

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

BERKLEY RESOURCES INC. APPLICATION TO RE-ENTER A SWEET OIL WELL LEDUC-WOODBEND FIELD

**Decision 2000-8
Application No. 1041795**

1 DECISION

The Board has carefully considered the evidence received and denies Application No. 1041795, without prejudice to any future application. The Board would suggest that any future application consider this Decision and the record of these proceedings.

Reasons for the Board's decision are as follows

- The location of the Pohlka families' farmyard in the extreme southwest corner of their property presents some unique constraints and allows limited options for the Pohlka families to develop their farming operation.
- Serving any expanded farming operations with the necessary services from the farmyard also is constrained.
- Surface facilities associated with a producing oil well at the proposed re-entry location would unnecessarily interfere with the Pohlka families' land use for commercial farming purposes without satisfactory mitigation measures being proposed.
- Similarly, if the well produced gas, surface facilities may be required including a pumpjack to remove water from the wellbore, based on offset wells.
- Any access road associated with the well at the proposed location results in interference for the Pohlka families' farming operations without satisfactory mitigation available.
- A satisfactory alternative location may exist for a well to be directionally drilled in the northwest corner of the Pohlka land within acceptable technical and economic parameters.

2 APPLICATION AND HEARING

Those who appeared at the hearing and the abbreviations used in this report are indicated in Attachment 1 at the end of this report. An area map showing the locations of the proposed facilities relative to this proceeding is provided in Attachment 2.

2.1 Application No. 1041795

Berkley Resources Inc. (Berkley) applied on June 3, 1999 in accordance with Section 2.020 of the Oil and Gas Conservation Regulations for approval to re-enter the vertical abandoned Okalta Leduc No. 6 well at a surface location in Legal Subdivision 2, Section 33, Township 49, Range 26, West of the 4th Meridian (2-33 well). The purpose of the re-entry is to obtain sweet oil production from the Upper and Lower Mannville zones.

2.2 Interventions

The Pohlka families' residences and farmyard are also located in LSD 2-33-49-26 W4M (LSD 2 of Section 33), approximately 150 metres (m) from the 2-33 well site.

The Pohlka families raised concerns about the following

- close proximity of the well to their farm and residences
- health and safety risks
- groundwater and creek contamination
- economic impact and interference with their farming operations
- soil damage
- location of access road to the 2-33 well, and
- contamination from the abandoned 2-33 well site

Mr. Pankiw's residence and farmyard are located in LSD 3 of Section 33. Mr. Pankiw objected to the re-entry application citing concerns with past sour gas smells, health and safety, flaring, increased traffic volumes on Highway 39, and the potential danger of accessing the 2-33 well from this highway.

The locations of the residences relative to the 2-33 well site are shown in Attachment 2.

2.3 Hearing

The application was considered at a public hearing in Leduc, Alberta, on December 9, 1999, before Board Members A. J. Berg, P.Eng. (Presiding Member), G. Miller, and Acting Board Member H. O. Lillo, P.Eng. The panel viewed the site of the proposed facility and potential access routes with the hearing participants, prior to the opening of the hearing on the morning of December 9, 1999.

3 ISSUES

The Board believes the issues concerning the application to be:

- need for the proposed facilities
- surface location
- concerns of re-entry
- impacts
- well access
- conservation
- communication and consultation
- operator history
- future application and spacing requirements

In succeeding sections, the Board will address its views on these issues.

4 NEED FOR THE PROPOSED FACILITIES

4.1 Views of the Applicant

Berkley submitted that Saunders Minerals Ltd. (Saunders) holds the Petroleum and Natural Gas (P&NG) lease from the freehold mineral owners covering LSDs 1, 2, 7-10, and 12-16, all in Section 33, Township 49, Range 26, West of the 4th Meridian (Section 33).

Berkley entered into a joint venture with Saunders in March 1999, whereby Berkley would earn an interest in the lease by committing expenditures to test the Mannville Group or Upper and Lower Mannville zones.

Berkley believed that its geological analysis indicated that the Upper and Lower Mannville zones are prospective for the economic production of oil, gas, or a combination thereof. Berkley stated that Probe Exploration Inc. (Probe) has three gas wells located at LSD 5-34-49-26 W4M, LSD 16-34-49-26 W4M, and LSD 4-2-50-26 W4M, all producing from the Upper Mannville zone (Upper Mannville F pool). Berkley believed that the reserves for the Upper Mannville zone extend into the east half of Section 33 and as a result, reserves are being drained by the three Probe wells.

As part of the Section 33 lease agreement, if offset well activity occurs, the freehold leaseholders are required to drill in Section 33 or pay compensatory royalties to the freehold mineral owners of Section 33.

Berkley believed that available log information did not conclusively define whether the Upper Mannville zone in the 2-33 well would produce oil, gas, water, or a combination of all three. If the Upper Mannville zone was oil bearing, Berkley believed that it had a potential of $1220 \times 10^3 \text{ m}^3$ of oil in place based on the parameters of 12.2 m of pay, 105 hectares (ha), 16 per cent porosity, 30 per cent water saturation and a 0.85 shrinkage factor. If the formation proved to be gas bearing, Berkley believed that with an initial reservoir pressure of 9800 kilopascals (kPa) and a bottomhole temperature of 55 degrees Celsius ($^{\circ}\text{C}$), there may be a potential for $140 \times 10^6 \text{ m}^3$ of gas in place, less the potential drainage from the Probe wells. However, upon cross examination by Board staff, Berkley stated that the proven marketable gas reserves were $30.8 \times 10^6 \text{ m}^3$ (1.1 billion cubic feet), based on 4.6 m (15 feet) of pay, 105 ha (260 acres), a recovery factor of 60 per cent and a surface loss of 10 per cent, a porosity of 16 per cent, initial water saturation of 25 per cent, a pressure of 9894 kPa (1435 pounds per square inch) and a temperature of $131 \text{ }^{\circ}\text{C}$. Berkley did not state what the proven oil reserves would be if the zone were to be oil bearing.

Berkley indicated that the Lower Mannville zone had 14 m of potential hydrocarbon pay thickness. Based on Accumap data, Berkley indicated that Seller's Oilfield Services Ltd. (Seller), had previously produced approximately $2.4 \times 10^6 \text{ m}^3$ of sweet gas from the Lower Mannville zone in the 2-33 well. Seller is the current licensee of the abandoned 2-33 wellbore. Berkley believed that, assuming all hydrocarbon pay was gas filled, volumetric estimates of potential gas in place, based on an areal extent of 64 ha, 10.7 m of pay, 20 per cent porosity, 25 per cent water saturation, 10 600 kPa bottomhole pressure, and a bottomhole temperature of $52 \text{ }^{\circ}\text{C}$, would result in an original gas in place of $115 \times 10^6 \text{ m}^3$. However, since there was no pressure

data available to calculate potential remaining reserves in the Lower Mannville zone, Berkley stated that the above values could only be confirmed by testing the zone. Berkley, upon cross examination by the Board staff, stated that the proven marketable gas reserves for the Lower Mannville zone were approximately $28.6 \times 10^6 \text{ m}^3$, based on 65 ha, an average net pay of 6 m, recovery factor of 60 per cent and a surface loss of 10 per cent, porosity of 20 per cent, initial water saturation of 30 per cent and a pressure of 10 500 kPa.

Based on well log information, Berkley stated that it is possible the Lower Mannville zone in the Southeast quarter of Section 33 may be an extension of the Blairmore NN pool which produced oil in the LSD 15-28-49-26 W4M well (15-28 well). Therefore, assuming the Lower Mannville zone is oil filled, volumetric estimates of potential oil in place could be $820 \times 10^3 \text{ m}^3$ based on an areal extent of 64 ha, 10.7 m of pay, 20 per cent porosity, 25 per cent water saturation and a 0.79 shrinkage factor. However, this scenario is unlikely since this zone previously only produced gas and Berkley wants to re-complete higher up.

Berkley stated that since it has an agreement with the Section 33 mineral rights leaseholder, it has the rights to drill for the minerals underlying Section 33. Therefore, it should have the ability and right to access these minerals.

4.2 Views of the Interveners

The Pohlka families did not dispute the need to access the minerals and the rights of mineral owners and mineral leaseholders. However, they believed that if the need to access minerals adversely affects the rights of the surface owners, then the surface owner impacts should prevail. In this case, the interveners believed that the re-entry well as proposed, drastically affected the rights of the surface owners.

The Pohlka families are of the view that Berkley's geological data did not demonstrate the need for the proposed well to be located at the 2-33 location. They believed that Berkley had not properly explored the possibility of mineral extraction from the Upper and Lower Mannville zones through directional drilling, simply because of incremental costs and possible technical difficulties associated with directional drilling. They further submitted that Berkley's interest in saving money must not be placed above the potential risks and impacts the re-entry would cast on the Pohlka families.

Mr. Pankiw did not raise any argument over the need for the bottomhole location of the well or dispute the need to access the minerals and the rights of mineral owners and mineral leaseholders. Mr. Pankiw's concerns were similar to the Pohlka families.

4.3 Views of the Board

On the basis of the geological evidence provided by Berkley, the Board accepts that there is potential for finding either gas, oil, or a combination thereof in the Upper and Lower Mannville zones under the Southeast quarter of Section 33. The Board concurs that to properly assess the potential for hydrocarbons in both the Upper and Lower Mannville zones, the 2-33 bottomhole location may be the most appropriate.

5 SURFACE LOCATION

5.1 Views of the Applicant

Due to the geological nature of the Upper and Lower Mannville zones, Berkley indicated that the bottomhole location of the 2-33 well would be the only location to access the hydrocarbons for production.

Berkley further indicated that additional costs would be incurred to directionally drill a new well to access these minerals. Further, directional drilling requires coming through shallower zones at an angle which may result in the hole collapsing.

Berkley initially provided a cost estimate of the various options in support of the application as follows:

- The cost to re-enter and test the existing 2-33 wellbore as applied for, would be approximately \$302 000
- A new vertical well would cost approximately \$525 000
- A further additional cost of \$202 000 would be required to tie in the well to either the existing Probe or Southward Energy Ltd. facilities
- A northwest directional well was estimated to cost approximately \$550 000 when the application was made
- A northwest directional well would have savings on tie-in costs
- Berkley indicated at the hearing that drilling costs have increased since its estimates were made in the application and would add an additional 20 per cent to the costs of a new or a directional well

Therefore, the directional drilling option would be considerably more expensive compared to re-entering the well as originally proposed.

Berkley's witness, Mr. O'Byrne, also testified as follows:

"If, for any reason, we are unable to enter, re-enter the existing wellbore at the 2-33 site, any redrill would be located immediately adjacent to that wellbore, likely a matter of a few metres to the north and east."

Berkley stated that it would be limited to directionally drilling from a maximum distance of 500 m. Additionally, Berkley indicated that other nearby wells would also affect the ability to drill new wells from alternative locations within 500 m. Further, the alternative locations suggested by the interveners were outside of the 500 m parameter and on other people's lands. Using the 500 m parameter, if Berkley relocated to the east of the 2-33 location, the well would still be located on the Pohlka families' land. If the well were drilled to the west, it would be on Mr. Pankiw's land. To the south, it would again be on other people's lands and across a highway. If the well were to be drilled north of the 2-33 location, it would still be near the creek, thereby requiring a lease site berm and aboveground storage tanks, identical to those that would be required for the proposed re-entry location.

Berkley concluded that directionally drilling would increase drilling costs, cause additional land disturbances and environmental impacts, and impose impacts on other landowners. Therefore, Berkley believed that directionally drilling for geological reasons at the alternative locations suggested by the interveners, was not acceptable.

5.2 Views of the Intervenors

The Pohlka families believed that the main reason for the re-entry over a new or directionally drilled well was cost, and that the geological reasoning was secondary to that.

The Pohlka families believed that the differences in cost to directionally drill the well over re-entering were insignificant compared to the financial impact it would have on the landowners.

They also submitted that directionally drilling would only take five days more than re-entering the well 2-33. They believed that an additional five days was not significant enough to offset any advantages of the re-entry option. Directional drilling would be acceptable from a geological point of view, could still minimize impacts, and would allow for the restoration of trust between all parties. Further, the Pohlka families believed that the additional costs of directional drilling could be offset by reduced road access costs and lower tie-in costs. Regardless, if Berkley could drill the well from another surface location, it should, since cost should not be paramount when landowners are affected.

Mr. Pankiw believed that the proposed well location was too close to his residence and to his neighbours, the Pohlka families. He indicated that in his experience, oil and gas facilities located in close proximity to their farms would cause problems. He believed that the well should be directionally drilled from a location further north, and agreed with the Pohlka families' alternative locations.

5.3 Views of the Board

The Board accepts the drilling and re-entry costs as submitted by Berkley. The Board further accepts that the 500 m offset for directional drilling appears reasonable and would allow Berkley to access the potential reserves at additional cost.

The Board also understands Berkley's point of view that re-entry of the presently abandoned well is the company's preferred choice and would reduce their financial risk. The Board also notes that oil and gas exploration and development, by its nature, requires the acceptance of financial risk by proponents.

The Board believes that the increased costs associated with directionally drilling from a location further north of the proposed location may be partially offset by reduced road access costs and reduced tie-in costs. The Board also notes the interveners' concerns regarding financial and operational impacts on their farming operations that may result from this proposed development.

The Board also agrees that a balance needs to be achieved that respects the interests and rights of both parties.

6 CONCERNS OF RE-ENTRY

Background of Okalta Leduc No. 6, 2-33 re-entry well

The 2-33 well was initially drilled in early 1949, and was initially completed as a sour Leduc oil well. Seller then re-completed the well in 1984 as a sweet Basal Quartz gas well that provided gas for Seller's facilities in Section 28-49-26 W4M. The well was abandoned in 1993 and the well site and access road were reclaimed in 1996.

Seller no longer holds any mineral rights or surface rights in Section 33. Seller was noted as being the current freehold abandoned wellbore licensee.

The existing 2-33 well has 273 millimetres (mm) outside diameter (OD) surface casing (grade unknown) set to a depth of 183.5 m. The 2-33 well also has 177.8 mm OD; J-55 production casing set to a depth of 1651.7 m. Surface casing was cemented to surface and the production casing was cemented with 375 sacks of Portland cement in 228.6 mm open hole with a theoretical cement top calculated to be at approximately 885 m, which is approximately 345 m above the Upper Mannville zone.

The well was abandoned with a bridge plug set above the perforations, capped with 7 m of cement, and was successfully pressure tested to 7000 kPa at the time of abandonment. The wellbore was circulated and filled with inhibited fluid to protect against corrosion, the casing strings were cut, and the well casings were capped with welded steel plates to complete the abandonment.

6.1 Views of the Applicant

Berkley noted that the production casing in the 2-33 well had an original burst pressure rating of 30 060 kPa.

Berkley proposed to re-enter the 2-33 wellbore and pressure test the casing to 11 000 kPa for 15 minutes, to ensure the casing is capable of holding expected pressures. This pressure test would be 50 kPa higher than the maximum expected pressure from any zone open to the wellbore.

Berkley stated that if the casing did not successfully pressure test, it would likely run a casing inspection log and either repair the casing or if required, Berkley would run a new casing liner from below the producing formation to surface. Berkley indicated that there was sufficient room to run and cement the liner inside the existing casing to produce both the Upper and Lower Mannville zones.

Berkley would also run a cement bond log to confirm an effective cement bond exists across the two zones and also to confirm where the cement top of the production casing is located. Berkley noted that groundwater in this well is covered by surface casing, which is cemented to surface.

Berkley would then drill out the cement bridge plug at 1333 m and test the remaining potential of both the Mannville zones. Berkley stated that if there were economic reserves in both the

Upper and Lower Mannville, a packer would be set above the Lower Mannville and both zones would be produced.

Berkley stated that from discussions with the previous well owner and the consultant who abandoned the well, there was no evidence to indicate there were problems with the cement or casing integrity in the 2-33 well.

Berkley stated that there had been similar re-entries done in the Leduc area by other companies and Berkley considered them to be routine operations. Additionally, Berkley indicated that Probe had re-entered over 10 similarly abandoned wells and did not experience any significant problems with casing integrity in any wells that were drilled and completed in the late 1940s and 1950s.

Berkley acknowledged the possibility of encountering pressures at surface upon re-entry of the 2-33 well as a result of failed abandonment plug placed in the well at the time of the abandonment of the Leduc zone in May of 1984.

If there was pressure at surface upon re-entry, pressure sources could be either sweet or sour depending upon which of the abandonment plugs were leaking. Berkley would be able to confirm whether or not this type of failure had occurred by hot tapping into the steel abandonment plate welded onto the end of the existing casing strings. Berkley indicated it was prepared to accept this eventuality and would properly re-abandon the lower zones if pressures were detected.

6.2 Views of the Interveners

The Pohlka families indicated that the first operator used the original wellbore in the 1940's, making the wellbore 50 years old.

Since Berkley had not performed any testing of the wellbore, the Pohlka families were unclear as to the structural integrity of the well. The Pohlka families indicated that the theoretical information used by Berkley did not examine how the wear and degradation of the wellbore over the years would effect the wellbore's ability to handle original discovery pressures of the Upper Mannville zone.

6.3 Views of the Board

The Board notes the age of the 2-33 well and that the casing has been previously subjected to sour service when originally completed in the Leduc zone.

The Board further notes that the casing grade is J-55 from the late 1940's and that the metallurgy of this casing grade may not meet current casing standards.

Additionally, the Board understands that the existing wellbore has been perforated and abandoned over a number of intervals. The Board believes that the Upper Mannville zone, since it has not been previously produced at this location, may be at a pressure that will be at or near average original discovery pressures of 9750 kPa.

The Board notes that the casing was originally rated to 30 060 kPa (burst) and that the casing was successfully pressure tested to 7000 kPa at the time of abandonment in 1993. The existing reports state that the wellbore fluids were displaced and filled with inhibited water to mitigate corrosion and maintain casing integrity

The Board notes that Berkley proposed to re-enter the 2-33 wellbore, run a cement evaluation log to confirm hydraulic isolation and to locate the cement top for the production casing. The Board also notes that Berkley would pressure test the casing to 11 500 kPa to ensure the casing is capable of maintaining pressure integrity if it is exposed to maximum expected reservoir pressures. However, the Board believes that Berkley would still need to re-enter the wellbore and conduct additional casing evaluations to fully determine the condition of the well casing and abandonment plugs isolating the Leduc and Nisku perforations.

The Board believes that production casing integrity could be adequately determined using the methods proposed by Berkley. Additionally, the Board notes Berkley's commitment to remedy failed abandonment plugs during re-entry operations and accepts Berkley's procedure for the detection of failed abandonment plugs. Therefore, the Board accepts the methodology and testing procedures of Berkley and based on the above, believes that the well could be safely re-entered, provided that Berkley meets all current Alberta Energy and Utilities Board (EUB) requirements.

However, if the well were to encounter sour gas, Berkley would be required to amend its well licence and further satisfy the Board that the well could be safely operated under the sour service conditions.

7 IMPACTS

7.1 Views of the Applicant

Berkley indicated that the lands for the proposed re-entry and surrounding lands previously and presently have significant oil and gas activity. Therefore, it believed that the impacts of oil and gas development are not new to area landowners. Additionally, it had a corporate Emergency Response Plan (ERP) in place to deal with any emergency from its oil and gas activity.

Berkley stated that a number of re-entries in this area have been conducted on wells of similar age. The only difficulties noted were some Probe re-entry wells where perforations near the surface were found to be leaking. In those wells, the surface casing had been set above the base of the groundwater and the production casing had not been cemented to surface. This required the production casing in those wells to be perforated in order to conduct remedial cement squeezes to properly protect groundwater.

The base of useable groundwater has been identified by Alberta Environment to be at a depth of 160 m. Berkley noted that the casing in the 2-33 re-entry well was not perforated because it had steel pipe or surface casing set and cemented to below the base of groundwater at a depth of 180 m.

Berkley stated that none of its operations would expose the groundwater. Berkley also stated that it would further ensure groundwater was protected. This protection would be accomplished by conducting a pressure test on the casing, prior to opening up either the Upper or Lower Mannville zones.

If required to do so, Berkley would test the Poholka families' water well for quality and quantity prior to commencement of re-entry operations.

With respect to surface water runoff and contamination of a nearby creek, located 80 m west of the re-entry well, Berkley indicated that its operations would not place the creek at risk of being contaminated. The re-entry would only require small amounts of completion fluid to complete the re-entry.

Additionally, Berkley committed to building a berm along the edge of the well site bordering the creek to insure that any uncontrolled release of fluids would not spread.

Further, Berkley indicated that it would use aboveground storage tanks to store all of the required completion fluids. The estimated volume of fluid stored on site would be about 30 m³ which could easily be contained by the berm, measuring 20 m by 3 m by 1 m, which could actually hold approximately 60 m³.

If the well were to produce natural gas, which Berkley indicated is a possibility, liquid volumes produced from the well would be minimal. If there were a breach of the wellbore such as a hole in the production casing, the failure would be detected by pressure on the surface casing vent and could be contained and repaired at that time. Should the well produce mainly liquids, the well would require a pumping unit and would be equipped with a low-pressure shutdown sensor which would shut the pump off in the event of a wellhead leak or pipeline leak and would further minimize potential contamination volumes.

Berkley indicated that the disposal of work over fluids to be used during the re-entry operations would be in compliance with EUB regulations and EUB *Guide 58: Oilfield Waste Management Requirements for the Upstream Petroleum Industry (G-58)*.

Operations would involve milling out a bridge plug and perforating the casing over two intervals (Upper and Lower Mannville Group). Berkley indicated the wellbore is currently filled with fresh water containing 2000 parts per million of corrosion inhibitor, which would be circulated out of the wellbore and disposed of by injection into an approved disposal well as per G-58. The completion fluid to be used during re-entry operations would be fresh water containing K-Tech, a product used to minimize potential formation damage or clay swelling. It would also be disposed of as per G-58.

In response to concerns expressed by the interveners regarding odours and flaring, Berkley stated that all its produced fluids from the 2-33 well would be collected and pipelined to existing facilities in the area. Berkley was adamant that there would not be any permanent flaring or venting at the well site during the producing life of the well.

However, Berkley acknowledged that some initial testing would be required and that this would require six to eight days to complete. The testing period was primarily geared to obtaining sufficient transient pressure analysis data for the well and that the test period was not necessarily optimized toward minimizing flaring volumes. Berkley also stated that they would not allow vapours to escape from liquids produced from the well during testing and that they would employ a closed system which utilizes a pressure tank to collect test fluids and associated vapours. Berkley acknowledged that vapour recovered during testing would be flared and that there could be some odours associated with this flaring.

Berkley would reduce the impacts of noise associated with production operations. If the well was to be an oil well, Berkley stated that all well equipment would be electrically driven, and that an electrical distribution line would be constructed to supply the electrical needs.

All production for either an oil well or a gas well would be pipelined to other area facilities. Berkley stated that it would comply with the all of the EUB's noise directives on a temporary and permanent basis.

With regard to visual impacts, Berkley indicated that it was unclear as to why this concern exists. It indicated that from its observation, the 2-33 well site was not visible from the farmyard or the residences because farm buildings block the view to the well site.

On the issue of vehicle usage, Berkley indicated that there would only be one truck visit to the site per day to complete required daily checks at the well site. Berkley believed that since this would be less than the daily vehicle traffic that currently exists at the Pohlka families' farm that its truck traffic would have a negligible impact.

Berkley acknowledged that once well testing was completed, it would be in a better position to determine future surface facilities. Since it had resolved all of the landowner issues, Berkley submitted that the only outstanding issue was compensation for the access road to the well site.

7.2 Views of the Interveners

The Pohlka families indicated that the proposed well would be located approximately 125 m from the yard and approximately 180 m from the closest dwelling. They stated that without any tree growth or buffer between the well and the farm, the well and any related operational activities would be aesthetically displeasing, may create offensive odours, and cause a noise aggravation to the quiet lifestyle of their home.

The Pohlka families believed that a well this close to current residents posed a potential health and safety risk. The Pohlka families indicated that Berkley had failed to determine if the previously produced Lower Mannville Group contained sour gas. The Pohlka families believed that Berkley had also failed to address issues related to potential controlled or uncontrolled releases of sour gas from the re-entry well.

The Pohlka families were not satisfied with Berkley's corporate ERP, as they believed that it had never been tested and Berkley had indicated that it would not be tested. In the Pohlka

families' view, the ERP was inadequate from that perspective, as well as the fact it did not include community telephone numbers.

With regard to groundwater contamination, the Pohlka families stated that the proposed well would be located approximately 80 m from a creek. They believed that the close proximity of the creek to the re-entry well would cause contamination to the creek as well as to groundwater.

Concerns were also expressed regarding the affects the creek may have on the casing integrity. The Pohlka families believed that previous creek flooding spring runoff, and heavy rains in the summer, may have contacted the casing and that this may have affected the integrity of the casing. They also believed that water previously injected into the well may have contributed to changing the characteristic of the hydrocarbon production from the well from sweet Mannville production to potentially sour production. Reference to production records also indicated that the 2-33 well casing had been subjected to sour service when the well was originally completed in the Leduc formation.

The Pohlka families believed that the re-entry would cause more economic impact to their farming operations than any economic benefit to Alberta. Additionally, the well site location would create major interference and inconvenience by restricting access and manoeuvrability of farm equipment, which range from 12 to 24 m in width (40 to 80 feet).

To assist the Board in understanding their concerns with further development, the Pohlka families explained some of their previous experiences with wells and facilities on their land. The Pohlka families acknowledged that the previous wells on their land had been abandoned and that the numerous electricity power poles, the access roads and other types of surface disturbances were removed. Unfortunately, all of these sites were not abandoned in an appropriate manner. Approximately 4 ha (10 acres) of contaminated soil still exist immediately adjacent to the west boundary of the former 8-33-49-26 W4M well site (8-33 well site). This had left these lands unproductive.

The Pohlka families believed that disturbances from any additional wells on their lands would increase the injurious affect to their lands by further admixing of already disturbed soils.

The Pohlka families also indicated that they had plans to develop an elk farm. The elk farm would be located in the furthest west portion of LSD 7 on Section 33, in the cultivated area between the creek and the west fence line. The Pohlka families indicated that facility development of any kind in this area would impact these plans.

Mr. Pankiw indicated that he had a lack of trust for the industry to deal appropriately with surface impacts as evidenced by the 8-33 well site contamination. Additionally, he personally had had past experiences with increased noise, traffic, and companies leaving fences open.

Mr. Pankiw indicated that when Seller operated the well, they had experienced large amounts of sour gas smells and speculated that Berkley could encounter sour gas, not sweet gas, from the two Mannville zones.

7.3 Views of the Board

The Board notes that surface casing has been set and cemented to below the base of groundwater and accepts that this provides adequate protection of the groundwater aquifer. The Board believes potential release volumes of completion, work over, and produced fluids would be relatively small, quickly detected, adequately contained and should not pose a threat to surface water. The Board notes that Berkley would handle completion fluids in accordance with G-58 to eliminate additional sources of contamination.

Accordingly, the Board agrees that both ground and surface water impacts would be minimal. However, if the Board were to approve a well application on the Pohlka families' or on offsetting lands, Berkley would be required to initiate water well testing at nearby residences to provide baseline data to assess whether there may be any future impacts to groundwater from Berkley's operations.

The Board acknowledges Berkley's commitment to minimizing the amount of flaring and utilization of equipment to reduce odours associated with the initial re-completion operations from either re-entering the abandoned well or from a new well (over six to eight days) as well as during any future work over operations. Additionally, the Board notes Berkley's willingness to investigate further reduction or elimination of well test flaring, consistent with the EUB *Guide 60: Upstream Petroleum Industry Flaring Guide*. This guide promotes, where possible, a reduction or elimination of flaring in Alberta, effective January 1, 2000. The Board would require Berkley to comply with the spirit of this guide.

If the Board were to approve a well application from either a re-entry or from a new well, the Board would expect Berkley to conduct the necessary fluid analysis. This analysis would determine the appropriate hydrogen sulphide content of all zones open to any wellbore. Berkley would advise the Board of those results. Should fluid analysis indicate the presence of hydrogen sulphide Berkley would be directed to make any necessary corrections to its program.

The Board does not believe that the 2-33 well location is appropriate for an oil well, regardless of whether the production from the well is sweet or sour, given the potential visual, noise impacts and interference with the Pohlka families' use of the land immediately adjacent to their farmyard.

If the well is a sour gas well, Berkley has failed to provide evidence that it has developed a site-specific sour gas ERP. The only ERP the Board has to weigh as evidence is a corporate ERP, typical of any requirement for a sweet facility. In this case, the Board heard evidence that the potential exists for sour gas. Therefore, if the well is a sour gas well, given the close proximity to the Pohlka families' farm and residences, the Board does not agree that the surface location is suitable.

The Board believes that the surface location may be appropriate for a sweet gas well without surface facilities, with remote metering and without a permanent access road, providing all regulatory requirements are met and all potential impacts are mitigated.

However, sufficient evidence was not provided at the hearing that would allow the Board to fully determine the future potential for surface facilities in the event that the well becomes a gas well. The Board does acknowledge that Berkley would need to complete well testing to fully determine future surface facilities. Even though surface facilities may not be needed initially, these facilities could still be required in the future, as a result of reservoir depletion, to handle water or hydrocarbon liquid production.

The Board believes that the circumstances of the proposed well in relation to the Pohlka families' farmyard and adjacent land are somewhat unique. These circumstances include the position of the farmyard in relation to the remainder of the Pohlka families' land and the natural features of the land.

Given the potential visual impacts, the potential noise impacts and most importantly, the interference with the Pohlka families' use of the land immediately adjacent to their farmyard, in the absence of acceptable mitigation measures, the Board cannot accept that this well site would be appropriate for a gas well or an oil well.

8 WELL ACCESS

8.1 Views of the Applicant

Berkley outlined five options to access the 2-33 well site, all on Section 33. It provided a map at the hearing showing these options. These options are indicated on the map in Attachment 2.

Option 1 and Option 2 would both be initiated from the original road approach off of Highway 39, approximately 400 m from the intersection of Highways 39 and 60. Option 1 would use the approach, follow the edge of the field westward to the east side of the farm site, north and then west to access the 2-33 well site from the south. Berkley indicated that this option would cost approximately \$28 300. Option 2 would be located on the original, reclaimed 2-33 well access road. It would use the existing approach, go north approximately 200 m, then west into the well site. Berkley indicated that this option would cost approximately \$26 300.

Option 3 would involve constructing a new approach from Highway 60 at the quarter section line on the northern portion of LSD 8 of Section 33, west approximately 550 m to approximately the centre of the northern portion of LSD 7 of Section 33, just east of the creek, then head south-west, east of the creek and into the well site. Berkley indicated that this option would cost approximately \$41 600.

Option 4 would make use of an existing Probe access road to the middle of the southern portion of LSD 11 of Section 33. A new access road would be constructed east into LSD 10 of Section 33, south approximately 200 m, west approximately 200 m, crossing the creek using an existing bridge, then tie into the remaining portion of Option 3. Berkley indicated that this option would cost approximately \$42 800.

Option 5 would involve constructing a new approach from Highway 60, approximately 250 m north of the intersection. This route would go straight west to the proposed 2-33 well site. Berkley indicated that this option would cost approximately \$33 500.

Berkley had entered into negotiations with the landowners of LSD 11 of Section 33. However, when Berkley received a cease and desist request from the Poholka families' lawyer, Berkley stopped any further investigation of that option.

Therefore, Berkley preferred Option 2 for a temporary and permanent access road. However, Berkley did indicate that it would be prepared to except any option that the Board deemed to be the most acceptable.

The temporary use of Option 2 would allow Berkley to re-enter the well, test it, and then determine if a more permanent access option would be necessary, based on the success of the re-entry.

8.2 Views of the Interveners

The Poholka families indicated that they were opposed to any new access roads being constructed on their lands. Option 1 would be located very close to their farmyard and residences, creating additional traffic, noise, and dust. They indicated options 2, 3, and 5 would split up the lands making it difficult and inconvenient to farm. Additionally, they believed that any of the access roads that would be located in close proximity to the intersections of Highways 39 and 60 would be incredibly dangerous given the large volumes of traffic.

Although the access using Option 4 would have the least affect on farming operations, the Poholka families indicated that it would greatly impact their plans for a future elk farm.

8.3 Views of the Board

The Board notes that in the application correspondence from Alberta Infrastructure, any access from either Highway 39 or 60 would be unsafe and inappropriate. Since the approach is located within 500 m of the intersection, and given the current volumes of traffic, Alberta Infrastructure had concerns with using this approach on a permanent basis. The Board also notes that Alberta Infrastructure indicated the existing approach from Highway 39 was approved on a temporary basis, for agricultural use only, and on limited use. Alberta Infrastructure would however, approve the short-term use of the approach for drilling and testing of the well only. The Board accepts the views of Alberta Infrastructure.

The Board notes that Option 1 is very close to the Poholka families' farmyard, and could potentially be disruptive to the families' way of life. The Board also believes that Option 2, 3, and 5 split the farming operations and could interfere with farming. Therefore, the Board does not agree that Options 1, 2, 3, or 5 would be appropriate for a permanent access road to the proposed facility. Should a temporary access be granted, the Board believes that it would need to weigh the temporary aspects of it and determine if temporary mitigative measures could be put in place that would resolve as many landowner issues as possible and be acceptable to the Board.

Option 4 was noted by the Board as having the least amount of farming impacts, as it would be further west of the majority of farming operations and enter from a direction at a point furthest from the Poholka families' farm. Additionally, the Board notes that of all the options, the

Poholka families' testimony at the hearing indicated that Option 4 would impact them the least. Although the Board believes that Option 4 is the least offensive access to the proposed 2-33 well site, Option 4 does not meet all the requirements and would still result in unnecessary interference with the use by the Poholka families of their land.

Accordingly, the Board does not accept that any of the proposed access routes are acceptable for the proposed 2-33 oil well application, given the information available at the hearing.

However, the Board does accept that a shortened version of the Option 4 route would likely be acceptable in the event that a directional well was approved for the northwest corner of the Poholka family land.

9 CONSERVATION

9.1 Views of the Applicant

Berkley indicated that they intended to perforate in the highest structural position in both the Upper and Lower Mannville zones. In the case of the Upper Mannville zone, Berkley wanted to avoid any water production problems. Berkley noted that there was heavy oil staining in the samples from the Upper Mannville but they did not interpret any appreciable accumulations of oil.

Berkley would be completing the Lower Mannville zone higher up than the previous perforations to stay well within the gas cap. According to Berkley, there was a possibility of an oil leg in the Lower Mannville zone but Berkley did not believe there was sufficient oil reserves remaining to warrant perforation of the oil leg. Berkley also believed that the 15-28 well to the south had depleted the oil reserves under the Southeast quarter of Section 33.

9.2 Views of the Interveners

The interveners did not comment on the issue of the appropriate conservation of gas and oil.

9.3 Views of the Board

The Board accepts that it is very speculative as to whether there is oil or gas in the Upper or Lower Mannville zones. The Board believes that proper testing would be required in order to determine if there are sufficient oil reserves to be recovered in line with proper conservation practices.

10 COMMUNICATION AND CONSULTATION

10.1 Views of the Applicant

Berkley indicated that it began its initial personal consultation with the Poholka families for permission to survey on March 19, 1999.

Berkley indicated that Mr. Darrell Poholka would not give permission to enter the land to survey. Further attempts to obtain permission met with refusal, resulting in a letter from Mr. Poholka to the St. Albert Field Centre. This letter outlined concerns related to the distance of the well to the farmyard and creek, the inconvenience to their farming operation, the possible contamination of topsoil, and the harassment from Berkley personnel. Berkley, in a letter dated April 8, 1999, attempted to resolve these concerns by reducing the size of the lease and by pursuing alternative access roads.

A meeting took place between the Poholka families, Berkley, and the Farmers Advocate of Alberta on June 9, 1999. Berkley indicated that they reviewed the development plan for the proposed re-entry and various access road options. Berkley stated that it continued attempts to consult and negotiate with the Poholka families from June 14, 1999 through to October 7, 1999. Shortly thereafter, Berkley received a letter from the Poholka families' lawyer requesting Berkley "cease and desist" direct communication with the Poholka families.

Berkley indicated that although it appreciated the concerns of the landowners, both parties must attempt to resolve any outstanding issues. Berkley believed that it was dealing with a landowner that simply did not want to deal with the oil and gas industry.

Berkley believed that attempts to negotiate were made by its staff, by its land agents, by Board staff and by the Farmers Advocate of Alberta, all of which met with little cooperation from the Poholka families. It stated that this ultimately led to the polarization between parties and the need for the Board hearing to deal with the matter.

Berkley concluded that it believed it had made every attempt to meet with the Poholka families, to address their concerns, and had tried to satisfy all of the Poholka families' concerns and issues. Berkley believed that the only remaining issue was compensation for access to the well site, which it stated to be a matter for the Alberta Surface Rights Board.

10.2 Views of the Interveners

The Poholka families believed that Berkley failed to properly disclose the potential for sour gas within either of the target formations, to properly disclose and explain its ERP, and to properly address issues related to controlled and uncontrolled releases. Instead, Berkley simply proposed a sweet oil well re-entry.

The Poholka families believed that Berkley had not taken their concerns seriously. In the Poholka families' view, Berkley only proposed a well location, a location in the best interests of Berkley at a cost saving to Berkley. The Poholka families felt that it was Berkley's way only.

The Poholka families believed that for effective communication to take place, landowners should feel that a company is listening and attempting to address the impacts. The Poholka families believed that Berkley was inconsiderate of their needs and was only interested in meeting Berkley's needs. An example that the Poholka families used was the original Berkley's one-hour notification prior to visiting them.

10.3 Views of the Board

The Board believes that the initial contact between a company and a landowner establishes much of the short-term and long-term relationship between the two parties.

Berkley's initial notification and public consultation process could have been improved upon as it was only initiated from a survey point of view. The Board believes that the consultation did not sufficiently address future development, the potential for the well to be a gas well, and the potential for the well production to be sour. The Board is concerned with Berkley's contention that it was acceptable to arrive at the Pohlka families' residence after only one-hour's notice.

The Board does note Berkley's efforts to discuss issues with the Pohlka families, only to be turned away and finally, issued with a legal cease and desist request from the Pohlka families' lawyer.

The Board is also concerned that, at no time prior to the hearing, did the Pohlka families disclose the potential, to the Board or the applicant, for their future plans to establish an elk farm. Withholding this information failed to allow opportunity for all parties to assess alternative access roads, potential mitigation measures, and alternative well sites prior to the hearing.

The Board does not consider it reasonable for the Pohlka families to withhold important information while criticising the applicant for similar actions.

In conclusion, the Board believes that while Berkley made many attempts to meet the minimum requirements respecting notification, Berkley failed to meet the intent of *EUB Guide 56: Energy Development Application Guide and Schedules (G-56)* as it relates to communication.

G-56 does not precisely define the scope of a public involvement program. An applicant's program needs to address public expectations regarding consultation, as well as any issues unique to the area. In this case, the Pohlka families have had many experiences with the oil and gas industry, and many ongoing concerns as a result.

The Board believes that Berkley's apparent one-way approach, coupled with the Pohlka families existing sensitive land use issues and lack of willingness to cooperate, are both contributing factors that polarized communication. The Board expects the public and landowners as well as industry to actively participate in a meaningful and open consultation process.

The Board believes that both parties failed to actively seek resolution to the issues, resulting in a hearing.

11 OPERATOR HISTORY

11.1 Views of the Applicant

Berkley indicated that it is a public company incorporated in August 1986 and its shares are traded on the Vancouver Stock Exchange. Berkley's head office is in Vancouver, British Columbia, with an operations office located in Calgary. The operational staff is contracted to Berkley - the company has no permanent employees in Alberta.

Berkley stated that the proposed application for a re-entry well licence was not Berkley's first project in Alberta. It had previously operated several sour oil wells including a sour oil facility in the Valleyview area. These facilities were no longer in operation.

Berkley indicated that it had a corporate ERP in accordance with the EUB's regulatory requirements, which provided direction for alerting and organizing the personnel who deal with the protection of life, property, and the environment during any occurrence and control of emergency situations.

Berkley also stated it had insurance with blowout coverage of \$2 000 000 for its operations. However, during cross-examination at the hearing, Berkley indicated that it would be prepared to increase this insurance to \$5 000 000.

11.2 Views of the Interveners

The Pohlka families were concerned that Berkley was brought together for investment purposes only, that it may not be a permanent company and key personnel could change.

The Pohlka families indicated they believed that Berkley did not have a long-term track record showing that it could properly re-enter and operate the old wellbore safely. The Pohlka families were concerned that the lack of a corporate track record, coupled with Berkley's proposal to use an old untested wellbore, could result in Berkley not being able to properly manage potentially severe problems that could arise at the well site.

11.3 Views of the Board

The Board has some concerns with any company that may be, or may be perceived as, a virtual company with no permanent employees or presence in Alberta. However, the Board also believes that the people of a company make the company. The Board also recognizes the reality that contract staff and management often make up a significant portion of many companies' workforces in today's business environment.

The Board further notes, with approval, that Berkley's corporate ERP did list how to contact the company's President and shareholder in Vancouver, in addition to Berkley's management.

The Board believes that the members of Berkley are well known in Alberta and have a good operating history with the Board, and that they have met the Board's requirements. The Board further accepts the commitment and experience of Berkley's staff would result in a well being operated and supervised by experienced capable people, and these people would provide effective supervision of any well operation. The Board further accepts that Berkley would contract experienced operators, familiar with the area, to physically operate the production of a well.

The Board notes the liability insurance originally proposed and believes that in this particular case, it may be insufficient. However, the Board notes, with approval, that Berkley was prepared to upgrade its insurance to a higher level to provide assurance to the Poholka families and to the Board. During the Hearing, Berkley upgraded its commitment to insurance to \$5 000 000 and agrees that it would be more appropriate.

12 FUTURE APPLICATIONS AND SPACING REQUIREMENTS

12.1 Views of the Applicant

Berkley indicated that it needs to first obtain a licence from the Board, obtain temporary access to the 2-33 well site and then test the 2-33 well to determine the integrity of the wellbore and the extent of the production capabilities within the existing Upper and Lower Mannville formation. Once these tests were completed, Berkley would be in a better position to plan future surface facilities, design flow lines, and determine where to test and process the production.

If the well were to be an oil well, an electric pump jack would exist at surface. If the well were to be a gas well, a wellhead would exist at surface. In any event, a future new pipeline would need to be designed and constructed to deliver production to nearby facilities.

Berkley indicated that it has the rights to the drilling spacing unit (DSU) for oil. Therefore, it has the right to drill and complete the well.

If the well is determined to be a gas well, EUB regulations stipulate that Berkley would not be allowed to produce the gas until it acquired the complete DSU, or if that is not possible, enter into agreement with other gas mineral rights holders. Berkley indicated that if the well was determined to be a gas well, it intended to apply to the EUB for a reduced spacing order, allowing it to have all production in its quarter section spacing.

When asked at the hearing if Berkley would be responsible for the well if the well proved to be unsuccessful, Berkley committed to assume any liability associated with abandoning the well.

12.2 Views of the Interveners

The interveners were concerned that there was very little information on future development and facilities associated with the well. The Poholka families believed that since there was such little information regarding any successful production of the well, the impacts to them outweigh the need for the well and any future impacts associated with other facilities.

The Poholka families were also concerned with cleanup responsibilities of any oil and gas industry on their property, since they were currently having problems with reclamation on a portion of their land to the north. The Poholka families felt a lack of trust with Berkley, and therefore, were concerned that Berkley could simply walk away from the project.

12.3 Views of the Board

The Board notes that Berkley could test the well, determine the production of the well, and then determine what other facility requirements it would need to take the production to a suitable facility.

The Board further notes that any such future development would require additional applications by Berkley in accordance with the EUB's Acts and Regulations and more particularly, *G-56*. The Board points out that these applications would entail the entire public consultation and notification process established within *G-56* for any new facility.

Regarding future spacing applications, *Informational Letter 82-14* allows a company to apply for the rights to the smallest DSU when it is unclear as to whether oil or gas may exist, and in this case, when it only has the rights to the smallest DSU. This process is designed to allow for competitive opportunity of a company to drill or re-enter a well and determine what actually exists.

Under these circumstances, if the company tests a well and determines that production does not meet spacing requirements, it can apply to the EUB for either compulsory pooling or reduced spacing. In these cases, the EUB would apply the rules to allow for fair and equitable production by all parties.

However, in this case, the Board is not convinced that a high degree of uncertainty exists. All of the evidence presented at the hearing, such as competitive drainage of gas reserves, potential for Mannville gas in the area, leaves the Board to believe that Berkley had planned to produce gas from the 2-33 well. However, the nature of the hydrocarbons is speculative and the Board must respect the rights and rules as they apply to a competitive industry.

The Board notes that Berkley has made a commitment to be responsible for the wellbore if a licence is issued. The Board notes that an agreement has been reached between Berkley and Seller, that Seller would agree to assign the wellbore to Berkley, subject to the execution of appropriate documents.

The Board believes that commercial agreements between companies and freehold parties should be the responsibility of those parties. However, the Board must be satisfied that ownership of facilities is consistently dealt with and that the public will be protected if ventures, such as the re-entry of an abandoned well, prove unsuccessful.

When the Board issues a well licence to an applicant, the applicant becomes the licensee of the well and is subject to all future responsibilities for that well. If the Board were to issue a licence to Berkley to re-enter the existing abandoned wellbore, regardless of whether Berkley determines that the project should proceed, Berkley would be responsible for the 2-33 abandoned well and Seller would be relieved of its responsibility for the wellbore.

13 DECISION

Refer to section 1 of this report.

DATED at Calgary, Alberta, on February 22, 2000.

(Original signed by)

A. J. Berg, P.Eng.
Presiding Member

(Original signed by)

G. Miller
Board Member

(Original signed by)

H. O. Lillo, P.Eng.
Acting Board Member

ATTACHMENT 1 TO DECISION 2000-8

THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations Used in Report)

Witnesses

Berkley Resources Inc. (Berkley)

S. Palmer
R. B. Brander

J. E. O'Byrne, B.A.
B. W. Goruk, P.Eng.
P. N. Byers, Ph.D, P.Geol.

Darrell and Steven Pohlka (the Pohlka families)

K. Wilson
J. Kripps

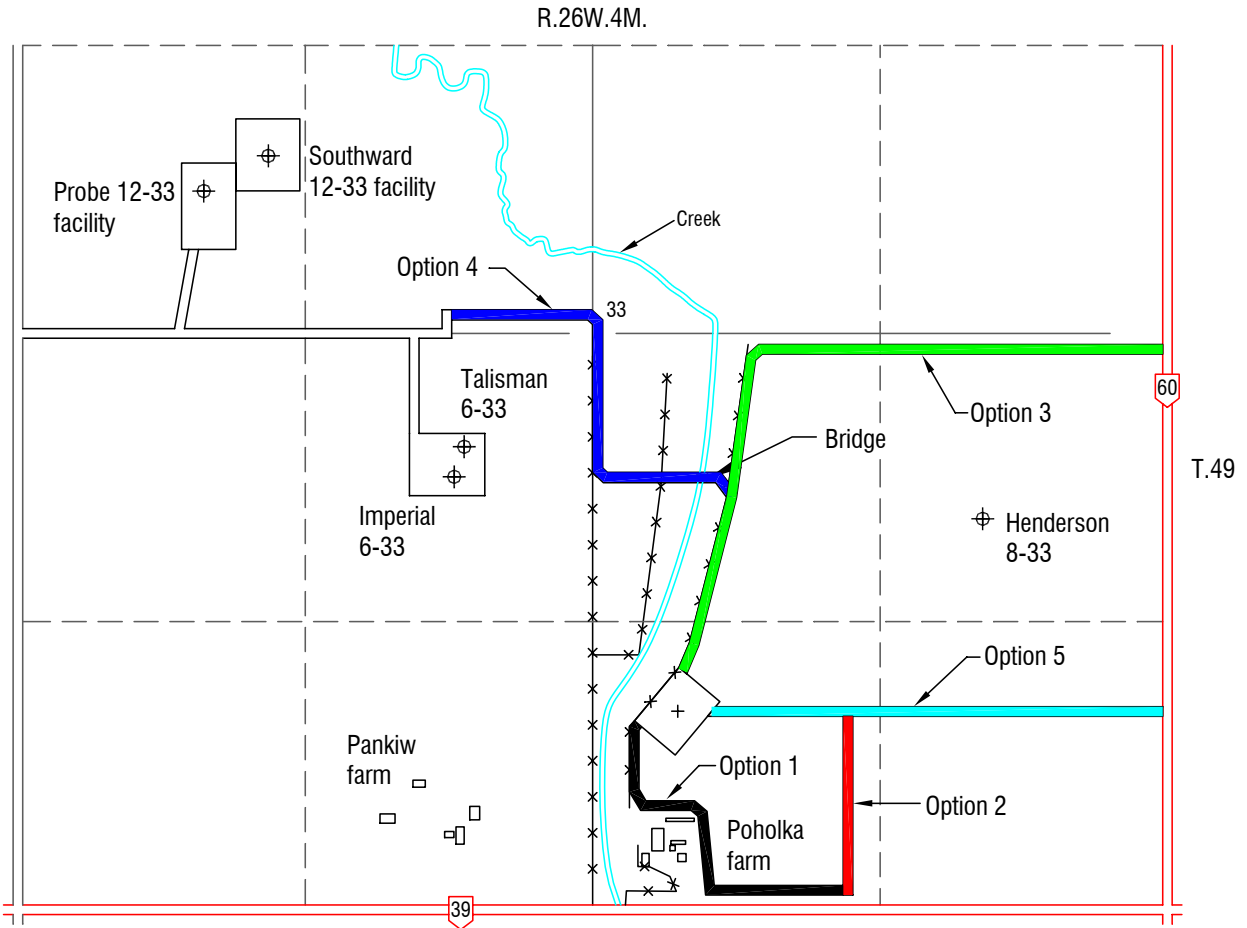
D. Pohlka
S. Pohlka

William H. Pankiw

W. H. Pankiw

Alberta Energy and Utilities Board staff

W. Y. Kennedy, Board Counsel
P. R. Forbes, C.E.T.
H. Nychkalo, B.Sc.
P. Grande, P.Geol.



Legend

- | | | | |
|--|--------------------------|--|-----------------------|
| | Abandoned well locations | | Option 4 access road |
| | Option 1 access road | | Option 5 access road |
| | Option 2 access road | | Low grade gravel road |
| | Option 3 access road | | Fence |

Attachment 2
Leduc - Woodbend field

Application No. 1041795

Berkley Resources Inc.

Decision 2000-8