ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

DUVERNAY OIL CORP.
APPLICATIONS FOR WELL, BATTERY, AND PIPELINE LICENCES
EDSON FIELD

Decision 2007-111 Errata
Applications No. 1500699, 1551285, and 1529482

The Alberta Energy and Utilities Board (EUB/Board), subsequently replaced by the Energy Resources Conservation Board (ERCB), issued *Decision 2007-111* arising from the hearing held in Edson, Alberta, from September 18 to 20, 2007. The Board has since discovered errors in two areas of this document.

On page 29, Section 9.3.2, paragraph 2, sentence 2 reads: "The Board understands that Duvernay will not exceed 3.00 e^3m^3 during completion of the well and will comply with *Directive 060* requirements for the flare permit application." The sentence, with the change in bold, should read: "The Board understands that Duvernay will not exceed **300** e^3m^3 during completion of the well and will comply with *Directive 060* requirements for the flare permit application."

The legend on the map, page 42, identifies the "Halroyd land." "Halroyd" is misspelled and should be corrected as bolded to "**Holroyd**."

The Board considers that the corrections to the areas identified and noted above properly reflect the evidence and the Board's intention in *Decision 2007-111*. Therefore, the Board approves the above-noted corrections to *Decision 2007-111*.

Dated in Calgary, Alberta, on January 15, 2008.

ALBERTA ENERGY AND UTILITIES BOARD

<original signed by>

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

<original signed by>

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

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

Duvernay Oil Corp.

Applications for Well, Battery, and Pipeline Licences
Edson Field

December 20, 2007

Alberta Energy and Utilities Board

ALBERTA ENERGY AND UTILITIES BOARD
Decision 2007-111: Duvernay Oil Corp., Applications for Well, Battery, and Pipeline Licences, Edson Field

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1 DECISION

The Alberta Energy and Utilities Board (EUB/Board) is satisfied that the proposed well, battery and pipeline are in the public interest. Once all commitments are implemented and all conditions are met, the Board is satisfied that the well can be safely drilled and the battery and pipeline safely operated to provide the necessary level of protection for the public and the environment.

Having carefully considered all of the evidence, the Board hereby approves Applications No. 1500699, 1551285 (replaces Application No. 1499076) and 1529482 (replaces Application No. 1487188), subject to the conditions herein.

2 INTRODUCTION

2.1 Applications

Duvernay Oil Corp. (Duvernay) filed three applications relating to an existing natural gas well located at Legal Subdivision (LSD) 8, Section 13, Township 54, Range 19, West of the 5th Meridian (the 8-13 well). The first application (Application No. 1500699) was applied for pursuant to Section 2.020 of the *Oil and Gas Conservation Regulations (OGCR)*, to re-enter and deepen the 8-13 well to produce natural gas from the Wabamun Formation (Wabamun) containing a maximum hydrogen sulphide (H_2S) concentration of 379.6 moles per kilomole (mol/kmol) (37.96 per cent).

The second application (Application No. 1551285) was applied for pursuant to Section 7.001 of the *OGCR* and requested approval to construct and operate a single-well gas battery located at the 8-13 well site. The proposed battery would include a line heater, inlet separator, compressor, dehydrator, condenser, emergency flare system, incinerator system, and storage for produced water and hydrocarbon liquids.

The third application (Application No. 1529482) was applied for pursuant to Part 4 of the *Pipeline Act* for a pipeline to tie in the proposed 8-13 well to an existing Talisman Energy Inc. (Talisman) operated pipeline system at LSD 6-34-53-19W5M (6-34 tie-in). The gas would then be transported to the Talisman Edson Gas Plant, located at LSD 4-11-53-18W5M for processing.

All three applications were considered in the same oral hearing.

Following the hearing, Duvernay filed minor amendments to the battery and pipeline applications that were not contested by the interveners.

2.2 Interventions

The following parties objected to the Duvernay applications: Mr. Howard Bugg and Mrs. Judith Bugg (the Buggs), Mr. Charles Bullock, Dr. Dave Holroyd and Dr. Mavis Holroyd, Mr. Kirby Smith and Mrs. Katherine Storey Smith, Mr. Fred Makowecki, and Mr. Carl Thompson. The land interests of these parties are shown on the Project Area Map included as Figure 1. These parties expressed concerns related to health, safety, flaring, air quality, animal health, and emergency response planning.

All intervening parties were granted standing to participate with full intervener status except Mr. Makowecki and Mr. Thompson as they were not considered to be directly and adversely impacted because both reside outside of the emergency planning zones. However, Mr. Makowecki and Mr. Thompson were provided opportunity by the Board to present their views.

2.3 Hearing

The Board held a public hearing in Edson, Alberta, from September 18 to September 20, 2007, before Presiding Board Member A. J. Berg, P.Eng., and Acting Board Members C. A. Langlo, P.Geol., and R. G. Evans, P.Eng.

The Board and staff conducted a self-guided tour of the general area on September 17, 2007, to view the lands encompassed by the proposed well, battery, and pipeline route. The tour stayed on area roads and the proposed well site.

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

Although the oral argument was completed on September 20, 2007, on November 1, 2007, Duvernay filed minor amendments to the battery and pipeline applications that were not contested by the interveners. Accordingly, the Board considers that the close of evidence for this proceeding was November 1, 2007.

3 ISSUES

The Board considers the issues respecting the applications to be

- need for and location of the well, battery, and pipeline
- drilling and completion operations
- emergency planning zone (EPZ) size
- drilling completion and production emergency response planning
- public safety, training, exercises, and personnel
- flaring, incineration, and modelling of emissions
- compliance issues
- public consultation and other matters

The Board considered all relevant materials constituting the record of this proceeding. References in this decision to specific parts of the record are intended to assist the reader in

understanding the Board's reasoning relating to a particular matter and should not be taken as an indication that the Board did not consider all relevant portions of the record with respect to that matter.

4 NEED FOR AND LOCATION OF THE WELL, BATTERY, AND PIPELINE

4.1 Views of the Applicant

Duvernay explained that the 8-13 well was originally licensed and drilled in 2005 to evaluate a Mississippian gas target. Duvernay stated that the original well was not completed and the casing remains intact without perforations.

Duvernay stated that it did not encounter economically producible hydrocarbons in the Mississippian and later decided to deepen the 8-13 well. Duvernay submitted that its geological and geophysical analysis indicates a potential natural gas resource of between 10 and 200 billion cubic feet (bcf) (0.28 billion cubic metres [m^3] to 5.66 billion m^3) in the Wabamun at this location and noted that there are no existing wells currently producing or capable of producing Wabamun gas reserves from the pool in question. Duvernay stated that, in its view, the 8-13 well has a probability of success of encountering an economic gas accumulation in the Wabamun of approximately 20 per cent and noted that the current expiry for its rights is 2010.

Based on this information, Duvernay applied to re-enter the 8-13 wellbore and vertically deepen the well by 200 to 212 m to evaluate potential reserves within the Wabamun.

Duvernay argued that re-entry and deepening of the existing 8-13 wellbore is the most efficient, economic, orderly, and safe way to evaluate and produce the Wabamun gas reserves at this location and stated that its preferred timing to commence drilling would be February 2008. Duvernay stated that it would cost approximately $2 million more to drill a new well than the proposed re-entry; however, it did not propose any alternative locations to access the reserves underlying Section 13.

Once the well has been drilled, Duvernay stated that the gas battery is required to remove liquids from the natural gas and then compress the dry gas to provide enough pressure for the gas to be pipelined. Duvernay noted that there are no similar facilities in close proximity to the proposed well. Duvernay also confirmed that the applied for pipeline was necessary to tie the proposed well and battery into the Talisman gathering system at 6-34 tie-in.

Duvernay submitted that the well is necessary and in the public interest.

4.2 Views of the Interveners

While the interveners did not comment on the specific location for this well, battery and pipeline, it was their position that no critical sour gas wells should be drilled in proximity to residences, farms, and ranches and that, in their opinion, there would not be any benefit to the local community in drilling this well.

The interveners argued that approval of this well would result in intensive sour gas operations in this area, intensifying what they perceived to be unacceptable risks. The interveners submitted

that they were concerned about the proliferation of wells in this area and believed that the risks associated with the proposed well outweighed the benefits to the community

Mr. Makowecki emphatically stated that he believed more wells should not be drilled in the area, regardless of whether they are sour or not. He stated that, in his opinion, there would be not be any benefit to the local community that would make the risks of drilling wells acceptable.

4.3 Findings of the Board

The Board accepts that Duvernay has the right to explore for and produce the potential reserves within the Wabamun underlying Section 13.

The Board agrees that, if this well is to be drilled, accessing the Wabamun from the existing wellbore at the 8-13 would have less impact than drilling a new well from a new surface location. The Board also notes that the casing in the existing wellbore is suitable for the gas that may be encountered in the Wabamun, was set in 2005 and has not been perforated. Given the condition of the wellbore, the Board finds that there would be no advantage to accessing the Wabamun through a new wellbore.

The Board is also satisfied that if Duvernay's well application is approved and the well is drilled and capable of commercial production, there will likewise be a need for the proposed battery and pipeline.

The Board considers it is in the public interest for these resources, which belong to all Albertans, to be produced. Accordingly, the Board is satisfied that there is a need for the proposed project.

However, the Board will only approve the applications if it is satisfied that the well can be drilled, and the associated production facilities can be operated, in a manner that ensures the protection of the public and the environment.

The Board will now address Duvernay's drilling and completion operations.

5 PROJECT OPERATIONS

5.1 Drilling and Completion Operations

5.1.1 Views of the Applicant

Duvernay proposed to re-enter and vertically deepen the 8-13 wellbore approximately 200 m into the Wabamun at a calculated maximum H_2S content of 37.96 per cent.

Duvernay estimated that since 1954, up to 500 wells have penetrated into or through the Wabamun in the Edson area. Duvernay used an analogy of the 1964 well at LSD 2-13-54-19W5M (2-13), 625 m southwest of the proposed 8-13 well. Duvernay confirmed that no abnormal pressures, kicks, or other unusual drilling conditions were encountered when the Wabamun was penetrated at 2-13. Duvernay drilled the 8-13 well in March and April of 2005 and installed 139.7 millimetre (mm), L-80 Sour Spec casing set to the top of the Wabamun at a depth of 3052 m and noted that the casing is cemented to surface and has never been perforated.

Prior to commencing re-entry operations, Duvernay stated that it would pressure test and run cement bond and casing integrity logs.

Duvernay stated that drilling time was estimated at seven days with the sour zone being open for about four days. Duvernay proposed a maximum mud weight of 1140 kilograms per cubic metre (kg/m^3) for the 8-13 well based on that weight being used for the 2-13 well. Drilling operations would include a number of safety features, including shear rams in the blowout preventer, dual mud/gas separators, dual drilling spools, dual ignition, H_2S scavengers that monitor soluble sulphides in the drilling fluid, and dual drilling fluid mixing systems having usable surface drilling fluid volume totalling 100 per cent of the calculated gauge hole volume minus the drill string displacement. Duvernay also noted that there would be on-site H_2S and mobile air monitoring to immediately alert personnel of any emissions.

Duvernay stated that it would use the same drilling rig under the supervision of experienced personnel for the completion operations. Duvernay confirmed that the re-entry hole would be cased and cemented with a 73 mm liner, with an overlap of a minimum of 200 m into the existing casing. The 60.3 mm L-80 Sour Spec tubing string would be equipped with a chemical injection line, a methanol injection line, and a subsurface safety valve. The tubing string would be set into a permanent packer. Duvernay stated that it would pressure test the tubing and associated equipment and a full sour service wellhead would be installed.

Duvernay would then perforate the casing and acid stimulate the well with the tubing and subsurface safety valve in place, effectively restricting production to the maximum applied for suspended/ producing rate of 1.56 cubic metres per second (m^3/s).

The well would be flowed for cleanup and evaluated through a three-phase test separator. All fluids would be metered and the H_2S content measured. All produced liquids would be removed from the site in pressurized trucks to eliminate odours. Once the test is complete, the well would be temporarily suspended with a double plug arrangement.

With respect to production operations, Duvernay stated that the subsurface safety valve would shut down the well if there was an equipment failure or an on-site H_2S detection at the surface. The methanol injection string would help to prevent the formation of hydrates in the well.

Duvernay stated that 10 years was a reasonable estimate of the productive life of the well if it discovered close to the currently estimated maximum 200 bcf.

Duvernay stated that the wells it is currently operating in Alberta are producing from the Nordegg Formation in the Fir area with H_2S contents from 50 parts per million (ppm) to 900 ppm. With these wells there are no surface dwellings or residents inside any of the planning zones. Duvernay stated that it has also drilled and completed about 60 sour gas wells in British Columbia.

Duvernay stated that it would have two drilling superintendents on staff, each with over 35 years of experience, and that it would select qualified and experienced drilling and completion contractors. A detailed rig inspection and blowout prevention drill would be conducted prior to commencing drilling operations.

Duvernay estimated that the minimum time for gas to surface during drilling and completion operations would be approximately 30 minutes, based on the bottoms-up time to circulate a kick. Based on a 2 m^3 kick, it estimated the approximate calculated time to surface was 100 minutes.

5.1.2 Views of the Interveners

The interveners questioned Duvernay's ability to safely re-enter and complete the well although they did not specifically challenge the drilling and completion program for this well. The interveners were concerned that Duvernay only operates seven sour wells in Alberta and suggested that a 38 per cent sour well operation was not the place to gain critical sour well drilling and operations experience. The interveners suggested that Duvernay should obtain more sour experience before attempting this project.

With respect to past performance, the interveners stated that they believed the evidence shows that Duvernay has reacted to deficiencies in its operations but has not been proactive in preventing them.

The interveners also argued that past company performance should be considered by the Board when it makes decisions on proposed sour gas wells.

5.1.3 Findings of the Board

The Board believes that the nature of the intended sour reservoir is an important factor that it must consider when evaluating a company's plan to drill a critical sour well. In this case, the Board observes that the characteristics of the Wabamun in the Edson area are well known because of the number of wells which have been drilled into the Wabamun. In addition to this general information, the Board notes that Duvernay also provided specific evidence regarding a well drilled into the Wabamun in 1964 from a location only 640 m from the 8-13 well site. The Board considers it pertinent that no kicks or other drilling complications arose when that well penetrated the Wabamun. Based on this information, the Board considers it unlikely that abnormal pressures will be encountered when the 8-13 well penetrates the Wabamun.

The Board is also satisfied that Duvernay's drilling and completion equipment and its intended drilling and operating procedures would meet all EUB requirements for this type of well. The Board notes that the tubing and casing to be used has been supported by the National Association of Corrosion Engineers threshold test data and are recommended for severe sour service. Further, the Board considers that Duvernay's use of intermediate casing and multiple blowout controls at surface significantly reduce the risk of an uncontrolled release of gas during drilling operations.

With respect to the risk associated with a blow from a critical sour well, the Board agrees with Duvernay's expert, Mr. Chadder, of RWDI Air Inc., that the likelihood of a release for critical sour gas wells is approximately one quarter the likelihood of a noncritical gas well blowout because of the additional stringent requirements for critical sour wells. The Board notes there have been no blowouts of critical sour gas wells since its regulations for these types of wells were enacted.

The Board is satisfied that Duvernay has sufficient resources and expertise either within the company or available to the company through its contractors to meet its responsibilities to safely drill, complete, and produce the well and to protect the public. The Board is satisfied that the

proposed well can be drilled and completed safely with appropriate safety equipment and personnel.

However, even with all of the enhanced safety measures, the Board considers that no system of human endeavor is risk or error-free and that no mechanical system is free of the possibility of multiple breakdowns. Accordingly, the Board routinely requires a complete and thorough ERP to be implementable for all critical sour wells in the event that such failures occur.

5.2 Facility and Pipeline Operations

5.2.1 Views of the Applicant

Duvernay submitted that its proposed battery would include a process line heater, an inlet separator, a compressor, a dehydrator, a still condenser, an emergency flare system, an incinerator system, water storage and hydrocarbon liquid storage. All equipment would be fired using natural gas.

The gas from the wellhead would be heated by a natural gas fired line heater, reduced in pressure and separated for measurement. The gas would be compressed and sent to a triethylene glycol dehydrator to remove water. The gas would then be metered and sent through the proposed 7.2 kilometre, 114 mm pipeline to the 6-34 tie-in point.

The battery would also be constructed with several Pressure Safety Valves (PSVs) on vessels. In the event that the PSVs open, they would release gas to the emergency flare system. Duvernay stated it would take approximately 40 minutes to depressure and flare the gas. During operations, all emergency shutdown (ESD) valves would be inspected and maintained monthly.

Duvernay submitted that the pipeline would be built to the specifications outlined in the latest edition of Canadian Standards Association Z662: Oil and Gas Pipeline Systems (CSA Z662) specifications. At the 6-34 tie-in point, a blending system would be installed to balance the H_2S levels of the combined production stream. The blending system would be equipped with two independent monitoring systems to ensure that target H_2S levels are not exceeded in the pipeline from the 6-34 tie-in to the Talisman Edson Gas plant.

5.2.2 Views of the Interveners

The interveners questioned Duvernay's ability to safely operate the proposed battery and pipeline. They suggested that Duvernay should obtain more sour experience before attempting a project of this nature.

The interveners also questioned the reliability of the ESD valves on the pipeline and noted that Duvernay had no statistics on failure rates for the valves.

5.2.3 Findings of the Board

The Board considers that the automation that Duvernay has included on its proposed well, facility and pipeline are excellent safety measures and the Board commends Duvernay for its actions in this regard.

However, the Board wishes to emphasize that automated devices are not perfect and that this equipment will need regular maintenance. The Board reminds Duvernay of its obligation to ensure that its staff understand the mechanics and limitations of this equipment and that adequate processes are in place to ensure proper maintenance scheduling is maintained. Similarly, the Board is pleased that Duvernay will implement cathodic protection and corrosion mitigation for these operations.

While the Board is satisfied that the proposed battery and pipeline can be constructed and operated with appropriate safety equipment and personnel, the Board requires emergency response plans because equipment can fail and human error can occur.

The Board expects that Duvernay will ensure that it has internal controls and monitoring that will result in the plans being properly executed and maintained. The Board considers this to be a very important issue.

6 EMERGENCY PLANNING ZONE SIZES

The EUB *Directive 071*: *Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry* describes the requirements for developing ERPs and contains the current requirements for the calculation of an EPZ for wells, pipelines and facilities. The EUB has been in the process of developing a new tool for calculating EPZs called EUBH2S.

6.1 Views of the Applicant

Using the requirements set out in *Directive 071*, Duvernay filed two ERPs with the EUB in support of its applications:

- ERP specific to the drilling and completion of the 8-13 well (the drilling ERP).
- ERP specific to the operation of the well, pipeline, and 8-13 battery (the production ERP).

Duvernay stated that it considered that all of the Board's emergency response requirements had been met. Duvernay further stated that the current nomograph method for EPZ calculation should be used as it is the method of calculation currently endorsed by the Board and is what is contained within *Directive 071*.

Using the nomographs, Duvernay determined an EPZ of 9.0 kilometres (km) for the drilling and completion operations of the 8-13 well based on the EUB's geological staff's determination of a maximum H_2S content of 37.96 per cent and a cumulative release rate of 7.42 m^3/s. Duvernay stated that it believed that the actual H_2S content and release rate would be approximately half of that determined by the EUB. For the well production operations, Duvernay used the nomographs to calculate the EPZ to be 3.11 km[1] and during the hearing expanded this to a 3.2 km radius. The associated EPZs for the related pipeline were calculated to be between 2.1 km and 2.6 km depending on the pipeline segment length between ESD valves.

[1] Duvernay calculated the EPZ size by the nomograph method for the well operations as being 3124 m (3.12 km). Duvernay expanded this EPZ out to 3200 m (3.2 km). Both the 3.1 and the 3.2 km EPZ size were referenced throughout the hearing as the calculated EPZ for well production by both the interveners and Duvernay. The Board accepts the applied for well operation EPZ size to be 3.2 km.

At the request of the Board, Duvernay also determined EPZ distances using the Draft EUBH2S Model (EUBH2S). The table below shows the model and nomograph results calculated by Duvernay.

Table 1. Duvernay calculated EPZ (km) using different response times

Project Phase/ Operation	Nomograph 15 minute ignition time	EUBH2S	EUBH2S 15 min	EUBH2S 30 min	EUBH2S 45 min	EUBH2S 60 min
Drilling and completion	9.0		7.1			
Well Production	3.2			4.7	5.7	6.4
Pipeline	2.1 - 2.6					
Pipeline Case 1[a]		4.2				
Pipeline Case 2[b]		2.3 - 2.7				

[a] Case 1: ESD activation initiated if the minimum pipeline pressure drops to less than or equal to 90 per cent of licensed maximum operating pressure (MOP). ESD to occur in 5 seconds of activation.

[b] Case 2: ESD activation initiated by pressure rate of change detection of pipeline pressure changes of 4 kPa/s with polling rate of 10 seconds.

When conducting the EPZ calculations with the draft EUBH2S, Duvernay defended its use of site-specific inputs rather than the EUBH2S default inputs recommended by the interveners. Duvernay argued that the default values were not expected to be used unless actual site specific data was not available. Duvernay contended that its use of a 15 minute ignition time for the drilling ERP was more reasonable than the 60 minute default time proposed by the interveners as it will have a qualified and trained ignition team on site continuously during the drilling phase.

Duvernay also challenged the use of a 180 minute ignition time for the production ERP that was identified by the interveners and asserted that an ignition time of 30 minutes was more realistic. Duvernay did acknowledge, however, that travelling conditions to a potential incident site may not always be optimal and could require between 45 to 60 minutes. Duvernay explained that its production ERP was designed to account for this range. It felt confident that upon arrival of response personnel at the location, the incident could be evaluated and mitigating measures, such as ignition, could take place within 45 to 60 minutes. Duvernay committed to demonstrating its capability to adequately implement the production emergency response measures.

Duvernay contended that it was obligated to meet the current requirements of *Directive 071* and that the EPZs calculated using the nomograph method were conservative and appropriate. Duvernay also committed to recalculate the production EPZs for the well and pipeline segments once the H_2S content of the produced gas has been confirmed.

Duvernay stated that it would be in full compliance with all of the EUB's requirements regarding *Directive 071* even if those requirements should change with the anticipated implementation of a revised *Directive 071* and implementation of EUBH2S.

6.2 Views of the Interveners

The interveners acknowledged that all of Duvernay's EPZ calculations using the EUB nomograph method were correct. However, they argued that the EUBH2S model is more accurate and is the better tool to determine EPZs. The interveners argued that the currently accepted nomograph method for EPZ calculation does not take into consideration location

specific data such as prevailing wind directions and topographic features which they noted are a part of EUBH2S.

The interveners contended that the Draft *Directive 071* that includes the usage of EUBH2S should be applied to Duvernay's applications for two reasons. Firstly, the interveners stated that they understood that in accordance with EUB *Bulletin 2007-09*: *Deferral of Implementation of Revised Directive 071: Emergency Response Requirements for the Petroleum Industry*, the revised *Directive 071* would be in place by the fall of 2007, prior to the Board issuing its decision on these applications. Secondly, the interveners emphasized that the EUB is not bound to accepting minimum requirements in its public interest test.

The interveners proposed that the EPZs for drilling, completion, and production operation scenarios be calculated using EUBH2S modelling. The interveners emphasized that all model input parameters, including ignition time, used to support the EPZ results must be justified and defensible and questioned whether Duvernay's inputs met that test. The interveners argued that Duvernay's use of the EUBH2S modelling should utilize the default values for ignition times rather than the site specific inputs to provide for a higher level of safety.

For the drilling operations, using EUBH2S, the interveners argued that the EUB's default ignition time of 60 minutes would be reasonable and realistic. They noted that the increase in ignition time from 15 minutes to 60 minutes would expand the drilling EPZ from 7.1 km to 14.15 km. For the well production operations, the interveners argued that an ignition time of 180 minutes yielding an EPZ of 9.77 km was appropriate. Using default values contained within EUBH2S, such as an ESD valve closure time of 60 seconds and a trigger set point of 50 per cent of the maximum operating pressure, the interveners noted that the calculated EPZ for all pipeline segments would be 9.7 km.

The interveners stated that the length of time calculated for ignition to take place should take into account the time before the decision has been made (TBD, as referenced by the interveners modelling expert Dr. Du) plus the time after the ignition decision has been made (TAD). The interveners were concerned that the company was being too optimistic if by considering that TBD and TAD together would be accomplished in 15 minutes for the drilling scenario.

The intervener's expert also expressed concerns about the potential gas to surface angle of release from the wellbore. He noted that in EUBH2S, the default release angle is horizontal. Dr. Du did not accept Duvernay's argument that the combination of extreme heat and the expected high well flow rates would quickly incinerate the drilling rig which may prevent horizontal release angle. He considered that the high flow rate of approximately 980 m per second would keep the flame away from the drilling rig so that the temperature wouldn't be as high as Duvernay expected, and would therefore not incinerate any materials impeding the horizontal nature of the release.

The interveners' expert commented on their issues with RWDI's reports. Dr. Du commented on the screening meteorology and considered that site-specific data would give more reliable assessments. The second concern of the interveners' expert was the model parameter called hill height which was set to zero. The interveners noted that Duvernay's evidence indicated that RWDI had reprocessed Duvernay's dispersion modelling results. Dr. Du commented that the

new modelling results showed a larger air-quality impact and the maximum evacuation extent for planning purposes increased from 3.05 km to 5.64 km

While Dr. Du still had concerns over the release angle and the use of EUBH2S, he acknowledged that Duvernay and their modelling experts RWDI had addressed most of his other concerns.

6.3 Findings of the Board

Directive 071 describes the EUB requirements for developing ERPs and contains the current requirements for the calculation of an EPZ for wells, pipelines and facilities. *Directive 071* describes an EPZ as a "priority area surrounding a well, pipeline or facility where immediate response actions are required in the event of an emergency."

At present, the EUB requires that EPZs be calculated using the nomograph method described in *Directive 071.* A licensee must determine an initial EPZ using this methodology to delineate the area of greatest immediate impact from an uncontrolled release of H_2S. The size and shape of the final EPZ must reflect site-specific features of the area and information gathered during the public involvement process.

In an effort to address several recommendations detailed within the *EUB Public Safety and Sour Gas Final Report 2007* (*PSSG report*) and to further refine emergency response planning to reflect more site specific environs, the EUB has been developing EUBH2S, a new method for calculating EPZs. This new tool is currently in the review stage. Once adopted by the EUB as the regulated method of EPZ calculation, companies will be required to utilize this tool in place of the existing nomograph method for development of emergency response actions and procedures.

While the Board recognizes the uncertainties associated with the introduction of a new modelling tool, it wishes to emphasize that EUBH2S tool is still in the developmental phase and may be subject to further changes. Further, the Board stresses that the nomograph method of EPZ calculation is a proven approach to EPZ planning. While EUBH2S will incorporate some refinements into the calculation of EPZs, the Board believes that EPZs calculated using the nomograph method will provide for the safety of the people in the area.

The Board requires that for applications relating to the production of sour gas, stringent measures are in place to ensure that its public safety mandate is achieved. Because an EPZ determines the priority response area, the Board believes that it is essential that the calculation of EPZs is based upon methodologies that safeguard the public.

The Board also wishes to emphasize that the EPZ is a tool used to *initiate* emergency response planning by the licensee. The EPZ therefore represents a priority area for initial response measures to be implemented by the licensee to engage potentially impacted parties during an incident. *Directive 071* is clear in its requirements that the ERP must also provide for potential response beyond the EPZ, based on the actual site conditions and specific parameters such as release rates and volumes. These requirements are clearly part of Duvernay's responsibility for the current applications.

The Board notes the concerns raised by the interveners and their desire for the Board to require Duvernay to use EUBH2S, rather than the nomograph method, to determine EPZ size. The

Board notes the desire to use the models is stronger for the production EPZ, due to the EUBH2S calculated EPZ being significantly larger than the EPZ calculated by the nomograph.

In making its determination of the appropriate EPZs for this project, the Board has reviewed the results of the two models using the default ignition times recommended by the interveners and those proposed by the applicant. Ignition time is an important factor in determining EPZ size as a shorter ignition time will generally result in a smaller EPZ (as demonstrated in Table 1).

The Board does not agree with the interveners that an ignition time of 60 minutes should be used for the drilling EPZ calculation. The Board finds that Duvernay's proposed 15 minute ignition time for drilling operations is an achievable goal given its intention to use experienced drilling supervisors and rig crews. The Board also notes that Duvernay will have designated on site personnel with the authority to ignite the well on their own initiative.

To ensure that this goal is achieved, the Board notes Duvernay's commitment to demonstrate its capability by conducting a full scale drilling ERP exercise prior to entering the Wabamun, which will include its ability to ignite the well within the stated time frame. The details of the full scale exercise will be further explained the sections below.

With respect to the concerns expressed by Dr. Du regarding his TBD and TAD methodology, the Board accepts Duvernay's estimate of 30 minutes as the minimum time for gas to reach surface pending failure of all safety equipment. The Board considers that this amount of time is adequate to evaluate whether the ignition criteria detailed within the ERP and in *Directive 071* has been met (or TBD) and to take the actions to ignite the release (or TAD).

The Board observes that the drilling EPZ calculated using the nomograph method is almost 2 km larger than the EPZ calculated using EUBH2S, using a required ignition time of 15 minutes. While the Board does not consider that a larger EPZ automatically provides better public protection than a smaller EPZ, the Board finds the 9.0 km EPZ for Duvernay's drilling operations to be appropriate based upon current *Directive 071* requirements.

Regarding the pipeline EPZ, the Board observes that its size is largely dependant upon the release volumes of the pipeline segments and the pipeline control systems (such as ESD valves) incorporated into the pipeline design. The Board notes that Duvernay confirmed that it would recalculate the production and pipeline EPZs once actual H_2S content and release rate data obtained from the wellbore is known. The Board further notes that Duvernay expressed willingness to implement pipeline control systems such as pressure rate-of-change detection and other measures to maintain the EPZ distances at or near the values applied for in its application. Taking these commitments into account, and considering that the interveners did not question the appropriateness of the pipeline EPZ , the Board finds that the pipeline EPZ of 2.1 to 2.6 km as applied for by Duvernay is appropriate.

Regarding the well operations and production EPZ, the Board notes that a significant difference exists between the calculated EPZ based on the nomograph method and EUBH2S model. While Duvernay proposed that the Board use the nomograph calculated EPZ for well operations and productions, it also committed to a response/ignition time of 60 minutes.

Duvernay assured the Board that such a response/ignition time is an achievable goal regardless of weather or road conditions and committed to conduct extensive exercises to that end. While

the Board will discuss this matter in further detail in sections that follow, it is of the view that it is appropriate to require Duvernay to demonstrate its ability to achieve a 60 minute response/ignition time prior to the commencement of production operations.

Given the fact that production EPZ calculations normally rely on data provided after a well's completion has taken place, Duvernay is required to confirm the production EPZ using the data that will be acquired post-completion. Any changes to the EPZ size and resulting ERP changes, regardless of the EPZ calculation method used, are required to be submitted to the Board before the Production ERP will be in effect. This must be submitted to the EUB for further review and amended production ERP approval.

The Board further notes, that it is quite possible that revised *Directive 071* will be in force by the time the well is ready to be put on production and the proposed pipeline being ready to be put in service. Duvernay has committed to comply with the directive and any related implementation plan, including recalculation of its well operations and productions EPZ using EUBH2S.

The Board would also like to remind Duvernay of its obligation to provide any changes of the ERP resulting from recalculation or from added enhancements to all parties who hold an ERP so as to facilitate effective emergency response procedures.

7 DRILLING COMPLETION AND PRODUCTION ERPS

7.1 Views of the Applicant

In support of its application and in accordance with *Directive 071,* Duvernay submitted a site-specific drilling and completions ERP to address the emergency response procedures for the drilling and completion phases of the well.

Duvernay identified that the production ERP was also submitted in accordance with *Directive 071,* but stated that this ERP was specific to the operations of the project once the drilling and completion operations had terminated and the well was put on production.

Duvernay affirmed that the two ERPs are separate from each other in design, implementation and emergency response responsibilities. Duvernay stated that it believed there would be no confusion as to which ERP will be implemented in the event of an emergency.

Duvernay submitted that it had incorporated a number of safety measures into the drilling and completions ERP. It noted that while the two plans were distinct entities, there were common elements within the plans including:

- H_2S monitors on site located at the 4 corners of the lease to monitor H_2S and other gases that could present a safety risk to personnel or others.
- Air monitoring within the EPZ including six temporary stationary air monitors at area residences that continuously sample for the presence of H_2S and SO_2.
- Mobile air monitoring units activated if a Level 1 emergency is declared.
- Personnel equipped with handheld detectors which would be mobilized downwind of the release and throughout the EPZ to monitor air quality until the arrival of the second unit.

- Duvernay will also be using Plume-RT, which is a real-time room modelling program to assist in predicting the movement of any plume
- Mutual aid agreements

Duvernay stated that it consulted with persons outside the EPZ and more than 70 residents inside the EPZ. Duvernay stated that it held an emergency response workshop to assist in the public's understanding of emergency response procedures, and that it participated in an EUB facilitated Appropriate Dispute Resolution process, to address and review both ERPs and any resulting concerns. Duvernay stated that it believed that area resident concerns were addressed through the consultation process and observed that no objections were made by the majority of people. Duvernay provided the Board with a list of the commitments it had made to residents as a result of its consultation process (see Appendix 3).

Duvernay acknowledged the interveners' concerns over communication and notification, but believed that its automated call out system was capable of calling all EPZ residents within five minutes. It stated that this system could be linked to Duvernay's office and emergency operations centre for monitoring. Duvernay highlighted the systems capability of being able to identify who has been contacted and who had not received the phone message. Duvernay also stated that notification would be given to the public in the EPZ for all major operational procedures as well as in the event of an emergency. Duvernay also acknowledged that the automated call out system needed additional work and refinement to address the interveners' concerns pertaining to children or others who may answer the phone and not understand the meaning of the message relayed.

Duvernay confirmed its intent to use four rovers during drilling operations. Three rovers were expected to be used during the day while one rover would be dedicated to travelling the EPZ at night. Duvernay stated that the higher number of rovers during daylight operations was intended to address the increased number of recreational users in the area during that time. In the event of an incident, rovers would be notified via the automated call out system as well, so as to decrease rover response time and ensure more effective coordination of rover priorities. Duvernay explained that each rover would be equipped with up-to-date maps, and that each rover would be assigned to a specific area of the EPZ.

Duvernay stated that, in the event of an emergency, roadblocks would initially be established through its mutual aid partners until such time as its own responders could arrive on location to assume these duties. To assist in advising all individuals entering and exiting the EPZ about the potential hazard during drilling and completing, signs would be posted on the common access roads when operations are being conducted in the sour zone. Duvernay also committed to set up a check-point person at the entrance of the Hornbeck cross-country ski area to monitor activity on the ski trails and provide information to users during drilling and completion operations.

To enhance its transient search of the area, Duvernay stated that a helicopter would be dispatched at a Level 1 emergency. However, Duvernay emphasized that the plan is not dependent on helicopter support as the rover searches, in Duvernay's view, would be just as effective without the assistance of a helicopter. Duvernay stressed that its ERPs were living documents and committed to continuous updates to ensure the ongoing adequacy of the ERPs.

Duvernay acknowledged that the ERPs currently submitted with the EUB were not final versions due to suggestions from area stakeholders and input from the interveners ERP experts. As such the ERPs needed updating. Duvernay noted that one such revision that resulted from ongoing communication with intervening parties was the movement of the evacuation centre listed within the drilling ERP. Duvernay submitted a list of the known ERP deficiencies and stated that it would ensure that the necessary ground proofing and updating of the ERPs were completed by the time drilling operations commenced. Duvernay stated that in the case of the drilling ERP, the on-site incident commander and the EUB will participate in decisions to ignite, evacuate or declare levels.

Duvernay stated that the incident commander, for both ERPs, will have the authority to take corrective action, on their own accord, including decisions to ignite, evacuate, or determine levels of emergency. The consultation with emergency managers in Calgary would take place only if there were time to do so.

Duvernay stated that it would ensure that there would be comprehensive training on all aspects of the ERP ignition training although it acknowledged that its training program was not completed as yet. Duvernay believed it could ignite the well in less than 10 minutes and were committed to the 15 minute ignition time.

Duvernay committed to a comprehensive ERP exercise prior to entering the critical zone. Further, any adjustments necessary to its ERP based on the exercise results, including providing additional rovers, if it was determined to be necessary, would be made. Duvernay stated it would have helicopters, quads, and snowmobiles available to make sure that transient users, hunters, trappers and other recreational users could be evacuated safely.

Duvernay stated that its senior executives have been clear that drilling would not commence until they were confident that the drilling ERP could be successfully implemented. Similarly, Duvernay stated that it would demonstrate to the public that the production ERP would be effectively and efficiently implemented.

Duvernay highlighted that a clear distinction between the two ERPs was responder personnel response times. While the drilling ERP was designed such that initial responders would be located on site during the drilling and completion operations, it clarified that responders would only be present at the 8-13 facility during the daytime hours for the production ERP.

Duvernay confirmed that the proposed 8-13 facility and related pipeline would be manned by two operators during the day and unmanned at night. Duvernay argued that the risk of a serious incident from production operations would be extremely low due to good engineering design, continuous manned and unmanned monitoring of the facility and automatic and remotely activated safety shutdown systems. Duvernay further noted that the 8-13 location would have H_2S detection systems placed on the four corners of the lease, to continually monitor the lease area via an automated system. Duvernay noted that this system would be linked to the Talisman plant for monitoring 24 hours per day.

Although Duvernay stated that it was confident that during the production operations, its operators could arrive at the incident location within 30 minutes of notification during optimum conditions, Duvernay acknowledged that given the area's meteorological conditions, driving

conditions are not always optimal. Accordingly, Duvernay utilized a 45 to 60 minute response time window. Duvernay contended that this was an adequate response time for emergency response personnel to receive notification of an incident, travel to the location and undertake initial corrective actions.

Duvernay further noted that in conjunction with the responders being enroute, the H_2S perimeter alarms were expected to activate and the emergency shut down valves would remotely close, ceasing production. However, it would take about 40 minutes to depressure and flare the gas. This mitigating action, Duvernay contended, would limit the amount of H_2S that could potentially be released to the atmosphere.

7.2 Views of the Interveners

In addition to concerns with the calculated size of the EPZ, the interveners expressed concern over the emergency response procedures which Duvernay would attempt to implement in an emergency. The interveners questioned the practicality and safety of having two ERPs developed by two different ERP consultants for one sour project. While such concerns are highlighted by the proposed Duvernay project, one of the interveners stated that they were included in four different ERPs already and that they had concerns about the consistency and terminology between these ERPs as well as Duvernay's different response plans.

The interveners questioned whether the four rovers described in the ERP were adequate to search for transient users and to assist in evacuation of a 9.0 km drilling EPZ. They also questioned whether Duvernay's proposal to use helicopter support was realistic or practical, due to limitations on night time flying, the impacts of sour gas on helicopter functions and the mobilization time.

The interveners questioned Duvernay's estimated response time mentioned in relation to the production ERP, by the two area operators and suggested that the response time may be greater than 60 minutes in poor weather conditions. The interveners also argued that Duvernay underestimated travel times from Edson to the well site and contended that ignition and response times did not account for adverse weather and road conditions.

They questioned how Duvernay was going to effectively implement the ERP public protection measures with what they believed was inadequate manpower. The interveners noted that Duvernay was using 'on call' operators during the nighttime, when production operations are to be unmanned and questioned whether it was realistic for Duvernay to expect the two daytime operators to be able to effectively respond to a nighttime emergency after having worked all day.

The interveners expressed concern that two daytime operators were not sufficient to monitor the 8-13 battery as well as the pipeline. They questioned the number of routine and daily activities that must be undertaken at the 8-13 facility as well as pipeline maintenance operations and stated they believed that more resources were needed to monitor for any incidents. Also, the interveners argued that their safety would be impacted by Duvernay having unmanned operations at night, resulting in longer response times.

The interveners noted that at the time of the hearing the ERPs were out of date and inaccurate and specifically noted that a number of houses and recreational areas such as campgrounds,

quadding and skiing trails were not included on the ERP maps. They questioned how the rovers could adequately assist in evacuation and notification in the EPZ, when the required maps were missing key features.

The interveners expressed concern regarding Duvernay's proposal to use an automated callout system. Specifically, they questioned its effectiveness if the call was answered by a child or someone with limited comprehension of the intent of the phone call.

The interveners were not satisfied that the air monitoring proposed by Duvernay during the drilling stage was sufficient. They further contended that a sour gas release may not be detected by the monitors as it was possible that a release could be blown in different directions than where the monitoring units are placed.

The interveners acknowledged Duvernay's claims that other area operators could potentially provide initial emergency response support. However, they challenged the practicality of relying upon such partners in the absence of joint training exercises. The interveners were not confident that third party contractors would have the training or knowledge to implement an effective response. The interveners also expressed concern that agreements between Duvernay and area operators for assistance in an emergency were not formalized or finalized as of the time of the hearing.

The interveners also expressed concern about Duvernay potentially utilizing its Wildhay and Fort St. John personnel to assist in an emergency. The interveners felt that Duvernay's intention to utilize its Wildhay and Fort St. John area operators was ineffective, as Wildhay is approximately 80 km west of Edson, while the Fort St. John staff was located in northeast British Columbia.

The Buggs noted the wide variety of livestock and wildlife present on their grazing lease and expressed concern that the ERPs do not adequately address the potential evacuation of their livestock or address wildlife safety. The interveners were also concerned about Duvernay's plans for evacuation of certain livestock and pets in the event of an emergency, and considered it would be a considerable challenge to evacuate their elk and other livestock in the event of an emergency. The interveners noted that there is a reference to having a livestock operations manager person in the ERP but that there was very little elaboration on this matter.

The Buggs also noted the number of visitors that enjoy both their grazing leases and area recreational sites such as the Hornbeck ski trail which contain about 37 km of groomed trail. On the north lease of the Buggs, there is a major snowmobiling trail that goes from east to west and is part of a network of trails that goes to Hinton. The interveners noted that there are many recreationalists who will spend a whole weekend going back and forth through the trails in this area because of the connections. In hunting season, the interveners suggested it would not be unusual for 15 or 20 hunters to be in the area and whose location at any given time would be unknown.

The interveners stated that they often spend considerable amounts of their day on their grazing lease or enjoying the recreational areas and that to travel to the most northerly end of their grazing leases requires not less than 40 minutes given that it is 26 km by road of often poor quality.

Accordingly, the interveners were concerned with the ability of Duvernay to contact the landowners themselves, transients and recreational users.

7.3 Findings of the Board

7.3.1 Completeness of the ERP

The Board considers that an effective emergency response has two essential components, a thorough, effective and practical plan, and the means and experience necessary to carry out that plan. These two components are closely interrelated and both aspects can only be refined and perfected through ongoing practice and training.

In its examination of Duvernay at the hearing, the Board noted that its two ERPs required a number of updates, including updated resident lists, new maps with highlighted recreation activities, a change of the evacuation center, communication flowchart updates and a determination of whether Duvernay or Talisman would be operating the proposed well.

In keeping with ERP requirements outlined in *Directive 071*, Duvernay developed both a site specific drilling ERP and a production ERP and filed them with the EUB prior to the start of the hearing. Both documents were reviewed by the EUB's Emergency Planning and Assessment Group who determined that both ERPs met the information requirements described in *Directive 071* and both were deemed to be technically complete.

Generally the Board will deem an ERP to be technically complete long before it is ever necessary to implement it. In that regard, the Board expects and understands that the licensee will continue to revise and update its ERP to ensure it is finalized prior to implementation and regularly updated as long as the subject facility is in service. In this respect, the Board accepts that Duvernay's ERP was not entirely up to date at the time of the hearing given the time elapsed between the filing of its ERP and the commencement of the hearing.

However, the Board emphasizes that Duvernay is required to finalize its ERPs prior to the commencement of drilling or production operations. The Board accepts Duvernay's commitment to provide its updated ERPs to the EUB, prior to the commencement of the applied for operations.

7.3.2 Ignition Response Times

As noted in section 6.1.3, the Board finds that an ignition/response time of 15 minutes during the drilling phase of the project is a reasonable and achievable goal given that the well will be manned throughout this phase. To ensure that this goal is met, the Board will require Duvernay to demonstrate, prior to entering the sour zone, its ability to ignite the well within 15 minutes of an uncontrolled release occurring at surface. The Board considers that such a test will be most effective if conducted by its drilling crew with the rig in place.

During the production operation phase of the project, Duvernay stated that the 8-13 facility will be unmanned at night and would thus require a 30 minute response time in optimal conditions and up to 60 minutes for less than optimum conditions. The Board notes Duvernay's commitment to have two operators in the Edson area and on call to meet the required response

performance at all times. Duvernay estimated that the operators would be at the site and respond to a situation at the battery or pipeline within 45 to 60 minutes. The Board acknowledges the interveners are concerned that Duvernay may not be able to respond within 60 minutes during poor weather conditions, particularly as a result of its site visit prior to the commencement of the hearing.

The Board conducted a site visit of the project area and made note of the terrain, location of the site relative to Edson, and overall road conditions to which emergency responders would travel. The Board shares this concern about the ability of Duvernay operators to reach the lease and be ready to complete mitigative measures in 60 minutes, let alone 45 minutes. The Board questions the ability of the operators to travel this road in all types of weather and road conditions in the time frame estimated.

Given this concern, the Board will condition the facility and pipeline licence with respect to Duvernay conducting a verification of its stated response times contained within its production ERP. The Board will further express its views on this matter in the Training Section portion of this decision where details of Duvernay's commitment to conduct an exercise on its drilling ERP are further detailed.

7.3.3 Cooperation

The Board acknowledges that it is currently not a *Directive 071* requirement for the ERP to be fully tested prior to drilling. The Board is pleased with the cooperation between the interveners and Duvernay in addressing some of the issues of concern, including the commitment to the drilling ERP exercise. Further, the Board is pleased with the approach that Duvernay will take to include the interveners' emergency response expert in evaluating the drilling ERP exercise.

7.3.4 Communication and ERP Terminology

With respect to the communication concerns of the interveners, the Board acknowledges Duvernay's willingness to address the interveners concerns surrounding the automatic call out system. Any revisions to such systems should be included within the ERP that is to be resubmitted to the EUB. The EUB will consider these issues at that time.

With respect to the request of interveners to have satellite access to the information, the Board did not have adequate evidence at the hearing in order to make a decision on this matter.

The Board also notes that a significant amount of time at the hearing was spent on addressing the difference in terminology between the two ERP plans. While the Board considers that the potential for confusion may exist without proper training on the plans, as will be discussed in the below section, the Board is satisfied that the training program will be in place to address the terminology differences.

The Board notes that Duvernay did not appear to have turned its mind yet to the privacy issues associated with the ERP at the time of the hearing. Duvernay stated that it would be addressing these privacy issues.

8 TRAINING, EXERCISES, AND RESPONSE PERSONNEL

8.1 Views of the Applicant

Duvernay stated that its past experiences and exercises should provide some comfort to the Board and to interveners. Duvernay stated that it has already conducted three table-top exercises for the operations ERP and completed follow up reports on these exercises. Duvernay stated that any corrective items resulting from future exercises would be incorporated into training and the ERP. Duvernay also stated that it would undertake additional exercises after the closure of the hearing, and emphasized that such exercises are key to constant ERP improvement and responder knowledge.

Duvernay confirmed that both of its ERPs were reviewed prior to the hearing by EMRC, a third party emergency planning expert retained by the interveners. Duvernay stated that it was impressed by the work performed by EMRC and accepted its recommendations.

Duvernay further committed to the involvement of such experts in future ERP exercises before drilling and production commenced and would welcome the assistance that they could provide. Duvernay stated that it hoped that this would help address concerns of area stakeholders regarding Duvernay's ability to implement the ERP, and would ensure that their concerns are taken into account.

Duvernay stated that its senior management were committed to drilling the proposed well safely. Further, Duvernay stated that it was committed to protecting the residents in the unlikely possibility of a loss of well control.

Duvernay stated that it wanted to "ground proof" the ERP through one or more full-scale exercises to ensure that the ERP was functional, workable and effective. Duvernay stated that it wanted to identify any issues that might come out of these exercises and if so, to identify any corrective actions that might need to be taken. Duvernay stated it would rerun the exercises, if necessary, until it was satisfied that they were effective and workable.

Duvernay stated that it would conduct a full-scale exercise, preferably very close to the time of drilling and completion so that the actual environment was very close to what the company would experience during the actual drilling operations.

Duvernay stated that if there were residents that wished to observe the exercise, they would be invited. Duvernay offered that residents would also have the option of receiving a phone call, as part of the exercise, as if it were an actual notification. Duvernay stated it was willing to use real phone numbers of the residents as part of the callout and to put various people throughout the EPZ to see how the callout works, if the residents were interested to do so. However, Duvernay stated that it did not want to bother anybody that did not want to voluntarily participate.

Duvernay stated that it believed that design of the exercise was best left up to its emergency response planners who could design an appropriate test to confirm that the ERPs work. However, Duvernay stated that, with the agreement of the interveners, the actual exercise and plan would always be within the final decision and control of the company

Duvernay considered having EMRC do a third-party evaluation of the exercise at Duvernay's expense. However, it stated it had not worked out the details for this arrangement. Duvernay stated that it believed that the involvement of the EMRC was a step in building trust with the interveners. Further, Duvernay stated that it expected EMRC would prepare an honest evaluation on the exercise and report its findings back to the interveners.

Duvernay also stated that it would be pleased if the Board was willing to be involved in the on-site exercise, and to provide comments for improvements. Duvernay stated it would also welcome an EUB audit of the exercise. Duvernay stated that it saw the role of the EUB as one of evaluating and approving the implementation of the ERP. Duvernay stated that, in its view, the involvement of the Board would help restore confidence by the interveners.

Duvernay stated that the full-scale exercise was intended to simulate a real emergency and that there were two fundamental areas that it wished to test: well ignition and a complete evacuation within an appropriate timeframe and emergency level. Duvernay requested that the Board provide an opportunity for Duvernay to complete a successful ERP exercise and not condition the licence such that it could lose its licence if an exercise were unsuccessful. Duvernay would prefer that it not be allowed to drill until it had completed a successful test.

Duvernay stated that the full-scale exercise would include some of the following elements:

- to test roles and responsibilities
- to test the adequacy of the number of rovers for the drilling ERP
- to confirm times and distances
- to test the ability to safely evacuate all residents and transients in a timely fashion
- to test the ability to effectively communicate with persons, including children, that might not be able to fully understand the evacuation warning and the resulting follow up
- to drive the required routes to ensure that the rovers were able to reach the evacuees and any transients
- to demonstrate that the safety of the responders was protected
- to identify known recreation areas
- to ensure that communication is working to both rovers, roadblock crews and residents
- to ensure the information relayed to all persons is clear and applicable
- to test that the automated call out system's back up (manual system) is functional
- to test the follow-up measures in the event that residents don't reply to the evacuation message and to test how Duvernay's staff investigate why the replies weren't forthcoming
- to test the ignition time and decision-making process for drilling
- to test the ability to manage corporate EOC management issues

In response to a request from the Board, Duvernay provided Exhibit 004-21 as its initial views on performance measures for evaluating the proposed exercise.

With respect to the production ERP, many of the above items would also be similarly tested. Duvernay also stated that it was its intention to do exercises in a variety of weather conditions.

Duvernay confirmed that its production operators will be required to successfully complete ignition training and that other Duvernay employees or contractors would be required to attend the Incident Command System (ICS) 100 training course, which allows its users to adopt an integrated organizational structure to match the complexities and demands of single or multiple incidents without jurisdictional boundary issues.

Duvernay stated that by using selected, qualified and experienced contractor personnel, who have undergone extensive training, it would be able to safely manage operations associated with the project. Duvernay also stated that a Public Safety Coordinator would be on site to address any of the developing concerns and issues that would arise if an incident occurred.

Duvernay assured the Board that its response personnel implementing the 8-13 production ERP would fully understand their roles and responsibilities and will undergo training and practice sessions for implementing those responsibilities.

Duvernay acknowledged that it currently does not have official or signed mutual aid agreements with area operators, however it has had discussions regarding the planned operation and initial discussions about mutual aid with Yellowhead County, Aspen Regional Health Authority, the Edson and District Hospital, Talisman Energy, and EnCana Corporation. Duvernay confirmed that it would establish mutual aid agreements with Talisman and EnCana and that these agreements would be finalized prior to the start of operations

8.2 Views of the Interveners

The interveners were clear that their first preference was for the well application to be denied. However, if the Board were to approve the applications, the interveners were very supportive of the exercise approach to evaluate the ERPs, especially since they believed Duvernay did not appreciate the work involved in ground truthing its ERPs.

The interveners stated that their vision for the exercise was that they and EMRC would be consulted so that they would have input into its planning. However, the interveners agreed that the final decision and control would be in the hands of the company. Further, the interveners envisioned that they would observe the exercise and they wanted ERMC to observe the exercise, document its views on how well the exercise went, and then provide a report for the interveners. The interveners also believed that EMRC should have input into the performance criteria used. The interveners agreed with Duvernay that the design of the exercise should be left to the experts.

With respect to assisting in verifying the estimates of ignition timing, the interveners suggested that there might be statistics or information already available to the Board. The interveners understood that the Leduc Training Center had this capability. The interveners saw the exercise being of the scale that would require the participant of mutual aid partners, the County, and the EUB.

The interveners wanted an assessment of Duvernay's ability to implement all the components of its ERP, including the abilities of its response personnel, the functionality of the backup safety equipment and communications component of the plan, and an assessment to include the ability of the rovers to locate hunters and skiers and others that might be called "recreationalists."

The interveners believed that if the EUB approved Duvernay's application, it would have no choice but to participate in the exercise to ensure that Duvernay demonstrated its ability to implement the plan and fulfilled its commitments and intent.

With respect to the Board's role in overseeing the proposed exercise, the interveners stated they would be satisfied if the Board staff were given the authority to make the assessment of whether or not Duvernay completed a successful exercise and that it was not necessary for the Board itself to make this determination. However, the interveners stated that, in their view, the Board staff who were doing the assessment of the exercise must be independent from and not the same people who had already found that the ERPs were technically correct.

With respect to the drilling/completion ERP and the production ERP, the interveners stated that they found the two different plans confusing due to different language and emergency response procedures used. The interveners contended that some of Duvernay's responders would have to be trained on both plans, resulting in a potential source of confusion due to this difference in languages and in roles and responsibilities for each plan. The interveners also questioned the training schedule and program that Duvernay may have developed to address this concern.

The interveners noted the number of times that Duvernay requested direction from the EUB to help ensure the ERPs and training methods were appropriate. The interveners contended that Duvernay was demonstrating its lack of experience with a project of this magnitude, by asking for assistance from the Board so frequently. The interveners stated that it is Duvernay's responsibility to know the appropriate and applicable emergency response procedures and safety regulations

The interveners expressed a lack of confidence in the training and experience with H_2S of the Duvernay responders. The interveners referenced some shortcomings identified in a report prepared on their behalf by EMRC. While the interveners acknowledged Duvernay's commitment to implement the EMRC recommendations, they questioned why such steps had not been taken earlier by Duvernay and that only at their instigation was such a measure was taken.

8.3 Findings of the Board

When determining whether to issue an approval for any sour facility, the Board must be satisfied that the applicant possesses the necessary technical knowledge and experience as well as a strong commitment to public safety. As Duvernay has never drilled a critical well, the Board cannot rely upon Duvernay's corporate record when assessing its capability to operate the applied for well. Rather, the Board must consider the experience of the individuals employed or contracted by Duvernay to carry out this task and the training measures it proposes to ready itself for this significant challenge.

In this respect, the Board notes that prior to the hearing Duvernay completed several table top exercises on its drilling ERP and its production ERP. The Board also notes Duvernay's further

commitment to conduct a full scale training exercise to demonstrate its ability to safely and effectively implement its drilling ERP. As a part of this commitment, Duvernay confirmed that its staff would undergo other relevant training such as ignition and incident command.

The Board considers that the table top exercises already conducted have allowed Duvernay to become familiar with its ERPs and have improved its response capability. The Board also supports the use of outside support services and mutual aid agreements with other operators, as their participation substantially increases the response capability.

The Board further understands that the interveners question the appropriateness of using other area operators and mutual aid responders who may not be familiar with Duvernay's emergency response procedures. However, the Board notes that there are elements of emergency response that are common to all ERPs regardless of the specific company. These common elements are associated with the key requirements stipulated within *Directive 071*. One such common element is the establishment of roadblocks; a responsibility that Duvernay has stated that other area operators may assist with during an emergency.

The Board notes that prior to commencement of the hearing, and in conjunction with concerns expressed by the interveners that Duvernay underwent an ERP review process with EMRC. The Board has reviewed the recommendations made by EMRC, and finds them to be appropriate. The Board is pleased with Duvernay's decision to implement the recommendations. The Board further notes that Duvernay also committed to undergoing another third party review, and committed to incorporate any findings into its ERP.

The Board would like to make clear, that Duvernay's third-party evaluation that it committed to participating in, does not preclude the Board from conducting a separate EUB emergency response assessment of Duvernay's production ERP in the future.

The Board appreciates Duvernay's commitments to conduct a full scale training exercise on its drilling ERP and have its emergency responders complete ICS training. The Board considers that Duvernay has taken a very progressive approach in this regard. Further, the Board is pleased with the approach of Duvernay and the interveners to involve the interveners' experts and those interveners who wish to constructively participate in the exercise.

The Board expects that the exercise will be developed consistent with the evidence, representations and commitments made in this proceeding and the conditions listed in Appendix 2. The Board recognizes that Duvernay's proposed exercise represents a greater commitment than is required by the current *Directive 071*. Nonetheless, the Board expects this committed exercise to be developed no less than in accordance with the exercise requirements detailed within *Directive 071*, as well as to incorporate key concerns identified by the interveners.

The Board directs Duvernay to submit a report detailing the results of the exercise and any action items identified during the exercise to be provided to the interveners, in addition to being submitted to the EUB. Although the Board will not direct that the interveners submit a copy of the report that their expert completes for them, the Board would appreciate receiving a copy.

The Board reminds Duvernay that all wells drilled in Alberta, regardless of any stated commitment within the hearing process, are subject to the regulations detailed within *Directive 036*: *Drilling Blowout Prevention Requirements and Procedures.* This directive details the EUB

minimum equipment and procedure requirements that the licensee must follow when drilling wells in the province. Section 16.2 of this directive details, the licensee's representative must be familiar with the ERP and can be subject to the review criteria contained within Appendix 14 of *Directive 036*.

At the hearing, Duvernay was not in a position to advise the Board whether Duvernay or Talisman would operate the well. When Duvernay submits its production ERP to the Board for approval, Duvernay is required to advise the Board which company will be operating the well and how the ERP has been adjusted if Talisman is to be a contract field operator for the well. The Board expects that the personnel of the company that would actually be performing the day-to-day field operations would be the personnel that are being tested in the exercise.

9 FLARING, INCINERATION, AND DISPERSION MODELLING

9.1 Views of the Applicant

Duvernay evaluated the impacts of H_2S, SO_2 and NOx emissions by conducting air dispersion modelling under five different operations and emergency situations. These five models were run by RWDI Air Inc. (RWDI) and First Response Emergency Services (FRES).

The H_2S dispersion for EPZ determination is reviewed in Section 6 of this decision. The remaining discussion of modelling follows.

9.1.1 SO_2 Dispersion for Uncontrolled Ignited Releases during Drilling and Completion

Duvernay initially determined SO_2 dispersion predictions for an ignited well blowout during drilling and completions using the AERMOD dispersion model with Alberta Environment (AENV) screening meteorological data. Duvernay stated that site specific meteorological and terrain data was not used because it is standard practice to use default values unless there are site specific concerns. Duvernay stated that its results indicated that EUB evacuation criteria for SO_2 concentrations, as specified in *Directive 071*, would be achieved at 3.05 km from the well.

Duvernay subsequently revised its SO_2 dispersion predictions to address intervener concerns that the meteorological and terrain data used in the model were not specific to the well site. The AEROMOD dispersion model was rerun using refined meteorological data based on the Multi-Model Extraction Utility (MMEU) tool. Duvernay noted that terrain inputs were also adjusted to correct for proper hill heights. Duvernay stated that its revised results showed the distance increased for an area extending to 5.64 km from the well site which it stated was within the 9 km drilling and completion EPZ.

Duvernay stated that it assumed the discharge from the well was vertical rather than horizontal for drilling when it modeled the ignited uncontrolled well scenario. Duvernay stated that it believes that this approach is consistent with expected release conditions where the combination of extreme heat and high well flow rates are expected to quickly incinerate any drilling rig materials that might obstruct the discharge. Duvernay's expert, Mr. Dowsett, stated that he had used a horizontal release for the production scenario as it seemed reasonable the situation could develop where the pipe was bent to a horizontal position.

9.1.2 SO_2 Dispersion for Sour Gas Well Test Flaring during Drilling and Completion

In response to intervener concerns, Duvernay revised its initial sour gas flare permit application to include refined meteorological data that it considered representative of the well site and to consider regional cumulative effects of SO_2 in accordance with Section 3.6.6 of EUB *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*.

Duvernay submitted that its revised dispersion modelling results using refined meteorological data showed that flaring will meet all EUB low-risk criteria from October to March with the addition of propane fuel gas. For the months April through September, the low risk criteria could not be met under all conditions. Duvernay acknowledged that additional modelling will be required if these months are to be considered as possible test dates.

Duvernay stated that ideally it would like to drill this well in February 2008. However, it committed to undertaking additional modelling if the well is drilled during the April to September time period. Duvernay indicated it was willing to notify the interveners if it applies for another flare permit to complete and test the well in the summer months, and also to share the additional modelling results with the interveners.

Duvernay applied for 96 hours of flaring in its flare permit application but stated that it expects to only need to flare for 36 hours. Its expectation was that there would be 12 hours of cleanup followed by an additional 24 hours for a total of 36 hours.

Duvernay stated that it had performed a search of EUB and AENV information and concluded there are five sweet gas processing facilities within 7 km of the 8-13 well site. The closest sour gas processing facility is greater than 10 km from the well site. Therefore, Duvernay determined that cumulative effects for modelling of the temporary well testing were not required as there are no continuous SO_2 sources in the area.

9.1.3 SO_2, NO_x Dispersion for Emergency Depressurization Flaring during Operations

Duvernay submitted revised SO_2 dispersion results of emergency flaring at the proposed 8-13 well. The dispersion model was rerun using refined meteorological data based on the MMEU tool. Duvernay submitted that the revised results showed all EUB low-risk criteria were met with the addition of 6×10^3 m^3 per day of propane to the emergency flare. Duvernay also argued that in accordance with *Directive 060* requirements, complex terrain modelling is not required in this flaring scenario.

In response to intervener concerns that appropriate flow rates were not used in the initial model, Duvernay indicated that gas flared after an emergency shutdown at the 8-13 facility would take 40 minutes to completely depressurize from 8650 kPa to zero. Duvernay noted that AENV requires that flaring durations less than an hour be adjusted to 1 hour for dispersion modelling purposes. Duvernay submitted that the maximum and low flow rates are not relevant to the air quality assessment nor required to meet AENV modelling requirements.

9.1.4 SO_2, NO_x Dispersion for Continuous Incineration of Sour Waste Gas during Operations

Duvernay stated that 3.04 10^3 m^3 per day of sour gas production will be continuously incinerated at the proposed 8-13 facility. Initial modelling of continuous emissions of NOx and SO_2 was also done using the AERMOD model as well as AENV screening meteorological data and flat terrain assumptions. Duvernay stated that the results showed compliance for NO_x emissions; however, SO_2 emissions showed noncompliance with the Alberta Ambient Air Quality Objectives (AAAQO) for the 24 hour averaging period. Duvernay submitted that the predicted 24 hour SO_2 exceedance is infrequent, likely two days out of the 1826 days evaluated, and unlikely to occur.

In response to the concerns raised about these potential exceedance, Duvernay reran the AERMOD dispersion model using MMEU generated meteorological data, digital terrain heights to correct for proper hill height, and an incinerator stack height increased to 36.6 m. Duvernay submitted that the revised model results showed that the proposed 8-13 facility would be in compliance with all of the applicable AENV AAAQO's for SO_2 and NO_2 from sour gas incineration.

Duvernay is committed to performing a stack survey of the proposed incinerator stack to ensure that the actual exhaust parameters conform with the parameters used within the model. If the parameters differ, Duvernay also stated that it would ensure that the Alberta Ambient Air Quality Objectives are met for the proposed incinerator.

9.2 Views of the Interveners

9.2.1 SO_2 Dispersion for Uncontrolled Ignited Releases during Drilling and Completion

The interveners argued that dispersion modelling using AENV screening meteorological data cannot satisfactorily characterize the well site and surrounding areas, and will not be as reliable as site specific data. The interveners also pointed out that hill heights were set to zero in the AERMOD model which they felt was a deficiency.

The interveners requested, prior to the hearing, that Duvernay rerun the SO_2 dispersion modelling for an ignited well to reflect actual conditions at the well site and acknowledged that Duvernay revised the SO_2 dispersion results using refined meteorological data and corrected the terrain inputs. They also recognized this approach was agreed upon by AENV staff. Some interveners still had concerns that the refined meteorological data, based on an accepted simulation program, showed wind coming predominantly from the south and noted that the prevailing wind, in their view, comes mostly from the west and northwest in this area.

The interveners noted that the revised SO_2 dispersion results for an ignited well changed the distance to meet *Directive 071* SO_2 criteria from 3 km to 5.6 km from the well site. The interveners felt that people who live in the expanded zone should be notified of this change as it changes the potential risk to them due to the drilling activity. If an uncontrolled release is ignited, the interveners felt that people who live in the zone should understand that they may not be able to return to their homes until a potential well fire is extinguished.

The interveners also believed that a horizontal rather than a vertical release angle should be used to model an ignited uncontrolled well release. They argued that in the course of an ignition, the rig will collapses on the well forcing the ignited plume to be horizontal. In this scenario, the interveners argued that the SO_2 concentration predictions will be higher than the values modeled by Duvernay using a vertical release and the area impacted by SO_2 emissions will be greater.

9.2.2 SO_2 Dispersion for Sour Gas Well Test Flaring during Drilling and Completion

The interveners did not find Duvernay's initial well test flaring assessment results to be acceptable. They argued that dispersion modelling should be redone using site specific meteorological data and that the cumulative effects of continuous SO_2 sources in the region should be considered as per *Directive 60, Section 3.6.6.*

The interveners acknowledged that Duvernay's revised well test flaring results had incorporated refined meteorological data. They also understood that Duvernay will meet the EUB low-risk criteria with respect to the flaring in the period from October to March with the addition of propane fuel gas, but noted that Duvernay would not be able to meet the low-risk criteria if flaring occurred during April to September. For these reasons, the interveners stated their preference to see the well drilled in the October to March time period and for Duvernay to consult with stakeholders regarding the results of any remodelling.

9.2.3 SO_2, NO_x Dispersion for Emergency Depressurization Flaring during Operations

The interveners stated that Duvernay's dispersion modelling included results only for the average flow rate. Other flow rates, required by *Directive 60,* such as the maximum flow rate, which they stated was most likely to result in an exceedance, was not included within Duvernay's analysis.

9.2.4 SO_2, NO_x Dispersion for Continuous Incineration of Sour Waste Gas during Operations

The interveners requested that the SO_2 dispersion modelling for continuous incineration of sour waste gas be redone to account for site specific meteorological conditions, input appropriate terrain heights, and outline a plan to reduce any exceedance of the AAAQO for SO_2 levels.

The interveners acknowledged that Duvernay's revised dispersion modelling results incorporated refined meteorological data and complex terrain inputs. The interveners understood that the incinerator stack height was increased to achieve AAAQO for SO_2.

9.3 Findings of the Board

9.3.1 SO_2 Dispersion for Uncontrolled, Ignited Releases during Drilling and Completion

The Board acknowledges that Duvernay's revised SO_2 dispersion predictions addressed the interveners concerns and that the meteorological and terrain data used in the model are representative of the well site. Although the interveners felt that the prevailing regional wind direction is from the north and the west, the Board accepts Duvernay's conclusions that the refined meteorological data used in the modelling is adequately representative of the well site conditions.

The Board is also cognizant that the revised SO_2 dispersion modeling results for an ignited well resulted in an increase of the area requiring evacuation from 3 km to 5.6 km from the well site. The Board agrees with the interveners that people who live in the expanded zone must be notified of this change and how it might affect them during drilling of the well. Residents need an understanding that if an uncontrolled release is ignited, they might not be able to return to their homes until the well is extinguished. The Board understands that Duvernay is committed to following through with this notification.

The Board accepts that Duvernay has completed modelling that provides for a reasonable prediction of the maximum SO_2 concentrations during an ignited well release.

In any case, Duvernay is required to monitor the resulting SO_2 dispersion concentrations in the event of an ignited uncontrolled well release and Duvernay is required to take any necessary resulting actions.

9.3.2 SO_2 Dispersion for Sour Gas Well Test Flaring during Drilling and Completion

The Board believes that Duvernay's revised dispersion modelling results using refined meteorological data and flaring with the addition of propane fuel gas will meet all EUB low-risk criteria from October to March. However, for the months April through September, the low risk criteria could not be met under all meteorological conditions and *Directive 060* requirements.

The Board accepts Duvernay's commitment to undertake additional well test modelling if the well is drilled during the April to September time period, to notify the interveners if it applies for another flare permit, and to share the additional modelling results with the interveners. The Board understands that Duvernay will not exceed 3.00 e^3m^3 during completion of the well and will comply with *Directive 060* requirements for the flare permit application.

9.3.3 SO_2, NO_x Dispersion for Emergency Depressurization Flaring during Operations

The Board also acknowledges that Duvernay's revised model results show all EUB low-risk criteria are met with the addition of $6 \times 10^3 m^3$ per day of propane to the emergency flare. The Board is satisfied that Duvernay has demonstrated it will meet applicable *Directive 060* flaring requirements.

9.3.4 SO_2, NO_x Dispersion for Continuous Incineration of Sour Waste Gas during Operations

The Board recognizes that, based on an incinerator stack height of 36.6 m and the use of revised model input parameters for meteorological data and terrain, the proposed 8-13 facility will be in compliance with all of the applicable AENV AAAQO's for SO_2 and NO_2 from sour waste gas incineration.

As the proposed facility plans continuous incineration, Duvernay stated that it would accept as a condition of the approval the requirement to perform a stack survey of the proposed incinerator stack to ensure that the actual exhaust parameters conform to the parameters used within the model.

Accordingly, the Board requires Duvernay, as a condition of its license, to perform a stack survey of the proposed incineration stack and to ensure that the actual exhaust parameters conform to the parameters used within the model. If the parameters differ, the Board requires Duvernay to take the necessary measures to ensure that the Alberta Ambient Air Quality Objectives are met for the proposed incinerator.

10 COMPLIANCE ISSUES

10.1 Views of the Applicant

Duvernay stated that it was surprised to learn that the interveners had used the *Freedom of Information and Protection of Privacy Act* to gain access to information regarding its past EUB noncompliance activities. Duvernay stated that it would have preferred the interveners to have approached the company directly as it would have willingly supplied the interveners with the information they requested.

Duvernay argued that when an enforcement action is issued by the EUB, the company is required to produce an action plan outlining how it intends to rectify the problem. Duvernay stated that it had developed such plans and that they were accepted by the EUB as addressing the noncompliance issue. Duvernay also stated that a company is not just expected to fix the problem at the site, but also to adjust its processes company wide. The corporate policy must be revised in order to incorporate learnings from an action plan into company policy. Duvernay stated that one such action were improved pipeline inspection processes that are now occurring on a regular basis.

Duvernay submitted that as a result of the noncompliances that occurred with drilling of a sour gas well and the Duvernay drilling program which now exists, its drilling supervisors are required to complete a number of tests, including blowout preventer pressure tests. It stated that those reports are now submitted daily to Duvernay's Calgary office and the Calgary office is in contact with the field daily. Duvernay also stated that its procedure manual is now sent out to each drilling rig consultant for use should an issue arise. Duvernay is also ensuring adherence to all EUB guidelines on specific flow check problems.

Duvernay stated that it has learned from these high risk noncompliances and has improved its ongoing processes as a result of them. Duvernay stated that it now has an incident reporting system in place. If there is an incident in the field related to a facility, construction, drilling, completions and operations, an incident report is filled out and followed up on by the Calgary office. Duvernay stated further that it carries out an investigation and ensures that recommendations for future actions occur. Duvernay stated that it has refined its corporate policy for drilling and other operations to reflect the concerns identified in the enforcement actions.

Duvernay stated that it believes that although past performance is also important, it is also important to recognize that it has corrected these noncompliances by developing accepted action plans and improved company procedures.

Duvernay argued that its compliance record is better than the current industry average and emphasized that over the last few years, it has had an 80.5 per cent satisfactory inspection rating.

10.2 Views of the Interveners

The interveners argued that Duvernay has had past EUB noncompliance issues regarding other operations in the province and that it does not therefore have the trust of the public.

The interveners believe that not every company that applies for a licence should get one and that companies should have a proven track record and proven ability, infrastructure, human resources and superior operating standards.

The interveners cited a recommendation in the PSSG report that stated province-wide performances of a company should be taken into consideration when making decisions respecting proposed sour gas facilities.

The interveners argued that Duvernay has not proven that it has the capability to drill or produce a critical sour gas well. The Buggs stated that they are very supportive of "good" industry, but that they believed that Duvernay was taking an approach which focused on as little investment of time and money as possible. They also argued that Duvernay placed too much reliance on the regulator to lay out the procedure and protocols and did not focus attention on its own responsibilities to have its applications approved

10.3 Findings of the Board

The EUB recognizes the significant challenges associated with Duvernay's project and considers that the opportunity to drill and operate such a well must be reserved to companies that possess the necessary knowledge, experience and commitment to public safety. In that regard, the Board must assess whether Duvernay has demonstrated these attributes by assessing its corporate compliance record and its response thereto.

The Board notes that since 2004 Duvernay has received two high risk noncompliance events associated with drilling sour wells in Alberta. While a company's compliance record is a very important factor to consider in an application for critical sour wells, pipelines, or facilities, the Board also considers the company's response to such actions. The Board accepts that Duvernay took significant and meaningful steps to prevent reoccurrence and improve its operations for each enforcement action received.

The Board is not of the view that Duvernay's applications should be denied as a result of its compliance record. To the contrary, the Board finds that Duvernay's compliance record demonstrates it to be a responsible operator with appropriate management practices in place. In the Board's view, Duvernay's responses to the various enforcement actions demonstrate a commitment to ensuring the protection of the public and the environment.

11 PUBLIC CONSULTATION AND OTHER MATTERS

11.1 Views of the Applicant

Duvernay stated that it believes its public consultation efforts were meaningful and fully met and exceeded the Board's requirements as per *Directive 056* for the proposed well, battery and pipeline. Duvernay stated that it had established a participant involvement plan for consultation

and notification for stakeholders and consulted with over 70 area residents within the area for the well, battery and the pipeline. Duvernay stated that it held meetings in Edson to allow residents to participate in discussions regarding the project and that information regarding the EUB's facilitation process was also provided. Duvernay stated that it had phone call discussions with the interveners to further discuss concerns and project update materials have continued to be sent out to area stakeholders regarding Duvernay's plans. Duvernay stated that it had also conducted an emergency response workshop to promote a greater understanding of emergency response procedures and its ERPs.

Duvernay stated that it had discussions with the local Yellowhead Synergy Group regarding this project and would continue to work with them. Duvernay also stated that it planned to continue to work with all area stakeholders and the interveners to ensure that all concerns are addressed and that it continued to gain the trust of the area residents

Duvernay acknowledged that its public consultation and notification program did not take into account two families that have recently moved onto the Buggs subdivided home quarter lands. However, Duvernay acknowledged that both EUB *Directive 056: Energy Development Applications and Schedules* and *Directive 071* requires that consultation needed to take place with these individuals as well as any other persons that have moved into the area since the original consultation occurred and committed to undertake those actions.

Duvernay also stated that additional development and refinement of the ERPs has occurred through consultation with area stakeholders, and that one of the requirements of *Directive 071* was the updating of its ERP prior to commencement of operations. Duvernay confirmed that personal information required under *Directive 071* for residents within the respective EPZs will need to be verified and updated. Duvernay stated that it understood that it would continue to have ongoing relationships with people within its planning zones and that it hoped to be able to build trust and good neighbour relations with the community.

Although Duvernay argued that it did a good or very good job on its public consultation program, it acknowledged that it had a rocky start. Duvernay stated that upon recognizing this, it ensured more appropriate persons were involved in the project and focused more on the issues.

11.2 Views of the Interveners

The interveners expressed dissatisfaction with the public consultation efforts made by Duvernay. Among other things, they expressed concern that there was confusion with information that was in the community regarding this project and a proposed ProspEx Resources Ltd. (ProspEx) well with a much lower H_2S release volume that was later cancelled. Since Duvernay's working partner on its project is ProspEx and since this well application and the cancelled ProspEx well application were brought before the community at the same time, the interveners suggested that Duvernay intentionally attempted to cause confusion with the public.

The interveners were also concerned with the timing of the information sessions that were held by Duvernay and the EUB.

The interveners were concerned that Duvernay and its consultants frequently wanted to have meetings and talk on the phone when the interveners wanted answers to specific questions and

solutions to their concerns. One intervener stated that more detailed information about the actual project should have been provided to the interveners to assist in understanding the project.

The interveners identified two new families that moved during October 2006 and February 2007 onto subdivided land owned by the Buggs. The interveners were concerned that Duvernay's last update of new residents was in August 2007 and some new residents needed to be contacted and consulted about the project.

The Buggs were also concerned that Duvernay had advised them that they were not in the ERP for operations and expressed concerned that Duvernay did not realize that the Buggs grazing lease was in the proposed EPZs. They noted that they spend a significant amount of time on the grazing lease and expressed concern over the apparent lack of acknowledgement of that by Duvernay.

In addition to the concerns surrounding consultation, the interveners expressed concern with other area operators and listed past unsatisfactory industry experiences.

The Buggs stated they have experienced considerable problems in the past with respect to being able to determine where a sour gas odor came from. In some of these situations, the source of the problem was identified, but in other situations the source was never identified. When the matter was investigated further by the interveners, oilfield records that would have helped identify the source were unavailable.

The Buggs stated that they have also had personal health effects and livestock losses that they attribute to sour gas releases. Some of these releases they claim have been traced to the Canadian Crude Separators Inc. (CCS) waste disposal operations. The interveners expressed concern that the EUB does not appear to follow-up on and monitor energy developments that have been approved following a public hearing and cited the approval of the CCS waste disposal facility as an example.

The interveners used truck traffic through Edson as an example, indicating that they felt the number of trucks passing through Edson on the way to the facility appeared to be increasing despite CCS's commitment that traffic to the site would not increase through Edson. Another concern expressed by the interveners was that the Edson Hospital does not have the capability to respond if there is an emergency and that there is a need for a new hospital in the area.

The interveners expressed the concern that the additional activity in the area will bring additional vandalism.

The interveners submitted that Duvernay should be cognizant of the interveners preferred timing for any drilling activities and felt that the safest season is likely October to April.

11.3 Findings of the Board

The Board notes the level of concern and dissatisfaction expressed by the interveners with respect to consultation. In the Board's experience, building relationship and trust between parties is one of the keys to a successful consultation process; the Board therefore strongly encourages Duvernay to find ways to improve communication and to continue to build trust with interveners and the community.

Although Duvernay appears to have had a rocky start with the public consultation program, it appears to the Board that Duvernay improved its program and its approach to consultation over time. The interveners agreed that the initial contact by Duvernay was not appropriate and acknowledged that Duvernay made changes to its personnel in response to that concern.

It is the Board's experience that the point of first contact by a company with area residents is critical to the long-term relationship. The Board encourages companies to make sure that the persons conducting this first contact have the necessary information and relationship skills.

The Board observes that once trust and confidence is lost, it takes significantly more effort to gain it back than would have taken if consultation and first contact had been done correctly.

The Board also observes that Duvernay and its consultants could have shown more consideration to the manner in which the interveners wished to be communicated with and could have shown more consideration in respecting the timing of those consultations. While the Board is aware that companies have their own internal timelines and demands to work with; companies should also be cognizant of the time constraints and pressures of daily living for affected individuals, and communicate accordingly.

With respect to the previous sour gas problems that the Buggs, in particular, have experienced the Board requests its staff to review these issues and concerns about CCS and other companies in the area and to provide the full Board with its assessment and recommendations. The Board notes that the interveners have contacted other agencies and the municipality with regard to a number of these concerns, including those relating to medical facilities and that these are areas over which the EUB does not have jurisdiction.

In the other sections of this decision, the Board has commented on the number of issues that are related to public consultation. However, the Board will not repeat those issues in this section and refers the interested reader to all of the other sections.

The Board does not find any outstanding matters that it has not already addressed in the preceding sections that would warrant denial of the applications on the topic of public consultation.

The Board discussed with Duvernay at the hearing whether the Board should revise its practice regarding ERP completeness for companies going to hearing, in future editions of *Directive 071*. Duvernay considered that it would be useful for the Board to give greater guidance to applicants on the Board's expectations for the degree of completeness required for the ERPs on applications that are going to a hearing.

Given the foregoing, the Board requests the EUB's Public Safety Group to bring this issue forward to the full Board with its recommendations on whether or not future applicants should be required to have a finalized ERP prior to going to a hearing so that interveners would have sufficient time and opportunity to examine and test a completed ERP document.

While the Board notes that the Buggs residence lies outside of the EPZ area for the production ERP, the Board refers Duvernay to Section 2.2.2.1 of *Directive 071* that requires identification of all persons, such as grazing lease users, within its ERP. It is the opinion of the Board that the

Buggs do have land interests that lie within the production EPZ. The ERP must be updated appropriately.

12 CONCLUSIONS

Prior to and during the hearing, Duvernay made a number of commitments that Duvernay views would be a benefit to the project or to the community, but are not strictly required by the Board's regulations. The Board expects Duvernay to follow through on these commitments. The Board reminds Duvernay that there may be consequences for a failure to follow through on these commitments. The Board encourages Duvernay to carefully read the introductory statements by the Board in Appendix 3 that deals with the commitments.

The Board commends all parties for their cooperation during the proceeding and for the assistance that they provided to the Board in providing the necessary views and evidence to allow the Board to render a decision.

The Board is satisfied that the proposed well and facilities are in the public interest. Once the commitments including the ERP exercise are implemented, and the Board's conditions which include the updating of the ERPs, are met, the Board is satisfied that the well can be safely drilled and the facilities safely operated to provide the necessary level of protection for the public and the environment.

Dated in Calgary, Alberta, on December 20, 2007.

ALBERTA ENERGY AND UTILITIES BOARD

<original signed by>

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

<original signed by>

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

<original signed by>

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

APPENDIX 1 HEARING PARTICIPANTS

Principals and Representatives (Abbreviations used in report)	Witnesses
Duvernay Oil Corp. (Duvernay) A. Harvie, Counsel, Macleod Dixon LLP	K. Archibald, of Duvernay Oil Corp. A. Bush, of Duvernay Oil Corp. T. Krysak, of Duvernay Oil Corp. N. Stephenson, of Duvernay Oil Corp. D. Chadder, of RWDI Air Inc. I. Dowsett, of First Response Emergency Services Ltd. H. Davie, of Gecko Management Consultants T. Messer, of Caliber Planning
Interveners K. E. Buss, Counsel, Ackroyd LLP	J. Bugg F. Makowecki C. Thompson Dr. Du
Alberta Energy and Utilities Board staff JP Mousseau, Board Counsel J. Fulford G. McLean C. Ravensdale D. Burke P. Hendy	

APPENDIX 2 SUMMARY OF CONDITIONS

This section is provided for the convenience of the readers. In the event of any omission of conditions, or any difference between the conditions in this section and the material in the main body of the decision, the intent or 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 well or facility. The conditions imposed on the licence are summarized below.

The Board would like to note that in the event any commitments made by Duvernay detailed within Appendix 3 contradict the conditions listed below, the conditions take precedence.

Given the concerns expressed by the parties about the application and the responses by Duvernay, the Board finds it prudent to impose the following conditions upon Duvernay:

1) Duvernay's ERPs must be finalized prior to the commencement of drilling and production operations. Duvernay must provide its updated ERPs to the EUB prior to the commencement of the applied for operations. (page 18)

2) Duvernay must confirm during the drilling stage, prior to entering the critical sour zone, its ability to ignite the well within 15 minutes of uncontrolled sour gas release at surface. The Board considers that such a test will be most effective if conducted by its drilling crew with the rig in place. (Page 18)

3) With respect to the facility and pipeline licence, Duvernay must conduct a verification of its stated response times contained within its production ERP or adjust its EPZ size and ERP accordingly if it is unable to demonstrate its ability to achieve a 60 minute response/ignition time prior to commencement of production operations. (Page 13)

4) Duvernay must perform a stack survey of the proposed incineration stack and ensure that the actual exhaust parameters conform to the parameters used within the model. If the parameters differ, Duvernay must take necessary measures to ensure that the Alberta Ambient Air Quality Objectives are met for the proposed incinerator. (Page 30)

APPENDIX 3 SUMMARY OF COMMITMENTS

The Board notes throughout the decision report that Duvernay Oil Corp. has undertaken to conduct certain activities in connection with its operations that are not strictly required by the EUB's regulations or guidelines. These undertakings are described as commitments and are summarized below. 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 the applicant, having made the commitments, to fully carry out the undertaking or advise the EUB if, for whatever reasons, it cannot fulfill a commitment. The EUB would then assess whether the circumstances regarding the failed commitment warrant a review of the original approval.

The Board also notes that the affected parties also have the right to request a review of the original approval if commitments made by the applicant remain unfulfilled.

The list was taken from Exhibit 04-27 provided by Duvernay in response to a Board request and from commitments made during the course of the hearing by Duvernay. The Board has revised some of the wording from Exhibit 04-27 to reflect its understanding of the commitment based on the evidence.

It should be noted that any updates that relate to an ERP are required by Directive 071 to be submitted to the EUB for approval prior to any drilling or production activity.

In the event that any commitments made by Duvernay were omitted from this list, the Board considers that those commitments are still in effect.

In cases where the commitment related to individuals that did not participate in the oral hearing, the Board removed those specific names to protect their privacy.

Drilling, Completion, and Well Testing

1) Once the well is production tested, if Duvernay reruns dispersion models, Duvernay will notify the interveners of the results.

2) If Duvernay intends to complete the well between April and September, additional modeling will be required. This modeling and subsequent flare application will be provided to the interveners.

3) Duvernay commits to having two operators onsite seven days a week for the day shift during the production phase.

4) Duvernay commits to have two operators in the Edson area and on call to meet the required ERP response performance time, when there are no operators on site at the facility.

5) Duvernay commits to implement facility and pipeline automation as discussed during the proceeding.

6) Duvernay commits to undertake additional well test modeling if the well is drilled during the April to September time period.

7) Duvernay commits to notify the interveners if it applies for another flare permit, and to share the additional modeling results with the interveners.

8) Duvernay committed to remove all produced liquids from the site in pressurized trucks to eliminate odors.

ERPs

9) Duvernay commits to ignite the well within 15 minutes after an uncontrolled sour gas reaches the surface during the drilling and completion phase.

10) Duvernay commits to demonstrate its ERP capability by conducting a full-scale drilling ERP exercise prior to entering the Wabamun. The exercise will include Duvernay's ability to ignite the well within 15 minutes of an uncontrolled sour gas release reaching the surface.

11) Duvernay commits to test rover deployment during a full scale ERP exercise (drive to individual residences in the EPZ and record distances and times). Additional rovers will be added if necessary.

12) Duvernay commits to have its emergency responders complete ICS training.

13) Duvernay commits to undergoing another third party review of its drilling ERP exercise, and committed to incorporate any findings from that review with respect to training and/or ERP implementability into its ERP.

14) Duvernay commits to test the 60 minute ignition time for the production phase in a variety of weather and road conditions prior to the commencement of production. If the exercise indicates a longer response time, Duvernay will adjust the size of the ERP accordingly.

15) During the period between completion and start of production, Duvernay will suspend the well and visit the site once per day. Perimeter monitoring will be in place at this time.

16) Duvernay commits to submitting the updated ERPs for approval by the EUB.

17) Duvernay committed to move the evacuation center from the Parkland Composite High School to Edson and District Recreation Complex.

18) Duvernay committed to notifying residents within the EPZ at a Level 1 Emergency via telephone.

19) Duvernay commits to adding Mr. Thompson's residence to the drilling and completion ERP.

20) Duvernay commits to a firefly traffic safety plan during the drilling and completion phase.

21) Duvernay commits to developing and implementing a firefly pointing procedure during the drilling and completion phase.

22) Duvernay commits to communicate changes to affected residents if the Drilling and Completion ERP changes.

23) Duvernay commits to developing a plan to address the Automated Callout System with respect to the possibility of having children answer the phone message.

24) Duvernay committed to notifying all residents within the EPZ by telephone:

a) 24 hours prior to moving the rig onto location

b) 24 hours prior to entering the sour Wabamun zone

c) Immediately upon finishing drilling

d) 24 hours prior to the start of operations for completion

e) After finishing all operations

f) In the event of an emergency

25) Duvernay commits to incorporate exercise action lists into the ERPs.

26) Duvernay commits to formalizing mutual aid arrangements in writing, if able to.

27) Duvernay will relocate an individual, his family and two dogs during the drilling and completion of the well.

28) Duvernay committed to notifying a specific individual if the 8-13 well goes to production.

29) Duvernay will place a trailer on a specific individual's property during the drilling and completion phase of the project and make its best efforts to transport the individual's nine horses to a safe location. Duvernay will also compensate the said individual for the loss of said horses in the event that a loss is experienced that is associated with the drilling completion and expected production of the 8-13 well.

30) Duvernay is committed to an individual that if evacuation was necessary that there will be compensation if his house gets broken into or if anything gets stolen while he is away from home. Duvernay also committed to an individual that his horse and pets will be moved at Duvernay's expense in the event of an evacuation.

31) Duvernay committed to place temporary stationary air monitors at five specific individuals residences, seasonal residences and at the EnCana Plant at LSD 2-13-54-18W5M during the drilling and completion phase.

32) Duvernay committed to a specific individual to make its best efforts to assist with livestock evacuation in the event of an emergency.

33) Duvernay commits to comply with any revised *Directive 071* once it is issued, including recalculation of its well operation and production EPZ using EUBH2S.

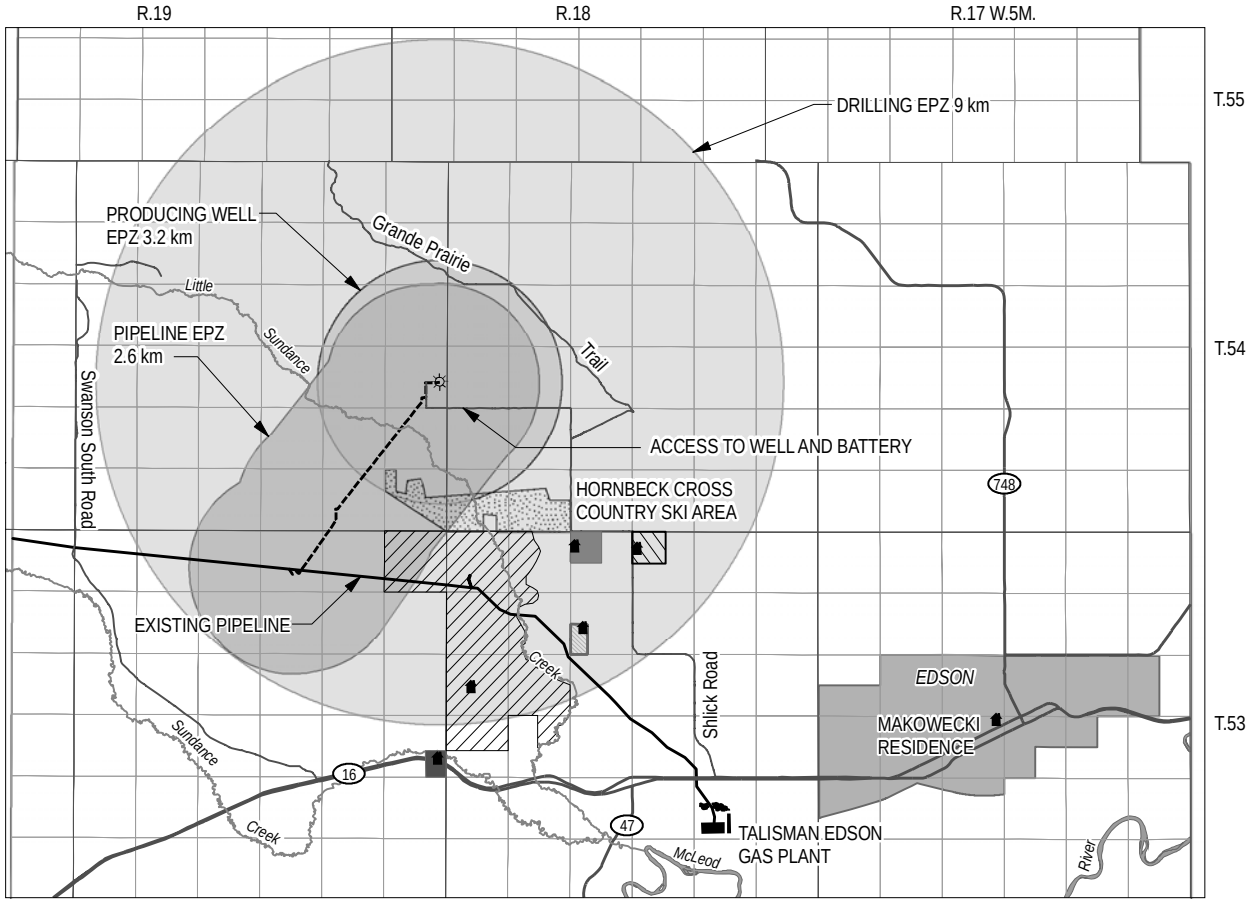

Figure 1. Project area map