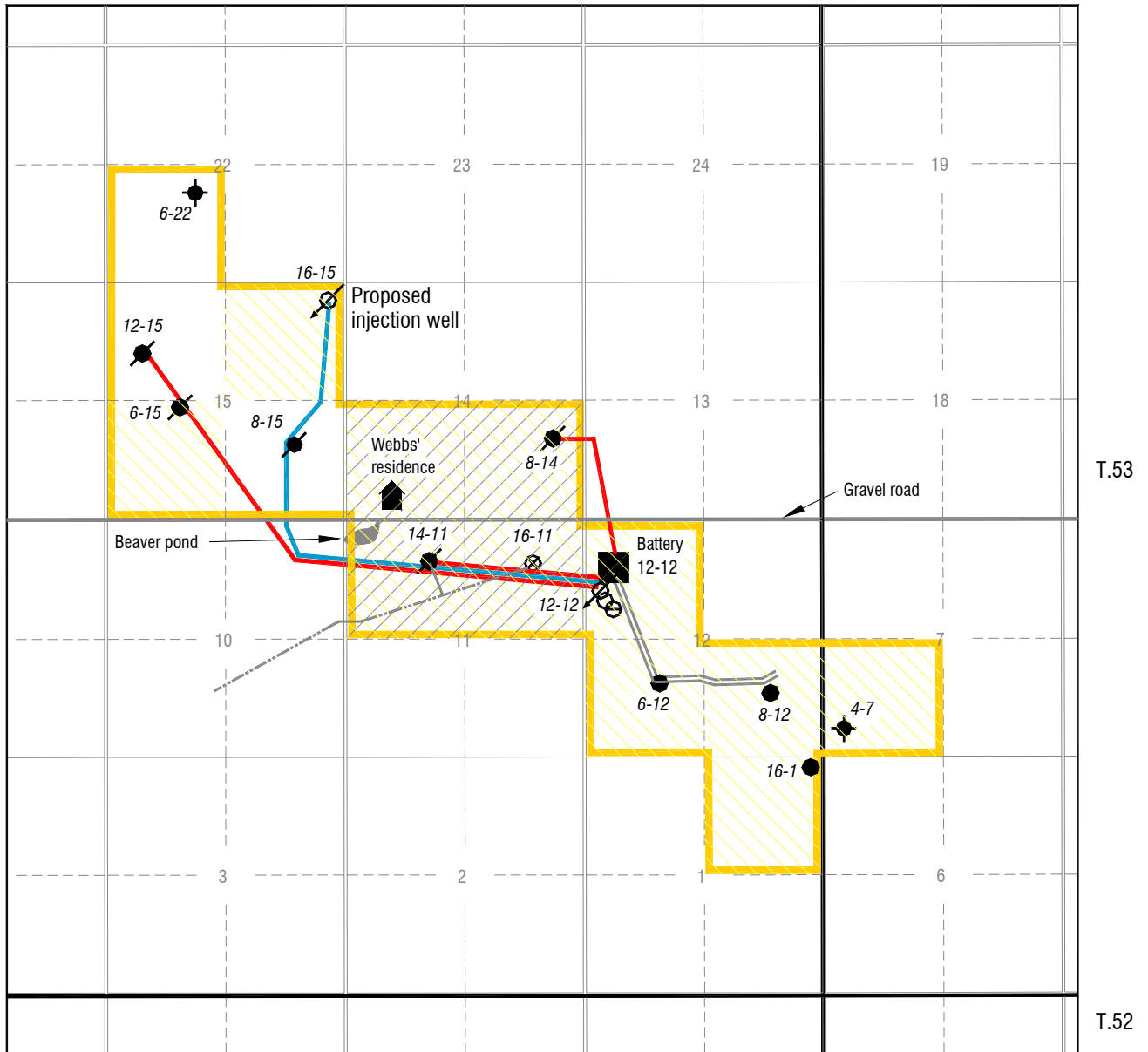
- 1) a) to complete semi-annual monitoring of the water levels in both the Webbs' domestic and stock water wells;
- b) to complete testing of the quality of the water in both the Webbs' domestic and stock water wells on a regular basis, using the 1988 water quality test as a baseline for comparison to future tests; and
- c) to provide the results of the monitoring and testing noted in items (a) and (b) above to the Webbs in a timely manner and, if requested, to discuss those results with the Webbs in a timely manner.
- 2) to address the weed control issue identified at the hearing in cooperation with the Webbs.
- 3) with respect to any future pipelines proposed to be routed across the Webbs' lands, to monitor the pipeline pressure on a daily basis to detect any fluctuations and, if anywhere noted, to investigate those within a 24-hour time period.

Condition

The condition imposed in the present approval is detailed below. Conditions, generally speaking, are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with conditions or it is in breach of its approval and subject to enforcement action of the EUB. Enforcement of an approval includes enforcement of the condition attached to the approval. Sanctions imposed for breach of any condition may include the suspension of the approval, resulting in the shut-in of a facility.

Case is required to fulfill the following condition:

Annual pressure surveys are to be done on the pool in accordance with EUB *Guide 40* to monitor the progress of the scheme. Results are to be filed with the EUB as normally required and enhanced recovery scheme performance discussed with the Webbs if requested.



Legend

- | | | |
|-----------------------------------|-----------------------------------|---------------------------|
| Proposed water injection pipeline | Carrot Creek Cardium GG Pool | Injection well |
| Proposed oil effluent pipeline | Area subject to Approval No. 7947 | Oil well |
| Existing Case pipelines | Lands owned and occupied by Webbs | Suspended water injection |
| Tom Brown Resources pipeline | | Standing water well |
| | | Observation water well |
| | | Suspended oil well |
| | | Abandoned oil well |

Figure 1. Carrot Creek Area Waterflood Project Applied-for Pipeline Routes
 Applications No. 1072552, 1072554 and 1096705
 Case Resources Inc.

Decision 2002-032



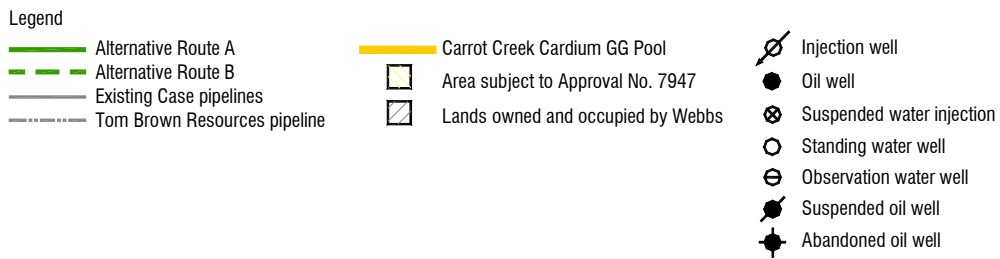
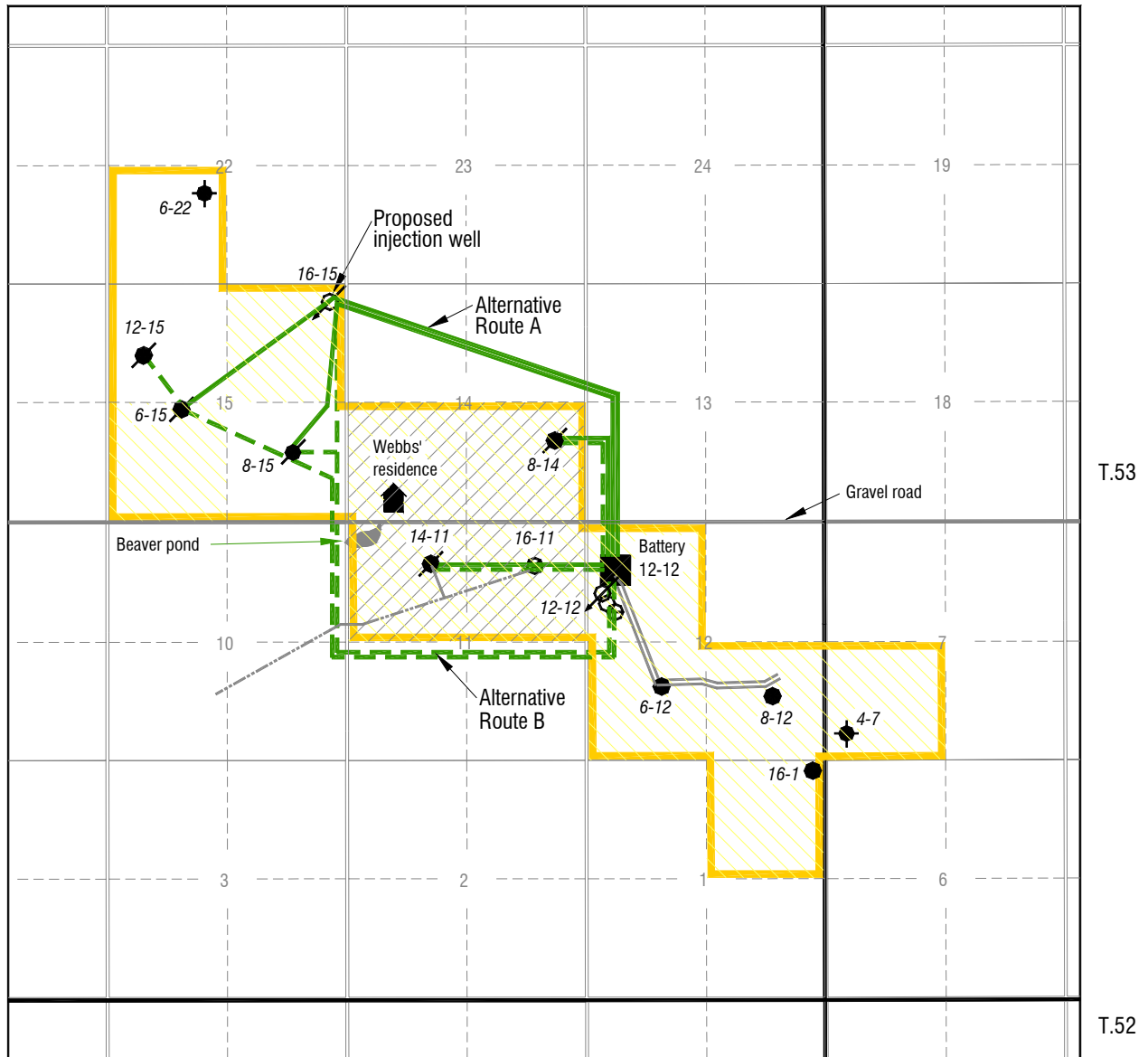


Figure 2. Carrot Creek Area Waterflood Project Alternative Pipeline Routes
 Applications No. 1072552, 1072554 and 1096705
 Case Resources Inc.

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