

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

**NORTHROCK RESOURCES LTD.
APPLICATION TO CONSTRUCT AND OPERATE
A SOUR GAS PROCESSING FACILITY, ASSOCIATED
PIPELINES, WELLSITE FACILITIES, AND
AN ACID GAS DISPOSAL SCHEME
PEMBINA FIELD**

**Decision 99-31
Applications No. 1039083, 1040394,
1040831, and 1039502**

1 DECISION

Having considered all the evidence, the Board is prepared to approve Applications No. 1039083, 1040394, 1040831, and 1039502, subject to Northrock Resources Ltd. meeting all regulatory requirements, its commitments in the applications and at the hearing, and the Board's conditions outlined in Section 10 of this report. The approvals will be issued in due course.

2 CONCLUSIONS

The Board is satisfied that there is a need for additional sour gas processing in the Pembina area and that Northrock's proposal is the most acceptable option. The proposed facility will result in:

- lower plant and regional sulphur emissions due to the use of acid gas injection and minimized sour gas flaring;
- reduced land use and environmental impacts due to reduced transmission distances via sour gas pipelines, and
- timely provision of processing capacity for existing sour gas production in the area.

On this basis, the Board concludes that approval of this facility will not result in unnecessary proliferation of facilities in the area.

3 APPLICATION AND HEARING

3.1 Applications and Interventions

Northrock Resources Ltd. (Northrock) submitted Applications No. 1039083, 1040394, 1040831, and 1039502 (the Applications) to the Alberta Energy and Utilities Board (EUB/the Board) to obtain approval

- to construct and operate a new sour natural gas processing facility at 11-14-50-8W5M (11-14) in the Pembina field;
- to construct and operate various pipelines for the purpose of transporting products to and from the proposed Pembina sour natural gas processing facility;
- to construct and operate two single sour gas well batteries at LSD 6-14-50-8W5M (6-14) and LSD 4-3-51-8W5M (4-3) in the Pembina field; and
- for an acid gas disposal scheme at the 11-14 location.

The details of the applications are included in Appendix 1. The location of Northrock's proposed sour natural gas processing facility (gas plant), existing wells, and other alternative pipeline routes and gas processing facilities are shown on Figure 1. Northrock's proposed project, emergency planning and awareness zones, and residences in the immediate surrounding area are shown on Figure 2.

The EUB received objections to Northrock's Pembina sour gas processing project from area landowners in November 1998 prior to the subject applications being filed. Subsequently, Northrock filed its applications with outstanding interventions and the Board directed, pursuant to Section 29 of the Energy Resources Conservation Act, that a public hearing be held to consider the applications. The Board received submissions from various interested parties on 19 July and 16 August 1999 in opposition to the applications.

3.2 Hearing

The applications and interventions were considered at a hearing in Drayton Valley, Alberta, on 31 August and 1, 2, and 3 September 1999 before Acting Board members C. A. Langlo, P.Geol., W. G. Remmer, P.Eng., and R. N. Houlihan, Ph.D., P.Eng. Those who appeared at the hearing and abbreviations used in this report are listed in the following table.

THOSE WHO APPEARED AT THE HEARING

Principals and Representatives (Abbreviations Used in Report)	Witnesses
Northrock Resources Ltd. (Northrock) B. K. O'Ferrall	A. J. Mah, P.Eng. K. J. Marjoram, P.Eng. L. Smith, P.Eng., of Tartan Engineering Ltd. D. Lui, P.Eng., of Lui Petroleum Management Inc. R. Beck M. Trudell, Ph.D, of Komex International N. Hircock, P.Eng., of N. C. Hircock Process Consulting Ltd. K. Fast, P.Geol. I. Dowsett, R.E.T., of Conor Pacific Environmental Technologies Inc.

THOSE WHO APPEARED AT THE HEARING (continued)

**Principals and Representatives
(Abbreviations Used in Report)**
Witnesses

The Pembina Landowners Association
(the PLA)
R. M. Krulak

B. Isenor
B. Loney
M. Mueller
R. Guyon
C. R. Darsi, Ph.D., P.Eng.,
of Darsi Engineering
J. Farquharson, C.E.T.,
of Fraszter Farquharson &
Associates Ltd.
B. S. Gettel, B.Comm.,
of Gettel Appraisals Ltd

Pembina Institute for Appropriate Development
(PIAD)
C. Severson-Baker

C. Severson-Baker

Elk Point Resources Inc.
D. Bell

Penn West Petroleum Ltd. (Penn West)
S. Dunnigan

G. Hogdson, P.Eng.,
A. Ralston
B. K. Moore, P.Eng.,
of DPH Engineering Inc.

Alberta Energy and Utilities Board staff
W. Y. Kennedy, LL.B., Board Counsel
D. L. Schafer
B. K. Eastlick, P.Eng.

Mr. Bell, of Elk Point Resources Inc., registered as a participant at the hearing. However, Mr. Bell did not present direct evidence, conduct cross-examination, or present closing argument.

4 FACILITY PROLIFERATION POLICY

All of the interveners to this hearing raised the issue of gas plant proliferation in the Drayton Valley area. Prior to discussing the issues specific to the applications, the Board believes that an overview of the proliferation policy and associated guidelines is useful.

The Board's proliferation policy guidelines and expectations for notification and consultation of the public and industry are described in EUB *Guide 56: Energy Development Application Guide and Schedules*. Additionally, the Board's expectations with respect to proliferation of gas plants are described in *Informational Letter (IL) 91-1: Applications for Approval of Gas Processing Schemes — Policy on Plant Proliferation*.

The proliferation guidelines require proponents to identify and contact in writing all operators of similar facilities within a minimum 10 kilometre (km) radius and all oil and gas reserve owners within a 5 km radius of the proposed plant prior to submitting an application. As a minimum, the proponent must provide parties with details of the facility, including location, type, and design capacities.

The Board notes that *Guide 56* identifies minimum notification distances. However, it is expected that proponents will assess each situation in terms of potentially affected public, existing facilities, and needs of other reserve operators in deciding an appropriate notification radius. Particularly in the case of sour gas plants, distances to viable alternatives may be greater than the minimum notification radius noted in *Guide 56*. The scope of broader industry notification in such situations includes consideration of the proximity of gathering pipelines and the available gas processing capacity.

The Board expects operators to vigorously explore all reasonable options to use existing facilities as alternatives to new construction. The Board believes that proponents will formally request information on available capacity, potential for modification or expansion (if required), and terms and fees from operators of existing facilities that may present viable alternatives to new construction. The Board also expects operators to document their comparison of the costs and impacts of the alternatives.

In assessing the impacts of alternatives, the Board recognizes that avoiding construction of new gas plants is not necessarily the only desired outcome. The Board expects that the most desirable outcome will be the alternative that represents an appropriate cost/benefit trade-off while minimizing the impacts of the development. The assessment of alternatives needs to consider not only the land-use impacts of new gas plants but also the impacts of compressor stations and pipelines, relative environmental emissions, and the overall public impact of each alternative. The Board expects proponents to document their assessment of the relative impacts of the alternatives considered.

Where new gas plants are proposed, the Board expects that these plants will be sized to take into account the longer-term needs of the area in which they are situated. In designing new facilities, the Board expects proponents to make formal inquiries of reserve owners and base facility designs on this information, supported with adequate documentation.

The Board notes that *Guide 56* is worded in terms of public consultation and industry contact. It is the Board's expectation that applicants of sour facilities will do more than simple notification. The Board considers it essential for proponents to enter into meaningful public and industry consultation, including the opportunity for and consideration of stakeholder input in significant project design decisions.

5 ISSUES

The Board considers the issues respecting Northrock's applications to be

- need for the facilities
- proposed plant and alternative pipelines/processing options
- impacts
- consultation with the public and industry

6 NEED FOR THE FACILITIES

6.1 Views of the Applicant

Northrock said that it requires its proposed well-site facilities and flow lines to separate, measure, and transport its Pekisko gas reserves to a gas plant regardless of where the plant is located. Northrock also noted that additional sour gas processing facilities are required in the Pembina area and presented a number of reasons to substantiate such additions. Northrock has extensive land holdings and shut-in reserves in the area and plans to continue to explore and drill for both sweet and sour gas. It noted that the reserves require a safe and environmentally sound means to get the gas to market.

Northrock has three shut-in sour gas wells in the immediate area located at 6-14, 4-3, and LSD 14-11-50-8W5M (14-11). It estimated the Pekisko reserves for the 6-14 and 4-3 wells based on geological mapping and a well test at the 6-14 well. Northrock said that the daily production would be approximately 225×10^3 cubic metres per day (m^3/d) (8 million standard cubic feet per day — mmscf/d) from the 6-14 well and 140 to $169 \times 10^3 \text{ m}^3/\text{d}$ (5 to 6 mmscf/d) from the 4-3 well. It noted that the 14-11 well has been shut in since 1997 and there are no production plans for the well, since ownership of the 6-14 and 14-11 wells are the same. Northrock noted that the 4-3 well is in a competitive drainage situation due to the lack of sour gas processing infrastructure and production from offsetting wells.

Northrock noted that the interveners did not dispute the need for the development of its gas reserves and production of the 4-3 and 6-14 wells. It acknowledged that the landowners would prefer not to have the facilities located near them, but pointed out that denying its plant application would only transfer the issues to another location.

6.2 Views of the Interveners

Mr. Mueller said the PLA was formed in opposition to the application because its members felt strongly that there were already enough sour gas plants in the general area and that other alternatives were available for processing this gas. Additionally, he noted that Northrock's proposed plant would be located in a highly populated area with between 23 and 25 residences located within the emergency planning zone (EPZ).

The PLA submitted that there are a number of reasons for the Board to reject Northrock's application. These include public safety and emergency response preparedness, unnecessary risks, poor public consultation, property value impacts, and Northrock's failure to meet the requirements of the EUB's proliferation policy.

The PLA acknowledged the need for Northrock to develop and process its gas reserves but was concerned with the impacts of the proposed sour gas processing facility. The PLA said that although it was comfortable with the development of properly sited sour oil and gas facilities in the area, it was concerned with the proposed acid gas injection scheme associated with Northrock's proposal.

PIAD did not contest Northrock's right to produce its reserves but objected to the selection of its proposed plant as the preferred option. PIAD concluded that the information provided during the hearing strongly supported its position that the Northrock application is a clear case of plant proliferation. It submitted that Northrock had not followed the requirements of the plant proliferation policy as outlined in *IL 91-1*. PIAD submitted that additional impacts and risks associated with the proposed Northrock project can and should be avoided and that the Board would be consistent with *IL 91-1* if it did not approve the Northrock project.

Penn West said that it had a processing alternative with available capacity for Northrock's sour gas and therefore disputed the need for the proposed plant.

6.3 Views of the Board

The Board accepts the need for Northrock to produce its sour gas reserves in the area. It also recognizes the need for Northrock's proposed well-site separation and measurement facilities at the 4-3 and 6-14 wells and the need to construct sour gas gathering pipelines to transport raw gas from its wells to a central facility for compression and dehydration or sour gas processing.

The Board notes that the interveners did not directly object to the need for the pipelines or small well-site facilities and concludes that the well-site facilities and pipelines to a central facility are

needed. The Board also accepts that sour gas processing is needed. However, in reaching its decision on the preferred location for such processing, it must first consider the relative impacts and benefits of the proposed plant and alternative processing options.

7 PROPOSED PLANT AND ALTERNATIVE PIPELINES/PROCESSING OPTIONS

7.1 Views of the Applicant

Northrock proposed a plant with an amine sweetening process and an acid gas disposal scheme at 11-14 (Figure 1). It sized the plant for a $565.7 \times 10^3 \text{ m}^3/\text{d}$ (20 mmscf/d) gas inlet based on the fact that the Pekisko wells have a relatively high deliverability with high decline rates. It noted that the plant capacity was also based on its plans to begin production from currently shut-in Northrock and third-party wells and on future drilling. It also noted that hydrocarbon liquids recovery capacity was available at the Amoco Lobstick sweet gas plant. Northrock said the decision to select an inlet gas processing capacity rate of $565.7 \times 10^3 \text{ m}^3/\text{d}$ was based on balancing these factors.

Northrock noted that, ideally, gas processing facilities are located as near as possible to the producing wells and, as it proposed, to the 11-14 acid gas injection well. Northrock noted that the Municipal District (MD) of Brazeau No. 77 consented to the sour gas processing facilities being located on its land at the 11-14 location.

Northrock stated that it had investigated alternatives to the proposed plant and concluded that suitable sour gas processing capacity does not exist near its wells. It said that it had issued direct notification to all operators within 10 km of its proposed plant site and to plant operators within 69 km. Northrock said, however, that it had not made formal written inquiries requesting capacity from operators of existing gas plants, nor had it invited operators in the area to nominate for capacity in the proposed plant.

Northrock noted that the Chevron-operated Bigoray plant option required a 21 km pipeline with a Pembina River crossing, had limited sour gas processing capability, and was approved for only 0.1 tonne/day (t/d) sulphur inlet. Similarly, it noted that the Mobil-operated Pembalta solution gas conservation battery was approved for only 0.03 t/d sulphur and would require 10 km of pipeline. It stated that the Amoco-operated Bigoray plant was approved to flare up to 3.0 t/d of sulphur, did not have adequate available capacity, and required a 16 km pipeline. It further observed that the Imperial-operated Cyn-Pem plant had capacity for only about half of Northrock's requirements and that either 38 km of new pipeline would be required or significant additional compression would have to be added to use an existing low-pressure Suncor pipeline. Northrock also noted that the Chevron and Amoco Bigoray plants would require upgrading of the sales gas pipelines to accommodate its gas volumes.

Northrock noted that the Penn West-operated Minnehik-Buck Lake (MBL) plant had the capacity to process some or all of its gas but required some 69 km of pipeline, including 33 km of new sour gas pipeline construction. Northrock said that it had considered pipeline routing to

connect to the MBL plant and had determined that 75 to 100 residents would be within the 0.88 km pipeline EPZ. It noted that a North Saskatchewan River crossing would be required and that land disturbance and emissions would be greater with this option than with the proposed plant.

Northrock assessed the differences in operating and capital costs between its proposed plant and the MBL option as significant. It anticipated that operating costs and the Amoco Lobstick processing fee for its gas would total $\$8.15/10^3 \text{ m}^3$ ($\$0.23/\text{mcf}$). This compared to $\$13.49/10^3 \text{ m}^3$ ($\$0.38/\text{mcf}$) for compression/dehydration facility operating costs and pipeline, compression, and process fees for the MBL option. Northrock said that capital costs were approximately equal for either option; however, fuel gas usage would be greater for the MBL option. Northrock also pointed out that the capital costs of its plant were largely recoverable, as the equipment can be relocated. The financial risk of the MBL pipeline, however, was noted to be greater, since the pipeline could not be salvaged.

Northrock noted that regardless of the option chosen, a central compression and dehydration facility near the location of its producing wells would be required.

Northrock submitted that it had proposed a well-conceived gas processing and acid gas injection scheme, that its proposed facilities would have minimal impact compared to alternatives, and therefore that its application should be approved.

7.2 Views of the Interveners

The PLA said that the application should be rejected, as Northrock had failed to meet the requirements of the EUB proliferation policy. It stated that Northrock had not carried out sufficient investigations of alternatives, including creating additional capacity at existing facilities. The PLA argued that it appeared that it was too late to look for options when Northrock investigated alternatives, since Northrock had already committed significant resources to the project in the form of drilling the acid gas injection well and purchasing processing equipment.

The PLA said that a rational, objective review of the region was needed rather than a piecemeal gathering of information. It stated that a proper feasibility study of existing facilities and possibilities for adapting them for additional capacity, including an assessment of the impacts of connecting to the facilities, was needed.

PIAD stated that Northrock had completed only a cursory review of processing opportunities in the area. It said that, despite repeated requests, Northrock had failed to produce a detailed technical and economic assessment of alternatives. PIAD stated that a definitive assessment of the environmental and risk implications of a pipeline to an existing plant compared to Northrock's proposed plant had not been done. It noted that the MBL plant was a viable alternative to the proposed facility. It also suggested that a pipeline to the Amoco Bigoray plant may have been a viable alternative, but noted that Amoco chose not to intervene.

PIAD argued that even if the proposed Northrock plant were approved, there was potential for proliferation, as the plant had not been sized to accommodate future development in the area by other companies. It was PIAD's view that the additional impacts and risks associated with the proposed project could and should be avoided and the Board would be consistent with *IL 91-1* if it did not approve Northrock's project.

Penn West noted that the obligation to observe the proliferation guidelines falls on Northrock. It said that it had made repeated attempts to discuss its MBL processing alternative with Northrock without success. Penn West submitted that Northrock did not seriously evaluate the feasibility of using alternative facilities in the area, nor did it thoroughly investigate the prospect of creating new commercial partnerships with existing operators before filing its application. Penn West said that given the serious outstanding public objections to the application and Northrock's failure to comply with the spirit and letter of the proliferation guidelines, Northrock's application should be denied. It said that Northrock should be directed to engage industry and the public in a meaningful dialogue and thoroughly investigate alternatives to the proposed facility.

Penn West said that there may be a number of more suitable alternatives. It maintained that the MBL option is both feasible and preferable and deserved proper consideration. It noted that an MBL pipeline offers access to enhanced resource recovery and regional air shed benefits and that it could also provide access to the MBL plant for other developing sour gas wells, thereby avoiding the related proliferation of small plants.

Penn West said that there was processing capacity at its MBL plant of approximately $394 \times 10^3 \text{ m}^3/\text{d}$ (14 mmscf/d) in spring 1998 and $1268 \times 10^3 \text{ m}^3/\text{d}$ (45 mmcf/d) on the date of the filing of the Northrock application. It also noted that Northrock has a 1.72 per cent ownership interest in the MBL unit and gas plant.

Penn West noted that the economic considerations of the MBL option were very similar to those of the proposed plant. It estimated the cost of the two alternative pipeline connections to the MBL plant to be between \$2.97 and \$3.18 million. Penn West said that a 28 km pipeline to the Elk Point battery or a 30 km pipeline to a Gulf tie-in at 8-7 could be constructed to take Northrock's gas to the MBL plant (Figure 1). Penn West estimated \$4.6 million for a Northrock compression/dehydration facility, compared to the \$3.9 million estimated by the applicant. Penn West estimated a total cost of \$9 million for the Northrock gas plant, which it noted was very similar to the costs provided by the applicant. Using Northrock's costs for pipelines to the new facility (\$0.7 million) and for the acid gas injection well (\$1.0 million), Penn West estimated a total cost of \$10.7 million for the Northrock plant. In comparison, Penn West estimated the cost for the MBL option to include \$3.9 million, as estimated by Northrock, for the central compressor station and \$3.2 million for the pipeline, for a total of \$7.1 million.

Penn West concluded that using an eight-year cost-return period at $565.7 \times 10^3 \text{ m}^3/\text{d}$ (20 mmcf/d), the capital cost, operating costs, and Amoco Lobstick fee totalled $\$17.75/10^3 \text{ m}^3/\text{d}$ (\$0.50/mcf) for the Northrock option. In comparison and on a similar capital recovery basis for a Northrock compression facility, the costs for the MBL option would be $\$19.17/10^3 \text{ m}^3/\text{d}$ (\$0.54/mcf),

including Northrock's unit capital and operating costs and related fees for third-party compression, pipelines, and processing at MBL. It noted that using a shorter cost recovery period on the Northrock plant would further reduce the differences in the options.

7.3 Views of the Board

The Board has summarized its expectations for new gas processing plants, particularly in areas where proliferation is a concern. The Board notes that prior to the hearing, little evidence in the form of formal communications was presented by Northrock to substantiate its statements regarding the limitations of existing gas plants or the economic and technical feasibility of modifying facilities in the area to process its sour gas. In this case, the Board is concerned that the hearing was the venue for submission of detailed information regarding processing alternatives. The Board expects that an applicant's evaluation of alternatives would be included as part of application information materials.

The Board believes that the onus is on the applicant to vigorously and objectively explore all reasonable alternatives and to justify, to the satisfaction of the Board, new plant capacity when process facilities exist in the area. This is particularly true in areas where there has been significant public concern about proliferation.

In this instance, however, the Board believes that sufficient information was provided during the hearing to enable it to consider proliferation issues and the most preferred option.

The Board notes that the Imperial, Chevron, and Amoco plants do not have capacity and that plant operators were not interested in upgrading their facilities but rather supported Northrock's proposal. The Board also notes that the Amoco Bigoray and Lobstick options would require new sour gas pipelines, with one involving a major river crossing. The Board also believes that there would likely be greater sulphur emissions at these plants compared with the Northrock plant unless costly modifications were undertaken. The Board also notes that Northrock will require a centralized compression facility in the area regardless of which option is chosen. The Board therefore accepts that these facilities are not viable options for processing Northrock's sour gas.

The Board notes the evidence with respect to conceptual pipelining options to take Northrock's gas to MBL. While the Board did not receive a detailed assessment of the relative safety implications of such a pipeline compared to Northrock's proposed plant, it believes that either could be operated safely. The Board also acknowledges and agrees with Northrock's submission that additional sour gas pipelining to MBL would potentially put more residences in the pipeline EPZ, as compared to the plant EPZ, and cause greater environmental and land-use impacts. Due to the preliminary nature of the pipelining options, the Board could not quantify the resulting impacts. However, it accepts that the pipelining options to MBL are likely to have a greater impact on the public.

The Board also notes that the MBL plant has the capacity to take Northrock's sour gas and believes it must first consider the other impacts of this alternative compared to Northrock's proposed plant.

8 IMPACTS

The Board believes that the impacts of the proposed Northrock gas plant must be evaluated and compared to the remaining available options, which include the MBL plant, with 28 to 33 km of new sour gas pipeline, as well as a new compressor station at the 11-14 location. The impacts to be considered are emissions, noise, safety and emergency response preparedness, visual impact, and property values.

8.1 Emissions

8.1.1 Views of the Applicant

Northrock said it intends to minimize environmental impacts by ensuring that 99.9 per cent or more of the acid gas stream would be disposed through subsurface injection. It proposed to inject the acid gas stream into the Wabamun Formation at its injection well at 11-14. It said its acid gas injection scheme would use state-of-the-art proven technology and noted that other injection systems that have been developed in the province since 1989 demonstrate the success of the technology.

Northrock committed to shut in the plant if the acid gas compressor was down. Northrock committed to remaining shut in until the problem was fixed to eliminate flaring from its facility. Northrock noted that only minimal amounts of sulphur dioxide would be emitted through flares during upsets and start-up.

Northrock said that condensate tank and produced sour water vapours would be flared and would contribute about 2.46 kilograms per day (kg/d) of sulphur dioxide (SO₂) emissions. It noted that this would be considerably less than the 4400 kg/d of SO₂ emissions for which Penn West's MBL plant is licensed. It said that all its tank vents and all potentially odorous vents would be connected to the flare. The low-pressure gas from the amine sweetening unit and the stabilizer, which would typically be sour, would be sweetened and burned as fuel.

Northrock said that the option to send its gas to the MBL plant would require additional compression, potentially increasing nitrogen oxide (NO_x) emissions. It also noted that if it were to send its compressed gas to the MBL plant for processing, an incremental 210 kg/d of continuous SO₂ emissions would be emitted at the MBL plant. Northrock noted that a central compressor station in place of the proposed plant would also require a sour gas dehydrator, which would generate approximately 27.6 kg/d of continuous SO₂ emissions versus the 2.46 kg/d at its proposed plant.

8.1.2 Views of Interveners

The PLA stated that its concerns included health and safety issues related to the proposed plant. It believed that the plant could release lethal emissions, odours, and pollutants from flaring. The PLA disputed Northrock's statements that SO₂ emissions at the 11-14 site would increase if the plant were not built and the sour gas were just compressed and dehydrated for pipeline transport to an existing sour gas plant. It said that desiccant processes could be used for dehydration that would not involve dehydrator flaring.

The PLA noted that Northrock proposed to flare the vent gas from the produced water and condensate tanks. It stated that installing a vapour recovery system to conserve the gas or the burning of vent gas in an incinerator would be better alternatives. The PLA stated that amine sweetening system upsets could lead to sour gas flaring in a relatively highly populated area.

PIAD stated that potential impacts would be minimized or avoided by pipelining the gas to an existing facility rather than proceeding with the current project. It noted that the proposed project would emit fugitive hydrogen sulphide (H₂S) and volatile organic compounds (VOC) from the sweetening facility, the disposal well, and condensate storage tanks. Emissions of SO₂, H₂S, and VOC in the vicinity of the plant as a result of low-level flaring and upset flaring would also occur. Relative to the potential for increased SO₂ and carbon dioxide (CO₂) emissions involved in processing the gas at the MBL plant, PIAD said that the direct trade-off would be increased emissions at MBL for decreased risk associated with the acid disposal pipeline and the disposal well.

Penn West stated that the MBL pipeline alternative offers many enhanced resource recovery and regional air shed benefits, including potential connection of other sour gas discoveries as well as sour gas currently processed in acid gas flaring plants.

8.1.3 Views of the Board

The Board recognizes the commitments made by Northrock with respect to emissions management at the proposed sour gas processing facility. It acknowledges Northrock's commitment to shut in the facility during injection system outages, as opposed to flaring for any extended period beyond normal depressurization of equipment. The Board accepts Northrock's commitment to flare odorous vent gas and does not believe that a vapour recovery system or incinerator, as suggested by the interveners, is warranted. The Board expects that Northrock's amine process will be adequately controlled to minimize sour gas flaring.

The Board believes that SO₂ emissions from the proposed Northrock sour gas sweetening and acid gas injection plant will be less than the other alternatives. The Board notes that continuous SO₂ emissions from the proposed Northrock plant will be less than 0.003 t/d (2.46 kg/d). This will be significantly lower than the estimated 27.6 kg/d SO₂ emission from a central sour gas dehydrator and an incremental 210 kg/d SO₂ emission from the MBL sulphur plant as a result of processing the sour gas from Northrock.

The Board is satisfied that Northrock's proposal will meet or exceed regulatory requirements. The Northrock acid gas injection proposal is based on proven technology, and the proposed plant will include appropriate sour gas monitoring and shutdown controls. The acid gas injection line will be short, located aboveground, and housed in an utilidor equipped with H₂S monitors. The monitors will automatically shut in both the plant and the injection well if a sour gas leak is detected. The Board believes that the design of the facility and the measures put in place by Northrock to deal with plant upsets will ensure safe operations.

8.2 Noise

8.2.1 Views of the Applicant

Northrock said that it would take a number of steps to minimize the noise generated at its facility. It said the equipment on site would be orientated such that it would minimize noise to the nearby residents. The acid gas compressor would be electrically driven and all fans in the plant would be of variable speed, so that in the evenings and during the winter season the fan speeds could be reduced in order to reduce noise. It said the fans would be designed to minimize noise. It incorporated Patching Associates' recommendation of installing a building ventilation system so that the main booster compressor would be able to operate with the doors and windows closed in order to reduce noise from the plant. Northrock said that it would use a universal or equivalent exhaust silencer on the booster compressor.

Northrock said that it conducted an ambient sound level survey in May 1999 and established that the default level of 40 decibels (dBA) at nighttime should be reduced to a target of 38 dBA. It then did a noise impact assessment and designed the facility to meet the default level by a margin of 2 dBA, targeting 38 dBA nighttime levels. Northrock said that it would adhere to the 38 dBA nighttime level and believed the noise level would be 36 dBA at the nearest potentially affected resident, 950 m away. Northrock concluded that its facility would be in compliance with the EUB's *ID 94-4: Noise Control Directive*.

As a condition of approval, Northrock committed to conduct a post-start-up comprehensive noise survey at both the nearest residences (the Richerts and the Lemkes) to verify compliance with *ID 94-4*. It acknowledged that if the comprehensive noise surveys indicated that the facility was not in compliance, operations would be suspended until noise mitigation had been completed.

Northrock said that it did not assess the noise levels that would be generated from a compressor station at 11-14. However, it believed that the noise levels would be very similar to that of the proposed plant.

8.2.2 Views of Interveners

The PLA said that it retained Faszter Farquharson & Associates to review and prepare an independent evaluation of Northrock's noise assessments. Its review found that there appeared to

be errors with respect to the sound source levels used and noted a number of contradictions in the report. The PLA concluded that the community and landowners could not have much trust in the quality of the noise assessment report presented by Northrock. The PLA said that the report indicates a noncompliance situation, particularly with Northrock's commitment to adhere to a lower permissible sound level (PSL) of a 38 dBA nighttime level. The PLA noted that there were no specialized noise controls cited in the documents, although it did acknowledge that parts of the specifications, such as of some of the fans, exhibit fairly low sound levels. The PLA contended that Northrock had not addressed its concerns and noted that it did not receive sufficient material to review all the items discussed at the hearing. It noted that there would be additional equipment located at well sites that might cause problems in the community and that these should be reviewed and included in the assessment.

8.2.3 Views of the Board

The Board notes the interveners' concerns with the adequacy of some of the noise controls proposed by Northrock. The Board also notes that the noise levels at the proposed plant or a central compressor station would be similar.

The Board accepts the commitments made by Northrock to minimize the noise generated from the proposed facility and to complete a noise survey upon start-up. The Board notes the concerns regarding noncompliance raised by the interveners and is satisfied that Northrock's commitment to conduct a survey will deal with this issue. In the event that the survey illustrates noncompliance, the Board notes that Northrock will suspend operations until noise mitigation is complete and the facility is compliant. In addition, the Board notes that should the interveners have a noise complaint, they may contact the EUB's Drayton Valley Field Centre to convey their concerns.

The Board accepts Northrock's commitment to exceed the maximum nighttime PSL by 2 dBA and believes that this commitment will result in low noise levels for the facility. The Board notes that although the 38 dBA nighttime PSL exceeds the standard requirement of 40 dBA, it will make this a condition of any approvals issued to Northrock. In addition, the Board will require that the results of the post-start-up survey be submitted for review by EUB staff and be made available to the interveners within 30 days of the start-up of the facilities.

8.3 Safety and Emergency Response Preparedness

8.3.1 Views of the Applicant

Northrock said that it had designed the 11-14 plant site to be safe for the public as well as its own operations staff. It noted that the facility would be automated to operate in a semi-attended mode, which would involve operator visits on a daily basis. Northrock stated that it would staff the facility on a 24-hour-per-day basis during the first months of operation until the plant was running satisfactorily. It said that thereafter operators would typically attend the plant for four

hours per day. It noted that fire detection devices would automatically shut in and depressure the plant; however, outages such as power failure would shut in but not depressure the facility.

Northrock stated that an automated call-out system would be installed to notify operators of problems when the plant was not attended. It noted that there would be at least four Northrock operators in the area and the system would sequentially call its staff until someone responded. Northrock stated that operators would be able to respond to a call-out within 20 to 30 minutes when the plant was in unattended mode. Northrock also said that it would finalize a mutual aid arrangement with the operator of the Lobstick plant to monitor pressures and flows from the proposed plant and act as a backup to notify Northrock's operators in the event of a flow disruption.

Northrock stated that the 120 m acid gas injection line from the plant to the 11-14 injection well would be installed above grade in a utilidor and that H₂S detection would be provided within the utilidor every 30 m. It said that if H₂S were detected, the plant would shut down and the acid gas injection line would be depressurized to flare. Northrock noted that its design included a gas supply and ignition system at the injection well to facilitate ignition and combustion of the acid gas in the event of an uncontrolled release from the well. The system would enable such a release to be ignited from a safe distance, and the gas supply would assist combustion of the acid gas. It noted that the acid gas heating value was 7.98 megajoules per cubic metre (MJ/m³) and that the fuel gas addition would result in a combined heating value of 14 MJ/m³ to ensure that the gas would burn.

Northrock stated that its EPZ for the plant was based on a 2.4 km radius, notwithstanding the Conor Pacific hazard assessment that indicated 1.8 km as an appropriate EPZ. It stated that the hazard assessment was based on a worst-case scenario involving the loss of the wellhead and downhole emergency shutdown (ESD), with full release from the injection wellbore. Northrock said that it had not evaluated the probability of such a failure but noted that the probability of an uncontrolled release from a producing well was in the neighbourhood of 1.7 failures in 10 000 well-years. Northrock did not complete a risk assessment; it used the hazard assessment to define the maximum distance from the injection well and plant site for emergency planning purposes.

In addition to the 2.4 km EPZ, Northrock stated that it also included an emergency awareness zone (EAZ) of 2.4 km. It noted that the EAZ is an area that it would monitor and use to set up roadblocks in the event of an emergency. In the event of an emergency, Northrock would be responsible for notification of residents within the EPZ. However, if the emergency extended farther, it would look to the MD to provide assistance.

Northrock said that it had initiated work on an emergency response plan (ERP) for its proposed project and that the ERP was in draft form. Northrock noted that its mutual aid agreement with the operator of the Lobstick gas plant would also provide for assistance in dealing with potential emergencies. Northrock said that it would meet with residents to understand their needs for assistance and to ensure that they understood the ERP. It said that it would also involve industry and interest groups such as PIAD in the development of its ERP. Northrock noted that it

intended to conduct practice sessions with residents willing to participate and that the sessions would also evaluate operator response times. Northrock committed to having its ERP completed and submitted to the EUB at least 30 days prior to start-up of its proposed project.

Northrock stated that it would adopt a tier-3 approach to compensation arising from a release from its operations. This approach would include reimbursement for immediate out-of-pocket expenses (tier 1), compensation for damages to property (tier 2), and compensation for longer-term effects (tier 3).

8.3.2 Views of Interveners

The PLA stated that there were 23 to 25 residents in the plant's 2.4 km EPZ and that 28 families were members of the association. It noted that signatories to a 67-name petition opposing the proposed plant lived mostly in the EAZ, with fewer than 5 outside that zone. The PLA stated that its key concerns included health and safety, pointing out that the proposed plant would be too close to residences and that school bus routes are also located near the proposed plant site. The PLA was concerned that the plant could release lethal emissions and that it would not be staffed 24 hours per day. The PLA stated that the plant would create constant fear and stress for residents in the area.

The PLA noted that while a raw gas pipeline to an existing gas plant would impact more people, it viewed that impact as much less serious than the risk of a highly concentrated H₂S release from the proposed facility. It contended that amine processes are prone to operating problems and that these could lead to flaring. The PLA said that completion of the ERP, including advising members of what would happen if alarms occurred, should be a high priority.

It was the view of PIAD that the additional impacts and risks associated with the proposed plant can and should be avoided. PIAD stated that Northrock ignored public concerns about H₂S and SO₂ exposure raised in its open house and had not taken steps to demonstrate that it could properly design and execute an adequate ERP.

8.3.3 Views of the Board

The Board notes Northrock's commitments regarding automation of the facility and controls to shut down the plant and to minimize flaring if problems are detected. The Board further notes that Northrock's proposed design includes features to address acid gas injection system integrity and leak detection. The Board accepts that these measures, when implemented, will minimize the potential risks associated with either a sour or an acid gas release. The Board expects Northrock to comply with its commitments on monitoring, automated control, and measures to minimize acid gas flaring.

The Board notes the concerns of the interveners regarding the ability of Northrock to respond to emergency conditions when the plant is not attended. The Board views that prompt operator response to upset and emergency conditions in semi-attended sour gas plants is essential. The

Board accepts Northrock's statements that it can respond within 30 minutes and will expect Northrock to meet its commitments to promptly respond to call-outs and emergencies when the plant is unattended. The Board also notes Northrock's commitment to staff the plant on a 24-hour basis until the facility is operating satisfactorily. The Board will require that the plant be continuously staffed until stabilized operations are demonstrated to the satisfaction of the EUB's Drayton Valley Field Centre.

The Board notes that because the 11-14 well is an injection well, as opposed to a producing well, the release rates described in Northrock's ERP calculations will not likely be achieved for several years. The Board also accepts that the probability of an injection well failure of the severity assumed by Northrock's hazard assessment is very low based on the technology employed. The assessment also uses a combination of H₂S release rates and meteorology to define the area that could be affected by a hypothetical worst-case scenario as a basis for emergency planning. Based on the Conor Pacific hazard assessment used by Northrock, the Board notes that an EPZ radius of 1.8 km would be appropriate but accepts Northrock's commitment to an EPZ of not less than 2.4 km from the plant site. The Board believes that the 2.4 km EPZ is appropriate in this case because it incorporates the majority of the homes in the immediate area.

While the Board notes that the ERP is not required at this stage of the project, it is clear that a more proactive approach to emergency planning may have addressed many of the public concerns. The Board accepts Northrock's commitment to give prompt attention to consulting the public on its ERP and to carefully consider any input received. The Board also expects that the completed ERP will be submitted for Board review and approval well in advance of, and at least 30 days prior to, the commissioning of facilities.

8.4 Visual and Other Impacts

8.4.1 Views of the Applicant

Northrock said that its flare stack, with a high- and low-pressure side, has to be 24 m (80 feet) in height due to radiant heat intensity and for safety reasons. It said that it may be able to lower the stack by approximately 6 m (20 feet) and put shrouding around the pilot to reduce visual impact. However, it noted that the site was well treed and that it would have to look carefully at the stack design, for this reason as well as other considerations, prior to committing to a change.

Northrock said that regardless of whether it applied for a plant or a compressor station at 11-14, the flare stack design would be very similar and there would be similar visual impact.

Northrock noted that the use of the Amoco Lobstick plant reduces the amount of surface facilities as well as the trucking of natural gas liquid (NGL) products to and from the plant. Northrock committed to limiting trucking hours for the safety of children being bused to and from school in the area of the plant.

Northrock noted that the nearest domestic water well is located in the southwest of section 14, approximately 400 m south of the site. It committed to sample and test all of the domestic water wells in the immediate vicinity for water quality prior to plant construction and to provide an ongoing groundwater monitoring program for the plant site.

8.4.2 Views of Interveners

The PLA said that it was very concerned with the visual impacts associated with the proposed facility. Mr. B. Isenor, a member of the PLA, said that his property is on a hillside approximately 2.4 km northeast of the proposed plant. He said that his property is very beautiful and still has the original log cabins on it. He submitted that the flare stacks would be clearly visible due to the incline from the plant up to his property and that they would be an eyesore.

8.4.3 Views of the Board

The Board notes Northrock's efforts to select a plant location that minimizes visual impacts by taking into consideration the area's topography and existing vegetation. The Board also recognizes that those nearby residents at higher elevations will likely see the top of the flare stack and associated pilot lights. However, it notes that this site is in an area that is less visible to the majority of the nearby residents. The Board notes Northrock's commitment to minimize visual impacts and to limit flaring during plant operations. The Board recognizes that a compressor station at 11-14 would require a flare stack of similar design and notes that this option would not eliminate the visual impact. The Board further notes that flaring from a compressor facility could be more noticeable as a result of higher emissions from the dehydration facilities that would be required.

The Board accepts Northrock's commitment to test nearby domestic water wells for water quality.

8.5 Property Values

8.5.1 Views of the Applicant

Northrock said that because of concerns raised by parties regarding property values in the area of its proposed plant, it commissioned a report by Phillips Appraisal (the Phillips report) to consider these impacts. Northrock recognized that there were some problems with the report but also noted that it raised some good points, as did the PLA's study by Gettel Appraisals Ltd. (Gettel). Northrock said that, in general, oil and gas facilities may devalue immediate adjacent properties in terms of land values, but it noted that there are many other contributing factors that may also have an impact. Northrock said that there had been no studies done that indicate that sour gas plants do, in fact, conclusively reduce immediate adjacent land values. It said that the whole issue really comes down to how well the operator can mitigate the impacts associated with these types of facilities, and it noted that it has clearly considered these impacts with respect to the design of its own facility.

8.5.2 Views of Interveners

The PLA said that it had an accredited appraiser from Gettel review the Phillips report, including Northrock's appraisals with respect to property value impacts. Gettel completed an independent review of possible property value impacts associated with sour gas facilities.

Gettel submitted that the Phillips report basically looked at ten case studies using a paired-sales analysis theory. Gettel said that it was concerned that the report simply analyzed data, instead of actually obtaining input from the parties directly involved in the sales in order to identify what factors impacted the property values. In addition, Gettel said that it was concerned with the report because it used a select number of properties as comparables to other test properties, which resulted in mixing the wrong types in order to complete the analysis. In Gettel's opinion the Northrock facility would have the greatest negative impact on property values within 1.6 km (1 mile) and it would have a peripheral impact within 3.2 km (2 miles) of the plant. Gettel predicted that there could be a 5 to 10 per cent impact on property values within this area and noted that potential sellers would have to disclose to any potential buyer that related property would be in the EPZ for the plant.

8.5.3 Views of the Board

The Board notes the evidence presented by the interveners that facilities development may impact the value of nearby properties. The Board also notes Northrock's contention that other factors, both tangible and intangible, could also influence property values in the same area. The Board accepts that facility development is only one of a number of factors that may impact

property values and concludes that it is not possible to clearly identify the impacts of facilities on property values in this case.

9 CONSULTATION WITH THE PUBLIC AND INDUSTRY

9.1 Views of the Applicant

Northrock said that it had undertaken an extensive public consultation process beginning in July 1998. It stated that it held two initial meetings with interest groups to get feedback and distributed a public information package to everyone in the notice area. It also met with the MD of Brazeau No. 77 to discuss its proposed project in detail. Three notices were published in three issues of the *Drayton Valley Western Review* newspaper to ensure that the public knew what Northrock was doing through its consultation process.

Northrock said that it held two public information sessions and conducted a number of one-on-one personal consultations. Based on the public information session at the open house and all written responses, Northrock put together a thorough question-and-answer package, which it sent to everyone within a 6 km radius of the proposed plant. This was followed by a second series of one-on-one personal consultations with landowners, residents, and occupants within a 2.4 km radius of the proposed plant.

Northrock said that it took a very proactive approach to dealing with public concerns. Northrock believed that its decision to proceed with the acid gas injection plant would address public concerns because it would ensure that 99.9 per cent of the acid gas would not be flared, resulting in reduced emissions and odours. It also redesigned the plant to treat low-pressure sour gas for fuel gas and eliminate related flaring. Additionally, it worked with Conor Pacific to complete a hazard assessment, and from that hazard assessment it made additional design changes, such as the utilidor, to reduce the risks involved with the acid gas injection pipeline.

Northrock said that following its conclusion to proceed with the acid gas injection scheme, it again went back and talked to the third-party processing operators and looked more extensively at options. It noted that public concerns were then raised about the timing of Northrock's project advertisement, so it placed additional advertisements in the *Drayton Valley Western Review* to inform interveners and residents of the status of its application process.

Northrock said that it had notified all of the plant operators and reserve owners within a 10 km radius of its proposed plant. It noted that it also notified some operators as far away as 69 km and that all of the notices included a detailed description of its proposed project.

9.2 Views of Interveners

The PLA said that it did not feel that Northrock conducted an early, meaningful, or honest public consultation program. It noted that the Board's minimum requirements for consultation with respect to sour facilities were not met, as some of its members within the 1.5 km distance were not personally consulted. The PLA characterized Northrock's consultation as a public notification process, given that the 6-14 well and the 11-14 acid gas disposal well had been drilled and completed prior to any public meeting or community information sessions being held. It argued that Northrock's consultation was in the construction stage of its project, not the planning stage.

Ms. Guyon and Mr. Mueller, members of the PLA, said that they first became aware of the Northrock plant proposal in October 1998, when they went to the MD of Brazeau No. 77 to find out what was going on with the lands in section 14-50-8W5M. They learned that a lease had been signed between the MD and Northrock and that the lease was already being constructed for the proposed gas plant. They noted that at the time they had not had any personal discussion with Northrock about the plant.

Mr. Loney, a member of the PLA, submitted evidence that his residence is within the EPZ and stated that he first became aware of Northrock's plans in August 1998, when a drilling rig went into the 6-14 location. He said that the well was finished drilling in early September 1998, following which a service rig with flare stacks and testing equipment was moved in. He stated that Northrock flared the well for approximately 14 days without prior notification to adjacent landowners. He noted that he had no information about what was going on until Northrock came back in the second time, changed its consultants, and then informed him that there was H₂S gas at the well. He said that he could see the flare from his residence and that it was very noisy. Mr. Loney said that he had not received notice from Northrock regarding the plant being proposed at 11-14 until late December 1998, when he received a package, noted an advertisement in the paper, and attended a meeting. He explained that he had not had any personal consultation with the representatives of Northrock with respect to emergency planning, although he noted that Northrock apparently tried to contact him by phone. He said that there were no messages left and nobody called back.

PIAD described the applicant's consultation efforts as inadequate. It noted that part of the reason for this was that Northrock was committed to its own sour gas processing project from the time it drilled its acid gas injection well at 11-14. It said that Northrock drilled the acid gas disposal well long before it conducted meaningful consultation with the public. PIAD said that Northrock refused to provide it with information on processing alternatives and ignored concerns about H₂S and SO₂ exposure raised at the November 1998 open house. Additionally, PIAD said that Northrock did not take the necessary steps to prove to the public that it could properly design and execute an ERP that would provide an adequate level of protection and instead chose to request a public hearing.

Penn West said that Northrock did not engage in meaningful dialogue with the industry or the public, nor did it document any such communication. Penn West submitted that every action of Northrock since 1998 was directed solely at the construction of its own plant irrespective of viable processing alternatives. It further noted that most of Northrock's corporate plan was acted upon before the consultation process even began.

Penn West said that it first became aware of Northrock's plans to construct a sour plant in the Pembina area in December 1998. Penn West indicated that it began reviewing options to pipeline the gas to the MBL plant but that discussion and correspondence were very limited between the companies. Penn West indicated that in late February 1999 it called Northrock to indicate that it would have the capacity to handle all of Northrock's gas and noted that the offer was rejected in May 1999. A meeting was held in July 1999 where options were discussed further but no agreement could be achieved due to the disagreement on appropriate operating cost between the MBL plant and the new plant.

9.3 Views of the Board

9.3.1 Public Consultation

The Board's expectations for notification and consultation with the public regarding production facilities are described in *Guide 56*. The Board notes that in this case the applicant was required to personally consult with the landowner and occupant and all residents within 1.5 km of the proposed plant location. It was also required to provide written notification to all landowners, occupants, and urban authorities within a 3 km radius of the plant and to notify the local authorities. The applicant had to carry out the consultation and notification process prior to submitting an application and had to inform affected parties of the details of the proposed development such that the parties understood them and their associated impacts.

The Board notes the PLA's concerns with Northrock's consultation efforts. The Board accepts that it is sometimes difficult to personally consult with absent landowners, occupants, and residents, and therefore it expects the applicant to use other communication mechanisms. However, the Board notes that Northrock continued to provide information packages, open houses, and several advertisements of its project in the local papers in an attempt to keep the public informed.

The Board believes that Northrock undertook a thorough public notification process with respect to its proposed plant and that it had notified those within the Board's minimum notification distance. The Board also notes that Northrock's notification process was carried out prior to filing the plant application and that Northrock had attempted to do one-on-one personal consultation with all parties within 2.4 km and provide written notification to all parties within a 6 km radius of the proposed plant.

The Board recognizes that some of the interveners' contentions about Northrock's consultation process revolve around the fact that Northrock had initiated several actions, such as the drilling

of wells, obtaining a lease from the MD, and drilling an injector, prior to consulting with the public specifically regarding the proposed plant location. The Board believes that although Northrock notified the landowners, it should have done so earlier in the conceptual design stage. In addition, Northrock should have established regular communications with individuals who had concerns, as well as notifying all adjacent landowners about well tests or any other similar activities. The Board agrees that Northrock must henceforth establish regular and ongoing communications with landowners in the area to deal with operations throughout the life of the facilities.

9.3.2 Industry Consultation

The Board notes that while Northrock did notify other operators in the area of its intention to apply for a new facility, it did not formally request operators to nominate capacity in the plant. The Board expects sour gas processing project proponents to undertake a reasonable and well-documented evaluation of the longer-term facility needs of an area in establishing design capacities. Notwithstanding the responsibility of the proponent to assess the longer-term processing needs of the area, the Board's proliferation policy, as presented in *Guide 56*, also places the onus on other operators to respond to proponent industry notification in this regard. On that basis, the Board accepts that Northrock's proposed facility has been appropriately sized and meets the needs of other area operators. The Board believes that the onus for ensuring that plants are properly sized must be shared by all operators in an area such as this.

The Board agrees that Northrock did complete its notification of all industry parties and that in some cases it contacted parties beyond the minimum distances. However, the Board notes the concerns raised by Penn West, the PLA, and PIAD with respect to the proliferation policy outlined in *IL 91-1*. The Board recognizes that the proliferation policy clearly requires the applicant to go well beyond simple notification in terms of investigating and documenting alternative processing options. The Board focuses on the requirement for the applicant to document its investigation of those options in section 7 of this report.

10 BOARD FINDINGS AND CONDITIONS

The Board has considered the evidence provided by the applicant and the interveners and concludes that Northrock's proposed project (the Applications) is required in order for Northrock to recover its reserves. The Board is satisfied that Northrock's project is in the public interest, as it meets all regulatory requirements. The Board also agrees that Northrock's project is the most acceptable processing option compared to other alternatives.

The Board finds that, in comparison with the MBL option, the project offers lower emissions and reduced land-use and environmental impacts associated with sour gas pipelining and provides timely processing capacity for sour gas production in the area. The Board believes that noise and visual impacts from the proposed facility would be similar to those from a compressor station, which would be required as part of the MBL option. The Board is also satisfied that the impacts of the proposed facility can and will be minimized through the commitments made by Northrock.

Northrock's commitments regarding the design and operation of its proposed gas plant are summarized in Appendix 2. In reaching its decision, the Board has considered these commitments and the public expectations that the commitments will be met and expects Northrock to comply with these expectations. The Board believes that some commitments should be linked to the approval and will therefore condition it as follows:

- 1) The plant will be shut in during outages of the acid gas injection system. Acid gas will not be continuously flared during injection system outages, other than volumes necessary to depressure and render equipment safe for repairs and maintenance.
- 2) The acid gas injection line will be installed in a closed utilidor that will be equipped with H₂S detection every 30 m. The automated response to H₂S detection in the utilidor will be configured to shut down the gas plant and to isolate and depressure the acid gas injection line.
- 3) All potentially odorous vents at the gas plant site will be connected to the flare system.
- 4) A meter will be installed on the acid gas flare line.
- 5) Sour fluids will be transported in pressurized trucks to prevent odours.
- 6) The gas plant facilities will meet a maximum nighttime PSL of 38 dBA. A post-construction comprehensive noise survey will be conducted at the Richert and Lemke residences to verify compliance with the 38 dBA nighttime PSL.
- 7) During initial plant start-up and until it is demonstrated to the satisfaction of the EUB Drayton Valley Field Centre staff that the plant can reliably and safely operate in a semi-attended mode, the plant will be staffed 24 hours per day. When the plant is unattended, Northrock operating staff will promptly respond to call-outs and emergency conditions consistent with its commitments and its emergency response plan.

Dated at Calgary, Alberta, on 23 December 1999.

ALBERTA ENERGY AND UTILITIES BOARD

[Original signed by]

C. A. Langlo, P.Geol.
Acting Board Member

[Original signed by]

W. G. Remmer, P.Eng.
Acting Board Member

R. N. Houlihan, Ph.D., P.Eng.*
Acting Board Member

* R. N. Houlihan was not available to sign but concurred with the report and decision.

Appendix 1

Northrock submitted Application No. 1039083 in accordance with Section 26(1)(b) of the Oil and Gas Conservation Act requesting approval to construct and operate a new sour natural gas processing facility in the Pembina field. The facility would be located in Legal Subdivision 11, Section 14, Township 50, Range 8, West of the 5th Meridian and would serve the Pembina field. The facility would be designed to process 565.7 thousand cubic metres (10^3 m^3) per day of sour natural gas with a hydrogen sulphide (H_2S) content of 6 moles per kilomole (mol/kmol), from which $553.3 \times 10^3 \text{ m}^3$ per day of sales gas and 29.7 m^3 of pentanes plus would be recovered. The facility would be designed to dispose of approximately 4.6 tonnes per day of sulphur equivalent through subsurface injection via a well existing in LSD 11-14-50-8W5M (the 11-14 well).

Northrock submitted Application No. 1040394 in accordance with Part 4 of the Pipeline Act requesting approval to construct and operate various pipelines for the purpose of transporting products to and from the proposed Pembina gas plant located at LSD 11-14-50-8W5M (plant). Specifically, Northrock has applied for the following pipeline approvals: approval to construct approximately 7.99 kilometres (km) of 168.3 millimetre (mm) outside diameter (OD) pipeline to transport raw sour gas (10 mol/kmol H_2S , level one) from existing wells located at LSD 6-14-50-8W5M and LSD 4-3-51-8W5M to the plant; approval to construct approximately 0.12 km of 60.3 mm OD pipeline to transport acid gas (350 mol/kmol H_2S) from the plant to an acid gas injection well located at LSD 11-14-50-8W5M; approval to construct approximately 6.26 km of 168.3 mm OD pipeline to transport sweet sales gas from the plant to the Amoco Lobstick gas plant located at LSD 9-17-50-7W5M; approval to construct approximately 6.50 km of 60.3 mm OD pipeline to transport fuel gas from the Amoco Lobstick gas plant to the proposed plant and associated facilities; approval to construct approximately 1.44 km of 88.9 mm OD pipeline to transport lower vapour pressure (LVP) products from the plant to an existing Pembina crude oil pipeline located at LSD 9-14-50-8W5M.

Northrock submitted Application No. 1040831 in accordance with Section 7.001 of the Oil and Gas Conservation Regulations requesting approval to construct and operate two single sour gas well batteries at LSD 6-14-50-8W5M and LSD 4-3-51-8W5M in the Pembina field. The well-site facilities would consist of a line heater, separator, flare knockout tank, and flare stack. These facilities would be required to produce raw gas from two existing gas wells to Northrock's proposed Pembina gas plant at LSD 11-14-50-8W5M.

Northrock applied for Application No. 1039502 under Section 26 (1)(d) of the Oil and Gas Conservation Act and Section 15.060 of the Oil and Gas Conservation Regulations for approval to convert the 11-14 well to an acid gas disposal well. The disposal fluid, a mixture of 35 per cent H_2S and 65 per cent CO_2 , would be injected into the Wabamun Formation of the 11-14 well at a maximum daily rate of $16 \times 10^3 \text{ m}^3$ per day. The cumulative volume of acid gas injection would not exceed $38 \times 10^6 \text{ m}^3$.

Appendix 2

Northrock made the following commitments during the course of the hearing that the Board views as important to the public and to its decision.

- 1) The plant processes and acid gas disposal system will be operated such that 99.9 per cent of the H₂S will be injected inclusive of flare emissions.
 - a) Sweet fuel gas will be used to pressure-up the plant for start-up and to avoid flaring of sour gas during such operations.
 - b) Sweet fuel gas will be used to sweep systems prior to planned shutdowns to avoid flaring of acid gas.
 - c) The plant will be shut in during outages of the acid gas injection system. Acid gas will not be continuously flared during injection system outages, other than volumes necessary to depressure and render equipment safe for repairs and maintenance.
- 2) Odorous emissions will be controlled from the plant and well-site facilities.
 - a) Well-site flares will be equipped with sweet gas purge and ignition systems. The flares will not normally have sustained pilots. The flares will be ignited and maintained when liquids are present in the flare knockout separators to control odours.
 - b) All potentially odorous vents at the gas plant site will be connected to the flare system.
 - c) Sour fluids will be transported in pressurized trucks to prevent odours.
- 3) The gas plant high- and low-pressure flare stacks will be equipped with continuous pilots and igniters.
- 4) Flared gas, including acid gas flared, will be measured and reported as required by *Guide 60*. Additionally, a meter will be installed on the acid gas flare line.
- 5) The gas plant, sour gas gathering system, and well-site facilities will be equipped with automated monitoring and shutdown equipment.
 - a) The plant will be equipped with H₂S, combustible gas, and fire detection systems in process and compressor buildings. The detectors will be configured to shut down and isolate or shut down, isolate, and depressure systems as appropriate.
 - b) Sour gas pipelines will be equipped with an automated pressure monitoring and ESD system.
 - c) The acid gas injection line will be installed in a closed utilidor that will be equipped with H₂S detection every 30 m. The automated response to H₂S detection in the utilidor will be configured to shut down the gas plant and to isolate and depressure the acid gas injection line.
 - d) The facilities will be equipped with an automated call-out system that will sequentially notify not fewer than four emergency contacts of plant outages and emergency conditions.
 - e) Operations staff will be capable of responding to call-outs within 30 minutes.

- 6) During initial plant start-up and until it is demonstrated that the plant can reliably and safely operate in a semi-attended mode, the plant will be staffed 24 hours per day.
- 7) The gas plant facilities will meet a maximum nighttime PSL of 38 dBA.
 - a) A post-construction comprehensive noise survey will be conducted at the Richert and Lemke residences to verify compliance with the 38 dBA nighttime PSL.
 - b) Compressor buildings will be equipped with suitable ventilation systems so that doors and windows will remain closed during warm weather.
- 8) A project-specific emergency response plan (ERP) will be submitted to the EUB at least 30 days prior to start-up of the plant and other facilities.
 - a) The ERP will be based on a emergency planning zone (EPZ) radius of not less than 2.4 km from the plant site.
- 9) Water wells in the vicinity of the plant will be tested for water quality prior to start-up of the plant.

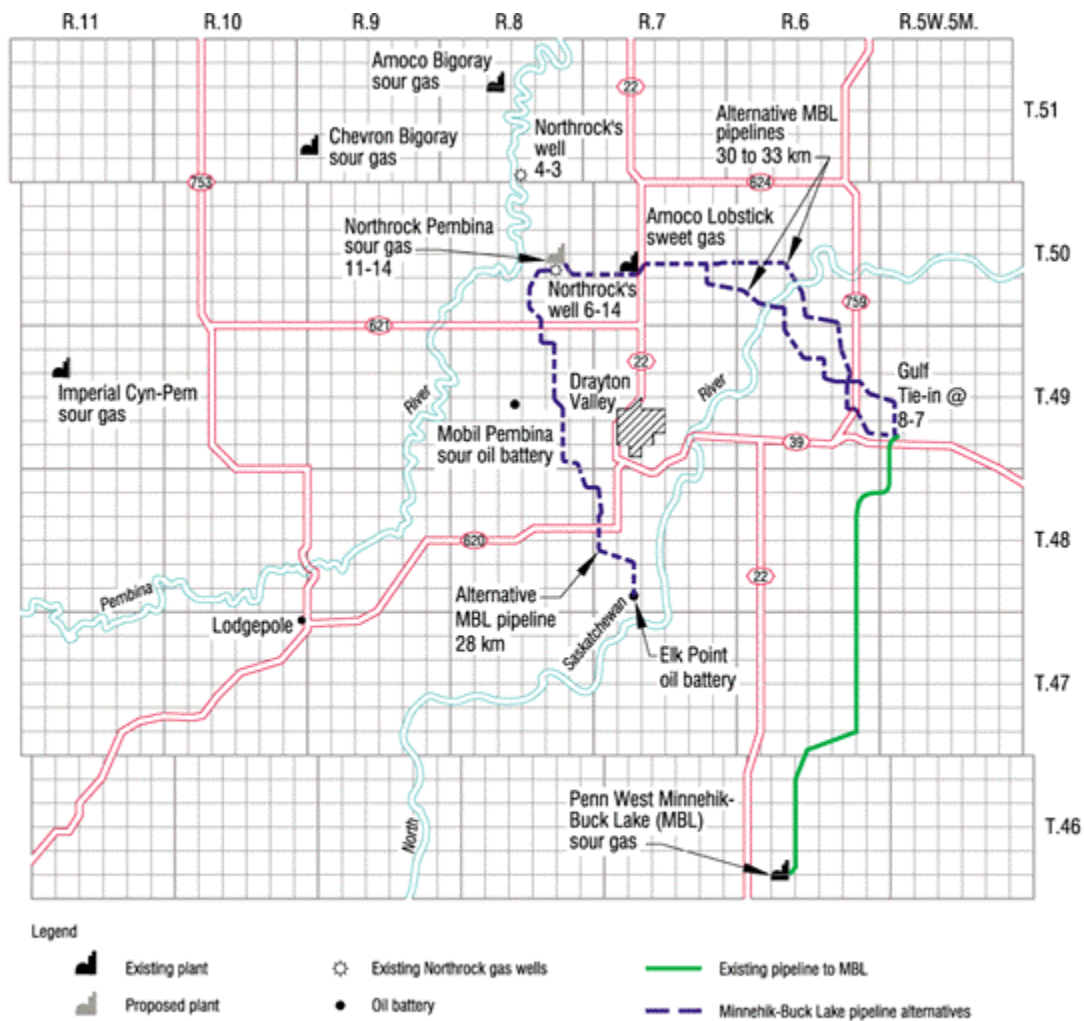


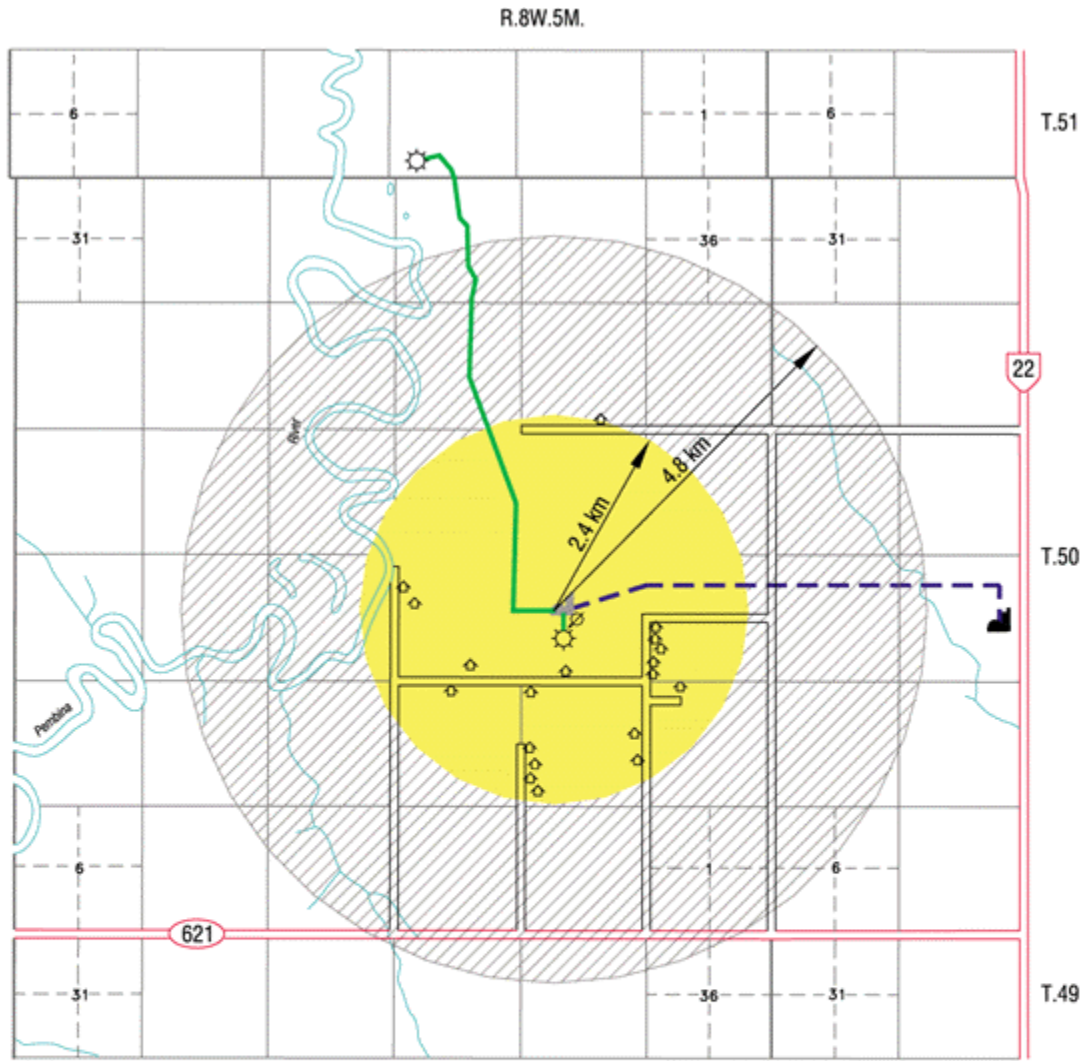
Figure. 1 Pembina area

Applications No's. 1039083, 1040394, 1040831, 1039502

Northrock Resources Ltd.

Decision 99-31





Legend

- | | |
|-----------------------------------|----------------------------------------|
| Existing sweet Lobstick gas plant | Existing roads |
| Proposed Northrock sour plant | Proposed Northrock sour gas pipeline |
| Existing Northrock gas wells | Proposed Northrock sweet gas pipeline |
| Existing Northrock injection well | Proposed emergency planning zone (EPZ) |
| Residences in EPZ | Proposed emergency awareness zone |

Figure. 2 Pembina area

Application No's. 1039083, 1040394, 1040831, 1039502

Northrock Resources Ltd.

Decision 99-31

