West Energy Ltd.

Applications for Well Licences
Pembina Field

August 8, 2007

ALBERTA ENERGY AND UTILITIES BOARD
Decision 2007-061: West Energy Ltd., Applications for Well Licences, Pembina Field

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ALBERTA ENERGY AND UTILITIES BOARD
Calgary Alberta

WEST ENERGY LTD.
APPLICATIONS FOR WELL LICENCES **Decision 2007-061**
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1 SUMMARY OF DECISION

The following summary is provided for the convenience of the reader. In the event of any difference between the summary in this section and the material in the main body of the decision, the wording in the main body of the decision shall prevail.

In the Alberta system, there are two sets of rights, the rights of the mineral lessee to access hydrocarbon resources and the rights of the surface holders. The Board is obliged, under its enabling legislation, to balance and adjudicate between the interests of the applicant to exploit its minerals and the interests of the surface owners and residents.

The Alberta Energy and Utilities Board (EUB/Board) conducted 11 days of a public hearing ending with oral argument on May 14, 2007, to consider applications by West Energy Ltd. (West) to drill two sour oil wells from a surface location at Legal Subdivision (LSD) 4, Section 1, Township 50, Range 7, West of the 5th Meridian. The wells would contain 16 per cent hydrogen sulphide (H_2S), with a resulting emergency planning zone (EPZ) of 4.29 kilometres (km) for drilling, completion, and servicing, and an EPZ of 1.32 km for production and suspension. The proposed wells would be located 3.2 km east of the Hamlet of Rocky Rapids in an area that has a higher than normal density of rural residential homes and farms (Figure 1). A number of area residents expressed opposition to the proposed wells, as described below.

In this decision, the Board assesses communication and participant involvement, the need for and timing of the wells, the location of the wells, hazard and risk, emergency response planning, human and livestock health, property value, and environmental impacts. After analyzing the evidence and argument provided for and heard at the hearing, the Board concludes that the wells are needed to extract the resource and are in the public interest.

The Board notes West's admission of weaknesses in its consultation approach and West's submissions that it has since taken steps to improve its consultation and administrative procedures. The Board considers that poor communication practices, at a minimum, escalated the concerns regarding need, location, safety, and other impacts addressed during the proceeding. The Board has identified a number of improvements for West to consider in future consultations.

If West successfully meets the additional requirements identified in this decision, the Board considers that these wells would represent a low level of risk when failure probability, mitigative measures, and emergency response plans (ERPs) are taken into account.

Although the Board finds that the proposed wells can be drilled, completed, and operated safely, given the above circumstances, the Board has directed that the ERP must be amended, updated, approved, and then comprehensively tested before drilling into the first critical zone. A number

of areas, such as the establishment of a dedicated ignition team and the timing of any ignition activities, are identified in this decision as requiring enhancement.

In this decision, the Board directs that prior to drilling into the critical sour zone, West must undergo an emergency response assessment and successfully complete a comprehensive ERP exercise. The Board believes the goals of the plan, the assessment, and the exercise should be to ensure that the ERP is comprehensive and operationally effective. The Board has determined that EUB staff, in their sole discretion, will determine whether West has satisfactorily met the Board's requirements for these applications. If West conducts a satisfactory ERP exercise and has an approved ERP, the Board will permit West to resume drilling operations, drill out the intermediate casing, and enter the critical sour zone (subject to the additional conditions listed in Appendix 2).

If the second ERP exercise is necessary for the first well and is judged unsatisfactory by EUB staff, the Board will condition its approval that the well licences be suspended, without prejudice, in accordance with all applicable EUB requirements. If the well licences are suspended, the Board will enforce all applicable suspension requirements and require all necessary remedial actions to be implemented. Subject to the rights of West or another party to make a submission to lift the suspension, the Board may, at some point, require the abandonment of the well.

West had proposed the construction of an additional egress road to enhance public safety. This road must be completed prior to spudding of the wells.

Therefore, having carefully considered all of the evidence and submissions, the Board determines that the wells are in the public interest and hereby approves Applications No. 1451106 and 1459453 subject to the conditions listed in Appendix 2 and detailed within the report.

2 INTRODUCTION

2.1 Applications

West applied to the EUB pursuant to Section 2.020 of the *Oil and Gas Conservation Regulations* (*OCGR*) for licences to drill two level-2 sour crude oil wells from the common surface location of LSD 4-1-50-7W5M. More specifically, Application No. 1451106 is for a licence to drill a directional well from the 4-1 surface location to a proposed bottomhole location of LSD 16-35-49-7 W5M (16-35 well), and Application No. 1459453 is for a licence to drill a vertical well from the same 4-1 location (4-1 well). The purpose of both proposed wells is to obtain crude oil from the Nisku Formation.

Both wells are expected to contain 160 moles per kilomole (16 per cent) H_2S. The anticipated cumulative H_2S release rate for the drilling and completion phases of the wells is 2.5 cubic metres per second (m^3/s), and for suspended and producing phases it is 0.44 m^3/s.

West applied for a drilling, completion, and servicing EPZ of 4.29 km and a suspended and producing EPZ of 1.32 km.

The proposed wells are to be located about 3.2 km east of the Hamlet of Rocky Rapids, Alberta.

2.2 Interventions

Objections were received from 124 intervening parties. The intervening parties expressed concerns related to health and safety, flaring, air quality, proliferation, emergency response planning, contamination of land and animals, and compensation. The concerns were expressed during West's public consultation and notification process, at the time of the receipt of the applications by the EUB, and throughout the EUB process leading up to the hearing.

A number of individuals who reside within the Hamlet of Rocky Rapids or within the proposed project's ERP formed a group called the Rocky Rapids Concerned Citizens (RRCC).

Brazeau County also expressed similar concerns during this time.

2.3 Hearing

The EUB held a prehearing meeting on October 30, 2006, and subsequently commenced a public hearing on March 26, 2007, before Presiding Board Member A. J. Berg, P.Eng., and Acting Board Members W. G. Remmer, P.Eng., and J. G. Gilmour, LLB.

The Board panel and staff conducted a tour of the general area on March 26, 2007, prior to the hearing commencement. The site visit included areas that were suggested by some parties in response to the Board's invitation.

Those who appeared at the hearing are listed in Appendix 1.

Due to the availability of various parties, the hearing was adjourned on March 30, 2007, and resumed on April 16, 2007. On April 20, 2007, a confidential, in-camera session was conducted to hear specific medical concerns from some of the intervening parties. The hearing was also adjourned on April 20, 2007, to allow parties time to prepare oral argument for May 14, 2007. The total hearing was 11 days. The Board considers the hearing to be closed on May 14, 2007.

3 BACKGROUND AND ISSUES

In making a decision on these applications, the Board weighed the evidence and considered the submissions of the parties regarding whether the applications meet EUB requirements, the existence of oil reserves to be recovered, the potential risks to and impacts on the safety of the public and on the environment associated with drilling and operating the wells, as well as the other issues identified below. The Board also considered whether the applications are in the public interest, in accordance with Section 3 of the *Energy Resources Conservation Act.*

The Board has made its determinations on the various issues under the following categories:

- communication and participant involvement
- need for and timing of the wells
- location of the wells

- safety (hazard, risk and emergency response planning)
- human and livestock health
- property values
- environmental impacts

The Board will now address the issues of communication and participant involvement.

4 COMMUNICATION AND PARTICIPANT INVOLVEMENT

4.1 Views of the Applicant

West contended that it had conducted extensive public consultation with residents within the EPZ. West indicated that it was able to obtain confirmation of nonobjection from the majority of the residents and that the RRCC represented a minority of those within the EPZ.

In contrast to the challenges associated with the current applications, West indicated that over the last two years it had received approval for 24 wells in the general area and that 17 of these well were critical wells by definition. With respect to the previous wells, West stated that it had held some open houses, entered into consultation with local residents, and resolved all concerns.

West indicated that when it began consultation in October 2004 for the two wells at the 4-1 location, it had not been prepared for the level of opposition presented by some members of the community. West stated that, in its opinion, one-on-one meetings were the best way to consult with parties. In addition to individual meetings, West stated that it conducted open houses to provide information to the community on the proposed wells.

During the hearing, West acknowledged that there were weaknesses in its public consultation program, especially early in the process. For example, West admitted that there was no administrative program in place to track correspondence from parties and, as a result, it was difficult to confirm what correspondence had been sent to parties and what correspondence had been responded to. Further, West acknowledged that in 2004 it did not have an adequate system in place to track commitments made to residents. As a result, West admitted during the hearing that its consultation program had not adequately addressed some residents' concerns.

West also commented on its consultation with Brazeau County, stating that the County had provided an activity checklist to West. After reviewing the checklist, West believed that the County was overstepping its jurisdiction regarding the requirements outlined in the checklist. West stated that if the checklist were to be used to foster consultation with the County, the prescriptive language would have to be removed. Overall, West believed that the only reason Brazeau County was objecting was in reaction to the RRCC's concerns.

While West acknowledged that it had had difficulties in its consultation program, West believed it was making improvements, as outlined below.

- West stated that in future it would not judge motives of parties objecting to its applications, would not make conclusions on people's positions, and would improve procedures to respond to concerns.

- West agreed that it should consult with parties as to how they wish to be communicated with and that it was important that it communicate with people in the parties' preferred manner.
- West submitted that it had recently hired a full-time administrator to ensure that all correspondence was tracked and responded to in a timely fashion. West also had introduced a process to track commitments.
- West stated it had recently hired a privacy officer to ensure no inappropriate disclosures of residents' private information.

Although West acknowledged that it could have conducted a more effective consultation program, it was also of the opinion that no amount of consultation would have been able to satisfy the residents' concerns, as their concerns and opposition extended to all sour drilling in the area, not just the applied-for wells.

4.2 Views of the RRCC

In evidence and during the proceeding, the RRCC provided numerous examples of both process and content deficiencies, starting with the first contact with West in October 2004.

The RRCC expressed the following concerns about the process used by West for communication:

- West did not designate one person to be in charge of consultation.
- West incorrectly indicated at the hearing that consultation issues did not have to be dealt with until the applications were filed with the EUB.
- West did not provide complete information packages to some landowners.
- West did not provide information to new landowners; rather, they learned from their neighbours.
- West did not respond to requests for third-party assistance to the community so they could better understand the impacts of the project.
- West used ineffective methods to communicate with the RRCC and incorrectly believed it was communicating with an RRCC community steering committee.
- West incorrectly assumed there was a letter writing campaign and did not respond to repeated requests for information.
- West distributed information to landowners but was not prepared to answer questions or consult at that time. West collected information for ERP purposes but did not respond adequately to landowner concerns about the project.
- West held two town hall meetings but used an incomplete invitation process, which resulted in many residences within the EPZ not being invited.
- West did not provide complete information at the meetings and did not allow sufficient time to discuss the material.
- West had no procedure to track information sent out, to deal with confidential information, and to ensure follow-up on resident concerns.

- West did not follow through on commitments to provide information, such as the drilling plan or draft ERP, until so directed by the EUB.
- West had lengthy periods of inaction (up to nine months) without status reports to the landowners.
- West admitted that it chose not to provide any response if it did not have a complete answer to questions.
- West appeared to be fixated on the large number of questions raised by one intervener over the concerns raised by other residents.

The RRCC expressed concerns about the content of the communication that residents received from West as follows:

- West's responses to questions from individuals were often vague, confusing, or unclear, or the response was "we will meet or exceed regulations" or "follow industry standards." The lack of appropriate answers led to repeat requests by some landowners.
- West responded to most individual landowners only with a form letter that did not deal with their specific concerns, including evacuation, sheltering, and use of monitors.
- West's documentation contained frequent errors and omissions.
- West changed information and commitments to residents throughout the process on matters such as H2S content, relocations, and well ignition.
- West inappropriately summarized the results of community consultations to the EUB.

The RRCC indicated that the poor communications led to confusion and apprehension, resulting in a loss of confidence and trust and a fear of West's future actions based residents' experience with the company. The RRCC contended that West's consultation and participant involvement program was incomplete, ineffective, and deficient and that the applications should therefore be denied.

4.3 Views of Brazeau County

The County contended that prior to the application being filed, it was not given the opportunity to provide input on West's proposal. The County had provided an activity checklist to West but the checklist was not returned. The County indicated that the purpose of the checklist was to encourage communication with companies and to be a mechanism for County staff to increase their knowledge. The County argued that West had not responded to its concerns.

4.4 Views of the Board

The Board notes that a significant amount of the evidence and hearing time dealt with the interveners' concerns regarding West's communication and consultation practices. EUB *Directive 056: Energy Development Applications and Schedules* specifies that a company is required to develop a participant involvement program that includes parties whose rights may be directly and adversely affected by a proposed project. The directive outlines the requirements for notification, consultation, and discussions with landowners to properly inform them of potential impacts, discuss concerns and, where possible, resolve issues.

Accordingly, the Board considers that it is appropriate to have a full examination of communication and consultation practices at a public hearing. However, the Board considers that the examination of these issues could have been handled more concisely and with less hearing time, given the remaining major issues that needed to be addressed in the hearing. The Board believes the approach taken by interveners and their counsel at the hearing with respect to these issues may be indicative of the challenges that West faced in its consultation program.

The Board has determined that West's participant involvement program addressed the minimum requirements of *Directive 056* for the following reasons:

- The major elements of the participant involvement program were in place, as West provided information regarding the applications to persons who may be directly and adversely affected at the time the program was conducted.
- The information provided was sufficient to allow the persons affected to evaluate the potential impacts of the applications on them.
- Sufficient information was provided to allow persons to determine whether they would oppose the applications and to request the opportunity to make representations at a hearing.

The Board considered that some residents contacted about the applications, including the landowner where the wells are proposed and other proximate residents, did not express any concerns regarding West's proposed drilling program. The Board also considered that a participant involvement program may not satisfactorily address residents' fundamental concerns or objections.

The Board notes West's admission of weaknesses in its consultation approach and West's submissions that it has since taken steps to improve its consultation and administrative procedures. Further, the Board notes West's elaboration of improvements that would be made in future consultations. If these improvements are effectively implemented by West, the Board believes the results will be positive for West and future residents.

The Board considers that poor communication practices, at a minimum, escalated the concerns regarding need, location, safety, and other impacts addressed during the proceeding. Further, the Board observed questionable communication practices by some of West's witnesses during cross-examination by the interveners. The Board encourages West to be thoughtful about which members of its staff have direct contact with local residents and landowners. The Board also encourages West to be thoughtful about the degree of preparation that it provides to its consultants and agents when they begin their initial contact with residents and landowners with a view to establishing positive relationships.

However, the Board accepts that even the most effective consultation and participant involvement program may not satisfactorily address residents' fundamental concerns or objections. Further, the Board notes that not all affected parties objected to the applications and, further, the Board notes that many of the nearby residents did not register an objection to the applications. Consequently, the Board considers that the consultation was adequate and effective for some of the residents. The Board notes that the landowner of the locations for the proposed wells did not object to the drilling of the wells.

The Board was concerned by West's apparent decision not to respond to individual concerns raised by residents. However, the Board believes that the RRCC could have improved the situation somewhat if it had considered other options in resolving the communication problems when incomplete responses were received from West. The Board believes the RRCC should have recognized the impact of sending repetitive letters with a large number of repetitive questions and should have explored other options with West to obtain the answers. The RRCC also could have asked for the Board's assistance in directing West to respond to its questions.

The Board believes that West understood the participant involvement requirements of *Directive 056*. However, the Board recognizes that West attempted to use the same town hall meeting format and one-on-one discussion procedures that it had used for the previous 24 wells licensed in the area without asking the community how it would like to be consulted. While the town hall meetings and one-on-one discussions are valid options for conducting public consultation, the Board believes that West could have revised its communication plan once it understood that a different approach would be required.

The Board suggests that a plan with the following components would have greater success in meeting the needs of a community:

- Develop a plan and strategy to first understand the issues and concerns and then develop effective communication and consultation approaches.
- Discuss with the community and individuals how best to communicate with them.
- Develop an open and transparent system that documents concerns (with appropriate privacy considerations), tracks company commitments, and achieves timely follow-up to questions and concerns.
- Discuss options and methods with the residents on how best to resolve some or all concerns, including Appropriate Dispute Resolution, or if it appeared that after effective information exchange and communication there was no resolution, the option and timing for an EUB hearing.
- Carefully consider the content of its communication and commitments. In particular, West should have been more careful about its language in committing to following the Pembina Nisku Operators' Group (PNOG) Best Practices.

The Board will now proceed to evaluate the remaining factors in its deliberations.

5 NEED FOR AND TIMING OF THE WELLS

5.1 Views of the Applicant

West indicated that the 4-1 well was part of the Pembina Nisku Bank Edge (PNBE) trend and that the 16-35 well was a follow-up well. West explained that the PNBE trend extended in a southwest to northeast orientation from the Alberta foothills to northeast of Drayton Valley. West specified that to determine the location and projected drainage areas of its proposed well, it primarily used three-dimensional seismic mapping, including detailed amplitude maps. West indicated that regional geologic mapping, as well as geologic and geophysical interpretation of what it considered analogous pools (Pembina Nisku SS and WW), was used to support its

interpretations. West's seismic interpretation indicated a high probability of intersecting its target and discovering oil in commercial quantities. West stated that the reservoir quality might be excellent and estimated 1 to 2.5 million barrels of recoverable oil from the two proposed wells. West argued that these wells were in the public interest, since exploratory wells, such as the ones proposed, had proven to be some of the most prolific wells in recent history.

West confirmed that the two proposed wells would suffice to produce the targeted reserves, although an additional injection well might be required. West noted that, depending on the success of the proposed wells, additional wells might be drilled to explore the PNBE trend in the area.

West characterized the wells as free flowing up to two years but the wells would require artificial lift after the bottomhole pressure dropped. West admitted that it might need an enhanced recovery scheme with a water injection well to continue producing the wells later in their productive lives. West stated that such wells also tended to produce a lot of water. West committed to declassifying the wells' critical well status once the release rates decreased.

West confirmed that it had the petroleum and natural gas rights to produce the Nisku Formation. However, West stated that the mineral rights on the 4-1 well would expire November 1, 2007, unless the government granted a further extension. West committed to drilling at a time that would avoid the Schmidts' busy season, the ski season for the Nordic Ski Club, and the racetrack schedule. West estimated that the best drilling time would be late fall and early winter to avoid these activities. West stated that both wells would be drilled back to back, followed by consecutive completions. West believed that consecutive drilling and completions would create the least impact on area residents. The wells would then be suspended to determine next steps. West indicated that if the wells were successful, additional equipment at the well site might include a line heater, separator, flare stack, flare knockout drum, and SCADA unit. West stated that the production equipment would be a closed system with no tanks.

With respect to pipeline routing options, West provided some elaboration on routing considerations, including routing to the Easyford battery. West stated that a route would not be finalized until after the wells were drilled and that it would consider other well locations when results of these wells were known.

5.2 Views of the RRCC

The RRCC submitted that it was not against oil and gas development, as many of its members already had sweet wells on their properties, but that, in the RRCC's view, the risks associated with the proposed wells far outweighed the benefits. The RRCC pointed out that Alberta's fiscal condition was second to none and that the royalties from these wells would be miniscule compared to the royalties gained from the thousands of wells licensed every year in Alberta. The RRCC stated that West was simply interested in profits. The RRCC reiterated that West itself said that it did not need the wells to ensure economic viability. However, the RRCC maintained that West would lose everything if an incident occurred.

Some members of the RRCC suggested that the drilling of the wells be deferred until the safety of the residents could be guaranteed. In the meantime, the RRCC posed that society should be investigating alternative sources of energy. The RRCC also believed that seismic information was not enough to properly assess the amount of the recoverable oil. It said that another reason to

defer the drilling was to wait until better technology was available to assess the size of the reserve and to recover a larger portion of the total reserve.

The RRCC requested the Board to look at area development as a whole and its long-term impacts. It stated that if these wells were approved, development in the area would continue at a high rate. The RRCC believed that the applications were incomplete because a pipeline application and the other five wells discussed in West's development plan should have been included for consideration.

The RRCC also questioned why West proposed to drill two wells without first testing one for economic viability. The RRCC submitted that the exploratory wells, if drilled, should be drilled and tested one at a time. The RRCC said that the Board should consider not only the drilling and completing of the wells, but also the production, servicing facilities, and pipeline installation that would be in place for an indeterminable amount of time.

5.3 Views of Brazeau County

Brazeau County did not make any submission on the need for the wells but believed the applications were incomplete. It stated that a pipeline should have been part of the applications for the Board to fully understand and appreciate the impacts of the proposed project.

5.4 Views of the Board

In the Alberta system, there are two sets of rights, the rights of the mineral lessee to access hydrocarbon resources and the rights of the surface holders. The Board is obliged, under its enabling legislation, to balance and adjudicate between the interests of the applicant to exploit its minerals and the interests of the surface owners and residents.

In this section, the Board considers

- the resource potential from the proposed wells,
- the impact of future technology on guaranteeing safety, and
- the necessity of an accompanying pipeline application.

With respect to the interests of West, the Board has considered the evidence submitted by West relating to the geology in the area and estimated oil reserves. The Board is familiar with the PNBE trend in the area and accepts the geological interpretation of West's play. Consequently, the Board accepts that there could be 1 to 2.5 million barrels of recoverable oil from the two proposed wells.

The Board finds that the argument of some of the members of the RRCC that the wells should not be drilled because Alberta is currently in a strong financial position is not relevant to the Board's consideration of applications. As noted above, the Board must have regard for the economic impacts of the proposed wells in determining whether the wells are in the public interest. Also, part of the Board's mandate is the orderly and efficient development of the energy resources of Alberta.

The RRCC has also recommended that the drilling of the wells be deferred until technology has improved to guarantee that accidents will not happen either now or in the foreseeable future. The

Board must make its determination on the applications based on the evidence currently before it. The Board has requirements respecting the drilling and operations of sour wells and conducts surveillance to ensure the safety of the public.

The Board considers that it is not possible to "guarantee" that accidents will not happen either now or in the foreseeable future. However, the Board regulates companies to ensure that safety is not compromised and that a high standard is maintained for the protection of the workers and of the public.

Further, the Board will not approve applications that do not achieve the required public safety protection.

With respect to the proposal by the RRCC that West should have been required to submit a pipeline application, the Board generally shares that view and generally requests a pipeline application to be made at the same time as the well applications. However, the Board considers that the reasons provided by West justify the lack of a pipeline application in this case. Further, the Board considers that the pipeline routing information and risk assessment required by the Board were helpful in understanding impacts. The Board considers that West also clearly understands the business risk it is undertaking if the wells are successful but a pipeline route is not approved.

Based on the applicant's right to access the resource and the need for the orderly and efficient development of the resource, the Board finds that the wells are needed to recover the resource.

However, having found that the wells are needed, the Board needs to assess the adverse impacts on the nearby residents. In this regard, the Board must also take into account the risks to public safety, the potential environmental impacts of the proposed wells, and the other potential impacts posed by the proposed wells, as well as whether the risks and impacts may be mitigated, as discussed.

With respect to the interests of the surface owners and residents, the Board needs to consider in subsequent sections of this decision whether the required public safety standards have been met, whether any adverse impacts are sufficient to deny the application, and whether additional mitigative measures can be put into place to offset the adverse impacts.

The first mitigating measure to be considered is whether the proposed wells are in the optimum location or whether other well surface locations would reduce the negative impacts on the community.

Therefore, the Board will, in the next section address the proposed well's location.

6 LOCATION OF THE WELLS

6.1 Views of the Applicant

West described the criteria it used to determine an optimal surface location. West stated that it considered the surface issues and concerns of the public, impact on the public, drilling time, flaring time, and pipeline routing when it chose its location. It also factored in the technical

limits of drilling directionally to more than one bottomhole target. West argued that it picked the 4-1 locations to

- minimize surface impacts,
- provide the most direct drill path to the primary 4-1 target,
- test the most updip portion of the seismic anomaly, and
- provide additional information to assist in determining if the 16-35 well should be drilled.

West claimed that it looked at number of different location options with residents. Specifically, West stated that surface locations at 3-1, 9-35, and 16-35 were considered. The seven residents consulted were split in preference for the 4-1 or 3-1 location; therefore, West retained the 4-1 surface location. West acknowledged that the Dodds' residence was the closest to the 4-1 location, but noted that of the other options, only one would move the wells farther from the nearest residences.

West stated that moving to a surface location at 9-35 would result in an 885 m deviation to reach the 4-1 bottomhole target. It explained that as the wells were targeting small pinnacle reefs, the farther away the surface location was from the objective, the more technically difficult the well was to drill and complete. West stated that it became operationally risky, resulting in additional horizontal and overburden stresses. West further argued that an 885 m directional leg would be more expensive, with less chance of success, and that the cement bond between the wellbore and casing might not be as good as it could be with a vertical well. West explained that in such plays most wells were drilled vertically and pointed out that directional drills were typically a maximum of 300 m horizontal displacement to the bottomhole location. West also indicated that a significant reach for an oil well on artificial lift would result in more difficulties in production and more frequent workovers.

Given the above, West argued that 4-1 was the best surface location, as it was the least risky operationally and it minimized surface impacts, since both wells would be drilled from the same surface location. West emphasized that it would use PNOG best practices to drill the proposed wells.

West stated that the distance between the 4-1 location and the closest point of Daryl Schmidt's riding operation was 420 m. West stated that it understood the Schmidts to have about 15 to 20 people attending their location throughout the day and that the busy season was between April and October. West stated that it did not believe that Mr. Schmidt's operation met the definition of a public facility as defined in *Directive 071: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry*. West also believed that construction of a riding arena on Mr. Schmidt's property would not cause the operation to be deemed a public facility. West admitted that it had not contacted the EUB to discuss the Board's opinion on whether the Schmidts' business was a public facility; its opinion was solely based on West's own interpretation of *Directive 071*.

6.2 Views of the RRCC

The RRCC argued that the proposed wells were too close to residences and that the proposed location presented many difficulties for leaving the area in case of an emergency. It emphasized that distance was the only true safety factor. The RRCC noted that West had said it would

employ PNOG best practices but reiterated that one of those practices was to maintain a 500 m distance between wells and residences.

The RRCC did not propose alternative locations, as it believed there were too many people in the area and that alternative locations would just move the wells closer to other residences.

The closest residents in the RRCC were Mr. and Mrs. Dodd and their children (the Dodds), located on Block 1 of the northwest quarter of Section 36-49-7W5M. The Dodds explained that their residence was about 294 m from the proposed 4-1 well and 15 m closer to the 16-35 well. In addition, their vegetable garden was about 200 m from the 16-35 well. They stated that if the wells were approved, they would prefer them to be moved the greatest distance away. When West presented them with location options, the Dodds preferred that the wells be moved to 3-1. However, the Dodds emphasized that they would not remove their objection to the drilling of the wells at any location in proximity to their residence.

Mr. Schmidt described his horse training centre as a place of business where he trained horses and taught clinics. He stated that during a lesson or clinic there could be up to 25 people on the property. Mr. Schmidt also stated that he boarded eight to ten horses, in addition to his own, while they were being trained. He explained that his intention was to build an indoor riding facility in the summer of 2007 to expand his business opportunities and allow for year-round training. He explained that he was concerned about the safety of his students and that the well might negatively impact his business, and he felt he would have an obligation to tell people about the well when they came to his place.

Mr. Schmidt admitted that he was not sure if his operations were a public facility based on the EUB definition. However, if the Board determined that his operations were not a public facility, he argued that the 500 m setback would not apply and the proposed wells should not restrict his ability to receive approval for the riding arena from the County.

6.3 Views of Brazeau County

Brazeau County was also concerned about the proposed location of the wells. It felt that a location in Section 35 would be more appropriate, placing the wells farther from residences. It contended that the wells could be drilled directionally from Section 35 and still hit the proposed target locations. Brazeau County specifically suggested that the wells be drilled from 9-35 if they were approved. It argued that this location would be farther from the residences in the RRCC and would improve egress.

Based on discussions with oil and gas industry personnel, the County believed that some wells could be drilled as far away as 1800 m from surface to bottomhole and that West itself admitted that it could deviate by 1000 m. The County argued that West should maintain its commitment to use PNOG best practices and not locate the proposed wells within 500 m of a residence.

6.4 Views of the Board

In the previous section, the Board determined that the wells were needed to produce reserves but noted that the Board also needed to assess the adverse impacts and the mitigating measures that might be taken to reduce the adverse impacts to an acceptable level. As such, the first mitigating measure to be considered is the best surface location, if any, for the wells.

In this section, the Board will address two principal matters, as follows:

- Are there more appropriate surface locations for the proposed wells?
- Should the EUB designate the Schmidts' horse operation as a "public facility" as defined by the EUB for setback purposes?

The Board notes that the EUB's setback requirements specify that the closest a level-2 sour oil well may be located to a residence is 100 m. With respect to the RRCC's view that the wells would be too close to residences, the Board notes that West has met the minimum setback requirements as outlined above, as long as there are no "public facilities" nearby. The Board also notes that it requires a 500 m setback from a "public facility." Later in this decision, the Board addresses whether the Schmidt horse operation is a "public facility."

The Board has evaluated the various surface location alternatives for the proposed wells. The distances from each location to the nearest residence are listed in Table 1 below.

Table 1. Assessment of alternative surface locations and deviation distances

Proposed surface locations	Distance to nearest residence (m)	Approximate distance to 4-1 surface location (m)
4-1-50-7W5M	307	N/A
3-1-50-7W5M	185	N/A
16-35-49-7W5M	294	555
9-35-49-7W5M	400	900

As shown above, only the 9-35 surface location has a slightly greater distance to the nearest residence than the proposed 4-1 surface location. During the hearing, a number of possible locations were discussed that were within the approximate 800 m maximum directional distance that West suggested was technically possible for a directional well to have a reasonable probability of hitting the target at the bottomhole location. Even within this maximum distance, the Board notes that any of the above locations would place a number of residences in close proximity to the wells and within the EPZ.

In assessing the appropriateness of the 9-35 location, the Board notes that it results in the largest distance to a residence but exceeds the 300 m directional objective submitted by West.

The Board accepts West's arguments that the target reservoirs are small pinnacles. Although it is technically possible to drill the wells from a distance greater than 300 m and up to about 800 m, the Board accepts the proposition that the chance of hitting the target decreases as the distance from the bottomhole increases.

The Board considers that drilling, operational, and safety success factors must be considered in evaluating whether a surface location is a reasonable directional drill distance from the surface to the reserves. The Board notes West's evidence that these proposed oil wells will be placed on artificial lift over time and, therefore, the Board believes these wells cannot have the same horizontal deviation as a gas well. The Board notes that the larger the horizontal deviation, the greater the potential for more frequent servicing operations.

Given that the 9-35 location would be only slightly farther from the nearest residence than the proposed 4-1 location, the Board finds that a surface location at 9-35, as suggested by the County, is not an optimal location, given the potential negative impacts outlined above.

In considering only the drilling, operational, and safety success factors, the Board agrees that the optimum range of surface location options is within 300 m of either 4-1 or 16-35 bottomhole targets.

The Board notes that the PNOG best practices state that the surface location of a well must be at least 500 m from a residence. However, the proposed wells are about 307 m from the Dodds' residence. Although the Board considers that West did not communicate itself effectively on its commitment to meet PNOG best practices, the Board recognizes that West was not able to apply the PNOG best practices in this situation.

The Board will now assess whether or not the Schmidts are operating a "public facility," as defined by the EUB. If the Board were to designate the Schmidts' horse operation as a "public facility," West would have to maintain a 500 m setback distance from the Schmidts' operation. If designated as a "public facility," the Board would not approve the proposed 4-1 well location.

When considering whether Mr. Schmidt's riding operation should be considered a "public facility," the Board must look at

- duration and frequency of use,
- number of people using the facility,
- means of transport to and from the facility,
- egress routes from the facility, and
- complexity of evacuation in the case of an emergency.

With respect to the first two of the above five criteria, based on the evidence given, the Board is of the view the duration, frequency of use, and number of people expected to be using the facility at any given time do not qualify Mr. Schmidt's riding operations as a public facility. With respect to these two factors, the Board considers that during the critical drilling phase of the wells, if they were approved, the Schmidts could evaluate the possibility of rescheduling classes.

With respect to the third, fourth, and fifth criteria listed above, during the lower risk production operations, the Board believes that an evacuation of this facility is manageable given the alternate egress route provided by the new road. The Board heard the evidence from the Schmidts that even though there may be children present at the lessons, adults are often accompanying and observing the children. Accordingly, with respect to these remaining three criteria, the Board does not consider that a lack of means of transport, the egress routes, or the complexity of evacuation would qualify the facility for designation as a "public facility."

The Board recognizes concerns raised by the Schmidts about the impact the wells will have on their business. While the Board agrees that there will be an initial noise and visual impact while the wells are being drilled, this will be for a limited duration. Further, the Board is aware that there are many businesses throughout the province that operate within the EPZ of a well or

pipeline. The Board encourages West and the Schmidts to maintain an open working relationship to ensure that West's operations have as small an impact as possible on the Schmidts' business.

In summary, after review of all of the factors for designation, the Board does not designate the Schmidts' horse operation as a "public facility." Further, the Board's understanding is that the County would rely on the Board's designation when considering any future application from the Schmidts to the County for construction of a riding arena.

Accordingly, the Board accepts West's argument that 4-1 is the preferred surface location since the 3-1 and 16-35 locations place residences closer than does the 4-1 location and since West meets the minimum setback requirements. Nonetheless, the Board considers that West should demonstrate its willingness to work with interveners to mitigate any adverse impacts based on mutual agreement, if the wells were to be approved.

The Board now considers other factors including safety and risk, the viability of the emergency response plan, environmental and other factors in the following sections.

7 SAFETY

Hazards and risks were discussed at length in the hearing. They are two different concepts, despite the fact that they are commonly used interchangeably.

A ***hazard*** is a chemical or physical condition that has a potential to cause harm. Examples of potential hazards include toxic compounds, flammable substances, and gas under high pressure. A hazardous event occurs if a toxic release, fire, or pressure containment system failure occurs. The consequences of such an event may include injury or death, adverse environmental impacts, and/or property damage.

However, because a potential hazard exists does not necessarily mean that a hazardous event will happen, as is well understood by people when they undertake everyday activities, such as driving or recreational or occupational activities.

People understand that hazards in their daily activities can be managed or mitigated by employing measures that help reduce the chemical and/or physical condition that has the potential to cause harm.

With respect to drilling operations, an example of hazard mitigation is to cement casing before drilling into high-pressure zones or to employ spacing setback distances to separate flammable substances from potential ignition sources. Another common example of hazard mitigation methods is the development of an ERP that details public protection procedures.

In everyday life, people mitigate hazards, for example, by maintaining their equipment in good order, following prudent safety procedures, using protective equipment, such as helmets for bike or ATV activities, and maintaining brakes in vehicles.

Risk can be defined as the consequence of a hazardous event combined with the probability that such an event will occur. The hazard is the mechanism that could cause harm and the risk is the likelihood of that mechanism causing harm.

The Board acknowledges that risk cannot be eliminated completely and that exposure to risk is part of everyday life.

Individuals may choose to undertake an activity that presents a risk, or risk may be imposed on individuals by actions of other parties, such as industrial activities.

It is the EUB's mandate with respect to energy development in Alberta to ensure, through regulation, that development activity is undertaken in a manner that minimizes the possibility of adverse consequences and is protective of public safety and the environment.

Eliminating or reducing potential hazards is a first measure to manage risks. Taking measures to reduce the consequences of a hazardous event and taking measures to reduce the probability that a hazardous event might occur also help manage risks. The EUB has requirements in place to prevent a release of sour gas from occurring during drilling, completion, production, and servicing operations. These include engineering standards, training, inspection, and enforcement requirements for safe and responsible sour gas operations. Examples of EUB risk reduction measures include *Directive 009: Casing Cementing Minimum Requirements* and *Directive 036: Drilling Blowout Prevention Requirements and Procedures*, among other requirements. Additionally, properly developed emergency response procedures reduce potential exposure in the event of an emergency, assist in mitigating the hazardous condition, and reduce the potential risk to public safety.

With respect to critical sour wells, the Board requires that the hazard be properly defined (e.g., H_2S release rate), the hazard zone be identified (e.g., the EPZ), and an appropriate emergency response plan (ERP) be in place to assist in mitigating the hazard.

7.1 Hazard and Risk Assessments

7.1.1 Views of the Applicant

West stated that based on a Board-approved H_2S content of 16 per cent and a H_2S release rate of 2.5 m^3/s, the EPZ for drilling and completion of the wells would be 4.29 km. West compared results of various EPZ calculation methodologies and assumptions to the nomograph-based EPZ determination set out in the current *Directive 071*. West found that results ranged from 2.8 to 4.4 km based on a 15-minute ignition time. West said that it used a number of conservative and protective assumptions in evaluating an uncontrolled release, including absolute open flow gas release, H_2S concentrations determined by the EUB, horizontal gas release, hydrocarbon liquid rain-out, and worst-case meteorology. West said that its assessment of land uses and complex terrain was comprehensive and representative of the area.

Although its detailed analysis recommended an EPZ of 3.8 km, West said it used 4.29 km to be more conservative. West also compared the effect of different assumptions on the roughness factor (Z_0) used in its plume dispersion modelling. Higher values of Z_0 reflect lands with features such as tall trees or many buildings that create turbulence and greater dispersion. Lower values of Z_0 reflect lands that create less turbulence, such as crop fields or grasslands. Terrain features such as hills and valleys increase Z_0. West's expert, RWDI, provided Table 2 to summarize the various models used, Z_0 assumptions, and the resulting EPZ determinations. West used EUB nomographs and applied for drilling, completion, and servicing EPZs of 4.29 km and a suspended and producing EPZ of 1.32 km.

Table 2. RWDI calculations of EPZ

Activity	Distance to 100 ppm as 3-minute average (km) EUB nomographs	Ignition time (min)	Distance to an exposure equivalent to 100 ppm for 60 minutes (km) EUBMODELS Z_0 = 1 m (default EUB stagnation temperature 5°C)	EUBH2S (Default) Z_0 = 0.1 m	RWDI Models Z_0 = 0.1 m	RWDI Models Z_0 = 1 m
Drilling	4.3	15	4.4	2.8	4.4	3.8
Completion	4.3	15	4.4	2.8	4.4	3.8
Production	1.3	60	3.4	2.5	4.5	3.7

West stated that originally the wells were estimated to have an H_2S content of 24 per cent. However, as more data became available on the Nisku play, the H_2S content of the proposed wells was estimated at 16 per cent. West reiterated that the 16 per cent was approved by the EUB.

West described the Nisku trend as originating in Brazeau County to the southwest and extending past Wabamun Lake to the northwest. West stated that the H_2S content decreased and the play became shallower moving from southwest to northeast. In addition, West argued that the reservoir pressure and gas-to-oil ratio also decreased at the same time. Therefore, West was confident that the H_2S release rates applied for were very conservative, and it expected the wells to have a much lower H_2S release rate than what was applied for.

Once the wells were completed and tested, West stated that it would recalculate the producing EPZ in accordance with the applicable EUB directives using appropriate methods, such as the most current version available of the EUBH2S program and risk analysis. West said it would notify area residents of the producing EPZ if it differed from the applied-for value.

West said that it had also completed a hazard assessment of an ignited well release using more detailed computer programs for establishing meteorological conditions and for evaluating plume dispersion. West's result indicated that sulphur dioxide (SO_2) concentrations were predicted to exceed *Directive 071* evacuation criteria within 2.9 km of the well site. However, West noted that this predicted distance was less than the 4.3 km EPZ that would be evacuated in the event of an uncontrolled release.

West noted that the proposed oil wells would eventually require artificial lift. West stated that at that time the wells would be reclassified as noncritical wells. The resulting reduced release rates would reduce the size of the EPZ and the hazard.

West also described a number of redundancies it would have in place to reduce the risk while drilling. West stated it would have the ability to close the inside of the drill pipe using the upper and lower Kelly cock. If the Kelly cock were off the pipe, the pipe could also be closed with the stabbing valve and inside blowout preventer (BOP) (check valve). To prevent flow outside the drill pipe, West indicated that the following equipment would be in place:

- two pipe rams, to close around a specified pipe diameter;
- annular preventer, to close around any size pipe; and
- blind sheer rams, to cut the pipe and prevent flow inside the drill pipe.

Finally, West stated that it would also have pit gain indicators that would alarm and signal the crew to check for any flow problems.

West prepared a risk assessment for the proposed wells based on an uncontrolled release with an ignition time of 15 minutes using the following information:

- release frequencies from Energy and Resource Conservation Board (ERCB) Report 90-B, Volume 6: *Risk Approach for Estimating Risk to Public Safety from Uncontrolled Sour Gas Releases*;
- hourly meteorological data from local ambient air quality monitoring stations;
- surface roughness of 1.0 m; and
- risk criteria from the Canadian Major Industrial Accident Coordinating Committee (MIACC) *Working Group on Land Use Planning and Control*.

Based on the risk analysis, West determined that

- no residence would be within the MIACC exclusion zone (i.e., annual risk of fatality is greater than 100 chances in a million);
- eight residences would be within the MIACC zone suitable for industrial and parkland uses but not residential (i.e., annual risk of fatality is greater than 10 but less than 100 chances in a million); and
- six residences would be within the MIACC zone suitable for low-density residential dwellings (i.e., annual risk of fatality is greater than 1 but less than 10 chances in a million).

West also compared risk analysis results based on a surface roughness of 0.1 m and found that there would be eleven residences located within an area where the predicted annual risk of fatality would be greater than 10 but less than 100 chances in a million and no residences in the MIACC exclusion zone.

West said that relocating the wells to a location such as 9-35 might reduce the number of residences in the area where the predicted annual risk of fatality would be greater than 10 but less than 100 chances in a million. West said that some residences would no longer be in the risk zone but others would be added, and West questioned whether anything would be gained from a risk standpoint by relocating the wells.

West said that relocation of residences would be a risk mitigation technique and that it would offer relocation to residents within 1 km of the well site during drilling and completion operations in the sour zone.

Overall, West believed that the wells could be drilled safely and within an acceptable level of risk.

7.1.2 Views of the RRCC

The RRCC expressed concern regarding the proposed H_2S content of 16 per cent. After reviewing available data, it stated that other wells in the area were predicted to be much higher. The RRCC requested the Board to err on the side of conservatism and use a higher H_2S content.

The RRCC stated that if the H_2S content of the wells were higher, West's modelling, setbacks, and EPZ would be wrong. The RRCC also emphasized that very little data had been made public, as most H_2S information was confidential. It did not believe this allowed for a transparent process and maintained that H_2S information should not be held confidential.

The RRCC stated that higher potential H_2S concentrations had implications on classification of the wells. If the well were level 3, there could be no unrestricted county developments (greater than eight dwellings per quarter section) within 0.5 km and no urban centres or public facilities within 1.5 km. The RRCC said that this would affect how Rocky Rapids landowners could use their land.

The RRCC said that there was no guarantee that a release could be ignited within 15 minutes and noted that the default ignition time in the EUB models was 60 minutes. The RRCC said that the solution would be to plan for a longer ignition time and hope that it would not be used. The RRCC stated that it determined that the EPZ would be 6.2 km if ignition time were assumed to be 60 minutes.

The RRCC stated that surface roughness assumptions were important for EPZ determination and risk assessment. It said that evaluation of roughness needed to consider snow cover and land characteristics on the axis between the source and nearby residences.

The RRCC said that assumptions regarding H_2S concentration, ignition time, and surface roughness individually or in combination could increase the EPZ. The RRCC stated that the EPZ needed to be looked at carefully.

RRCC said that based on West's risk assessment, at least eight families would be subject to an unacceptable risk level according to MIACC guidelines. The RRCC said that relocation might be a means to mitigate that risk for residents willing to relocate; however, it noted that not all of the eight residents were willing to relocate.

In its submissions (Exhibit 03-019), RRCC stated that, in its opinion, the benchmark for acceptable annual risk of fatality from industrial activities was one chance in one million. It believed that most risk practitioners chose to locate single-family residences at the outer edges of the 10 chances in a million zone, even though MIACC guidelines permitted residences in this zone. In the RRCC's opinion, locating residences in the 10 to 100 chances in a million risk zone would be considered unacceptable by risk practitioners in Canada.

7.1.3 Views of Brazeau County

Brazeau County stated that EPZ matters associated with production and pipeline facilities should be part of the application. Brazeau County also questioned the accuracy of the H_2S content applied for, as it too believed that the H_2S content should be higher than 16 per cent.

Brazeau County stated that it viewed the acceptable annual fatality risk as one chance in a million. It said that the risk associated with the proposed wells was much higher than that and the applications should be denied. Brazeau County also said that risk associated with potential future pipelines should have been included in the assessment.

7.1.4 Views of the Board

Regarding the H_2S content of the wells, the Board is satisfied that 16 per cent H_2S content is acceptable, as previously determined by the EUB Geology and Reserves Group. As was submitted in evidence, the group, in its review, examined the geology in the area and took into account other predicted H_2S contents of wells, including information regarding confidential wells. The Board notes that the estimated H_2S content of a proposed well is set out in the application for the well. Further, the Board notes that West voluntarily submitted confidential information in support of its H_2S content. The EUB staff, in their determination, use all of the information in their possession, including public and confidential data, to arrive at the best estimate possible. In consideration of all these factors, the Board is not persuaded that the evidence provided by the RRCC on the estimated H_2S demonstrates that the estimated H_2S content of the proposed wells should be higher than the 16 per cent determined by the EUB staff.

With respect to the release rate, the Board requires that a reasonable worst-case uncontrolled sour gas release be used as the basis for assessing potential hazards and for establishing EPZs. This assumes that ability to control or restrict well flow is lost and is based on representative knowledge of reservoir characteristics, including gas composition. The Board views that the release rate used by West is reflective of a reasonable worst-case scenario for the proposed Rocky Rapids area well locations.

The Board notes that the interveners presented alternative evaluations of sour gas releases based on assumptions involving higher H_2S concentrations and longer times to ignition, which resulted in larger EPZs. However, the Board views that their assumptions of higher H_2S or longer ignition time overstate a reasonable worst-case drilling release scenario, based on the evidence considered at the hearing.

The Board further notes that considerable discussion occurred during the hearing with respect to certain modelling assumptions, including surface roughness. The Board notes that results for the drilling and completions EPZ presented by West for various surface roughness factors differ; however, using more conservative assumptions (i.e., numerically lower roughness factor), the results are consistent with the 4.29 km EPZ proposed by West.

The Board views that West's hazard assessment and determination of an appropriate EPZ is consistent with the requirements and intent of *Directive 071*. The Board believes that the correct EPZ should be 4.29 km for drilling and completion. The Board expects West to meet its commitments to recalculate the drilling, completion, and production EPZ based on actual results, if the wells are ultimately approved and drilled.

The results of the hazard assessment demonstrate that drilling the well presents an inherent hazard for residents in the area.

Therefore, in order to approve the wells, the Board must be satisfied that West's ERP provides the basis for an effective emergency response to an uncontrolled release from the proposed wells. Further, the Board must be satisfied that the drilling and completions plan incorporates measures to reduce the hazard and the probability of an uncontrolled release to an acceptable level of risk for local residents.

Although the EUB has not defined risk acceptability criteria, it often uses risk estimates to judge whether a particular development or activity is within the public interest. In the case of the proposed wells, West's risk assessment indicate that, depending on input assumptions, during the drilling and completion operations between eight and eleven residences could be located within an area where risks exceed MIACC guidelines of an annual risk of fatality of 10 in one million for lands suitable for rural residences. The Board notes that no residences are in this risk range during production operations.

The Board recognizes that a number of redundancies are in place during the time of drilling that also reduces the risk as evaluated by West. The Board notes that the pre-1990 well failure statistics in ERCB Report 90-B do not incorporate the effects of regulations on the design of wells, BOP equipment, drilling practices, and drilling crew training that have subsequently been put in place by the EUB. In previous decisions, the Board has considered that these measures reduce the probability of a sour gas release.

Since the implementation of the critical well requirements by the Board, there has not been a blowout of a critical well. In previous decisions, the Board has applied a factor of 0.25 to risk estimates. If this factor were used for the West wells, a lower risk value would have been estimated and fewer residents would be within the greater-than-10-in-a-million criterion during the drilling and completion phases. The Board views that West has been conservative in its estimates by not including the results of improved well design and ERP requirements in the risk assessment presented.

The Board agrees with the interveners' expert that hazard reduction is preferable and that where hazards cannot be eliminated, measures to reduce the probability of the event may be used to reduce risks to acceptable levels. The Board recognizes that relocation of residents during sour zone drilling and completion operations eliminates the hazard for those who choose to relocate.

The Board also recognizes that in a practical sense, it is highly unlikely that all the well control mechanisms and established well control procedures would fail in the sequence necessary to result in an absolute open flow emergency from the well without substantial warning time. Rather, a series of events would likely have to occur that would give rise to the ERP activation and evacuation of nearby residences before an unignited, uncontrolled release happened. The criteria the Board uses for classifying incidents in that regard is provided in Appendix 3, and the Board notes that West's ERP would initiate evacuation at a level 2.

The Board believes that West's drilling and completions procedures meet the essential requirements of early detection of potential loss of well control.

Nonetheless, the Board agrees that it is prudent to offer relocation to residents close to the well during the drilling and completion of the critical zone, in accordance with the commitment made by West.

The Board believes that on the basis of the hazard and risk assessment, the wells could be safely drilled, completed, and produced. However, the Board will not approve the wells unless it is satisfied with West's ERP and other mitigating measures.

In the next section on Emergency Response Planning, the Board will assess the ERP.

7.2 Emergency Response Plan

7.2.1 Views of the Applicant

In support of its application and in accordance with *Directive 071*, West submitted a site-specific drilling and completions ERP in March 2006 and argued that the site-specific ERP adequately provided for protection of the public in an emergency situation.

West recognized that it had not provided updates to the ERP since it was submitted. West committed to updating the ERP if the well licences were granted, including updating all resident contact information, with particular attention to the specific needs and concerns of residents who had identified themselves as special needs parties.

In its evidence at the hearing, West acknowledged that a lack of trust had developed between itself and some residents. West stated that it would attempt to rebuild this relationship and assure the residents that they would be protected by the ERP by addressing specific concerns case by case. West stated that odour complaint protocols and the distinction between the different sources of H_2S would be discussed with the residents at that time.

During the hearing, potential situations that might occur (e.g., kicks) and the mitigating measures used to ensure public safety were discussed. West estimated that in a worst-case scenario, it would take a minimum of 30 minutes for gas to reach surface if a kick occurred and contended that this was enough time to enact its ERP. However, West indicated that gas was very unlikely to reach surface, as West had a number of measures it could implement, including shutting in the well to prevent such an incident.

West added that its ERP would only use certified and fully trained rover coordinators and rovers who would traverse the EPZ during sour drilling and completion operations to identify transients and recreational users of the land. The rovers would also collect weather data to assist in the determination of the appropriate egress routes during an emergency. West acknowledged that these response personnel would not carry spare breathing apparatuses with them, as the ERP was designed to ensure that the EPZ would be evacuated before there would be any uncontrolled release to surface. West said it would encourage residents to bring their own child car seats in the event of an evacuation. West acknowledged that there was the potential for large volumes of residents evacuating the EPZ and stated that it would employ school buses to accommodate these people, if required, and would locate the buses in accordance with the need of the residents. West committed to ensuring bus availability daily while it was conducting operations in the sour zone.

In addition to the ground rovers, West detailed two rover positions dedicated to monitor the North Saskatchewan River. The river monitors would be located outside of the calculated EPZ and would be able to prevent river traffic from entering the EPZ via the use of a loudhailer, flashing beacons, and reflective stop signs. West was confident that anyone travelling down the river would notice these signs and stop. In the event that river traffic did not stop, municipal resources would be used and a helicopter rover equipped with a loudspeaker would be deployed to hail river traffic. West further explained that the rovers whose area was adjacent to the river would also have the responsibility of ensuring that the river area was searched and evacuated. West acknowledged that the river locations would need to be confirmed and updated during the required ERP update.

West explained that the helicopter rover would be dispatched at a level-1 emergency. While West acknowledged that the Drayton Valley airstrip, which would serve as the helicopter landing pad, was in the EPZ, it contended that the helicopter would still be able to respond until a level-3 emergency had been declared, at which time a Notice to Airmen would be issued, isolating the airspace surrounding the EPZ. West expected that all residents and transients would be evacuated from the EPZ by this time.

In addition to the various roadblock, river monitoring, and rover kits stored in Drayton Valley, there would be four stationary air monitors within the EPZ during drilling and completions operations. In the event of an emergency, West would have three mobile air monitors travelling the area, which it stated exceeded the requirements of *Directive 071*. Once drilled and completed, West confirmed it would have three permanent H_2S monitors located at the well site. West acknowledged that initially the ERP contained only one egress route for the residents within the EPZ to use and it believed this was sufficient to protect public safety. Due to landowner concerns, West stated that it had identified a second egress route that could be used. However, this route would require upgrading an existing partial road and right-of-way to County specifications.

West stated that construction of the second egress road would commence after the wells were licensed and would be completed prior to its entering the critical sour zone of the first well. If West reached the critical sour zone prior to completing construction of the road, West committed to suspending drilling until construction was completed. Once drilling and completion operations were finished, West stated that this new road was to be maintained by the County.

West stated that it recognized residents' concerns regarding unreliable telephone coverage in the area and committed to using several methods to establish contact. These methods included notification by the automated Comm Alert telephone system, using live telephoners to follow up on the Comm Alert system, and personal visits by rovers in the event that the first two methods failed. West explained that Comm Alert maintained a database of all residents' phone numbers and would send an initial prerecorded message out to all area residents within 10 to 12 minutes of being activated. This notification would request residents' verification once they had received and understood the evacuation message. West stated that all residents would then receive a follow-up call from a West representative to confirm receipt and understanding of the initial message. rovers would be sent to the residence if confirmation of understanding was not received; in the event no one was home, a form would be left on the door explaining the situation and asking the resident to leave the area immediately.

West asserted that all residents within the EPZ would receive notification prior to West's entering the sour zone and at other critical stages during its operations. West emphasized that once residents received notice, it would be prudent for the residents to manage their outdoor activities to ensure that they could be easily reached in the event of an emergency. West stated that it did not expect residents to change their lifestyle to suit the drilling of the wells; rather, West believed residents could assist in ensuring their safety by being aware of the drilling and completions operation time frame. West committed to include information on the proper management of outdoor activities in the renotification package that would be provided if the wells were licensed.

West stated that it had discussed special circumstances for evacuation or care of household pets with several residents on a case-by-case basis. West assumed residents would take their pets with them if evacuated and that care of the animals would be discussed with a West representative at the evacuation reception centre at the Drayton Valley Omniplex. West committed to using its Livestock Compensation Agreement to provide compensation for residents whose livestock were injured or lost in a West-related incident. West stated that it was willing to sign copies of the agreement with parties within the EPZ who requested it.

West described that it had engaged Brazeau County and other government agencies to develop a Unified Command structure for emergency response and stated that the intent of Unified Command was to coordinate emergency response between West, the local authority, the regional health authority, and other related support agencies. West explained that its public safety responsibility also extended to the emergency awareness zone (EAZ) and that it would assist with response activities within the EAZ. West stated that at the request of the County fire chief, the EAZ was divided into specific response areas to facilitate response procedures.

West contended that its ignition protocol was in compliance with *Directive 071* and that the two main criteria for ignition were an uncontrolled sour gas release at surface and evacuation not being completed by the time the emergency reached a level 3. West stated that ignition would occur within 15 minutes of the decision to ignite being made, so as to ensure that all personnel were off of the lease site.

West acknowledged that making the decision to ignite might take a longer period of time than 15 minutes but would occur before any sour gas reached surface. West identified that senior West personnel were charged with the responsibility of igniting a release and qualified that decisions to ignite were made in consultation with the EUB.

West acknowledged concerns raised by area residents that there was a disparity between current shelter-in-place guidelines released in May 2006 and those provided during the original notification. West stated that since the distribution of the resident information packages in October 2004 and November 2005, the Canadian Association of Petroleum Producers (CAPP) recommended guidelines had been revised. West committed to providing comprehensive, updated shelter-in-place instructions to all residents within the EPZ as part of its renotification process. West pointed out that in addition to the shelter-in-place guidelines provided, during an emergency residents would be contacted individually and provided with verbal sheltering instructions.

West stated that it understood the concerns of the residents regarding the effectiveness of the ERP and referred to the full-scale ERP exercise held on August 5, 2005, which tested the ERP of one of its critical wells in the Lodgepole area. The exercise was conducted using a drilling and completions scenario and had some of the residents in that EPZ in attendance as observers. That exercise did not include any public notification or evacuation but did include deployment of rovers and roadblocks and the involvement of various government agencies. West contended that the success of the 2005 exercise proved that it was capable of effectively implementing its ERP.

West indicated that if the wells proved viable, they would need to be tied in via a pipeline to be put into production. West acknowledged that the RRCC raised concerns about a production facility ERP. However, West gave assurance that a production facility ERP would be created if

the wells went on production and that it would complete the same consultation and review process it did for the wells' ERP.

West stated that based on current information, it believed the EPZ of the pipeline would be about 800 m on either side of the pipeline.

7.2.2 Views of the RRCC

Among the issues raised regarding the West application were concerns about the site-specific ERP. Specifically, members of the RRCC expressed concerns about the notification procedures associated with the ERP.

The RRCC argued that most residents had only one phone line, which was used for both telephone and Internet service. Therefore, phone lines could be tied up, which would make telephone communication difficult when attempting to notify residents of an emergency. The RRCC also questioned how notification and evacuation would be handled with residents within the EPZ whose first language was not English.

The RRCC identified discrepancies between the shelter-in-place instructions provided during the initial notification and the current industry-accepted shelter-in-place guidelines. The RRCC stated that this discrepancy was a source of confusion and worry and could lead to incorrect procedures being followed, which would impact safety.

In addition to the contradictory information provided during notification, the RRCC stated that the lands within the EPZ and surrounding areas experienced poor cell phone coverage. This lack of consistent and reliable cell coverage would make notification during an emergency unreliable.

The RRCC also expressed concerns about the existing and proposed egress routes identified by West. Some members of the RRCC stated that if there were only one egress route out of the EPZ, residents might have no choice but to drive through a release when notified to evacuate the EPZ. The RRCC acknowledged that there was an alternative existing egress route east through the river valley that could be used; however, it stated that this route was on private land, was not maintained by the County, and was, at times, gated, making egress ability inconsistent.

The RRCC acknowledged West's intention to build a secondary egress route, but the RRCC stated that it was still concerned, as area topographical features and local weather might make both egress routes dangerous at times. Residents expressed concern that the second proposed egress route would be partially built within the river valley where H_2S would settle, therefore making it unsafe to drive through the low areas. The RRCC identified the effect that local weather conditions could have on egress routes. It stated that in the winter storms could make local roads impassable, and if drilling occurred during winter, residents might be unable to exit during an emergency.

Certification and training of West responders were cited as an additional source of concern. Many members doubted that West's responders would be properly trained to assist with potential medical emergencies encountered during evacuation or would have the ability to conduct search and rescue operations in the event that residents were in the river valley, ravine, or other outdoor areas. The RRCC questioned whether the rover teams would have the appropriate capabilities to safely transport small children and infants. The RRCC also questioned whether the rover

vehicles would be wheelchair accessible and, if not, whether any alternative evacuation methods were in place for people with limited mobility. The RRCC also contended that the training and certification of helicopter rovers were uncertain, as West did not provide any clarification in this regard, nor was any detail provided for any contingency plans in the event that helicopter traffic was grounded.

The RRCC expressed confusion about the criteria West was to use for ignition. Its concern revolved around West's statement that the ignition would occur within 15 minutes of making the decision to ignite. Specifically, the RRCC was concerned about how long West might take to make the decision. It was the RRCC's position that the actual decision to ignite sour gas could take hours, and during that time its members' safety would be in jeopardy.

Many members of the RRCC questioned the effectiveness of West's procedures to isolate the EPZ at a level-2 emergency. Concerns were expressed about isolation procedures along the North Saskatchewan River, which traverses the EPZ. They doubted the effectiveness of river roadblock crews located on the shoreline to stop river traffic prior to entering the EPZ. The RRCC stated that given the speed at which some river traffic travelled, loud hailers, flashing beacons, and stop signs would not be enough to notify river users of a potential hazard and would not deter river users from entering the EPZ. The RRCC also commented on the number of authorized and unauthorized boat launches in the EPZ and questioned West's capability and available manpower to monitor them.

The RRCC felt that the shelter-in-place component of the ERP was inadequate and inconsistent. It stated that West used an out-of-date CAPP shelter-in-place guideline and noted the caveat or disclaimer stating that the procedures were not a guarantee. The RRCC contended that given the disclaimer attached to the shelter-in-place guidelines, the procedures were not as reliable as West had stated. The RRCC also contended that sheltering in place would not be effective, as some residents lived in older homes that were not air tight enough to ensure that H_2S or SO_2 did not enter their homes. As such, it was the RRCC's position that sheltering was not a suitable method for public protection.

The RRCC stated that some members operated home businesses and felt that the proposed wells and the related EPZs would interfere with their ability to continue operating these businesses. They felt that clients would not be as willing to frequent these businesses because they were in the EPZ. The RRCC contended that this loss of income would directly impact their livelihood.

The RRCC questioned West's capability to implement the ERP. It acknowledged that West held an ERP exercise in 2005, but felt that the exercise was not applicable to the applied-for ERP as it was not spontaneous, did not include members of the RRCC, and was not conducted in an area topographically similar to the area in this EPZ.

The RRCC mentioned that the ERP only pertained to the drilling and completion operations of the wells. It stated that production operations were also of concern and felt that a production ERP should have been provided. Without the production ERP, the RRCC stated that it had incomplete information regarding the entire life of the project.

Given the above, the RRCC maintained that the applications should be denied, since it believed that the ERP was incomplete and did not adequately guarantee its members' safety.

7.2.3 Views of Brazeau County

Brazeau County expressed concerns regarding public safety and West's ability to implement the ERP. Specifically, the County was concerned about the large amounts of recreational land use within the vicinity of the proposed wells and the potential for large numbers of recreational users and transients that could be present in the EPZ during an emergency.

Accordingly, Brazeau County questioned whether West would be able to evacuate the entire EPZ in the event of an emergency.

The County was also concerned that it did not have sufficient resources to fulfill the responsibilities outlined in West's ERP. Specifically, Brazeau County expressed concern about West's potential reliance on the County's participation in emergency management in the areas outside of the EPZ, namely the emergency awareness zone (EAZ). Although Brazeau County acknowledged that it had a responsibility under the *Municipal Government Act* to ensure the safety of its citizens, it stated that it currently did not have a specific ERP in place for H_2S or other toxic gas emergencies. As such, responding to such an incident would be difficult with the resources that the County had available. Brazeau County also noted that not all of its potential responders were trained and certified to deal with H_2S emergencies.

The County stated that a well site location in Section 35 would improve the egress routes available to the residents within the EPZ. It said that due to prevailing winds, egress would be safer if the wells were located south of Range Road 72.

Brazeau County also reiterated the concerns expressed by the RRCC pertaining to training levels of the responders. The County took the position that poorly trained emergency responders employed by West would directly impact the health and safety of its constituents.

7.2.4 Views of the Board

Directive 071 states that an ERP must

- be well organized to ensure quick access to critical information;
- coordinate activities among industry responders, emergency services, local authorities, governments, and others that have a role in providing an effective response;
- ensure communication with all parties involved in or potentially affected by the emergency;
- assist personnel in determining and performing remedial actions;
- establish clear roles and responsibilities of responders;
- identify response organizations and command control structures;
- identify predetermined resources, required personnel, equipment, and services; and
- increase public confidence in the ability of industry to handle emergencies.

In keeping with *Directive 071*, West developed a site-specific ERP for the proposed locations. The Board is of the view that the features of the ERP meet the minimum requirements in *Directive 071* and provide for safety of the public. However, based on the evidence and

submissions and given the circumstances of these applications, the Board finds that additional safety requirements should be undertaken with regard to these applications to enhance public safety and to address concerns. The Board will consider the circumstances of these applications in relation to the following two main factors:

- the closeness of the wells to multiple residences, and
- the specific circumstances of the area as described below.

The Board notes and recognizes the concerns of the interveners regarding perceived shortcomings of the ERP as a result of poor communications and incomplete responses by West.

As a result of the changing circumstances and of new residents moving into the area, the Board considers that the ERP must be updated. In the Board's view, the hearing has clearly identified the need for more extensive information exchange between the parties and that West must learn more about the specific concerns of individuals with respect to emergency planning. For example, the residents need to better understand how the plan will be effectively implemented to meet their safety concerns.

Therefore, the Board will require West to modify its ERP, undergo an EUB assessment, and conduct a more comprehensive exercise of the plan than the one conducted by West in 2005 to the satisfaction of EUB staff, as discussed in this decision. The Board believes the goals of the plan, the assessment, and the exercise should be to ensure that the ERP is comprehensive and operationally effective. The Board has determined that EUB staff, in their sole discretion, will determine whether West has satisfactorily met the Board's requirements for these applications.

In the following sections, the Board will address specific points of the ERP as follows:

- updating the existing ERP
- testing the ERP

7.2.4.1 Updating the Existing ERP

The Board notes that a significant amount of time has lapsed since the initial consultation for and development of the ERP and the commencement of the hearing. This time lapse has enabled changes to the structures and components within the EPZ to occur, as well as allowed resident concerns to grow. Interveners also raised many relevant concerns that the Board wishes to have addressed in a thoughtful manner.

As such, the Board believes the existing plan must be updated to deal with the specific concerns of the interveners and of the Board, including

- effective methods to contact the residents and the public due to
  - poor cell phone coverage,
  - telephone availability due to Internet usage,
  - unique topographic features, such as the deep ravine, and
  - public usage of the area on recreational vehicles, such as quads or river boats;
- clear procedures and information regarding
  - sheltering: when to use it and when it is not appropriate,

- individuals and families unwilling to relocate and
- transportation routes through the area having regard for residents' concerns; and

- incorporating surface improvements:
- the addition of a new egress road.

In addition, the Board is concerned about the effectiveness of West's plan to place a notice on the front door of a residence if the residents were not contacted personally. This approach may not be effective in individual circumstances for a variety of practical reasons. Accordingly, the Board expects West to gather information from each household as to the preferred placement of emergency notices on their property or home in the event they are not contacted personally.

West needs to clearly communicate about the potential risks with any residents who indicate they are unwilling to voluntarily relocate during critical operations. West should identify any such residents as "special needs individuals" for purposes of its updated ERP.

With respect to expenses for those residents who are eligible for voluntary relocation assistance, the Board also notes some inconsistency between the amount of time allowed for relocation in West's documents and the reality of time that West may be in the critical zone. The Board expects that West will update its materials to be consistent and to ensure that relocation expenses are appropriate for the circumstances of the family, are in keeping with residents' normal standards, and respect the inconvenience associated with the relocation.

Accordingly, the Board will condition its approval to require that the ERP be updated to address effective methods to contact the residents and the public in light of telephone availability, notification if personal contact was not achieved, unique topographic features such as a deep ravine, the public's recreational use of the area, relocation expenses, and clear procedures on sheltering and transportation routes. The updated ERP must be submitted for review and deemed technically complete by EUB staff prior to the licences being issued.

The Board notes that *Directive 071* ignition requirements are designed to be applicable in all circumstances across the province. In this instance, given the close proximity of residences to these wells, the Board will require immediate ignition of any uncontrolled or partially controlled release as soon as all personnel working at the site have been cleared to a safe distance. Therefore, the Board requires West to take immediate steps to prepare for ignition at the earliest signs of a well control problem.

The Board will condition its approval to require the following further specific changes to the ERP:

- West must employ an additional rover dedicated to the ravine area.
- West must employ a dedicated ignition team on site during critical operations.
- West must implement immediate ignition criteria of an uncontrolled or partially controlled release of gas to surface as soon as all personnel at the site have been cleared to a safe distance.

West must submit its ERP to EUB staff for review prior to the licences being issued. EUB staff, in their sole discretion, will determine if the ERP is technically complete. If EUB staff deem it to be technically complete, the licences will be subsequently issued.

The Board notes that West has identified a slightly sour uphole zone in the proposed wells. The Board reminds West of its responsibility to notify all residents within the EPZ prior to entering the first sour zone, as well as its obligations for the critical zone. The Board was not clear that West had identified this requirement in its planning and documentation. The Board expects that West will update its ERP as necessary.

With respect to the new egress road that West committed to build, the Board will condition its approval to require the egress road to be constructed prior to commencement of drilling of the first well.

After construction of the road, the Board requires West to submit a supplement to the ERP that includes the details of the egress road. EUB staff will review the supplement in order to assess whether it is technically complete.

The Board notes that drilling may only commence upon EUB staff confirmation that the ERP, including the supplement, is approved.

Further, the Board will condition its approval so that West may not proceed to enter the critical zone until the assessment and comprehensive testing of the ERP, as discussed below, are conducted and the necessary approvals are received from EUB staff.

The Board will now address the testing of the ERP requirements.

7.2.4.2 Testing the ERP

The Board has heard the numerous concerns expressed by the citizens of the RRCC and of Brazeau County pertaining to the ERP and acknowledges that both parties share a lack of certainty about the effectiveness and ability to implement the ERP.

Therefore, the Board requires that West undergo an assessment of the ERP prior to entering the critical sour zone. This assessment, conducted by EUB staff, will test the key responders' knowledge and familiarity with the ERP. Further, West must implement items of improvement found through the assessment into the subsequent EUB-directed exercise to be conducted prior to entering the critical sour zone.

The EUB assessment will be conducted and the exercise will be designed in such a way as to ensure the ERP will effectively deal with the unique issues and concerns raised by the residents.

In the event that West will use different staff to fill key responder roles than those who were used during the exercise, the Board directs West to notify EUB staff prior to entering the critical sour zone. This notification applies to both the first and the second well The Board directs West not to proceed to enter the critical zone of either well until West receives approval from EUB staff. EUB staff, at their sole discretion, will determine if another exercise and assessment will need to be conducted.

Accordingly, the Board will condition its approvals so that West must successfully conduct a comprehensive ERP exercise to the satisfaction of EUB staff prior to entering the critical zone of the first well. West will only have two attempts to achieve a successful comprehensive ERP exercise. Further, the Board will condition its approval so that West may not enter the critical zone of the second well until it receives EUB staff approval that the exercise results remain valid for the second well.

During its deliberation, the Board considered two main options for the timing of both the assessment and the exercise,

- conducting the testing prior to licensing, or
- conducting the testing prior to entering the critical sour zone.

The Board gave significant consideration to directing West to conduct an exercise prior to licensing of the wells. However, for an exercise to be effective, the exercise must test all the integral components of the ERP, including all response personnel, backup safety equipment, and communication features. The Board considered that these components may not be in place until drilling has commenced and the secondary ignition system is brought onto location. Given the length of time to develop and submit the exercise plan to the EUB for review and approval, the Board encourages West to begin planning of its exercise as soon as possible after the issuance of this decision.

Consequently, for the effective testing of all features in the ERP, the Board has decided that directing West to hold an exercise prior to critical sour operations will provide the most realistic scenario in which to effectively test the ERP. It would also allow for the most rigorous and thorough testing of the ERP. Further, the Board would have more confidence that any lessons learned would be retained most completely as the exercise would be close to any potential real-life situations.

The exercise, in addition to the normal components of an exercise outlined in EUB *Directive 071*, must include the improvement items listed in the earlier section. The components of the exercise, including the proposed exercise's scope, objectives, scenario, means, and measures for success, must be developed by West in consultation with the RRCC and Brazeau County and submitted to the EUB for review and approval prior to execution of the exercise.

In addition to the measures listed above, the Board believes the exercise must include

- measures for evaluating the capabilities of the rovers to fulfill their responsibilities and whether the number of rovers is sufficient—this would include the simulation of cases where contact could not be established, such as searching the area and the ravine and monitoring and alerting the public who may be using the river;
- deployment of specialized staff and equipment;
- specific concerns expressed by the intervening parties, such as, but not limited to, evacuating children who require car seats, addressing household pet evacuation, and other evacuation issues, such as elderly people and those who may have language concerns;
- establishment of the communication network and procedures;

- appropriate involvement of local, municipal, provincial, and emergency services;
- utilization of neutral persons as proxies for residents to simulate a variety of normal circumstances, including residents in the ravine;
- elements of the specific scenario to be tested that are unknown to the emergency responders to simulate real-life potential situations; and
- travel times for rovers to residences.

The Board expects the exercise be as complete as possible but not designed so as to require the active participation of residents. However, the Board does require that a limited number of RRCC representatives be invited to witness the exercise.

The Board directs West to invite EUB staff from the Drayton Valley Field Centre and EUB Emergency Planning and Assessment to witness and evaluate the exercise. The Board has determined that EUB staff will have the sole authority to determine whether or not the components of the assessment and of the exercise are acceptable to adequately test the ERP. Further, EUB staff will have the sole discretion to decide whether or not the actual exercise is considered acceptable.

A post-exercise report must be submitted to the EUB by West, in accordance with Section 4.14 of *Directive 071*. The report must include the verified response times for the all service contractors employed by West in a response capacity, in addition to the information required in *Directive 071*.

If EUB staff consider that the initial exercise is unsatisfactory, the Board has determined that West will have one further opportunity to conduct another comprehensive ERP exercise. The Board has determined that EUB staff will have the sole discretion to determine if the exercise components are satisfactory to proceed to the second testing of the ERP.

If the second ERP exercise is necessary for the first well and is judged unsatisfactory by EUB staff, the Board will condition its approval that the well licences be suspended, without prejudice, in accordance with all applicable EUB requirements. If the well licences are suspended, the Board will enforce all applicable suspension requirements and require all necessary remedial actions to be implemented. Subject to the rights of West or another party to make a submission to lift the suspension, the Board may, at some point, require the abandonment of the well.

The Board directs West not to proceed to enter the critical zone until Board staff have given their approval to do so, as discussed above.

7.2.4.3 Other Matters

The Board notes that West's views of a "major" exercise and the residents' views did not match. This panel of the Board considers that the terminology of "major" in *Directive 071* has the potential for confusion and misunderstanding. Therefore, the panel will review this issue with the full Board and ask staff to determine if revised terminology in *Directive 071* would be appropriate.

The Board notes and understands Brazeau County's concerns that the County does not have a response plan specific to sour gas and as such does not have the resources to fully support sour gas emergency response activities. However, the Board does note that under the *Municipal Government Act*, all local authorities are required to have a municipal emergency plan. In the event that the local authority does not have support capabilities, the Board requires that the company address such situations within its ERP. Further, the Board notes that in the unlikely situation of an incident extending beyond the established EPZ, the applicant is required to work in conjunction with the local authority to provide full response actions commensurate with the identified hazards. The Board also encourages Brazeau County to continue its dialogue with Emergency Management Alberta to assist with improvement of the County's response to toxic gaseous releases.

The Board notes that Brazeau County stated that there was a need to identify the level of resources and responses available to all parties in the area in the event of an emergency. Since ERP coordination efforts are currently being investigated by a Board-sponsored committee, following *Decision 2006-087*: *Dominion Exploration Canada Ltd. Applications for Well Licences, Pembina Field,* September 5, 2006, the Board considers that the matter identified by Brazeau County should be addressed in this process. This panel further supports the ongoing work of this committee.

7.2.4.4 Summary

Given the number of requirements that the Board is directing West to meet in the above section, the Board summarizes the expected actions (by both West and EUB staff) to be followed. The Board encourages West to engage EUB staff in its initial planning stages regarding the timing and sequence of the events listed below.

- West updates its ERP and submits it to EUB staff.
- EUB staff review the ERP and determine if it is technically complete.
- Once the ERP is deemed technically complete, well licences are issued.
- An egress road is constructed prior to commencement of drilling of the first well.
- West provides a supplemental ERP with egress road details to the Board for review in order to deem it technically complete.
- West prepares exercise documents in accordance with *Directive 071* and this decision's requirements detailed above, and the proposal is submitted to EUB staff.
- EUB staff review the exercise documents to determine if the exercise will be appropriate and effective.
- Drilling may only commence upon EUB staff confirmation that the ERP (including the ERP supplement) is approved.
- Prior to entering the critical zone, EUB staff conduct an assessment and communicate feedback to West for incorporation into its exercise development.
- The exercise is conducted, and EUB feedback is communicated to West.

- If the exercise is deemed successful by EUB staff, West incorporates any applicable enhancement items resulting from the assessment and exercise into its ERP and submits a further supplement to the ERP to EUB staff for review and approval.
- If the exercise is not deemed acceptable by EUB staff, West must develop another scenario and submit it to the EUB for review. Once the second scenario is found to be acceptable by EUB staff, a second exercise is held.
- If the second attempt at the exercise is deemed successful by EUB staff, West proceeds with critical sour operations. If the second exercise is deemed by the EUB to be not acceptable, the well licences are suspended, in accordance with all applicable EUB regulations surrounding well suspensions.

To account for all the requirements laid out in this section, the Board has created a list of conditions that West must complete. The Board directs readers to Appendix 2 for a list of ERP-related conditions.

8 HUMAN AND LIVESTOCK HEALTH

8.1 Views of the Applicant

Dr. Davies on behalf of West explained that he used the Alberta Ambient Air Quality Objectives (AAAQO), which state a person can tolerate 450 micrograms per cubic metre ($\mu g/m^3$) of SO_2 without risk of health impacts at that particular concentration over a one-hour average. He reviewed RWDI's SO_2 dispersion modelling for the well test flaring scenario and noted that at the maximum point of impingement (MPOI), the SO_2 concentration would only be 260 $\mu g/m^3$, well below the AAAQO. Dr. Booker, on behalf of West, concluded that there would be no adverse health impacts on livestock or humans associated with the flow test, as the highest SO_2 concentration would be at the MPOI.

Dr. Davies also reviewed Dr. Kilburn's work, the human health expert for the RRCC. Dr. Davies expressed a multitude of concerns about Dr. Kilburn's work. Dr. Davies emphasized that Dr. Kilburn's studies lacked information on what chemicals his subjects were exposed to and in what amounts. Dr. Davies further explained that often his subjects were involved in class action lawsuits, resulting in a large amount of recall and subject bias. In addition, Dr. Davies believed that Dr. Kilburn had no basis for relating H_2S exposure to neurological effects when his subjects were exposed to a number of different chemicals at unknown exposure levels. He further explained that these views on Dr. Kilburn's studies were echoed throughout the scientific community.

When asked about the health effects of components of sour gas other than H_2S, Dr. Davies believed that from a toxicological perspective, the other components were of little significance either because they were inert or in such trace amounts that the opportunity for exposure was very limited. In other words, Dr. Davies stated that that H_2S would dominate.

Dr. Booker stated that there were very few published reports and virtually no substantiated evidence of acute exposure or chronic long-term effects on livestock resulting from exposure to SO_2. He explained that available scientific literature supported the conclusion that long-term health effects on livestock were unlikely as a result of acute exposure to sour gas constituents or

combustion products at the levels predicted by RWDI. He argued that epidemiological studies completed in the last decade strongly suggested that there was no association between chronic exposures to sour gas emissions and measures of reproductive health in cattle. However, Dr. Booker did cite the WISSA study that found an association with higher levels of SO_2 concentrations and calf mortality in the last trimester and in the first three months of life. Dr. Davies also completed a human health assessment that dealt with the flare emissions associated with the proposed eight-hour flare test. He explained that he only assessed a planned event because it was the most likely to occur if the wells were successful. However, he believed that an assessment of an uncontrolled release would result in the same conclusions.

8.2 Views of the RRCC

A number of individuals within the RRCC described existing health concerns that they believed would be exacerbated by the proposed wells. They recalled past incidents, such as the Amoco blowouts, when they experienced headaches and nausea.

The RRCC stated that the proposed flaring generated a number of its health concerns. However, the stress and anxiety of wondering what impact the wells would have in the long term also gave its members concern for their health.

It explained that it was aware that H_2S was a deadly toxin. It also expressed concerns about the short- and long-term impacts of H_2S odours, as well as of SO_2 emissions from flaring, on their health. From various articles, the RRCC understood that flaring would also affect the soil and water quality, leading to further health concerns. The RRCC explained that flaring of H_2S had the possibility of emitting 185 different chemicals and that sour petroleum had 250 different chemicals associated with it. They questioned how all those chemicals would affect their health.

The RRCC hired a toxicology expert, Dr. Kilburn, to further represent its health concerns. Dr. Kilburn stated that his studies depended on people being exposed to H_2S during an accident. He said it was unethical to purposely expose people to toxins, and therefore his studies often did not have exposure levels associated with them.

Dr. Kilburn cited a number of studies, including of the impacts on a residential area of H_2S vapours from sewage ponds and the health effects of a refinery fire. He used a number of different physiological techniques to determine the impacts of exposure to H_2S.

Dr. Kilburn stated that H_2S exposure had been associated with extreme fatigue, memory loss, permanent loss of smell, partial vision loss, abnormal balance, and pulmonary impacts. He argued that there could be health effects at H_2S levels as low as 1 to 5 parts per million. Regarding animal health, the RRCC understood that the livestock agreement was triggered by air monitor readings and questioned where the air monitors would be placed so that accurate readings could be taken in case of an incident. It argued that the fundamental problem with the Livestock Compensation Protocol was that it was difficult to determine who was at fault for the death or injury of an animal and that it was even more difficult to agree on a value. While the value of cattle was easier to estimate, Mr. Schmidt submitted that the value of horses was very difficult to estimate. He also noted that only the owners of the livestock could claim under the protocol. He feared that he would not be able to claim for his boarded horses in the event of an incident that resulted in his clients demanding payment from him.

The RRCC also hired an expert on animal health issues. Dr. Coppock stated that sour petroleum was a complex mixture of chemicals that included acute and chronic toxicity and the interaction of these chemicals might have long-term residual effects. He emphasized that the most conservative approach was assuming that the toxicology of sour gas was greater than the toxicology of H_2S alone. However, Dr. Coppock noted that West did not provide the anticipated chemical composition of the proposed wells, so he could not speak specifically about the chemicals that would be found in the proposed wells.

8.3 Views of Brazeau County

Brazeau County did not state any specific concerns regarding human and livestock health.

8.4 Views of the Board

The Board recognizes that studies may have many compounding factors that may have contributed to the health impacts on humans. While the Board agrees that there may be a multitude of other compounds in sour petroleum and flares, the Board believes that Dr. Davies's statement is reasonable that the impact of these multiple compounds would be overshadowed by the impact of SO_2 and H_2S. In particular, the Board views that properly designed well test flare systems consistent with EUB *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting* will have relatively high combustion efficiency and likely much lower levels of products of incomplete combustion than assumed in Dr. Davies's evaluation.

The Board also believes that it is important that experts rely on studies that use accepted scientific methods. The Board notes that Dr. Davies reviewed studies that used such a method and concluded that the results of these studies are more accurate than the information provided by Dr. Kilburn, when some of the studies he provided did not use the universally accepted scientific method.

The Board is not suggesting that there are no health impacts as a result of H_2S and SO_2 exposure. However, based on the available accepted research, the Board believes that the negative effects seen in some studies cannot be confidently isolated as an effect of H_2S or SO_2 exposure.

Furthermore, regarding Dr. Kilburn's evidence, the Board believes that much of the information provided was not substantiated by credible scientific evidence. The Board is concerned that Dr. Kilburn's argument was at times inflammatory and unnecessarily instilled concerns in the RRCC.

Overall, the Board is confident that the measures that West will have in place, including the ERP, blowout prevention, and flaring efficiencies, will minimize the exposure of persons to H_2S and SO_2 in such a manner that negative health effects should not occur.

Regarding animal health, the Board notes that there were some similarities in the arguments of West and the RRCC on calf mortality. However, the Board believes that the measures that West has in place, including blowout prevention and flaring efficiencies, will minimize the exposure of livestock to H_2S and SO_2 in such a manner that livestock health effects should be minimized.

The Board acknowledges that West has attempted to implement a Livestock Compensation Protocol developed with the Pembina Agricultural Protection Association. The Board is

concerned that the protocol does not address a number of intervener concerns, including the application to third-party-owned animals, the determination of the value of the animal, and the ability to measure the H_2S concentration at the site where a loss may have occurred. The Board suggests that the Livestock Compensation Protocol should be revisited to address these concerns.

The Board encourages parties to work effectively together to resolve these outstanding items prior to entering into agreements.

9 PROPERTY VALUES

9.1 Views of the Applicant

West asserted that it did not believe the proposed wells would have any impact on land value and that land value concerns were a matter of compensation. It further argued that the RRCC's land value expert did not complete any site-specific analysis upon which to base his conclusion that the proposed development would have a negative impact on land value.

9.2 Views of the RRCC

The RRCC stated it had concerns about impacts on property values. It questioned who would pay for the depreciation of its members' lands.

The RRCC hired an expert, Mr. Brian Gettel, whose expertise was quantifying damages to real estate arising from some form of external nuisance. He explained that buyers took into consideration a number of factors when purchasing real estate. He described the tangible concerns arising from proximity to sour gas development as odour, traffic, and noise. Some intangible concerns included the perception of sour gas and its effects. He emphasized that as buyers became more knowledgeable about the potential impacts of H_2S, they became more discriminating.

Mr. Gettel explained that the value of one property was driven by the ability to substitute that property for another one. He purported that if a buyer were presented with two identical properties with the exception that one had a sour facility on it, the buyer would almost always choose the property that had not been impacted.

Mr. Gettel admitted that currently there was a very strong market in Alberta. He acknowledged that during this time the effects of sour gas development were greatly reduced. However, he stated there were still problems, such as extended sales periods. He offered that when looking at the impacts of sour gas development on property values, one must look at the impact in a weak market, as this was where the most impact would occur.

Mr. Gettel concluded that the proposed wells would have a negative impact on property values in the range of 5 to 10 per cent.

9.3 Views of Brazeau County

Brazeau County did not identify any specific concerns regarding development and land value.

9.4 Views of the Board

Based on the evidence presented by the witnesses for the RRCC, the Board is not convinced that property values in the area will necessarily decrease by 10 per cent if the project is approved. To the contrary, the supplemental evidence requested by the Board from Mr. Gettel shows that property values have increased in the Hamlet of Rocky Rapids and the surrounding area for the past several years.

In weighing the evidence, the Board believes that any impact on property values resulting from the project being approved would be minimal, based on strong property markets in the province.

10 ENVIRONMENTAL IMPACTS

10.1 Views of the Applicant

West stated that it would commit to eight hours of flaring for cleanup and testing. If more time was needed, West explained that it would consult with the public and explain its reasons for requiring additional flaring. West hoped that area residents would agree to the request, as more testing could lead to the conclusion that the wells were not economically viable. West stated that the flare permit would be applied for at 229 hours so it would not have to obtain another approval from the EUB if West required more time to flare.

West also discussed the methods used to control odours and fugitive emissions. West explained that during testing the testers used a pressurized tank, the gas was flared off with a combination of propane, in accordance with the flare permit, and the hydrocarbon liquid was transported off site by a pressurized tank truck for disposal. West assured that each pressurized truck was physically inspected at potential release points before the vehicle moved off location.

Regarding noise concerns, West explained that the most noise came from the rig floor engines, elevators, and pumps, mostly as a result of tripping. Therefore, West said it would try to not trip at night to minimize disruption.

West ensured that any personnel entering or exiting the lease site would be instructed to not use their engine retarders. In addition, West committed to putting up speed limit signs requiring personnel to abide by a speed limit that would be less than the County or government speed limit.

West stated that the surface casing would be set below the depth of groundwater and that there would be cement returns to surface, ensuring full cementing of casing. West also provided for water well testing up to 800 m from the proposed wells for quantity and quality.

10.2 Views of the RRCC

The RRCC expressed concerns about flaring operations for a number of reasons. Some members requested testing of their soils and water before and after drilling and annually for each year the wells were on production because they believed the deposition of the flared products would cause adverse impacts. The RRCC also questioned the wording of West’s commitment to limit the flaring to eight hours. Originally West stated that it would seek permission from the

community to flare longer if needed, but the RRCC noted that the written commitment stated that West would meet with the community to discuss the need for further flaring and determine scheduling. To the RRCC, this appeared to be a notification rather than a genuine attempt to seek consent.

The RRCC argued that West's policy to test water wells within 800 m for quality and quantity was not sufficient as there were a number of residences with water wells outside of this radius. It also indicated there were a number of springs in the area that must be protected. The RRCC stated that it was not satisfied with West setting surface casing below the base of groundwater protection. They explained that without a cement bond log, there were no guarantees that the casing would be properly cemented to surface.

The RRCC also described its concerns about odour from flaring and general operations. Based on recent failures by industry to determine the source of odours, the RRCC doubted that the source of an odour could be found and resolved.

Noise was also identified as a concern by the RRCC. It explained that noise during drilling, building facilities, flaring, pipeline construction, and traffic were all points of concern. It acknowledged that West indicated the noise would be short term, but the RRCC argued that noise did not stop at drilling and that, nonetheless, it did not consider three months of drilling to be short term. Mr. Schmidt specifically stated that unpredictable noise was unsafe while training horses, as they might be spooked and cause injuries to themselves, Mr. Schmidt, or others. The RRCC questioned whether West would even respond and attempt to mitigate a noise concern if an area resident called to make a complaint. The RRCC also stated that its members would be sleep deprived throughout the drilling operation, which would negatively impact their ability to function on a daily basis and could lead to health problems.

Regarding truck traffic, the RRCC requested that if the wells were approved, traffic be limited to daytime hours and avoid increasing traffic in the area when school buses were on the road.

Lastly, most of the RRCC members requested that a chain-link fence be placed around the well site and locked at all times to prevent vandalism and ensure the safety of children playing in the area.

10.3 Views of Brazeau County

Brazeau County agreed that a chain-link fence around the well site was necessary to prevent vandalism and ensure public safety. Brazeau County also emphasized that it believed West should complete a cement bond log to ensure that casing was cemented full length.

10.4 Views of the Board

The EUB has strict flaring requirements, as detailed in *Directive 060*, and believes that any impacts due to flaring will be reduced by these requirements. The directive not only requires that flaring operations be conducted and fugitive emissions be controlled so that Alberta Ambient Air Quality Objectives are complied with but also includes requirements aimed at reducing contaminants associated with poor flare efficiency. This directive also sets out the EUB requirements for flare permits for well cleanup and testing.

The Board found West's submission on the amount of flaring to be confusing. The Board found it difficult to understand whether West was making a commitment to limit flaring or was suggesting a best efforts approach.

The duration that a flare permit is valid does not necessarily mean that flaring will occur continuously during that period. EUB flare permits do stipulate the maximum total flare volume, flaring rate, and sulphur emissions, which places limits on the total amount of flaring that can occur under the permit. The Board notes that West referred to eight hours of flaring; however, EUB flare permits do not specify hours but rather maximum volumes and an expiry date.

West explained that additional time beyond eight hours might be required if the well is not as productive as expected. In this case, West might want to have more flaring time in order to make a decision to not drill the second well.

Accordingly, the Board has decided to treat West's proposal as a commitment by West to limit active flaring to not more than eight hours for the purposes of cleanup and testing of the wells in normal circumstances. Further, the Board will treat West's proposal as a commitment to consult with residents if further flaring beyond eight hours is required.

In the event that West determines that additional flaring is needed and is able to gain residents agreement for additional flaring beyond eight hours, no further action is required from West as long as it is in compliance with any flare permit issued. If, however, West is not able to gain the residents' agreement for additional flaring beyond eight hours, West must request direction from EUB staff. West must include a summary of its consultation with residents and note outstanding concerns of residents in its communication to EUB staff. The EUB staff, in their sole discretion, will decide whether an extension to the eight-hour flaring limit should be granted.

Accordingly, the Board will condition its approval so that if West is not able to gain residents' agreement for additional flaring beyond the eight hours, West must receive EUB staff approval for an extension beyond the eight-hour flaring commitment made by West.

The EUB has requirements in place to prevent the spread of fugitive emissions off lease and to prevent H_2S emissions that would result in off-lease odours. However, in the event that an odour is detected, the Board encourages the RRCC and the general public to contact West or the EUB Drayton Valley Field Centre. Appropriate actions will then be taken to try and determine to source of the odour and mitigate the concerns as quickly as possible.

The Board has considered West's proposed actions to protect groundwater and test water wells. The Board believes the 800 m radius is sufficient to detect any potential effects on water wells. The Board does not normally require cement bond or noise logs to be completed on surface hole unless problems are detected or there are no cement returns.

However, given the natural springs in the area and the amount of concern from the public, the Board will condition its approval to require West to run a log on the surface casing on each well to evaluate the quality of the cement bond in both wells.

Regarding noise, the Board expects West to communicate with the closest residences, especially the Schmidts, to determine the impact noise may have on their operations and possible timing

and mitigation measures. The Board expects West to implement measures to reduce noise levels during drilling operations and to effectively respond to and deal with noise concerns.

In the event of an unsatisfactory situation regarding noise or any other matter, the public is encouraged the contact West or the EUB Drayton Valley Field Centre, and appropriate actions will be taken to try to mitigate the noise.

The Board acknowledges the inherent safety concerns with increased traffic during times of construction, drilling, and completions. The Board is satisfied with the steps that will be taken by West to mitigate this impact. Furthermore, the Board requests that West consider the requests of the RRCC to limit traffic to daytime hours and avoid increased traffic during times when school buses are on the road.

Lastly, the Board suggests that West and the landowner of the proposed well site discuss potential solutions to address trespass, vandalism, and safety issues of nearby concerned residents. This potential solution could include fencing, if appropriate, of the lease site.

11 CONCLUSIONS

Therefore, having carefully considered all of the evidence and submissions, the Board determines that the wells are in the public interest and hereby approves Applications No. 1451106 and 1459453 subject to the conditions listed in Appendix 2 and detailed within the report.

Dated in Calgary, Alberta, on August 8, 2007.

ALBERTA ENERGY AND UTILITIES BOARD

<Original signed by>

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

<Original signed by>

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

<Original signed by>

J. G. Gilmour, LLB
Acting Board Member

APPENDIX 1 HEARING PARTICIPANTS

Principals and Representatives (Abbreviations used in report)	Witnesses
West Energy Ltd. (West) D. A. Holgate D. Langen	K. McCagherty, P.Eng., of West J. M. Lane, P.Eng. of West C. J. Bennett, of West J. C. McPhee, of NBC Technologies Inc. S. B. Schinnour, of Behr Energy Services Ltd. H. J. Rindfliesch, of Behr Energy Services Ltd. D. S. Chadder, QEP, of RWDI Air Inc. D. B. Davies, Ph.D., of CANTOX Environmental Inc. C. W. Booker, D.V.M., of Feedlot Health Management Services
Rocky Rapids Concerns Citizens (the RRCC) J. J. Klimek D. Bishop	G. Mastre S. Cunningham R. J. Kiehlbauch D. Kisser C. Dusterhoff and S. Dusterhoff D. Schmidt and D. Schmidt R. Mulligan S. Kelly L. Duperron L. McGinn T. Dingwall R. Domke E. Belva B. Dodd and C. Dodd M. Szwec G. Mulligan S. Du, Ph.D., of California Air Resources Board K. H. Kilburn, M.D., of Neuro-Test, Inc. R. W. Coppock, D.V.M., of Toxicologists and Associates Ltd.

B. Gettel, AACI,
of Gettel Appraisals Ltd.
D. McCutcheon, P.Eng.,
of the University of Alberta

Brazeau County
G. Mastre

Alberta Energy and Utilities Board staff
G. Bentivegna, Board Counsel
D. Schroeder
E. Moore
J. Smith
J. Schlager
C. Ravensdale
K. Eastlick, P.Eng.

APPENDIX 2 SUMMARY OF CONDITIONS

This section is provided for the convenience of the readers. In the event of any difference between the conditions in this section and the material in the main body of the decision, the wording in the main body of the decision shall prevail.

Conditions generally are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with conditions or it is in breach of its approval and subject to enforcement action by the EUB. Enforcement of an approval includes enforcement of the conditions attached to that licence. Sanctions imposed for the breach of such conditions may include the suspension of the approval, resulting in the shut-in of a facility. The conditions imposed on the licence are summarized below. The Board would like to note that in the event any commitments made by West detailed within Appendix 3 contradict the conditions listed below, the conditions take precedence.

Given the concerns expressed by the parties about the ERP and the implementation of response measures and procedures, the Board finds it prudent to impose the following conditions upon West:

1) The ERP must be updated to address effective methods to contact the residents and the public due to concerns about telephone availability, unique topographic features such as the deep ravine, the public's recreational use of the area, and clear procedures on sheltering and transportation routes. The updated ERP must be submitted for review and approval by EUB staff prior to the licence being issued.

2) One additional rover dedicated to the ravine area must be incorporated into the ERP.

3) The new egress road must be constructed prior to commencement of drilling of the first well.

4) A separate dedicated ignition team must be on location during critical operations.

5) Immediate ignition criteria must be implemented in the event of an uncontrolled or partially controlled release of gas to surface as soon as all personnel at the site have been cleared to a safe distance.

6) West must successfully conduct a comprehensive ERP exercise to the satisfaction of EUB staff prior to entering the critical zone of the first well. West may not enter the critical zone of the second well until it receives EUB staff approval that the exercise results of the first well remain valid for the second well. West will only have two attempts to achieve a successful comprehensive ERP exercise on the first well.

7) If EUB staff consider that the initial exercise is unsatisfactory, West will have one further opportunity to conduct another comprehensive ERP exercise. If the second ERP exercise is judged unsatisfactory by EUB staff, the well licence will be suspended, without prejudice, in accordance with all applicable EUB requirements. Subject to the rights of West or another party to make a submission to lift the suspension, the Board may, at some point, require the abandonment of the well.

8) West must invite EUB staff from the Drayton Valley Field Centre and EUB Emergency Planning and Assessment to witness and evaluate the exercise.

9) West must log the surface casing of both wells to evaluate the quality of the cement bond.

10) If West is not able to gain residents' agreement for additional flaring beyond eight hours, West must receive EUB staff approval for an extension beyond the eight-hour flaring commitment of West.

APPENDIX 3 SUMMARY OF COMMITMENTS

The Board notes that during the hearing West committed to conduct certain activities in connection with its operations that are not strictly required by the EUB's regulations or requirements. It is the Board's view that when a company makes commitments of this nature, it has satisfied itself that these 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 West to carry out the commitments or to advise the Board if, for whatever reasons, it cannot fulfill a commitment. The Board would then assess whether the circumstances regarding the failed commitment warrant a review of the original approval. The Board notes that the affected parties also have the right to request a review of the original approval if commitments made by West remain unfulfilled.

In the transcript dated March 28, 2007, Volume 2, at pages 636 and 647, lines 2 and 19 respectively, in response to a request made by Acting Board Member Mr. Remmer, West undertook to provide a list of commitments made during the consultation process. The list of commitments provided by West was entered into the hearing as Exhibit 05-013c. The document was later updated on April 24, 2007.

The commitments summarized below are compiled from the update to Exhibit 05-013c. In the event that any commitments made by West were omitted from this list, the Board considers that those commitments are still in effect.

West Energy Ltd. Applications 1451106 and 1459453 Rocky Rapids Well Project Commitments

1. CONSULTATION

(a) Prior to West Energy Ltd.'s (West Energy's) re-consultation under Directive 071 in relation to the Drilling and Completions Emergency Response Plan (ERP) West Energy will consult with the community, via a meeting, to obtain input regarding the final content of the public information package to be distributed. West Energy will then distribute this information package in its re-consultation to revise the ERP under Directive 071. The public information package will conform to Directive 71 and may include additional information such as:

- sheltering in place;
- natural gas odours and consideration of sources (i.e. gas furnace operation and odours);
- privacy and personal information; and
- the need to heighten communication amongst family members during sour drilling operations.

(b) Upon individual stakeholders making a request, West Energy will provide a copy of that stakeholder's personal information collected during consultations for the applied for wells.

(c) West Energy has in place a relocation protocol. Upon the request of stakeholders residing within one kilometre of a proposed well, West Energy will relocate residents during critical sour operations. For residents outside of the one kilometre radius who may want to be relocated, West Energy will consult with those residents and will consider relocating them in accordance with the relocation protocol.

(d) West Energy has in place a livestock compensation protocol that it will implement if livestock are impacted in the unlikely event that a H2S or SO2 release occurs from a West Energy operation in the area.

(e) In the event the applied for wells are licensed, West Energy will invite those stakeholders who are interested to its pre-spud meeting.

(f) In the event the applied for wells are licensed, West Energy will also invite those stakeholders who are interested to its pre-sour meeting.

(g) In the event the applied for wells are licensed and cannot be drilled prior to December 21st, 2007, West Energy will consult with the community, via a community meeting, regarding a new drilling date.

(h) In the event the applied for wells are licensed and are commercially successful and require a pipeline tie-in, West Energy will discuss the success of the wells including the H2S content of the solution gas and the future pipeline via community meeting(s).

2. EMERGENCY RESPONSE PLANNING

(a) When agreed upon during consultation with applicable Government Agencies, West Energy will employ a Unified Command structure in its site specific ERPs.

(b) West Energy will consider a multiple telephoner notification system for all site specific ERPs.

(c) In the event the applied for wells are licensed, West Energy will construct an additional permanent egress route.

(d) Upon individual request by stakeholders in the emergency planning zone (EPZ), West Energy will make available standby trailers for horse evacuation.

(e) In the event of a level two emergency under the ERP, West Energy will dispatch an extra (in addition to those required under Directive 071) mobile air monitoring unit to monitor air quality on the east side of the North Saskatchewan River.

(f) During sour drilling and completion operations West Energy will have four stationary air monitors available and operating.

(g) Once sour operations, including completion operations, are finished West Energy will provide air monitoring data from the stationary monitors employed to those stakeholders who request the data.

(h) West Energy will provide flaring notification to all residences within the entire 4.3 kilometre drilling and completion EPZ (versus the 3 kilometre zone required under Directive 060).

3. DRILLING PROGRAM

(a) West Energy will drill surface hole with fresh water mud to a depth below ground water elevations. The source water will come from Drayton Valley and no water source wells will be drilled to support drilling operations. The casing set to below the base of the ground water will be IRP Volume 1 compliant. The string will be cemented full length.*

(b) West Energy will test water wells within 800m of a well before and after drilling for both quality and quantity. Tests will be conducted and analyzed by qualified laboratory services and results will be forwarded to landowners for their personal records. *

(c) West Energy will not employ the use of sumps for drilling operations and tankage will be utilized for all fluids. There will be no land spreading. *

(d) West Energy will implement noise initiatives by directing tripping operations to take place in daylight hours, instructing transport and services vehicles not to use engine retardant brakes, and instruct same to travel at speeds lower than posted limits. West energy will implement odour initiatives by providing portable toilets and sewage containment for trailers on site. Reduced speeds of transport and services vehicles will also reduce dust odour.

(e) A complete rig inspection will be conducted prior to drilling out of the surface casing and prior to drilling out of the intermediate casing. *

(f) West Energy will complete a leak-off test in accordance with Guide 8.

(g)* West Energy will set IRP compliant intermediate casing to a depth immediately above the Nisku formation. The string will contain a stage tool and external casing packer to cement back to surface. Casing safety factors exceed recommended practices.

(h) West Energy will meet or exceed Directive 36 and IRP Vol. 1 requirements for drilling fluids. The wells will be planned with an over balance of 2800Kpa (minimum). Surface volumes will exceed IRP minimum recommendations and weight materials beyond formation pressure plus the required over balance. Mud

specialists will be on site 24 hours per day through the critical sour section. *

(i) West Energy will ignite an uncontrolled release to surface within 15 minutes.

(j) In the event the applied for wells are licensed, West Energy will not drill the wells in the winter season (December 21st through spring break-up). In the event that West Energy is unable to drill the wells in the fall of 2007, West Energy will consult with the community as to its revised drilling schedule.

(k) In the event the applied for wells are licensed, West Energy will ensure that it will not drill the critical sour zone concurrent with the community's Thunder in the Valley race event (September 12 through 15th 2007).

(l) Downwind air monitoring will be on location for the entire Nisku penetration if required by the ERP or regulations. The downwind monitor(s) must be on location a minimum of 24 hours before the start of the drill out and continue monitoring until the liner has been cemented in place. If stationary monitor(s) are used they should be strategically placed around the well to catch prevailing winds. *

(m) No DST is planned for these wells. No Coring is planned for these wells. *

(n) (IRP Vol. 1 approved L-80 liner and hanger will be used. Minimum over lap of 120m inside the intermediate casing. The liner will be cemented full length. *

(o) Only sour service wellhead equipment will be used (minimum of PSL-2 and 21MPa working pressure). All casing bowl welds must utilize a wellhead supplier approved sour service welding procedure. Pre-heat and stress relief procedures must be documented on daily reports. A wellhead will always be installed prior to the drilling rig leaving location.*

4. COMPLETIONS PROGRAM

(a) Once completed and prior to being place on production EUB critical sour suspension guidelines will be followed in all cases. The well must also be surrounded with concrete barriers to avoid accidental contact. *

(b) All Nisku production wells capable of flow will be equipped with a packer designed specifically for sour service applications. While the well flows and a retrievable packer is being used, the annulus will be full of inhibited fluid. Packer isolation (integrity) testing will occur on an annual basis. *

(c) Production tubing will meet or exceed the requirements of IRP Vol. 2. There will be a minimum of two profile nipples installed in the BHA and these profile nipples will be made from a minimum of L-80 sour service material. *

(d) The use of nitrogen must be carefully evaluated. If it is used supplemental propane at appropriate rates to confirm combustion must be used to ensure complete dispersion per the EUB flaring permit. *

(e) West Energy runs cement bond logs for the production casing liner and the intermediate casing string for wells in the Nisku formation. West Energy employs a wellhead-on completion program for wells in the Nisku formation. All acid stimulation work on the Nisku will be done with the wellhead on. *

(f) West Energy will keep the flow test as short in duration as possible. It is intended that the flow test will not exceed 8 hours (4 hours cleanup, 4 hours test). Flow tests will use a flare stack that is specifically designed to meet or exceed EUB dispersion modelling requirements/specifications. In the event that further testing is required in excess of 8 hours and within the conditions of the flare permit, West will notify the community, through a meeting, to discuss the necessity and scheduling of further testing. *

(g) Downwind air monitoring will be on location for the entire production test as specified by the flare permit and ERP. The downwind air monitors must be on location a minimum of 24 hours before the start of the test and continue monitoring until all of the test equipment has been purged of sour gas. *

(h) Only service companies with crews experienced with sour gas will be utilized. A minimum of 1 years experience is required for all operations. *

(i) Two supervisors will be used when drilling in the Nisku or when 24 hour operations are occurring in the Nisku. *

(j) Operators are to ensure only equipment built to NACE Mr-01-75 standards are used for the Nisku penetration, completion and testing. Only the use of O.E.M. replacement parts and full traceability will be suitable. *

(k) Operators are to ensure dual ignition capability is available for use when the Nisku zone is penetrated, completed and tested. *

(l) Only security checked Rovers and Ambient Air Monitoring Personnel will be allowed to make contact with residents inside an EPZ. *

(m) West Energy will employ a subsurface safety valve on all flowing Nisku wells. *

5. OPERATIONS PROGRAM

(a) In addition to placing concrete barriers around the well head and associated equipment, West Energy will fence the well site. Prior to finalizing the design of the fence for the well site, West Energy will meet with residents within one (1) kilometre of the well site to discuss the scope and type of fencing to be used.

(b) West Energy will employ a closed production system on the applied for wells.

(c) West Energy will, where feasible, reduce the duplication of surface facilities for the applied for wells.

(d) West Energy employs the use of multiple point source hydrogen sulphide monitors at Nisku formation sour well sites.

(e) On an annual basis, commencing one year following continuous production from either of the applied for wells, West Energy will assess the production rate of the wells and determine whether it would be appropriate to change the size of the production EPZ for the wells. Upon determining that the production EPZ for the wells should be changed, West Energy will inform those stakeholders affected by such a change.

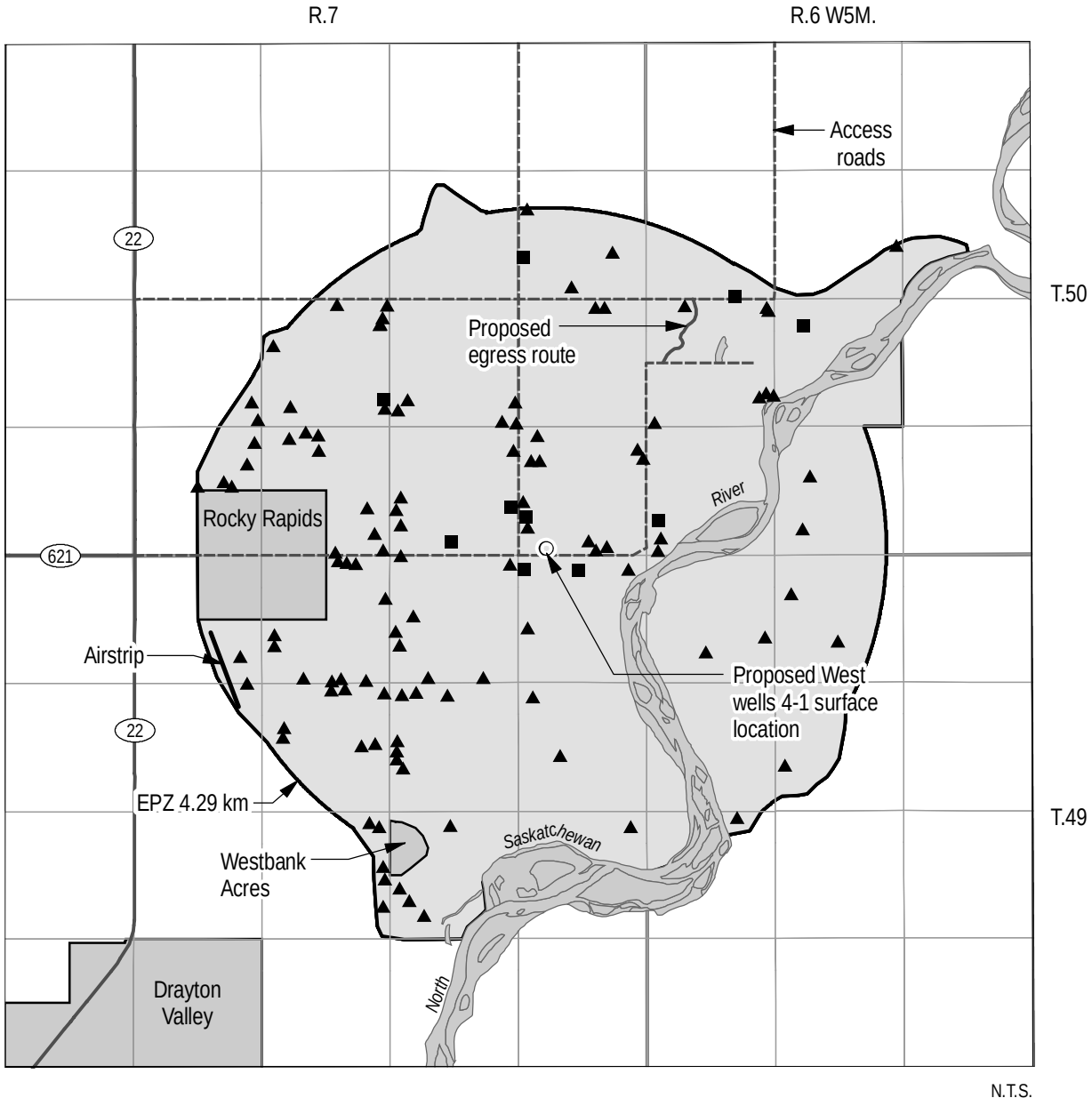
* Common with Exhibit 05-011, Pembina Nisku Play Joint Company Standards.

APPENDIX 4 CRITERIA MATRIX FOR CLASSIFYING INCIDENTS[1]

Criteria Matrix for Classifying Incidents must be included in a corporate-level ERP and used to classify all incidents. The table below, from Directive 071, considers the risk, control, containment, and impact on safety and the environment in arriving at a classification. A licensee should be aware that an emergency level might be declared due to one or more of the control, containment, and impact criteria being met.

Emergency[2]				
Risk	Alert: Minimal	Level 1: Low	Level 2: Medium	Level 3: High
Control	Immediate control of hazard, with progressive resolution of the situation.	Immediate control of hazard is becoming progressively more complex because of deteriorating conditions.	Imminent and/or intermittent control of the hazard is possible.	Imminent control of the hazard is not possible.
Containment	Control and relief systems functioning correctly.	Control and relief systems functioning correctly.	Some control and/or relief systems not operational.	Key control and relief systems not operational.
Impact Public/worker safety	On site only.	On site, with possible impact off site.	On site, with possible impact off site.	Potential for public safety to be jeopardized.
Environment	On site only.	On site, with some potential off site. Minor or short term.	On site, with some off site. Minor or short term.	On site, with significant off site. Long term.

[1] This table is excerpted from *Directive 071,* Table 2.
[2] All emergency levels are declared using the criteria matrix only.



Legend

■ Hearing participants

▲ Other area residences

Notes:
Hearing participants and residents within Rocky Rapids and Westbank Acres are not shown.
This figure is provided for illustrative purposes only.
This figure was created from West's ERP area map dated November 11, 2006.
The Board recognizes that the ERP area map is not up to date but will be updated by West.

Figure 1. ERP area map