

ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

	Decision 2003-014
PETROVERA RESOURCES LIMITED	Applications No. 1248262, 1086164,
APPLICATIONS FOR A PRIMARY RECOVERY	1087064, 1087238, 1241670, 1241671,
SCHEME AND WELL LICENCES	1241672, 1241673, 1241674, 1241675,
LINDBERGH SECTOR	1241676, 1241677, 1241678, 1256328,
COLD LAKE OIL SANDS AREA	1256330, 1256334, and 1256335

1 APPLICATIONS, PREHEARING MEETING, AND HEARING

1.1 Applications

Application No. 1248262¹ for a Primary Recovery Scheme

Petrovera Resources Limited (Petrovera) applied to the Alberta Energy and Utilities Board (EUB/Board), pursuant to Section 10 of the Oil Sands Conservation Act, for approval to construct and operate a primary scheme for the recovery of crude bitumen from the Mannville Group in the Cold Lake Oil Sands area. The applicant proposed that

- the drilling spacing units be reduced from 64 to 8 hectares (ha) in a scheme area comprising Sections 19, 28, the south half of Section 31, Section 32 of Township 57, Range 4, West of the 4th Meridian (57-4W4M), and Sections 2, 3, 10, 11, 13, 19, 24, and the south half and northwest quarter of Section 30-57-5W4M, and
- wells drilled or to be drilled within the area of application have a minimum interwell distance of 100 metres (m) and a project boundary buffer of 50 m.

Review of Existing Well Licences

In February 2001, Petrovera applied, on a routine basis, pursuant to Section 2.020 of the Oil and Gas Conservation Regulations, for well licences to drill three vertical wells to obtain crude bitumen production from the Mannville Group. The EUB issued the well licences for these wells, and Petrovera subsequently drilled the wells in March 2001.

The EUB received objections to the wells later in 2001, and Petrovera agreed to suspend activity at these three wells pending review of the original applications at a formal proceeding. That review was conducted as part of these proceedings.

The application numbers and well locations are given in Appendix 1.

¹ Application No. 1248262 consolidated and replaced previously filed Applications No. 1052693, 1052695, 1062337, 1062339, 1062340, 1062343, 1062344, 1243160, 1243354, and 1243745.

New Well Licence Applications

As part of its development planned in the area, Petrovera applied, pursuant to Section 2.020 of the Oil and Gas Conservation Regulations, for 13 additional well licences to drill vertical wells to obtain crude bitumen production from the Mannville Group. Appendix 1 includes a detailed list of the well licence applications and the corresponding proposed locations. A map showing the project area is in Appendix 2.

1.2 Prehearing Meeting

A number of people in the Elk Point and Lindbergh areas filed submissions opposing the Petrovera applications. In view of the significant number of people who indicated that they were opposed to the applications of both Canadian Natural Resources Limited (CNRL; see *Decision 2003-013*) and Petrovera, the EUB decided to hold a prehearing meeting to address matters such as the date for the hearing, whether the CNRL and Petrovera applications should be heard jointly or consecutively, the issues to be considered, and other matters.

The Board held a prehearing meeting in Elk Point, Alberta, on June 26, 2002, before Presiding Board Member J. R. Nichol, P.Eng., and Acting Board Member R. H. Houlihan, Ph.D., P.Eng. The third member of the panel Board Member J. D. Dilay, P.Eng., was not available to attend the prehearing meeting but read the verbatim transcripts. The Board subsequently issued *Decision 2002-071* on July 26, 2002.

Following the close of the prehearing meeting, Petrovera continued consultation with those who had filed objections. The applicant and interveners made considerable effort to discuss their issues through the appropriate dispute resolution (ADR) process, resulting in the resolution and subsequent withdrawal of several of the objections. The Board does not intend to address the specific concerns that were resolved between the applicant and the affected parties, except to the extent that interveners who participated in the hearing raised the same concerns.

1.3 Hearing

The applications and interventions were considered at a public hearing commencing on November 13, 2002, in Elk Point, Alberta, before Board Members J. R. Nichol, P.Eng. (Presiding Member), J. D. Dilay, P.Eng., and Acting Board Member R. H. Houlihan, Ph.D., P.Eng.

At the opening of the hearing, the following interveners registered:

- Mr. A. Opanavicius, a registered seed grower with land immediately adjacent to the application area, and
- the Lindbergh Residents Group (the Lindbergh Group), comprising of H. and M. Rybak, W. and M. Saranchuk, D. Smereka, M. Smith, R. and D. Pindroch, K. and M. Saranchuk, and E. and B. Koppang. The Lindbergh Group members all live in the Hamlet of Lindbergh and use a shallow aquifer as their water source.

Those who appeared at the hearing and the 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

Petrovera Resources Limited (Petrovera)
B. J. Evans, Q.C.

R. Banks
K. Spencer
J. Sheasby, P.Eng.
P. McCarron
D. Pelly, P.Eng.
J. Freeman,
of Matrix Solutions
R. Patching,
of Patching & Associates

Lindbergh Residents Group, on behalf of H.
and M. Rybak, W. and M. Saranchuk, D.
Smereka, M. Smith, R. and D. Pindroch, K.
and M. Saranchuk, and E. and B. Koppang
(Lindbergh Group)
R.C. Secord

K. Saranchuk
R. Pindroch
W. Saranchuk
D. Pindroch
M. Rybak
M. Saranchuk
D. Burnett,
of Morrow Environmental

A. Opanavicius
R. Strom

R. Strom

T. Dunham

T. Dunham

Alberta Energy and Utilities Board staff
G. Perkins, Board Counsel
K. Fisher
L. D. Wilson-Temple
S. Cartwright
B. A. Austin, P.Geol.

Although Mr. T. Dunham, a landowner in the application area, had not registered as a participant at the opening of the hearing, the Board granted him permission to question Petrovera.

At the close of the hearing, Petrovera was required to complete a number of undertakings. The undertakings were completed on December 17, 2002, and therefore the Board considers the hearing to have been closed on that date.

2 ISSUES

The Board believes the issues concerning the applications to be

- the need for reduced spacing and the proposed wells,

- impacts of drilling from a surface location in the south half of Section 3-57-5W4M,
- gas conservation/emissions and other impacts, and
- general concerns.

3 NEED FOR REDUCED SPACING AND THE PROPOSED WELLS

3.1 Views of the Applicant

Petrovera stated that the applications were a critical part of its overall business development plan for the Elk Point area. It explained that it had assets concentrated in five core areas of Saskatchewan and Alberta, with 92 per cent of its reserves made up of bitumen/heavy oil.

Petrovera applied to reduce the well spacing from one well per quarter section (64 ha) to one well per 8 ha in order to increase recovery of bitumen. Petrovera maintained that reduced spacing would increase recovery to 7 per cent, compared with 2.7 per cent under quarter-section spacing. Petrovera submitted that the applied-for spacing was consistent with other approvals granted in the area.

Petrovera stated that it targeted bitumen production from multiple formations in the Mannville Group. It explained that its primary targets in this project are the Colony, General Petroleum (GP), and Sparky Formations and that it had developed its geological interpretations using 2-D and 3-D seismic. The applicant interpreted the thick Colony channels as narrower and harder to detect than the blanket GP or Sparky sands, and the GP and Sparky sands as thinner but generally deposited over the entire section. These depositional and reservoir differences meant that “seed wells” (wells drilled to establish the producibility of the area) would need to be drilled in the first phase of a multiphase development to confirm the optimal placement and overall number of wells needed to recover the resource from each formation.

Petrovera advised that the 3 wells already drilled (2, 3, and 11, all in Section 24-57-5W4M) and the 13 additional wells applied for were the first phase of its project and each of those wells was considered to be a seed well. It said that seed wells did not depend on the success of each other. In subsequent phases of the development, Petrovera said it would continue to rely on seismic data but would select follow-up drilling locations having regard for economics and production data gathered from previous wells.

Petrovera stated that when the potential for closely spaced multiple wells existed, it intended to drill the wells from multiwell pads in order to minimize surface disturbance and reduce long-term environmental impacts. Petrovera anticipated that no more than four pad sites per quarter section would be required to achieve the maximum well density needed to extract the resource. It said that it intended to follow up the seed well phase by drilling the development wells within six to twelve months. Petrovera acknowledged that further public consultation may be required when multiwell pad development occurred.

On the basis of current 3-D seismic interpretation and data obtained from existing offsetting producing wells, Petrovera predicted that a maximum of 142 well locations would be needed. Petrovera believed that not all of the seed wells would be successful; the most likely scenario

was that a total of 70 wells would be drilled on the subject lands. Petrovera projected that 80 per cent of those 70 wells would be economically viable, based on past drilling success. Petrovera stated that it expected bitumen production rates of 219 and 450 cubic metres per day (m³/d) in the first and second years respectively.

Petrovera said its current production from the Elk Point area averaged 875 m³/d of bitumen. It estimated that as the proposed project peaked, base production would decline to 725 m³/d. This plus the 450 m³/d peak production estimated for the second year for this project would give a total production of 1175 m³/d from the Elk Point area. Petrovera stated that it was producing 1100 m³/d of bitumen in November 2000, and the proposed project would add at most 75 m³/d. Petrovera estimated that after one peak production year, production would decline below levels previously recovered from this area. Petrovera submitted that the cumulative impact of the new production coming on from the area of application would be no greater than the impact of its previous production from this area.

Petrovera acknowledged that the Lindbergh Group remained concerned about the development proposed on the southwest quarter of Section 3-57-5W4M (Section 3). From its 3-D seismic, Petrovera interpreted that a Colony channel was present in the area. Assuming favourable drilling results from the proposed well at 2-3-57-5W4M (2-3 well), Petrovera would proceed with additional drilling in the southwest quarter of Section 3. It said those additional wells may or may not intersect producible regional GP or Sparky sands. Petrovera indicated that it would not survey a pad site or a location on Legal Subdivision (LSD) 5 of Section 3 based on the current data and the proximity to the water wells of concern to the Lindbergh Group. On the basis of its current information, Petrovera anticipated that the potential existed for four additional bottomhole locations to be drilled into Section 3 from a pad site location yet to be determined. Petrovera stated that it had looked at other options to try to recover the bitumen under Section 3 without drilling a vertical well, but did not have any technology it believed could do that. One option was a horizontal well, which it believed would be problematic, since sand production from the formation would dune up inside the horizontal well and require sand clean-outs. Petrovera stated that it was acquiring a surface location and drilling a horizontal well in a test area to see if it was possible to drill a horizontal well. It noted that it did not have an economically viable methodology and was doing a research and development project in Section 19-56-3W4M.

Petrovera stated that its proposed development was in the public interest based on social, environmental, and economic benefits and impacts. It believed that it had demonstrated that its impacts on water, air, and noise levels would not be significant and that overall the project either would have no impact or would positively affect the quality of life in the community.

3.2 Views of the Intervenors

The Lindbergh Group did not contest the geological information presented by Petrovera, nor did it dispute that increased well density would increase the reserves produced. It objected to the proposed 2-3 well and asserted that the need to produce the reserves did not justify the risk the well would pose to its water supply. The Lindbergh Group was concerned that if the 2-3 seed well were successful, even more wells would be drilled, thus multiplying the risks to its water supply. It was also concerned about any pad location proposed for the south half of Section 3 and

asked the Board to deny Application 1256330 for the 2-3 well. As an alternative, the Lindbergh Group asked the Board to defer consideration of Applications No. 1256330 and 1248262 in relation to Section 3, pending the results from Petrovera's research and development project for the horizontal well in a nearby section. The Lindbergh Group stated that if surface access was not allowed on the south half of Section 3, it would not oppose the reduced spacing proposed in Application 1248262 for the primary recovery scheme.

Mr. Opanavicius did not specifically address the need for the reduced spacing or the wells, but he was concerned about any drilling activity planned for the southwest quarter of Section 19-57-5W4M, specifically Petrovera's weed control practices, as that quarter section was next to property he owned.

3.3 Views of the Board

The Board notes that none of the interveners opposed Petrovera's applications for the primary recovery scheme, except in that the Lindbergh Group opposed surface access to the south half of Section 3. The Board finds that the reduced spacing requested is consistent with other developments in the general area. It believes that the proposed reduced spacing will result in increased recovery of crude bitumen from the Mannville Group of sands because of the nature of the bitumen and the reservoirs. The Board is therefore prepared to approve Application No. 1248262 for the primary recovery scheme. However, the Board has some concerns regarding surface access to the south half of Section 3, as discussed in Section 4.3 of this report.

With respect to the applications for the well licences, including those related to the review of the existing wells, the Board finds that the only outstanding objection relates to Application No. 1256330 for the 2-3 well. With the exception of the 2-3 well, the Board believes that the applied-for wells can be drilled and produced with minimal impacts. The Board is therefore prepared to approve all of the new well licence applications except the application for the 2-3 well. The Board also confirms that the three well licences under review are in good standing. It deals with the issues respecting the 2-3 well in Section 4.3.

4 IMPACTS OF DRILLING FROM A SURFACE LOCATION IN THE SOUTH HALF OF SECTION 3-57-5W4M

4.1 Views of the Applicant

Petrovera noted that the Lindbergh Group was particularly concerned that the 2-3 well, proposed to be located on high ground to the northeast of Lindbergh, could impact the shallow water wells that supply the hamlet.

Petrovera indicated that it had shown concern for and properly addressed the issues and concerns related to the Lindbergh Group's water supply. The applicant noted that it had retained hydrogeological experts to investigate and prepare recommendations to protect the hamlet's water supply. This investigation included installing monitoring wells into the shallow aquifer to gain understanding of the shallow stratigraphy and gathering information on groundwater flow

rates, direction, and quality. Petrovera said that it had installed four monitoring wells around the proposed 2-3 well location, which it could use for future aquifer monitoring.

On the basis of information gathered during the hydrogeological investigation, Petrovera believed that the uppermost aquifer sand encountered at the proposed 2-3 well was the same aquifer in which the Lindbergh water wells were completed. The applicant characterized this unit as an unconfined shallow sand aquifer sitting above a layer of relatively continuous clay.

Petrovera believed that water entered the shallow, unconfined aquifer (recharge area) through the high ground north of Lindbergh in the west half of the northwest quarter of Section 35-56-5W4, the south half of Section 3, and possibly the northwest quarter of Section 3, but it stated that the western and northwestern extent of the recharge area had not been fully delineated. Petrovera noted that the proposed 2-3 well location was in the recharge area of the Lindbergh aquifer, but that the direction of shallow groundwater flow in the area of the proposed 2-3 well was southward, toward Horse Springs, not in the direction of the Lindbergh residents' water wells (see Appendix 3).

Petrovera said that it would adopt the four recommendations made by its hydrogeological experts to ensure protection of Lindbergh's water supply, which were

- installation of conductor casing at the proposed 2-3 well;
- installation of a compacted clay liner on the 2-3 well site, with designed control of surface water;
- development of rapid spill response; and
- continued groundwater monitoring.

The applicant indicated that it had previously drilled through shallow sand aquifers at other locations without incident, but due to the proximity of the proposed 2-3 well to the Lindbergh water wells, it was prepared to take the additional precaution of installing conductor casing over the unconfined shallow aquifer at this location. Petrovera stated that the conductor casing would be installed using an auger rig capable of vibrating the casing into the ground immediately behind the auger. Petrovera explained that this method of conductor casing installation was feasible to a depth of 15 m, which would fully cover the shallow aquifer.

Petrovera indicated that its normal policy was to test water wells located within 400 m of its drilling locations, but said it would expand this distance to accommodate the concerns of residents in the Lindbergh area. Petrovera stated that it would test the water wells for routine potability and would also conduct productivity/rate testing if the nature of the wells permitted such testing to be carried out.

Petrovera provided preliminary design information for the clay liner, berms, and surface water collection system for the proposed 2-3 location. Petrovera indicated that its policy was prevention of spills and rapid response to any spills that might occur. The applicant stated its supervisory control and data acquisition (SCADA) system, a remote monitoring system that would immediately alert Petrovera to any irregularities on the lease. Petrovera also said that it would continue monitoring groundwater in the area via its existing monitoring wells.

4.2 Views of the Interveners

The Lindbergh Group indicated that its concerns were related to surface activities at the proposed 2-3 well and the drilling of wells through the aquifers, but not to the recovery of the crude bitumen reserves located under these lands. The Lindbergh Group's concerns were based on the belief that wells in the south half of Section 3 would be located in the recharge area of the shallow aquifer system it used as a water source.

The Lindbergh Group noted that it currently enjoyed excellent water quality and quantity. It believed that the aquifer was vulnerable to a catastrophic event related to Petrovera's drilling and production operations in the immediate area. The Lindbergh Group did not believe that heavy hydrocarbons could reach the water wells from a spill at the 2-3 well location. However, it did believe that products of hydrocarbon biodegradation, such as iron and manganese, could reach the water wells. It also said that it believed water was a more valuable resource to the province than hydrocarbons.

The Lindbergh Group agreed that the applicant's hydrogeology report provided useful information on the shallow aquifer, but maintained that additional information was needed to more fully understand groundwater flow directions, the hydraulic conductivity of the aquifer, the extent of the aquifer recharge area, and whether Mr. Saranchuk's water well produced from an aquifer that was lower than the one supplying the other Lindbergh water wells.

The Lindbergh Group was also concerned that the use of dust suppression measures, such as chemicals or oil on the roads, could affect the shallow aquifer. It was concerned about Petrovera's reliance on its SCADA monitoring system and stated that having a person visit the well site was preferable to the site being electronically monitored.

The Lindbergh Group said it believed that drilling and subsequent production in the aquifer recharge area, the south half of Section 3, presented too great a risk to the drinking water supply of the hamlet. It did not object to Petrovera accessing the minerals beneath the south half of Section 3, but it believed surface activity there should be prohibited.

Should the Board approve the well licence application and surface access to the south half of Section 3, the Lindbergh Group requested that the Board require the installation of conductor casing to cover the lower aquifer, since some residents' water wells might be completed in that aquifer. It also requested that the Board require the delineation of the recharge area for the shallow aquifer system, the installation of additional monitoring wells between the proposed 2-3 locations and the county well, and the gathering of additional hydraulic conductivity measurements of the shallow aquifer.

4.3 Views of the Board

The Board recognizes that the shallow, unconfined aquifers that provide the drinking water supply to Lindbergh are susceptible to contamination by the development proposed by the applicant because the recharge area is very close to the proposed wells and the aquifer system is not naturally protected by overlying impermeable material.

The Board notes that the applicant described the proposed 2-3 well as being located in a saddle in a northwest-to-southeast trending ridge. Petrovera described this high land as located in the recharge area of the shallow aquifer and the groundwater flow from the proposed 2-3 well as likely to be southward towards Horse Springs. The Board accepts that this is the general direction of flow, but recognizes that derivation of flow directions from water level data is somewhat interpretive and that data points were not available between the proposed 2-3 well and the county water well. The Board notes that the Lindbergh Group said that by using a different contour interval, the flow directions portrayed in the applicant's evidence could be more to the south-southwest than what was depicted by Petrovera.

Petrovera put forward mitigative measures to prevent impact on the shallow aquifer during the drilling and production of the 2-3 well. While Petrovera's mitigative measures are extensive, the Board believes approval of a well site in the recharge area of this shallow, unconfined aquifer with receptors (springs) located ± 500 m directly down gradient and in close proximity to the Lindbergh Group's domestic water supply wells could pose an unacceptable level of risk. Although the Board recognizes that the risk of an uncontrolled release in the south half of Section 3 is low, the consequences to the hamlet's water wells or the springs, should this occur, would be significant and potentially long term. On the basis of the evidence before it, the Board does not believe that this is an acceptable risk, and therefore it will not permit surface activity in the south half of Section 3.

Given the outstanding uncertainties respecting the extent of the recharge area and the associated concerns raised by the Lindbergh Group, the Board directs Petrovera to take measures to define the recharge area of the aquifer system and provide this information to the Lindbergh Group and the Board prior to filing any applications for wells proposed to be located in the north half of Section 3.

5 GAS CONSERVATION/EMISSIONS AND OTHER IMPACTS

5.1 Views of the Applicant

Petrovera stated that it would do its best with current technology to reduce the amount of vented gas. It committed to not venting more than 500 m³/d on any individual operating site. The applicant explained that it would evaluate all of its vent volumes and would implement recovery of the gas wherever it was economically feasible to do so.

Petrovera stated that each well typically required about 300 m³/d of fuel gas to operate; hence a four-well pad would have a fuel requirement of 1200 m³/d. Petrovera stated that conservation would be implemented in that case if pad volumes reached 1700 m³/d. This was based on a typical four-well pad that would use the first 1200 m³/d as fuel and vent the remainder up to 500 m³/d. If venting on such a site exceeded 500 m³/d, conservation of the volumes in excess of site fuel requirements would be implemented, or if conservation were not economic, the excess gas would be flared.

Petrovera stated that it typically evaluated economics on a well-by-well basis, but in these applications it had considered multiple wells in assessing conservation. The applicant noted that

in an existing Lindbergh-area conservation scheme it had considered the total volume vented, and it noted that no single well, if evaluated separately, would have supported economic conservation.

Petrovera stated that it had not pursued joint evaluation of gas conservation with other operators in the area. It noted, however, that where gas conservation had been implemented, it had been able to work with operators of existing gas conservation infrastructure. Petrovera said that it would be willing to commit to work with other operators to develop a specific gas conservation plan for this area.

Petrovera stated that produced gas in the area typically contained only trace amounts of hydrogen sulphide (H₂S) at levels that would not prohibit venting of gas to the atmosphere.

Petrovera did not believe that odours off lease would be a concern, based on its air monitoring data and analysis of casing and vent gas composition. Petrovera stated that it would commit to providing air-monitoring equipment if an odour complaint were raised, and that it had so responded in the past.

Petrovera stated that it was committed to maintaining air quality in its operations that met or surpassed the Ambient Air Quality Guidelines and that it would monitor and respond if guideline limits were exceeded. In response to questioning by Mr. Dunham about an exceedance of the ambient air quality for H₂S detected during recent air monitoring in the vicinity of his property, Petrovera could not provide an explanation for the exceedance and offered Mr. Dunham an apology for not providing him with a more timely notification of the exceedance.

Petrovera stated that it had considerable experience with pipelining bitumen emulsions. It explained that the company's liquid production was exclusively bitumen at this time and that almost 50 per cent of the production was transported through pipeline, rather than trucked. Petrovera listed a number of sites, predominantly in Saskatchewan, where it successfully transported bitumen production through pipelines.

Petrovera stated that it considered a number of factors on a site-by-site basis in evaluating the suitability of pipelining bitumen production. It explained that it was important to achieve a low-viscosity emulsion that progressive cavity pumps could move effectively down the pipeline. Petrovera evaluated the viscosity of the bitumen in each instance and relied on high-water cuts as an essential component in further lowering the viscosity of the emulsion. Petrovera said these two factors and the produced sand content determined whether production could be transported by pipeline: production was pipelined when bitumen viscosity and sand content were low and/or water content was high (65 to 80 per cent or greater).

Petrovera indicated that it worked with its partners in its Saskatchewan properties when evaluating the feasibility of pipelining, but it had not specifically discussed regional opportunities with other operators in the Elk Point area. Petrovera also advised that it was currently involved in and would continue to support research and testing on bitumen production pipelining. It said that it would apply this technology to its operations in the Lindbergh area if and when it was appropriate to do so.

Petrovera stated that it expected low-water cuts, high-sand cuts, and high-viscosity bitumen in the area of the applications, and therefore it was not prepared at this time to commit to implementing pipelining as an alternative to trucking.

Petrovera stated that it was committed to meeting or surpassing the requirements of EUB *Interim Directive (ID) 99-08: Noise Control Directive* and to working with residents to identify and rectify noise problems in the Elk Point area. As a result of community consultation, Petrovera committed to installing double-muffled engine assemblies at all locations within the application area and installing Noise Solutions Incorporated (NSI) noise reduction motor shacks, or newer technology if available, at ten proposed well locations in the application area, including the proposed 2-3 well. Petrovera explained that it had agreed that battery equipment and more expensive equipment, such as an NSI shack assembly, would be used if Petrovera believed that it must be used to reduce noise levels or if potentially affected parties requested that it be used. One of those two conditions currently existed on ten of the sixteen proposed locations.

Petrovera indicated that it had worked cooperatively with other operators in the area to address noise concerns. Petrovera said it was generally using a hydraulic drive motor connected directly to the gear drive, which eliminated some of the belt noise arising from well sites.

In response to concerns from residents about truck traffic generating objectionable noise, particularly at night, Petrovera proposed to limit regular scheduled fluid hauling to between 7 a.m. and 7 p.m. in residential areas affected by traffic noise. Petrovera acknowledged that occasionally it would require a two-hour buffer after 7 p.m. to accommodate bad weather or other unforeseeable problems. The only other exception to this 12-hour operation would be during drilling operations, which would be 24-hour operations while the rig was there. Service rigs would shut down at night. Petrovera indicated that further traffic noise reduction measures, such as speed limits or engine retarder brake restrictions, would be employed where warranted.

Petrovera committed to employing dust control measures in the vicinity of residences affected by its drilling and production operations. Petrovera said that it continued to consult with residents to address their concerns about traffic and dust. It stated that if dust were a problem adjacent to a residence, it would dust-control the road. In the past, Petrovera had used oilfield waste for dust suppression. Petrovera said that it intended to deal with any dust concerns arising on a site-specific basis.

Petrovera said that its weed control program included inspection, spraying, and mowing to control the spread of weeds from its leases to neighbouring agricultural lands. Petrovera committed, as a result of ADR, to the use of weed-free seed throughout the application area.

Petrovera and Mr. Opanavicius had been involved in negotiations but had not yet agreed on terms regarding the monitoring and control of weeds on Petrovera's leases and lands adjacent to Mr. Opanavicius's lands.

5.2 Views of the Interveners

The Lindbergh Group noted the condition in *Decision 2000-23*² that required at least 75 per cent conservation at sites where produced gas volumes exceeded 140 m³/d. It argued that there was no reason similar provisions should not apply to Petrovera's proposed project.

The Lindbergh Group stated that although it was possible for Petrovera to adjust the temperature of storage tanks to minimize fumes, there might still be some off-lease migration of odours. The Lindbergh Group suggested that collection of the vapours may solve its odour concerns.

The interveners present at the hearing raised no specific concerns with the issue of pipelining production.

The Lindbergh Group expressed its appreciation that Petrovera intended to use an NSI motor shack with direct hydraulic drives at the 2-3 lease, as this would limit some of the noise from that location. It said that it would like Petrovera to consider using electrical drives if the hydraulic drives were too noisy. Other noises causing concern were associated with regular truck traffic, large trucks, and service rigs; the Lindbergh Group said that Petrovera committed that the service rigs would not operate on Sundays. The Lindbergh Group stated that tank cleaning by vacuum trucks was also a noisy activity. The Lindbergh Group explained that casing gases sometimes build up down hole and then migrate up and are released at once, making a popping noise. It said that some companies install mufflers, buried valves, or a silencer of some sort (usually a gas valve), which results in a constant diaphragm noise that the Lindbergh Group stated could be very irritating.

The Lindbergh Group was concerned that it was too early to know what kind of noises would be produced by the well at the 2-3 site. It was also concerned that if the well were successful, the noise level would be multiplied by additional wells that would be placed on a pad site in Section 3.

The Lindbergh Group indicated that as long as Petrovera's truck traffic stayed off the major road through Lindbergh, it would have no concerns about traffic routes.

In response to Petrovera's statement that it used oily waste for dust control, the Lindbergh Group emphasized that it did not want oil products or other chemicals to be used for dust suppression, as those chemicals could potentially work their way into the aquifer.

Mr. Strom indicated that if the Board were to approve the applications, his client, Mr. Opanavicius, wanted a condition that would require Petrovera to discuss weed control issues with Mr. Opanavicius if future development in the southwest quarter of Section 19-57-5W4M (Section 19) were proposed and prior to anything being constructed on that location. Mr. Strom acknowledged that currently there were no applications for wells on the southwest quarter of Section 19.

² EUB decision resulting from a hearing in which Ranger Oil Limited (Ranger) was the applicant.

5.3 Views of the Board

With respect to the Lindbergh Group's assertion that Petrovera should be required to conserve at least 75 per cent of the gas at sites where produced gas volumes exceed 140 m³/d, the Board notes that no evidence was provided to support the economics of gas conservation at that level of gas production. The Board acknowledges that such a condition was included in *Decision 2000-23*. However, that decision was based on evidence that supported the economics of gas conservation at that threshold and on the commitments made by Ranger. Due to the absence of evidence in these proceedings supporting the economics of gas conservation at the production threshold of 140 m³/d, the Board is not prepared to impose such a condition on Petrovera. In the case of the matters before the Board in this hearing, the Board believes that approaches consistent with *Guide 60: Upstream Petroleum Industry Flaring Guide* and consistent with commitments by Petrovera would be appropriate.

The Board notes that *General Bulletin (GB) 2002-05: EUB Requirements for Evaluation of Solution Gas Vent Gas Conservation* requires licensees to assess venting following commencement of production and to implement conservation if vented volumes are sufficient to conserve economically. Further, licensees are required to evaluate conservation of existing vent sources larger than 800 m³/d in 2002 and larger than 500 m³/d in 2003. Conservation of economic solution gas must be implemented by the end of the subsequent year. The Board is of the view that effective conservation includes use of gas to fuel production equipment, recovery of gas for sale, and use of gas to fuel electric generators.

The Board requires that all vent sources associated with the proposed project, regardless of size, be evaluated using the economic methods and assumptions prescribed in *Guide 60*, Section 2. The Board believes that new vent sources must be evaluated as soon as gas production rates can be established, and in any event within 90 days following initial production. The Board expects that economic conservation of produced gas will be operational within six months following initial production. The Board further expects that economic gas conservation will be implemented sooner (i.e., within 30 days following initial production) where production facilities are in close proximity to existing gas conservation pipelines.

In situations where gas conservation is initially determined not to be economic, the Board expects that Petrovera will periodically re-evaluate conservation opportunities. The Board expects that conservation opportunities will be reassessed if gas production rates or prices increase and when additional wells are connected to batteries. The Board believes that nonconserving venting or flaring sites should be reviewed on at least an annual basis.

The Board acknowledges Petrovera's proactive approach to incorporating gas conservation into its project budgets. In this situation, the Board believes that greater conservation of vented gas is possible. It accepts Petrovera's commitment to not vent produced gas when vented volumes exceed 500 m³/d on any operating site.

The Board notes that significant gas volumes are vented in this region of northeastern Alberta and that industry cooperation is necessary to improve conservation. The Board notes that the evidence discussed at the hearing indicated that cooperation is occurring between operators of existing conservation schemes and developers of new wells. It is not clear, however, whether

operators venting gas in an area are routinely collaborating to evaluate the potential for developing joint solution gas conservation schemes. The Board believes that solution gas would be economic to conserve if competing licensees coordinated their efforts in an efficient, cooperative process that takes advantage of combined gas volumes and economies of scale.

The Board expects that Petrovera will actively consult with other licensees of production facilities in proximity to the proposed wells and expects all parties to cooperate in the evaluation and implementation of solution gas conservation projects: that is, the Board expects all licensees in an area to exchange production data and jointly consider clustering of solution gas production and regional gas conservation systems.

Further, solution gas conservation economics will be enhanced if conservation is incorporated into the initial planning of larger multiwell projects. The Board expects Petrovera to continue to evaluate produced gas conservation on a project basis where multiple wells are developed within a project area.

In order to ensure that Petrovera actively pursues joint regional gas conservation schemes, the Board will condition its approvals to require the following:

- Petrovera must assess produced gas conservation within 90 days following initial production at each site and must reassess nonconserving sites not less than once per year thereafter.
- As part of the conservation evaluations, Petrovera must formally contact licensees of production facilities within a 1 km radius of each of its nonconserving sites and investigate joint options for conserving produced gas.

Notwithstanding the 1 km radius provided in the foregoing condition, the Board believes that a radius of more than 1 km may be appropriate in certain circumstances, and it expects Petrovera to recognize this and expand its investigation efforts accordingly.

It is a further condition that Petrovera must submit gas conservation evaluation audit packages for all sites where conservation will not be implemented. The evaluation packages must include documentation indicating the actions taken by Petrovera to assess joint conservation opportunities with other operators in the area, including information on gas flaring and venting rates. The evaluation information for nonconserving sites must be submitted to the EUB Operations Group at the end of the calendar quarter-year period in which the evaluations were completed until all sites have been evaluated.

It is not clear to the Board that sufficient evaluation of joint industry approaches to produced gas conservation has been made in the general Lindbergh/Elk Point area. The Board encourages industry, particularly licensees of facilities that currently do not conserve produced gas, to collaboratively seek a joint approach to achieving greater gas conservation in this region. The Board encourages operators to initiate a joint approach to evaluate the situation and to develop a regional gas conservation action plan. The Board believes that such a joint approach would identify economic opportunities to enhance conservation of produced gas sooner than might otherwise be the case.

The Board recognizes that Petrovera could provide no information on what caused the ambient air quality exceedance of H₂S near Mr. Dunham's property. The Board expects that applicants

will share data and address anomalies in an appropriate and timely manner. The Board notes the Lindbergh Group's statement that vapour collection may resolve its odour concerns.

The Board acknowledges that produced gas in the area contains low concentrations of H₂S. Board requirements described in *Guide 60*, Section 8, prohibit release to the atmosphere of gas containing more than 10 moles H₂S per kilomole. The Board does not anticipate that H₂S concentrations from Petrovera's proposed project will exceed that limit. The Board notes, however, that *Guide 60* also prohibits venting of gas to atmosphere that could result in off-lease odours. The Board expects that Petrovera's operating and site inspection procedures will include detection and management of odourous fugitive emissions. In accordance with *Guide 60*, if the Board receives odour complaints and subsequent investigation determines vented produced gas is the source, Petrovera will be required to conserve or burn the vent gases.

The pipelining of cold crude bitumen production continues to be an issue that faces all operators of primary oil sand schemes. The Board is disappointed that very little progress appears to have been made on the advancement of pipelining primary crude bitumen production, since the matter was raised in much more detail at other Board hearings that took place between 1998 and 2000. In fact, it appears that unless a dramatic technological breakthrough or a substantial increase in the price of crude bitumen occurs, pipelining this product will not be technically or economically feasible within the foreseeable future. The Board notes it has not seen evidence that efforts sufficient to produce a dramatic technological breakthrough are being made.

The Board intends to arrange a meeting of primary crude bitumen producers, technical institutions, research organizations, and other interested parties to determine if more can be done to advance the development of cold crude bitumen pipelining.

The Board notes the noise concerns raised by the Lindbergh Group, and discusses their issues more thoroughly in Section 6 below.

The Board notes that *Guide 58: Oilfield Waste Management Requirements for the Upstream Petroleum Industry*, Section 29, allows the use of oily waste for dust control. The Board expects that Petrovera will consult with the Lindbergh Group and other affected parties prior to dust suppression measures being implemented in the application area. In view of the concerns raised respecting aquifer contamination, the Board believes that the use of oily waste for dust suppression should be avoided on roads in the aquifer recharge area.

The Board considered Mr. Strom's request for a condition to be added to any licences that may be issued requiring negotiations between Mr. Opanavicius and Petrovera. The Board cannot impose a requirement that Petrovera reach an agreement with Mr. Opanavicius. The Board expects Petrovera, given Mr. Opanavicius's concern, to consult with him if wells are proposed on the southwest quarter of Section 19.

6 GENERAL CONCERNS

The prehearing objections and the interventions to the hearing raised a number of general concerns related to water wells, traffic, noise, dust, off-site odours, and various air emissions.

These concerns have been raised in the past and will likely continue to be raised with the Board whenever downspacing applications are being considered. This is particularly true in the designated oil sands and heavy oil areas, where more dense well development includes trucking of produced fluids and the venting/flaring of significant volumes of gas on a project/area basis. Some of the concerns can be very site specific or resident specific, and those should continue to be addressed on that basis. However, in the main, these issues are regional in nature and should be addressed on that basis in a joint, consistent, and cooperative approach by all of the operators in the area.

Petrovera advised that when selecting the pad site locations within its proposed development area, it gave consideration to surface restrictions, including surface bodies of water, farm sites, and roads. During the hearing, the Board noted discrepancies between the application materials for the proposed wells. Several of the discrepancies had to do with surface restrictions and the inconsistencies between the survey plan and the information submitted on the application schedule. As part of the undertakings completed after the close of the oral portion of the hearing, Petrovera rectified these inconsistencies. The Board expects applicants to ensure the accuracy of survey plans and application schedules prior to submitting a licence application.

The Board heard evidence that a number of Petrovera's consultation packages were left with a member of the Lindbergh Group for him to distribute to the rest of the community members. The Board expects that an applicant will normally deliver its information packages directly to all parties who may be directly and adversely affected by its application. That is one of the applicant's responsibilities under the public consultation requirements contained in *Guide 56: Energy Development Application Guide*.

With respect to site-specific concerns and complaints, the Board expects Petrovera and all other operators in the Lindbergh/Elk Point area to continue to address these matters with affected parties in a timely and effective manner. To the extent possible and practical, the Board encourages all operators to be proactive in assessing each of their proposed sites for offsetting landowner concerns, particularly in relation to noise issues, and to communicate with landowners/occupants on a regular and ongoing basis throughout the operating life of their facilities.

With respect to the regional issues common among members of the public, the Board believes that these matters can best be addressed on an area consistent basis. The Board recognizes the benefits of addressing these matters through a synergy group, such as the Lakeland Industry and Community Association (LICA), which provides for direct and ongoing input from all parties. If the parties have not already done so, the Board recommends that these types of issues be placed on the agenda for future LICA meetings.

The Board believes that there is a need to consider establishing area-wide protocols respecting noise assessment and mitigative measures, such as water well testing and traffic restrictions, including enforcement, and that such consideration can be accomplished through LICA. The adoption of area-wide protocols would ensure that all operators are taking the same approach to dealing with issues and that all landowners are, to the extent possible and appropriate, dealt with on a consistent basis.

The Board notes that Petrovera must submit an annual report as described in *ID 2002-03: Performance Presentations for In Situ Oil Sands Schemes*, and it expects that Petrovera will include a summary of noise, traffic, and gas conservation/emission complaints in that report. The summary must discuss what Petrovera's experience has been with each of these items and how it has responded to concerns that have been raised in the project area.

7 DECISION

Having carefully considered all the evidence, the Board finds that Petrovera has demonstrated the need for the proposed reduced spacing and wells. The Board finds that the associated impacts can be properly addressed and mitigated, with the exception of the 2-3 well and any surface development in the south half of Section 3-57-5W4M. As a result, the Board is of the view that the subject applications are in the public interest, and therefore, it approves all the applications, subject to Petrovera meeting all regulatory requirements and the conditions set out in Appendix 4, except Application 1256330 for the 2-3 well, which is refused without prejudice to any similar application Petrovera may choose to make in the future. The Board also confirms that the three well licences that were reviewed are in good standing.

DATED at Calgary, Alberta, on February 7, 2003.

ALBERTA ENERGY AND UTILITIES BOARD

[Original signed by]

J. R. Nichol, P.Eng.
Presiding Member

[Original signed by]

J. D. Dilay, P.Eng.
Board Member

[Original signed by]

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

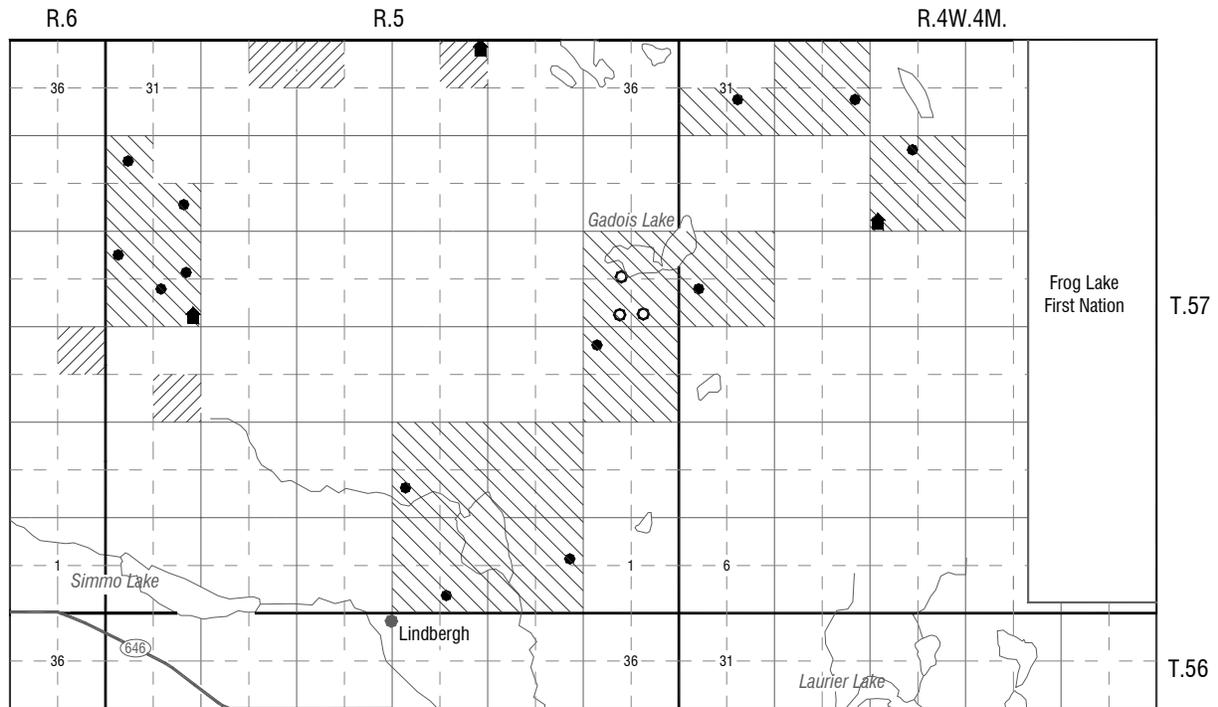
APPENDIX 1: WELL APPLICATIONS AND SURFACE LOCATIONS

Review of Applications

<u>Application No.</u>	<u>Well Location</u>
1086164	3-24-57-5W4M
1087064	11-24-57-5W4M
1087238	2-24-57-5W4M

Well Licence Applications

<u>Application No.</u>	<u>Well Location</u>
1241670	14-28-57-4W4M
1241671	7-31-57-4W4M
1241672	8-30-57-5W4M
1241673	13-13-57-5W4M
1241674	11-30-57-5W4M
1241675	5-19-57-4W4M
1241676	9-19-57-5W4M
1241677	12-19-57-5W4M
1241678	8-32-57-4W4M
1256328	7-19-57-5W4M
1256330	2-3-57-5W4M
1256334	9-2-57-5W4M
1256335	5-10-57-5W4M



N.T.S.

Legend

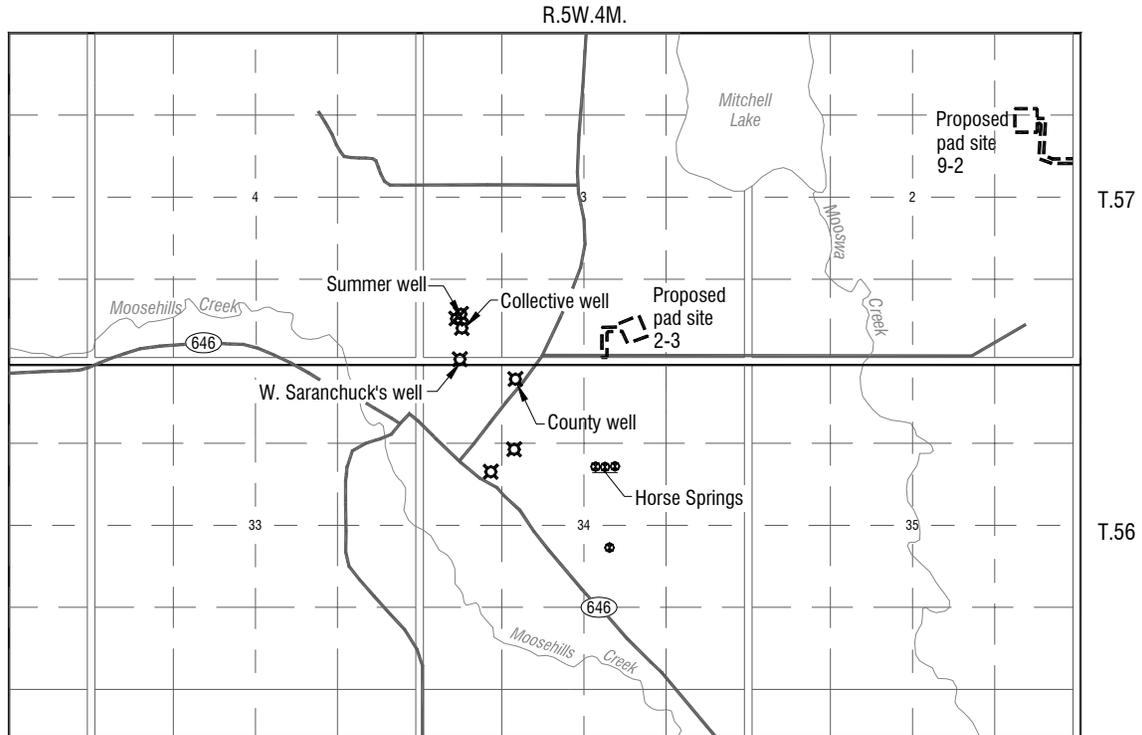
- Proposed crude bitumen well
- Drilled and cased wells
- ▲ Residence
- ▨ Petrovera primary recovery scheme
- ▩ A. Opanavicius lands

Note: M. Rybak, R. and D. Pindroch, W. Saranchuk, and K. and M. Saranchuk reside in the Hamlet of Lindbergh.

Appendix 2. Lindbergh Sector, Cold Lake Oil Sands Area

Applications No. 1248262, 1086164, 1087064, 1087238, 1241670, 1241671, 1241672, 1241673, 1241674, 1241675, 1241676, 1241677, 1241678, 1256328, 1256330, 1256334, and 1256335
 Petrovera Resources Limited

Decision 2003-014



Map adapted from Figure 5 of Matrix Solutions Inc.: *Hydrogeological Study of the Lindbergh Area S1/2 03-057-05 and N 1/2 34-056-5W4M* September 2002 (Exhibit 11)

N.T.S.

Legend

- - Proposed pad site
- ⊙ Spring
- ⊠ Water well

Note: Co-op gas lines are present in the area but are not shown

Appendix 3. Lindbergh Sector, Cold Lake Oil Sands Area

Applications No. 1248262, 1086164, 1087064, 1087238, 1241670,
 1241671, 1241672, 1241673, 1241674, 1241675, 1241676, 1241677,
 1241678, 1256328, 1256330, 1256334, and 1256335
 Petrovera Resources Limited

Decision 2003-014

APPENDIX 4: SUMMARY OF THE APPLICANT'S COMMITMENTS AND THE BOARD'S CONDITIONS

Commitments

The Board notes that Petrovera undertook to conduct certain activities in connection with the proposed applications that are not strictly required by the EUB's regulations. It is the Board's view that when applicants make commitments of this nature, they have satisfied themselves that the activities will benefit both the project and the public, and the Board takes these commitments into account when arriving at its decision. The Board expects an applicant, having made the commitments, to fully carry out the commitments or advise the Board if for any reason it cannot fulfill a commitment. At that time, the Board can assess whether the circumstances of any failed commitment are sufficient to trigger a review of the licence. Affected parties may also ask the Board to review a licence if commitments made by an applicant remain unfulfilled.

Petrovena committed to

- 1) work with other operators to develop a specific gas conservation plan for this area;
- 2) meet or surpass the requirements of *ID 99-08: Noise Control Directive* and to work with residents to identify and rectify noise problems in the Elk Point area;
- 3) install double-muffled engine assemblies at all locations within the application area and install NSI noise reduction motor shacks, or newer technology if available, at ten proposed well locations in the application area, including the proposed 2-3 well;
- 4) provide air-monitoring equipment if an odour complaint is raised;
- 5) maintain air quality in its operations that meets or surpasses the Ambient Air Quality Guidelines and to monitor and respond if guideline limits are exceeded;
- 6) employ dust control measures in the vicinity of residences affected by its drilling and production operations;
- 7) the use of weed-free seed throughout the application area;
- 8) not operate service rigs on Sundays; and
- 9) not vent more than 500 m³/d on any individual operating site.

Conditions

The conditions imposed upon the licences are summarized below. Conditions generally are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with each condition or it is in breach of its approval and subject to enforcement action by the EUB. Enforcement of an approval includes enforcement of the

conditions attached to that licence. Sanctions imposed for the breach of conditions may include the suspension of the approval, resulting in the shut-in of a facility.

- 1) Petrovera must assess produced gas conservation within 90 days following initial production at each site and must reassess nonconserving sites not less than once per year thereafter.
- 2) As part of the conservation evaluations, Petrovera must formally contact licensees of production facilities within a 1 km radius of each of its nonconserving sites and investigate with them joint options for conserving produced gas.
- 3) Petrovera must submit gas conservation evaluation audit packages for all sites where conservation will not be implemented. The evaluation packages must include documentation of actions taken to assess joint conservation opportunities with other operators in the area, including information on area produced gas flaring and venting rates. The evaluation information for nonconserving sites must be submitted to the EUB's Operations Group at the end of the calendar quarter-year period in which the evaluations were completed until all sites have been evaluated.
- 4) Petrovera must submit an annual report as described in *ID 2002-03: Performance Presentations for In Situ Oil Sands Schemes* and include a summary of noise, traffic, and gas conservation/emission complaints. This summary must discuss what Petrovera's experience has been with each of these items and how it has responded to concerns raised in the project area.