



Compton Petroleum Corporation

Applications for Licences to Drill Six Critical Sour Natural
Gas Wells, Reduced Emergency Planning Zone, Special Well
Spacing, and Production Facilities
Okotoks Field (Southeast Calgary Area)

June 22, 2005

ALBERTA ENERGY AND UTILITIES BOARD

Decision 2005-060: Compton Petroleum Corporation, Applications for Licences to Drill Six Critical Sour Natural Gas Wells, Reduced Emergency Planning Zone, Special Well Spacing, and Production Facilities, Okotoks Field (Southeast Calgary Area)

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ALBERTA ENERGY AND UTILITIES BOARD

Calgary Alberta

**COMPTON PETROLEUM CORPORATION
APPLICATIONS FOR LICENCES TO DRILL
SIX CRITICAL SOUR NATURAL GAS WELLS,
REDUCED EMERGENCY PLANNING ZONE,
SPECIAL WELL SPACING, AND
PRODUCTION FACILITIES
OKOTOKS FIELD (SOUTHEAST CALGARY AREA)**

**Decision 2005-060
Applications No. 1276857, 1276858,
1276859, 1276860, 1307759,
1307760, 1278265, and 1310351**

1 SUMMARY OF DECISION

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

The Alberta Energy and Utilities Board (EUB/Board) conducted an extensive public hearing from January 11 to March 4, 2005, to consider nine related applications by Compton Petroleum Corporation (Compton) to drill six horizontal sour gas wells seeking gas reserves containing 35.6 per cent hydrogen sulphide (H₂S), to construct and operate associated surface facilities, to reduce the emergency planning zone (EPZ) to 4 kilometres (km), with a corresponding emergency awareness zone (EAZ) of 8 km, and to implement the associated emergency response plan (ERP). Compton also applied for a special well spacing unit.

In arriving at decisions on applications, the Board is guided at all times by its mandate to consider the public interest. The Board acknowledges that these sour gas wells, given their H₂S content of 35.6 per cent, present a hazard during drilling, completion, and production operations, but a low level of risk. Given the proposed location of the applied-for wells in proximity to densely populated areas, the Board has adopted a particularly cautious approach with respect to questions of public safety.

In order for well licences to be issued, the Board must approve the associated technical drilling and completion programs, as well as the ERP.

The Board finds that the proposed wells can be drilled, completed, and operated safely. However, the well licences will only be issued if Compton can gain the Board's approval of its ERP, which is currently incomplete. If Compton gains the Board's approval of its ERP at a future date, the Board will issue four of the six well licences at that time.

Reduced EPZ

The Board agrees with parties that submitted that emergency response actions such as evacuation, sheltering, and notification must correspond to the appropriate distances to the hazard. For short-term releases, the Board agrees that for protection purposes in these circumstances, an effective sheltering program is equivalent to evacuation. The Board finds that evacuation actions, which would be initiated prior to any release of H₂S, constitute the preferred

method of protection for parties most at risk, in this case the rural residents in closest proximity to the proposed wells.

The Board has determined the following with respect to Compton's reduced EPZ application:

- Compton's proposed reduced 4 km EPZ is not sufficiently protective of public safety and is therefore denied, as is the corresponding 8 km EAZ.
- Compton must use a reduced EPZ of 9.7 km, composed of an evacuation zone of approximately 5 km in radius and a sheltering zone of approximately 4.7 km in radius.
- Compton must use an EAZ of 15 km.

The Board notes that as a result of an assessment of the particular situation the unified command may determine that evacuation of individuals in the sheltering zone or sheltering within the evacuation zone may be the most protective of public safety.

Drilling/Completion Plans

The Board approves the drilling, completion, and production plans, subject to additional Board-directed conditions and voluntary commitments from Compton. If Compton gains the Board's approval of a resubmitted ERP, the Board will approve four of the requested six wells.

ERP

Compton acknowledged that its ERP was incomplete as a result of the EPZ not being finalized. The Board finds that the ERP for the proposed reduced 4 km EPZ lacked sufficient detail and was deficient. In order to address its concerns, the Board directs Compton to resubmit an ERP incorporating Board-directed improvements. To address the need for improved coordination, the Board directs Compton to adopt a unified command approach with the municipalities and the Calgary Health Region (CHR) to provide for progressive and collaborative public protection measures within and beyond the EPZ. One of the conditions that the Board imposes is that Compton may enter the first sour zone only after successfully completing a major ERP deployment exercise.

Surface Facility and Reduced Spacing Applications

The Board approves the surface facility application, subject to Board-directed conditions and voluntary commitments from Compton, and approves the special spacing application.

Timing

The Board specifies a number of deadlines for Compton:

- **August 15, 2005:** Advise the Board if Compton wishes to pursue approval of its applications in accordance with the Board's determinations in this decision. If Compton advises the Board that it does not intend to pursue these applications further, or if the Board has had no response from Compton by the above date, the Board will consider the applications withdrawn and close its files.
- **November 1, 2005:** File a complete revised ERP following appropriate consultation with all affected parties. The Board will provide an opportunity for interveners that participated in the hearing to offer comments on the revised ERP.

- **January 1, 2008:** Licences for any wells that have not yet been spudded will be cancelled.
- **July 1, 2021,** or 15 years from the first well licence approval, whichever is earlier: all wells and surface facilities at the 10-13 site must be abandoned. The well and surface facility Legal Subdivision (LSD) 11, Section 24, Township 22, Range 29, West of the 4th Meridian must be abandoned 7.5 years from the approval of the first new well licence for the 10-13 site.

The Board will consider requests from Compton to modify the above deadlines for advising the Board as to its intention to pursue approvals of the applied-for well licences and for filing a revised ERP.

The following table summarizes the Board's determinations on Compton's applications:

Table 1. Summary of Board Determinations on Applications

Application description	Board decision	Did the Board impose additional conditions?	Did Compton make additional voluntary commitments?	Date of required Compton response
Distance to Hazard				
a. EPZ (proposed 4 km)	Denied (increase to 9.7 km)	Yes	Yes	August 15
EAZ (proposed 8 km)	Denied (increase to 15 km)	Yes	Yes	August 15
Well Licences				
a. Drilling/completion plans	Approved	Yes	Yes	-
b. ERP	Deficient	Yes	Yes	Nov. 1
c. Number of wells	Partial (4 of 6)	Yes	-	-
Surface Facilities	Approved	Yes	Yes	-
Reduced Spacing	Approved	-	-	-

2 INTRODUCTION

2.1 Applications

Applications No. 1276857, 1276858, 1276859, 1276860, 1307759, and 1307760

Compton applied to the EUB, pursuant to Section 2.020 of the *Oil and Gas Conservation Regulations* (OGCR), for licences to drill six horizontal level-2 critical sour gas wells from an existing well site in Legal Subdivision (LSD) 10, Section 13, Township 22, Range 29, West of the 4th Meridian (the 10-13 site).

The wells would be drilled to proposed bottomhole locations in LSD 4-13-22-29W4M, LSD 6-24-22-29W4M, LSD 4-18-22-28W4M, and LSD 12-19-22-28W4M. The two remaining wells would be drilled from surface locations within the 10-13 site and would be contingent on the results of the first four wells. The specific surface and bottomhole locations for these two contingent wells would be determined at that time. Each well would have a maximum H₂S content of about 355.6 moles per kilomole (mol/kmol) (35.6 per cent).

A comparison of the calculated H₂S release rate for each phase of the wells and the corresponding calculated EPZ for each of the wells, using the equations in EUB *Guide 56: Energy Development Applications and Schedules* and *Guide 71: Emergency Preparedness and Response Requirements for the Upstream Petroleum Industry*, is shown in Table 2.

Table 2. Summary of H₂S Release Rate and EPZ by Well Activity per Compton Applications

Well activity	H ₂ S release rate (m ³ /s)	Calculated EPZ (km)	Applied-for reduced EPZ (km)
Drilling operations	9.67	11.94	4.0
Completion and servicing operations	12.79	14.97	4.0
Producing/suspended operations	0.93	2.19	n/a

The purpose of the proposed wells is to obtain gas production from the Wabamun-Crossfield Member. The proposed wells would be located about 4.5 km southeast of the nearest communities in Calgary which is also 1.1 km east of the southeast boundary of the city limits of Calgary and about 1.2 km north of the Bow River.

The horizontal lengths of the four wells applied for with defined bottomhole locations are listed in Table 3.

Table 3. Proposed Horizontal Well Length and Orientation (Per Compton)¹

Bottomhole location	Direction from existing 10-13	Horizontal length (m)
12-19	NE	1373
6-24	NW	1054
4-13	SW	871
4-18	SE	854

Bottomhole locations and horizontal lengths for the two contingent wells were not identified.

Application No. 1278265

Compton applied to the Board, pursuant to Section 79, subsection 4, of the *Oil and Gas Conservation Act*, for the suspension of the drilling spacing unit and target area provisions for wells drilled or to be drilled in a proposed unit comprising Sections 18 and 19 of Township 22, Range 28, West of the 4th Meridian and Sections 13 and 24 of Township 22, Range 29, West of the 4th Meridian. Compton proposed that a well drilled in the unit for the production of gas from the Wabamun-Crossfield Member be a minimum of 300 metres (m) from the boundary of the unit.

Application No. 1310351

Compton applied to the Board, pursuant to Section 7.001 of the OGCR, for approval to construct and operate a multiwell sour gas battery. The battery would be located at LSD 10-13-22-29W4M and would be designed to handle about 524.1 thousand cubic metres per day (10³ m³/d) of raw gas, 7.4 m³/d of oil/condensate, and 0.0 m³/d of water. The inlet gas stream would contain 355.6 mol/kmol of H₂S.

¹ Exhibit 039-013a.

Application for a Reduced Emergency Planning Zone

Compton applied to the Board for a reduction in the EPZ for both the drilling and completion operations for the wells from the calculated radiuses of 11.94 km and 14.97 km respectively to a modified 4 km radius.

Compton stated at the hearing that its proposal for accelerated depletion of gas from the 10-13 site was in furtherance of the objectives of the Board, as set out in previous decisions, and those of local landowners, as evidenced by the terms of the Land Use and Resource Development (LRD) agreement, which flowed from EUB *Decision 2000-20*. Compton asserted that a 4 km reduced zone, properly managed, was protective of public safety. Further, Compton acknowledged that it could not alone implement the required evacuation, notification, and related emergency response actions that would be required within an EPZ that included large portions of the City of Calgary and, as such, a reduced zone was an integral element of its overall proposal.

Compton submitted that its proposed reduced EPZ provided a sound basis for an ERP that would adequately protect the public, based on its assessment of the hazard. Compton said that it had modified the planning zone to reflect site-specific characteristics, resulting in an irregular EPZ radius ranging from 4 km to about 5.7 km. The resulting modified planning zone did not encompass communities within the City of Calgary.

2.2 Interventions

Given the proximity of the proposed new wells to existing rural residences, to the City of Calgary, and to several other communities, a number of residents, landowners, and other interested parties expressed concerns about the proposed project in the following sequence:

- Objections and statements of concern were initially received by the Board in response to Compton's public consultation efforts regarding its reduced EPZ application, which was filed with the EUB in December 2001.
- Subsequently, additional objections and statements of concern were received following public consultation conducted by Compton with respect to four of six of its well licence applications and its special spacing application, which were filed with the EUB in August and September 2002 respectively.
- Further objections, statements of concern, and indications of interest in Compton's applications were received following the publication of the Board's Notice of Applications in July 2003.
- The EUB continued to receive objections and statements of concern in the periods leading up to, during, and subsequent to the public hearing.
- The EUB also received a number of interventions in support of Compton's applications.

2.3 Communication between the Board, Affected Parties, and the Public

In reviewing the scope of Compton's applications and recognizing the number of potentially interested parties, the Board determined early in its process that extraordinary steps should be taken to ensure that sufficient information was available to all interested and potentially affected parties. The Board wished to offer all parties ready access to information regarding Compton's

applications, as well as the EUB's application and hearing processes. To those ends, the EUB undertook the following initiatives:

- Advertisements were placed in city and local community newspapers providing Notice of Applications, Notice of Prehearing Meeting, and Notice of Hearing. Some of these advertisements included maps and notice of upcoming EUB information sessions.
- The EUB held seven public information sessions in various communities in the vicinity of Compton's proposed wells. The sessions explained the EUB's processes and provided guidance on how the public could access additional information regarding Compton's applications.
- The EUB developed a page on its Web site devoted to Compton's applications. The page provided access to the applications and related information. The page also provided up-to-date information regarding the progress of the applications and notification of upcoming events.
- The EUB developed an extensive mailing list of parties that had expressed an interest in Compton's applications. Parties on the list received regular correspondence from the EUB regarding the hearing process.
- The EUB developed a concise Statement of Facts to provide background information to the public regarding Compton's applications.

2.4 Prehearing Meeting and Hearing

Having regard for the unresolved concerns and objections, the Board directed that Compton's applications be considered at a public hearing. The Board decided that before scheduling a hearing, it would be useful to obtain additional information from the interested parties and Compton to ensure that the public hearing would be conducted in the most efficient and effective manner possible.

Consequently, the Board held a prehearing meeting in Calgary, Alberta, on October 23, 2003, before Presiding Board Member A. J. Berg, P.Eng., and Board Members J. R. Nichol, P.Eng., and G. J. Miller. The Board's ruling on the various issues identified at the prehearing meeting was released as *Decision 2003-088* on November 18, 2003.

In its prehearing meeting decision, the Board established a proceeding schedule for information requests, the submission of evidence, and the hearing date. The Board also established that the hearing would commence on March 30, 2004. However, on March 9, 2004, Compton filed a letter with the Board requesting that the Board adjourn the hearing to late summer or early fall of 2004. The Board granted Compton's request for an adjournment. For reasons of the Board's regulatory scheduling, the hearing was subsequently rescheduled to commence January 11, 2005.

The applications were considered at a public hearing in Calgary, Alberta, before Presiding Board Member A. J. Berg, P.Eng., and Board Members J. R. Nichol, P.Eng., and G. J. Miller. The hearing commenced on January 11 and concluded on March 4, 2005. During the hearing, the Board requested undertakings from parties to clarify their evidence and granted undertakings to examining parties requesting further information on submitted evidence. The final undertaking

was received on March 10, 2005, and is considered the final submission of evidence and thus the closing date for this proceeding.

In the course of the hearing, the Board heard evidence and accepted submissions from Compton and numerous interveners. A total of 21 interventions were received from municipal authorities, resident groups, adjacent landowners, corporations holding land interests in the area, and concerned citizens. The participation of these interveners provided considerable assistance to the Board in its deliberations. In addition to well-argued evidence, the interveners provided the Board with their various individual perspectives, enabling the Board to better understand the unique characteristics of the area surrounding the wells. The parties to this proceeding are listed in Appendix 1.

3 RECOMMENDED DISPOSITIONS OF THE APPLICATIONS BY THE PARTIES

In the following section, the Board has included a summary of the hearing participants' views with respect to their *requested dispositions only*.

The Board acknowledges that the applicant and the interveners made substantial contributions with respect to all of the issues under consideration by the Board. Their contributions, suggestions, and recommendations were considerably more detailed than those summarized below.

The Board has included some of the parties' views in the relevant sections of this decision; however, in the interest of creating a concise and readable document, the Board has distilled those views to their essential points. Parties should be aware that the Board, in reaching its decision, has nonetheless considered the complete views of the parties that were communicated through information requests and evidence, as well as in cross-examination, argument, and reply argument.

Compton requested that the Board approve its six well licence applications comprised of four defined wells and two contingent wells, its application for a multiwell sour gas battery, its special spacing application, and its application for a modified reduced EPZ of 4 km in radius with an EAZ of 8 km.

The Soutzo family (Soutzo) and Ollerenshaw Ranch Ltd. (Ollerenshaw) supported Compton's applications, as these parties hoped that the approval of the applications might end the long-standing conflict between the owners of surface and subsurface rights in the area. Further, Soutzo and Ollerenshaw requested that any licences be issued with conditions consistent with the terms of the LRD agreement between these parties and Compton, which includes a 15-year limit to the production of the proposed wells. They also requested that Compton be allowed to commence drilling of the wells during the 2005 drilling season.

BurnsWest Corporation (BurnsWest) initially registered in support of Compton's applications. However, at the conclusion of the hearing, BurnsWest stated that it no longer supported the applications, as it did not have confidence that Compton's ERP would offer adequate protection to transient users and residents on BurnsWest's property. BurnsWest further submitted that the

ERP lacked the detail required for it to be a usable document. BurnsWest sought assurance that if the applications were approved, Compton would be required to address and implement solutions to outstanding concerns regarding response protocols outside the EPZ and protection of gravel operators within the EPZ.

The Front Line Residents Group (FLRG) requested that the Board deny all of Compton's applications. The FLRG also submitted that Compton's public consultation was inadequate. In addition, the FLRG requested that the Board vary Well Licence No. 38033 for the existing 11-24-22-29W4M (11-24) well and Well Licence No. 36284 for the existing 10-13-22-29W4M (10-13) well and define a termination date for both wells. The FLRG asserted that the risk assessment results indicated that no residents should live within 1380 m of the proposed wells. The FLRG stated that the EPZ should be set at 9.7 km for the drilling case, in accordance with the dispersion modelling conducted by RWDI West Inc. (RWDI).

The White family requested that the Board deny Compton's applications and release its confidential decision defining the term of operation of the Chestermere pipeline, as prescribed in *Decision 2000-20*, or that the Board defer its decision on Compton's applications until such time as the Board received the updated sulphur dioxide (SO₂) health effects table from Alberta Health and Wellness, pursuant to Recommendation 59 from the Provincial Advisory Committee on Public Safety and Sour Gas. The White family requested that, alternatively, its recommendations be incorporated into the terms and conditions of any licences issued to Compton by the Board. Such recommended conditions included that Compton

- perform a test of quantity and quality on George White's water well prior to the drilling of the first sour gas well and after the drilling of the last sour gas well;
- locate air monitors in the Whites' yards in NW 19-22-29W4M and SW 19-22-29W4M, which would trigger an alarm in the event that sour gas emissions were detected by the monitors;
- equip the 10-13 well site with a siren, which would be audible in NW 19-22-29W4M and SW 19-22-29W4M; and
- move the Whites and their livestock away from their residences to another location, preferably for the life of the wells, at Compton's expense.

The CHR requested that the Board deny Compton's applications. The CHR asserted that the applications did not meet the Board's requirements or health effects criteria. The CHR stated that Compton's ERP was incomplete and should not be approved. It also stated that relief wells should be predrilled. The CHR supported dispersion modelling results submitted by the FLRG. The CHR requested that the EAZ be set at a minimum of a 20 km radius, based on the SO₂ dispersion modelling evidence.

Carma Developers Ltd. (Carma) stated that it did not oppose Compton's applications, provided that the wells could be drilled safely and the public be protected. Carma requested that should the applications be approved, the Board impose a number of conditions on the licences, as follows:

- Future delays in drilling would reduce the production life of the wells. As such, Carma recommended that the Board should specify a production life that was the earlier of 15

years or December 31, 2020, for the existing and proposed wells at the 10-13 site, with a 7.5-year production life for the 11-24 well.

- The Board should direct Compton to cause the Chestermere pipeline to be abandoned within a specified timeframe.
- The Board should require that any successor operators to Compton be bound by these obligations.
- The ERP must be updated and maintained in an up-to-date state, taking into account ongoing development in the area.
- Compton's revised ERP must take into account Carma's and BurnsWest's activities and the safety of these companies' respective workers in the area. The Board should require Compton to work with Carma and BurnsWest in this regard.
- The ERP should be updated annually and before initiating each segment of drilling.
- Compton should be required to insure that the air monitoring equipment would function as expected in this environment and to consult with Carma and other area developers regarding proper placement of the equipment, as Carma was concerned that there is no assurance that monitoring would work in the presence of dust and heavy equipment vibration associated with the surface development on its lands.

The City of Calgary (the City) submitted that the Board should either deny Compton's applications or delay approving the applications until Compton had demonstrated that it could satisfy the City's public safety concerns. The City was of the opinion that Compton's ERP was not in compliance with the EUB's regulations. It submitted that in the absence of a completed, approved ERP, no well approvals or conditional well approvals should be granted. The City requested that should the Board determine that the applications could be approved in principle, subject to the completion and submission of a finalized ERP, it should impose strict conditions on Compton regarding its interactions with local authorities. The City also recommended that the Board, in its decision, comment on the dispersion modelling evidence, Compton's proposed reduced EPZ, and the adequacy of Compton's drilling program, including well control measures. The City requested that if the Board approved the applications, it direct Compton to do the following:

- resubmit its ERP, having conducted appropriate public consultation;
- provide copies to the City of all ERP training materials;
- allow the City to attend the ERP training program sessions;
- complete a full-scale field exercise of the ERP involving the personnel and equipment that would be used during drilling;
- allow Emergency Management Alberta, the Municipal District of Rocky View, the Municipal District of Foothills, and the City of Calgary to evaluate the exercise and provide recommendations—the City stated that well licences should not be issued until such time as the recommendations of the evaluators had been implemented;
- provide daily drilling status reports to the municipalities;

- amend its ERP to include seven days per week, 24 hours per day unrestricted access for the City's Disaster Services Division personnel to the drilling control centre; and
- abandon the wells and reclaim the lease no later than 15 years from the date of approval of the applications.

The Evans family and Evans Development (the Evanses) requested that the Board deny Compton's applications. They argued that the Board should direct Compton, as a condition of any approvals, to negotiate a form of land use and resource development agreement, which would provide for cooperation with the Evanses in the development of their lands or in their use and enjoyment of the lands. The Evanses stated that such an agreement should be submitted to the Board by October 1, 2005. The Evanses requested that in the event that the parties failed to negotiate such an agreement, the Board prescribe terms and conditions upon Compton's well licences, such as the lifespan of the facilities, in order to address the ongoing conflict between mineral and surface development in the area. The Evanses expressed concerns about Compton's ERP in terms of their residence being located at the end of a dead-end road and the egress on that road in the event that the Shepherd ditch was being constructed at the same time as the proposed wells were being drilled. They pointed out that their residence was located about one mile to the immediate southeast and downwind of the proposed wells. The Evanses requested that the Board direct Compton to install an alarm at the Evans's residence that would immediately signal any upset at the wells. Further, they requested that the Board direct Compton to include a commitment in its ERP to relocate the Evanses during drilling in the sour zone for each of the proposed wells.

The Municipal District (MD) of Rocky View (Rocky View) stated that it could not recommend approval of Compton's applications, as the 4 km EPZ did not adequately address public safety concerns. Contributing to Rocky View's opinion in this respect was the current lack of a clear understanding between Compton, the City of Calgary, and the MDs of Foothills and Rocky View concerning the division of responsibility in the event of an emergency. Rocky View requested that the Board carefully consider the adequacy of Compton's proposed ERP. Rocky View submitted that should the Board approve the applications, it direct Compton to provide Rocky View with access to training materials and ongoing training of Rocky View staff, notification of any alerts, and access to reporting of any incidents and drilling updates while Compton was drilling in the sour zone. Rocky View suggested that once the Board had determined the size of the EPZ, Compton's ERP should be subject to additional public involvement and review. Rocky View also requested that a full-scale exercise by Compton be conducted and evaluated before any well licences were issued. Furthermore, the Board should impose on any approvals issued to Compton a maximum 15-year timeframe for the extraction of gas and the completion of any associated reclamation.

The Pearson family (the Pearsons) was in support of the Board approving Compton's applications, but requested that Compton make further enhancements to its ERP. The Pearsons requested that the Board impose a "sunset provision" as a condition to any licence approvals issued to Compton stipulating that the licences expire at the end of 2020. The Pearsons also indicated that they would prefer that no drilling or completion operations be conducted in the sour zones in August and September, when they would be harvesting crops.

Michael Queenan requested that the Board deny Compton's applications.

Ian Peace, also representing the Erin Woods Community Association, requested that the Board deny Compton's applications. Mr. Peace stated that if the Board were to approve the applications, public education regarding appropriate emergency response should be a condition of the approvals. Further, the Board should require a benchmark level of public knowledge as to the appropriate emergency response through a follow-up test to assess the effectiveness of the education.

Stefan Franklin requested that the Board deny Compton's applications.

Gordon Burditt requested that the Board deny Compton's applications.

The Coalition of Concerned Communities (CCC) did not support Compton's applications. The CCC's view was that Compton's application for a reduced EPZ and well licences based on a reduced EPZ should be denied, as Compton's applied-for reduced EPZ was not sufficiently protective of the public. It agreed with the evidence provided by the CHR and the FLRG with respect to an appropriate EPZ size and health effects. It submitted that the EPZ should be 8 to 12 km in radius. The CCC argued that the evidence showed the potential hazard from a release to extend well beyond the applied-for reduced 4 km zone. Further, the CCC submitted that Compton's ERP was not in compliance with the EUB's requirements.

Nicholas Baiton, representing Joyce Newton, requested that the Board deny Compton's applications. Mr. Baiton opposed the special spacing application.

Harald Thimm did not oppose Compton's applications but requested that should the Board issue the applied-for licences, it make arrangements for continuous on-site supervision by experienced EUB drilling engineers while the well operations were in the critical zone.

The Friends of Medicare requested that Compton's applications be denied.

4 DISPOSITION OF THE APPLICATIONS—VIEWS OF THE BOARD

The hearing of Compton's applications was lengthy (30 days) and generated 8152 pages of transcripts and 103 exhibits. Given the volume of evidence before it, the Board has modified the traditional format of its decision report, in that separate sections detailing the views of the parties have not been included. Rather, the Board has incorporated the essential submissions of the parties into the views of the Board.

Individuals interested in accessing more detail on the views of the parties may contact EUB Information Services at (403) 297-8190 for copies of the parties' submissions. Transcripts may be viewed on the court reporter's Web site at www.tscript.com.

4.1 Public Interest

In considering Compton's applications, the Board has had regard for significant volumes of evidence. In arriving at its decision, the Board has at all times been guided by its mandate to take into account the public interest. While all Board decisions are informed by the public interest,

Compton's applications have presented uniquely challenging issues, many of which may only be resolved on the basis of the Board's assessment of their relationship to the public interest.

For this reason, the Board believes it is appropriate to preface its reasons with an analysis of its public interest mandate.

4.1.1 The Board's Mandate with Regard to the Public Interest

In considering Compton's applications, the Board has been mindful of the requirements of the *Energy Resources Conservation Act* and the *Alberta Energy and Utilities Board Act* in regard to the concept of the public interest. In particular, Section 3 of the *Energy Resources Conservation Act* states:

3 Where by any other enactment the Board is charged with the conduct of a hearing, inquiry or other investigation in respect of a proposed energy resource project, it shall, in addition to any other matters it may or must consider in conducting the hearing, inquiry or investigation, give consideration to whether the project is in the public interest, having regard to the social and economic effects of the project and the effects of the project on the environment.—1992 cE-13.3 s246(5)

Similarly, Section 15(1)(d) of the *Alberta Energy and Utilities Board Act* states:

15(1) For the purposes of carrying out its functions, the Board has all the powers, rights and privileges of the ERCB and the PUB that are granted or provided for by any enactment or by law.
(d) with respect to an order made by the Board, the ERCB or the PUB in respect of matters referred to in clauses (a) to (c), make any further order and impose any additional conditions that the Board considers necessary in the public interest;

These sections require the Board to consider the public interest in its deliberations when deciding whether to grant the licences requested and empowers it, where necessary, to apply conditions to mitigate site-specific or local impacts.

4.1.2 Concept of Public Interest

It is difficult to define concretely what is meant by the public interest and how the Board will apply consideration of this interest in any given situation. To assert that the public interest is found where the greatest good for the greatest number can be identified ignores the very specific elements that Section 3 of the *Energy Resources Conservation Act* requires the Board to consider in assessing the public interest.

Clearly, it is not just the interests of the applicant and the interveners that are at stake. The Board has a duty to safeguard the interests of all the citizens of the province of Alberta.

Concepts as fluid as social, economic, and environmental impact are not easily resolved through the application of fixed principles. The Board must identify the elements of each applied-for energy development that would provide benefit not exclusively to the applicant and those directly connected to the development, but to Albertans in general. The Board must also weigh those benefits against the risk factors that are present, given the nature of the development, the location proposed, and other factors associated with the specific situation.

A finding by the Board that the approval of a development would be in the public interest does not imply that there will be no site-specific impacts. The challenge for the Board is to ensure that any site-specific or local impacts are mitigated to an appropriate and acceptable level.

The Board acknowledges that any form of energy development presents a level of risk to the public. The concept of risk is discussed in detail in Section 4.3.6 of this decision. If the Board finds that risk, among other potential negative consequences, cannot be sufficiently mitigated, thereby finding that the risk exceeds the potential benefit, the project could not be said to be in the public interest and would therefore not be approved by the Board.

Alternatively, a project may be found to be consistent with the public interest where the Board finds that the benefits of the project outweigh the potential for negative consequences and that appropriate mitigative measures can be applied to reduce or eliminate any negative aspects of the project.

4.1.3 Public Interest as It Applies to Compton's Applications

The applications before the Board present many difficult and intricate technical issues. In reaching its decision on each of the issues, the Board has considered and weighed the various factors that engage the notion of public interest. The Board notes that the key issues raised in the evidence fall within the social and economic aspects of the Board's public interest considerations.

The Board has considered the issue of public interest first by acknowledging that it is generally in the best interest of Albertans that the province's natural resources be conserved in an efficient manner. In regard to these applications, the Board notes the views of Soutzo, Ollerenshaw, and other interveners who advocated in favour of accelerated depletion of the Wabamun B Pool. While it is clear that accelerated depletion would be in the best interests of the landowners, the Board is also satisfied that it would likely diminish the potential for future conflict between energy development and urban development. The Board accepts that in the context of these applications, the concept of accelerated depletion, in so far as it ensures proper conservation of the resource and avoids further conflict between landowners, municipalities, and resource companies, is consistent with the public interest, provided that the wells can be drilled and produced safely and adequate public safety protection measures can be implemented. In this regard, the Board considers that the proposed project may address the concerns of the Evanses and other area landowners who expressed a desire to enter into an LRD-type agreement with Compton.

Having found that the applications are conceptually in accordance with the public interest, the Board must weigh the benefit that the concept of accelerated depletion offers against the risks entailed by the proposed wells.

The Board is of the view that the drilling, completion, and production of a sour gas well involves a risk that an accidental, uncontrolled release could occur. The potential hazards associated with an uncontrolled release are significant where the H₂S content of the gas that will likely be encountered is 35.6 per cent, as is the case with Compton's applications. The Board does not consider that the public interest would be served by requiring applicants to show that a proposed project presents no risk whatsoever in all cases. Such a requirement would be unrealistic and

insurmountable, guaranteeing that no exploration for or recovery of sour gas reserves could be approved in Alberta. The Board acknowledges that exploration for and recovery of sour gas reserves, as is the case with many activities in a modern industrial society, present a certain amount of risk. Nonetheless, in dealing with questions of risk and the public interest, the Board would not approve an energy development project that it believed was unsafe or would result in undue risk to the public.

The Board is of the view that the potential for and the consequences of an accidental sour gas release can and must be reduced to acceptable levels. Accordingly, the Board requires that applicants adopt safety features, train personnel, and plan for emergency response. If the Board can be satisfied that the appropriate precautions and protective measures are in place, it may find a proposed energy development to be in the public interest, despite the risks and hazards inherent in the drilling, completion, and production of sour gas wells.

The Board always adopts a cautious approach in addressing questions of safety and risk. In the context of Compton's applications, the Board considers that the location of the proposed wells, together with the variety of adjoining land uses, geographical anomalies, and population densities, requires that the Board exercise extra caution. For these reasons, where conflicting evidence was presented, the Board has accepted the more cautious assessment.

4.2 Special Well Spacing Application

With the exception of Mr. Baiton, who was acting for Mrs. Newton, the Board notes that no party took exception to the applied-for change in well spacing. The Board notes Compton's evidence that the Alberta Crown has agreed in principle to the unitization necessary to accommodate and protect its mineral interests in this area where Compton holds a significant freehold mineral interest.

The Board is satisfied that the application and related submissions constitute a complete application appropriate for the applied-for change in well spacing. The Board is also satisfied that, pursuant to Section 79, subsection (4) of the *Oil and Gas Conservation Act* (the *Act*), it has the legislative authority to consider Compton's request. The Board notes that the suspension of the drilling spacing units and target areas in a unit pursuant to the *Act* is common and provides an applicant an avenue to deal with unique subsurface and/or topographical issues.

The proposed unit pools four separate drilling spacing units (DSUs) comprising Sections 18 and 19, Township 22, Range 28, West of the 4th Meridian, and Sections 13 and 24, Township 22, Range 29, West of the 4th Meridian, effectively addressing any equity issues within the unit area. Limitations imposed on the applicant by the LRD agreement with respect to the number of surface sites, proximity of the development to a large urban centre, and the desire to accelerate the recovery of reserves over a 15-year period makes a well spacing change necessary to accommodate the proposed development.

In addition, the Board notes that the special spacing application is needed to meet the requirements of Section 5.010 of the OGCR, which limits the number of producing wells per DSU to one well per pool unless otherwise authorized by the Board. Compton's proposal to drill up to six horizontal wells from a central location in LSD 10-13-22-29W4M would mean that

Section 13 would have more than one well producing from the same pool and consequently would be in contravention of the legislation in the absence of approval of special well spacing.

Mr. Baiton submitted that Compton proposes to inappropriately drain gas from outside its proposed special spacing unit, including those lands belonging to Mrs. Newton. The Board notes, however, that Mr. Baiton advised that Mrs. Newton would not be proposing a sour gas well to drain any sour gas that might exist in the subsurface of her land. Further, the Board notes that no other party appeared at the hearing to speak to any potential drainage that may result from Compton's proposal.

Since there were no objections from parties proposing to drill wells on their own lands, the Board considers that any resource recovery from the proposed wells is likely the only conservation of this resource that will occur. Accordingly, the Board considers that the spacing application is consistent with the Board's requirements, that it is necessary to give effect to the well licence applications, and that no undue adverse effects or equity issues to offsetting mineral owners would result from approval of the application.

The Board notes that none of the proposed horizontal wells would be off-target with respect to the DSUs immediately adjacent to the boundaries of the applied-for unit, in that none of the wells would encroach on the 300 m buffer between a producing well and the boundaries of the unit. Consequently, the Board considers that none of the wells would be closer to the adjacent DSUs than would be permitted under conventional or normal gas well spacing.

The Board is satisfied that the approval of the requested well spacing is in the public interest, is consistent with its legislation, and allows the Board to further consider the applications to drill the proposed wells. If the wells were approved, the approval of the requested well spacing would allow Compton to maximize recovery from the reservoir and to accelerate production to ensure that the long-term impacts on surface development would be minimized. The Board finds that this approach is consistent with Compton's intention to abandon the wells and facilities in 15 years, while ensuring that recovery from the reservoir is optimized.

4.3 Well Licence Applications

4.3.1 Development Setting

In evaluating the applications, the Board recognized that the proposed wells would be drilled in a development setting into a partially depleted reservoir. The most recently measured pressure of the existing 10-13 well was less than 60 per cent of its original pressure (14 100 kilopascals [kPa] in 2002, as opposed to 23 581 kPa in 1969). The wells would terminate in a formation into which more than 500 wells have been drilled without a blowout occurring. Additionally, Compton is proposing to drill adjacent to an existing well for which reservoir pressure data are available.

These factors have influenced the Board's deliberations on these applications. The large amount of knowledge and history available regarding this formation and this particular reservoir provide the Board with a significant level of confidence in assessing Compton's proposal to drill the applied-for wells. The Board is mindful that such relevant data are not always available.

Consequently, the Board cautions that its determinations with respect to these applications should not be considered indicative of the position that it would take on similarly situated wells if they were exploratory in nature.

4.3.2 Potential Benefit to Be Derived from the Wells

In describing the benefit to be derived from a particular energy project, it is common for the applicant to point out the direct economic benefit that a productive well will bring to the province through royalty payments. In regard to the subject applications, however, the Board heard from Compton that it holds 68.75 per cent of the fee simple mineral rights in the area of its applications, while the Alberta Crown holds the remaining 31.25 per cent of the mineral rights. Thus, the interveners argued that the benefit to be gained from these particular wells would not be as great as if the mineral rights were held entirely by the Crown.

In response, Compton argued that it pays freehold mineral tax on its mineral rights, which effectively is equivalent to a Crown royalty. Indeed, the *Freehold Mineral Rights Tax Act*, RSA 2000 c. F-26, imposes a property tax on oil and gas mineral rights in Alberta that are owned privately (i.e., other than by the Crown). Under this Act, Compton would be required to pay tax to the Crown with respect to the production of natural gas. While no direct evidence was offered on the point, it is generally understood that such taxes would be less than would be paid under the *Mines and Minerals Act* on Crown-owned minerals.

The Board is of the view that the right of the people of Alberta to obtain royalties is a relevant benefit to be considered when assessing the need for the wells and in the overall assessment of the public interest. However, the Board recognizes that royalties are only one economic factor among many that can be seen as a benefit from appropriate resource conservation. The numerous benefits to the Alberta economy extend beyond the payment of royalties. The economic benefits of successful energy projects (including employment and taxes) are an integral element of the Board's stated assumption that safe, prudent conservation of Alberta's resources is in the public interest.

In assessing the potential benefit to be derived from the proposed project, the Board must first be satisfied that the potential for accelerated depletion realistically exists. Compton estimated that a total of 19.3 million cubic metres (10^6 m^3) (68 billion cubic feet (bcf)) of proven and probable gas reserves remained in the area of the applied-for wells. By contrast, Mr. Baiton, who represented Mrs. Newton, considered that the reserves would be gone by the year 2020 because the existing wells are producing the gas. He noted that now that $9 \times 10^6 \text{ m}^3$ (32 bcf) of gas has been produced, the reservoir pressure has declined by 70 per cent; Mr. Baiton therefore refuted Compton's submission that there was an additional $19.3 \times 10^6 \text{ m}^3$ (68 bcf) to be produced.

The Board notes that the existing 10-13 well is a very productive well and, together with the 11-24 well, would likely recover the reserves in the area of the applications if these wells were left to produce until the end of their natural production lives. The Board agrees with Compton that based on production decline analyses, the remaining production would likely occur over an extended period and, in the case of the 10-13 well, in excess of 50 years, if there were no other restrictions to their production, such as an order by the Board to abandon the wells and facilities before the completion of their natural production lives.

In this regard, the Board notes the views of the FLRG that the benefits of accelerated recovery were exaggerated and that Compton would likely terminate production in 15 years, regardless of the Board's decision on the applied-for wells. The FLRG suggested that the sealed Board decision associated with *Decision 2000-20* would restrict the production of the wells by virtue of restricting the operation of the Chestermere pipeline.

Similarly, the Board notes that the White family considered that a denial of these applications would not necessarily result in 50 additional years of production from the 10-13 well. The Whites submitted that if the applications were denied, the LRD agreement would fail, resulting in the release of the Board's decision relating to the expiry of the Chestermere pipeline. Other parties similarly questioned the benefits of accelerated depletion.

Based on the evidence in this proceeding, the Board considers that the need for the wells in order to accelerate production from this portion of the Wabamun B Pool can be justified by several related objectives inherent in the LRD agreement. The Board finds that accelerated recovery of sour gas reserves would have the effect of shortening the timeframe until abandonment and removal of surface facilities and pipelines from the area, allowing high-density urban development to proceed. The Board also agrees that the 15-year timeframe, as stipulated in the LRD agreement, would have the effect of offering additional certainty with respect to future land use in the area, from which all parties would benefit.

Further, the Board is of the opinion that additional wells are needed to accelerate reserve recovery and may result in the recovery of additional reserves by accessing portions of the reservoir not being drained by existing wells. However, the Board does not believe that the potential reserve additions can be quantified with any degree of certainty, due to the nature (i.e., complex and unexpected occurrences and variations in the presence and distribution of porosity and permeability) of the subject reservoir. The Board considers that the additional reserves may prove to be less than projected by Compton.

The Board finds that although there may not be any substantial increase in recovery from this portion of the pool, the time certainty associated with accelerated production from the pool is justifiable on the basis that it will eliminate conflicts with urban development of the area within a reasonable period of time.

The Board is satisfied that to recover the maximum gas reserves within the 15-year window proposed by all parties, additional wells would need to be drilled and produced. However, the Board finds that the total number of wells required is more difficult to determine. In general terms, a horizontal well will have a capability between two and three times that of a vertical well in the same reservoir. In addition, while more producing wells can be expected to increase recovery, the greatest gains in recovery would likely occur from the production of the first two wells proposed by Compton.

The Board finds that these observations appear to be supported by a reservoir study conducted on Compton's behalf by Epic Consultants, in which two- and four-horizontal well scenarios were modelled. The results of the study showed that the largest increase in recovery (15 per cent) was achieved with the addition of two wells. While the four-well scenario also demonstrated an increase in recovery over the two-well case, the increase was much smaller, at 3 per cent. These results would suggest that the objective of recovering the maximum reserves within the 15-year

period proposed could be achieved with only two additional wells. These results are based on the assumption that the first two wells would have similar reservoir and production characteristics to the existing 10-13 well for the entire length of the horizontal sections. However, there is no guarantee that any new wells will be as productive as predicted.

The Board agrees with Compton that after the initial two wells were drilled, a period of evaluation of the wells' performance would be required to determine the need for subsequent wells. The Board further anticipates that these additional wells would likely provide new information about the reservoir in terms of the presence and extent of the reservoir rock and its characteristics (porosity, permeability, presence and distribution of fracture, etc.) in the areas where no wellbore information has been obtained to date.

Should Compton learn from this evaluation that the initial two wells are capable of achieving the desired production levels, it may choose not to drill any further wells. Alternatively, the data provided by the evaluation of the first two wells may identify the necessity to drill a third and fourth well, should the first two produce at a lower rate than anticipated.

In order to optimize the opportunity to accelerate depletion of the reserves, the Board therefore accepts Compton's view that there is a benefit to be derived from four of the six wells proposed at this time. The Board is satisfied that allowing Compton to drill up to four wells will provide sufficient flexibility to maximize resource recovery.

The Board would consider the two contingent wells only in the event that the results of the first four wells do not provide the increase in production rates that are needed to support the accelerated production scenario forming the basis of Compton's applications.

4.3.3 Safety of Drilling and Completion Operations

The Board holds the firm view that the practices and procedures used during the drilling, completion, servicing, testing, and production of critical wells play a crucial part in ensuring that the public and the environment are protected from the hazards associated with sour gas.

The Board also recognizes that the occurrence of H₂S in hydrocarbon-bearing formations is not unique to Alberta; however, Alberta is a recognized leader in the development and application of requirements and practices tailored to the drilling, completion, servicing, testing, and production of petroleum resources where H₂S is present. Some of the key recommendations in this regard have been documented in Industry Recommended Practices (IRP) 1: *Critical Sour Drilling*, Alberta Recommended Practices (ARP) 2: *Completing and Servicing Critical Sour Wells*, and IRP 4: *Well Testing and Fluid Handling*. In addition to its own requirements, the Board requires that licensees meet or exceed the IRPs and ARPs when drilling and operating critical sour wells.

The requirements and recommended practices that industry must follow have, since their inception, contributed significantly to the safe drilling and operation of critical sour wells. Redundancies are integrated into the practices set out in the IRPs and ARPs to reduce the potential for the occurrence of an uncontrolled release. Although there have been blowouts of other sour gas wells in Alberta, there have been no blowouts associated with the drilling and completion of *critical* sour wells since the inception of these requirements.

With respect to the reservoir associated with the proposed wells, the Board notes that in excess of 500 wells have been drilled into or through the Wabamun Crossfield Member without any serious kicks (i.e., influxes of gas into the wellbore) or blowouts. The Board notes that some 35 wells have been drilled into the Wabamun B Pool with no incidence of kicks. Compton was examined thoroughly on its drilling and completion practices by interveners and by the Board. Although interveners had questions, the Board notes that none offered evidence that suggested that Compton's proposed drilling and completion plans were inappropriate or significantly deficient.

The drilling program for these wells calls for a water-based drilling fluid to be used, which would ensure that drilling would occur in significantly overbalanced conditions relative to reservoir pressure. The average pressure of the drilling fluid should be approximately double the current reservoir pressure. These factors reduce drilling risk and enhance well control because a well cannot flow against higher pressure (the average hydrostatic pressure exerted by the drilling mud column would be about 27 600 kPa, in comparison to the reservoir pressure that was calculated to be 14 100 kPa in 2002). As stated earlier, the proposed wells would be drilled into a known partially depleted reservoir, currently at less than 60 per cent of its original pressure.

Drilling in an overbalanced condition might typically be thought to correspond to an increase in the potential for loss of circulation. However, the drilling program for these wells would include the use of intermediate casing to a depth just above the porosity of the Wabamun B Pool, which should ensure that no fluids can or will be lost to any uphole zone. Further, the known fracture gradient of the Wabamun Formation, which is significantly higher than the maximum hydrostatic head of the drilling fluid column, provides assurance that any significant fluid loss to the target formation would be unlikely.

Specific concerns expressed by the interveners included the setting and cementing of surface casing. The Board agrees with Compton that setting and cementing of surface casing at 450 m would adequately protect the groundwater aquifers in the area, which are located at a maximum depth of 412 m. The White family requested the Board to make a water well quantity and quality test a condition of any well licence approvals. The Board finds that Compton's commitment to test the quantity and quality of George White's water well (before and after drilling and completion operations) adequately addresses the water-related concerns raised by the family.

With regard to the White family's request that Compton run premium grade casing for the surface casing string, the Board finds that Compton's proposal to set 450 m of 244.5 millimetre (mm) K55 surface casing is consistent with accepted industry practices. Prior to entry into the Wabamun Crossfield porosity, Compton's drilling program calls for intermediate casing to be run and cemented to surface; as such, the surface casing would not be exposed to a sour environment. The Board notes that K55 casing is listed as suitable for sour service in both the American Petroleum Institute (API) 5CT document (*Specification for Casing and Tubing*) and IRP 1.

Further, barring multiple equipment failures, the pressure capacity of the intermediate casing should provide the ability to shut in the wells at any time by activating the control equipment at surface. Multiple checks and balances incorporated into the drilling procedures, in combination with the redundant well control systems and devices, add significantly to the safety of the drilling and completion operations.

Given that completion operations would yield the highest potential release rate, the Board asked Compton at the hearing to consider the use of a permanent production packer that would be installed prior to the initiation of any completion operations and would not be removed from the well, even in the event of a subsequent packer failure. The adoption of this completion practice would ensure that the highest potential release rate would be that associated with the drilling scenario. The Board notes that Compton committed at the hearing to follow the procedure suggested by the Board, thereby limiting the maximum release rate to below that of the drilling rate. The Board will make this a condition of any well licences that are granted.

The Board notes that Compton's evidence in the hearing was that the most likely source of any blowout was human error. The Board also notes that Compton has stated that experienced rig crews will be used.

The FLRG expressed concern that Compton did not have the capability to drill these wells safely, its personnel were stretched too thin, Compton had no dedicated environmental, health, and safety (EH&S) corporate function, and Compton was overly confident in its capabilities. The Evanses also expressed doubt regarding Compton's technical capability with respect to the proposed project.

Compton stated that in addition to using two well site representatives (supervisors) during critical sour drilling operations, it would provide for a third qualified person to be available as a well site representative. This third person would be familiar with the operations and would be able to step in and fulfill the duties of the licensee's (Compton's) on-site representative, should he become necessary as a replacement. The Board is satisfied that the provision for three well site representatives is sufficient to ensure appropriate supervision of critical well operations.

The Board finds that Compton has been careful in designing a thorough and complete drilling and completion program. Notwithstanding that the risks are very low, the Board expects Compton to remain diligent at all times and to ensure that all procedures and practices that it committed to are, in fact, followed.

Another issue that received considerable attention during the hearing was the history of drilling problems in this reservoir and in critical sour wells. The Board finds that given that there have been no kicks during the drilling of wells in the Wabamun B Pool and that there have been no blowouts associated with the drilling of critical sour wells since the inception of the new requirements set out in EUB *Interim Directive (ID) 87-2* in 1987, an uncontrolled release of sour gas from any of the proposed wells is highly unlikely. Furthermore, if there is an uncontrolled release of sour gas, the Board agrees with Compton that it is highly unlikely that the flow would reach the calculated release rates before the flow was ignited.

There was discussion at the hearing as to how long it would take for gas to reach the surface in the event of a kick. Estimates ranged from a few minutes to a number of hours, depending on the scenario under consideration. With respect to the drilling of the wells, the Board finds that in the unlikely event of a kick, there would be a minimum of one to two hours before any gas reached the surface. It is calculated that only very small volumes of gas would reach the surface at any given point in time, as the gas influx (likely equivalent to 1 to 2 m³) would be circulated out of the well over a period of ten to twelve hours. In the Board's view, an uncontrolled flow approaching the calculated release rate for the drilling case would only occur in the event of a

catastrophic failure involving a number of coincident events (equipment failure, massive lost circulation, and human error). The Board finds that this type of failure scenario is highly unlikely.

The Board is aware that Compton indicated that during completion of the wells, there was a possibility for an instantaneous gas release equal to the calculated release rate for the completion scenario. The Board has examined this evidence in the context of its requirement for Compton to install a permanent production packer prior to initiating completion operations and, as a result, finds that this magnitude of instantaneous flow from the well is highly improbable during completion operations.

Coincident catastrophic failures of the wellhead, the tubing, and the packer would be required to allow for an instantaneous flow at or approaching the calculated release rate for the completion scenario. In the Board's view, it is extremely unlikely that all of these events would occur simultaneously. The most likely failure that would result in an instantaneous release of gas would be a wellhead failure, and in that case, the maximum release rate would be equivalent to that calculated for the production scenario, assuming that the acid wash had been completed.

The Board acknowledges Mr. Franklin's concerns regarding security during the drilling and completion of the applied-for wells. The Board notes that the Alberta Government has established a Counter-Terrorism Crisis Management Plan. It also notes that the Board's *Security Management Regulation* AR 249/2004T empowers the Board to take certain measures to ensure the mitigation of terrorist threats against the energy and utilities sectors. Pursuant to this regulation, should the Board be informed of a high or imminent threat of terrorist activity against a specific well, the Board shall inform the licensee of the threat and determine what measures the licensee will take to address the threat. The Board also notes that should the threat of terrorist activity be high or imminent against a specific well, the Board may shut in that well if it is of the view, after consultation with the licensee, that the licensee is unwilling or unable to take measures to address the threat.

Mr. Baiton submitted that there should be a live test and demonstration of the Firefly ignition system. Mr. Baiton was also concerned about the practical implications of a blowout deflected under the rig floor and whether the Firefly would be located at the proper distance, given the release rate and mixing ratio with the atmosphere. He noted that the lower explosive limit for H₂S is 5 per cent. The Board agrees with Mr. Baiton that an appropriate test to confirm proper operation should be conducted, and the Board expects that Compton will give consideration to the issue of the proper distance from the rig to position the Firefly units. The Board will address this matter further in the conditions.

The CCC expressed concerns that the under-rig igniter was untested for its intended use on the applied-for wells. The Board will address this matter further in the conditions.

Although the Board is satisfied that the adoption of the IRPs and ARPs pertaining to the drilling and completion of critical sour wells ensures that the proposed wells can be drilled safely, the Board will make the following conditions of any approvals issued to Compton in recognition of the proximity of these wells to densely populated areas:

- Conduct a test firing of each of the specific Firefly units that would be deployed on site during the drilling and completion of the wells. These tests are to be conducted on site, provided that the testing can be done safely, having regard for the site-specific conditions at the time of the test and obtaining prior agreement to the test from the landowner. If the on-site test is not possible for the aforementioned reasons or any others that it may not be aware of, the Board would accept an off-site test, provided it was conducted immediately prior to the transfer of the Firefly units to the well site. If an off-site test is required, the Board would prefer a site in relatively close proximity, such as a neighbouring farm or gravel pit, if possible, to minimize any travel-induced disruption to the functioning of the units. The Board is aware that this test would reduce the discharges available in each unit from 20 to 19, but is satisfied that the presence of the fuel gas-supplied ignition system would be capable of maintaining ignition if an uncontrolled flow from the well were to extinguish itself.
- Test the satisfactory functioning of the under-rig igniter on site before drilling commences.
- Revise the sections of the applications addressing drilling, completion, and testing to reflect the commitments and revisions made as a result of the hearing and this decision and resubmit them at the time that it submits any revisions to its ERP.
- Provide an independent nitrogen booster system connected to the shear ram via a shuttle valve, in addition to the accumulator system and the nitrogen backup system. This booster system must comprise a minimum of three 34 000 kPa, 50 litre nitrogen bottles. These nitrogen bottles must each contain a minimum pressure of 30 000 kPa and be connected to the shuttle valve with a 34 000 kPa fireguard hose. A minimum 34 000 kPa regulator must be installed in the above system and set at 24 000 kPa.
- There may be no drilling or completion operations in the critical sour zones of the wells during the months of December, January, and February.
- Notify EUB Field Surveillance staff so that detailed inspections may be conducted prior to drill-out of the intermediate casing shoe, prior to removal of the bridge plug during completion operations, and during the testing of each well.
- Test the quantity and quality of George White's water well before and after drilling and completion operations.

4.3.4 Scheduling of Drilling Operations

The Board notes that Compton proposed to drill and complete each well sequentially, to evaluate the wells for 30 days before drilling the next two wells, and then to allow for an evaluation period ranging from one to twelve months before drilling the two proposed contingent wells. This approach, set out in Compton's applications, was referred to as "Case A" in the undertaking to the Board, Exhibit 039-006, which assessed a number of alternative approaches:

- Case B: drill two wells to the intermediate casing point, then drill both horizontal sections, then complete both wells before testing for a period of 30 days, then repeat the sequence for two more wells before determining whether to proceed to drill the two contingent wells.
- Case C: same approach as Case B be but drill three wells to the intermediate casing point, then drill the horizontal sections for all three wells, then complete all three wells before testing.

- Case D: same approach as Case B but drill four wells to the intermediate casing point, then drill all of the horizontal sections, then complete all four wells before testing.

Compton stated that it would be willing to undertake any of the four options outlined above, but that it preferred Case B. Further, Compton concluded that Case B was superior to its original proposal set out in its applications. The Board notes that the City and Rocky View preferred Case B. The White family preferred a variation of Case A. Although the Pearsons originally stated that they preferred that no critical operations be conducted in August and September, they later clarified that concern related to potential financial rather than safety impacts. In this regard, the Board notes the general obligation of operators to compensate affected parties for any direct impacts arising from incidents or accidents associated with the energy development in question.

The Board finds Case B to be the preferred approach to the drilling and completion of the four wells and expects that Compton will adhere to this scenario unless early drilling results warrant a change. The Board directs that a proposal to change the sequence of drilling and completion from that described in Case B be discussed with all of the interveners prior to submitting a request to the EUB's Operations Group for approval of the requested change.

4.3.5 Impact of the Applications on the White Family

The use of existing roads during drilling was of significant concern to the White family for reasons of safety impacts associated with increased traffic and the effect that the resulting dust might have on the health of George White and of the family's cattle. The White family estimated that a four-well drilling program would result in 4800 vehicles passing their yards and a six-well program would result in 7200 vehicles trips. The White family requested that the Board condition any approval such that Compton would be required to access the drilling location via 88th Street from Highway 22X, rather than via Range Road 290.

The White family further requested that if Compton were to use Range Road 290, it erect well activity and stop signs in an effort to slow truck traffic. The Board expects that Compton will address road safety issues with their contractors as part of their operations.

George White and Kenwyn White expressed concern regarding the safety of the drilling and operation of the six wells, given the proximity of their home to the 10-13 surface lease. Mr. White indicated that the distance from his residence to the edge of the 10-13 lease was about 790 m and only 600 m from the edge of his property to the edge of the lease. The Whites submitted that given the Major Industrial Accidents Council of Canada (MIACC) guidelines, there should be no permanent residence in such close proximity to the 10-13 well location. Further, the Whites were concerned that Compton had held no discussions with them on this matter.

The White family expressed concern regarding the potential for contamination of the air and other environmental impacts arising from sour gas development. Florence White described in detail how she had found a number of dead birds in the vicinity of her home, the cause of death unknown. The Whites submitted that, at a minimum, Compton should be required to locate a stationary air monitor in their yard, which would offer them additional peace of mind.

The Whites requested that the Board direct Compton to relocate the family and its livestock until after the drilling and production of the proposed wells were completed. At the same time, the Whites were concerned that such a lengthy period of relocation would be disruptive and inconvenient to them in terms of tending to livestock and their children's schooling. In response to an undertaking to the Board, the White family filed Exhibit 039-077(b), which elaborated on the conditions that might allow them to remain at their residence after the wells had been drilled, completed, and tested.

The Board agrees with the Whites' expert witness, David Picard, that it is reasonable to expect that Compton would go beyond normal practice to control fugitive emissions and odours. Mr. Picard put forward a number of recommendations to be implemented by Compton in order to minimize fugitive emissions and odours during drilling, completion, and production. The Board acknowledges that Compton has committed to implement all of the recommendations, with the exception of a new complaint tracking and analysis form. The Board expects Compton to implement all of the recommendations to which it has committed.

The Board is satisfied that the concerns of the White family may be addressed by their relocation during drilling and completion operations. The Board will make it a condition of any licence to require Compton to offer to relocate Gerald White's and George White's families during drilling and completion operations. The Board expects the parties to agree upon the details of the relocation.

Regardless of whether Gerald White's family is relocated, the Board directs Compton to place a stationary air monitor in the family's yard during drilling and completion and for the first three months of production operations.

4.3.6 Risk Associated with Drilling and Completion of the Proposed Wells

As stated above, the Board acknowledges that the drilling of critical sour gas wells entails a certain element of risk. This acknowledgement of reality should be the starting point for all risk and hazard assessment and associated planning conducted by an applicant.

The Board is satisfied that the evidence submitted by Compton acknowledges this fact, despite the apparent overconfidence exhibited by its consultant during the hearing. Compton may believe that the chance of an accidental release to be somewhere "between zero and the square root of zero"; however, it must address in its planning the fact that an element of risk is at issue.

The Board, for its part, must determine whether the extent of the risk is appropriate, given the Board's duty to protect the public interest.

The Board acknowledges that risk analyses are commonly used worldwide as part of industrial project assessments to demonstrate to regulators that hazards are being safely managed and that the risks associated with hazards are as low as reasonably practicable. Typically, both individual and societal risks are assessed.

The EUB has not to date defined specific risk guidelines. However, where the circumstances warrant, the EUB will require an applicant to assess the risks associated with an application in order to demonstrate that the risks are reasonable. In the context of Compton's applications, the

Board finds that a risk assessment is essential. In this respect, the FLRG filed risk assessment evidence that was helpful to the Board in its deliberations.

As discussed in Section 4.1.2 of this decision, where the risk is determined to be too high, cannot be safely mitigated, or outweighs the benefits, the Board will generally find that a proposed energy development project is contrary to the public interest.

The Board considers it important to differentiate clearly between the terms “hazard” and “risk.” These concepts are related but distinct and are frequently applied interchangeably, resulting in confusion. The concept of risk considers the likelihood together with the negative consequence that would result from an event. As such, risk can be characterized as the possibility of a negative consequence. In contrast, hazards are things that present risk. With respect to these applications, the hazard is sour gas. An assessment of the hazard considers that a sour gas release has occurred and determines the consequences of this event. Dispersion modelling can be used to determine the distance to which toxic effects may extend. Risk assesses both the consequences and the likelihood of the sour gas release and can be expressed as the number of chances in a million that a fatality will occur.

An activity may be considered a *major hazard* if the consequences of an incident could be severe, yet be considered a *low risk* because the likelihood of such an incident is low and has been reduced through preventive safeguards.

The Board understands that *individual risk* is often quantified in terms of the number of chances in a million that a person may die from the activity in question. In contrast, *societal risk* assesses the chance and the number of fatalities that could occur from a particular activity and associated accident scenarios.

The Board acknowledges that risk cannot be eliminated completely. Indeed, exposure to risk is part of everyday life. Risk may result from individual choice to undertake an activity, or it may be imposed by an external agent, for example, industrial activities or acts of nature. In the case of energy development in Alberta, it is the EUB’s mandate to ensure, through regulation, that development activity is undertaken in a manner that minimizes the possibility of adverse consequences and is protective of public safety and the environment.

Many of the EUB’s requirements are intended to prevent a release of sour gas from occurring during drilling, completion, production, and servicing operations. Strict engineering standards, training, inspection, and enforcement requirements ensure that sour gas operations are undertaken in a safe and responsible manner. An earlier section of this decision addressed the additional requirements in place during drilling.

The Board notes that there are many engineering and procedural safeguards that must fail for a drilling incident to escalate to an uncontrolled release of sour gas. For example, Compton provided Exhibit 039-013C in response to an undertaking, which listed the number of mechanical failures that would be required in order for an uncontrolled release to occur. However, as discussed during the hearing, the most common cause of a blowout is human error. As such, the Board is of the view that not only must utmost attention be paid to mechanical and operational considerations, but equal or greater attention must be accorded to the training and experience of the crews in all aspects of the drilling and completion of critical sour wells.

The Board addresses the possibility of human error through rigorous regulatory technical standards, training of sour gas workers, and the EUB's inspection process. Vigilance on the part of the licensee, its contractors, and the EUB's inspectors provides the single most important defense against human error. The Board considers that these are all key factors that contribute to the infrequency of sour gas incidents in Alberta.

RWDI, on behalf of the FLRG, conducted a screening-level individual risk assessment. The assessment found that based on a four-well drilling program using a critical well factor of 0.25 and a 15-minute time to ignition, low-density residential development is acceptable (according to MIACC guidelines) at distances greater than 450 m (having a risk of fatality of 10 chances in a million) from the wells. Unrestricted development (having a risk of fatality of 1 chance in a million) is acceptable at distances greater than 1750 m from the wells. RWDI acknowledged that these distances would likely be lower if a comprehensive risk assessment were conducted. The Board accepts that these distances are consistent with current and future land uses in the vicinity of the well.

The Board has considered the risk analysis performed by RWDI after inclusion of the critical well factor of 0.25 and is convinced that the wells proposed by Compton present a very low individual risk of fatality. On this basis, the Board deems the individual risk associated with a four-well drilling program to be acceptable. The Board also notes that these conclusions are drawn based on a screening-level risk analysis. The Board accepts that the individual risks would likely be lower if a comprehensive analysis were performed.

The Board notes that RWDI also analyzed the societal risk associated with the proposed wells against the United Kingdom's Health and Safety Executive (UKHSE) societal risk criteria. These criteria are applicable to events that could result in multiple fatalities from a single major industrial incident.

The Board notes that RWDI's analysis, using an ignition time of 15 minutes for the four-well annual drilling case, indicates that up to 30 fatalities could occur during a release of sour gas. However, taking into account the critical well factor, only one scenario occurs at a probability that is deemed unacceptable. The other calculated values are in the range where risk reduction is desirable but the risk is not unacceptable. The major area where risk reduction could occur lies in reducing the time to ignition; the Board is satisfied that the triple ignition system proposed by Compton will ensure timely ignition to mitigate the risk. The Board is mindful of RWDI's acknowledgement that the societal risk would likely be lower if a comprehensive risk assessment were conducted.

The Board is satisfied that the evidence demonstrates that the applied-for wells can be drilled safely, given that the attendant individual risk is acceptable and societal risks are low. As such, the Board considers that the granting of the well licences is in the public interest if Compton gains the Board's approval of a resubmitted ERP.

4.3.7 Number of Wells

As discussed in Section 4.3.2 of this decision, the Board is not satisfied that six wells are required to drain this reservoir. Accordingly, the Board will consider issuing licences for up to four wells at this time.

Should Compton wish to drill the proposed fifth and sixth contingent wells, it is required to return to the Board to request the necessary approvals. At that time, Compton must provide justification of the need for the wells, an appropriately updated ERP, and all of the supporting documentation required to complete the well licence applications in accordance with EUB *Guide* 56. Depending on the circumstances, the Board may or may not engage in a separate formal proceeding.

4.3.8 Production Operations of the Wells

The White family considered it reasonable to expect that Compton would go beyond its normal practice to control emissions and odours, taking into account the large number of people who may potentially be affected. For example, the White family's expert witness observed that Compton did not seem to have a complaint tracking and analysis form that captured all the information needed to effectively evaluate and isolate problems.

The White family submitted that the cause of unsatisfactory EUB inspections of Compton's facilities stemmed from a combination of lack of adequate inspection by Compton itself, poor communications, and an inadequate management system. The White family was concerned that Compton had not implemented its expert's recommendations to date, despite Compton's statement in March 2004 that it would carefully review the recommendations with a view to adopting them, provided they were not inconsistent with safe operations. The White family argued that Compton did not appear to be the "learning organization" that it described itself to be and may not, in reality, be willing to incorporate new ideas into its operations.

The White family retained Colin Duncan to prepare an expert report dealing with the integrity of the existing pipeline and facilities and related corrosion matters. The White family observed that the 10-13 to A10-02 pipeline had not been inspected since the year 2000, despite its being ranked second in terms of corrosion probability in the year 2000. Mr. Duncan questioned why Compton had taken a long time to verify the results of an in-line inspection conducted in 2003 on the 11-24 to 10-13 pipeline segment. Mr. Duncan submitted that even with a rigorous inspection and monitoring program in place, there was a significant risk of future pipeline failures. The White family reiterated its criticism regarding Compton's slowness in implementing recommendations from outside parties.

The White family argued that inadequacies existed in Compton's record-keeping system for safety and compliance records, as well as previous corrosion records. In particular, the Whites pointed out that Compton had been unaware of a break-in that had occurred at the 10-13 well site on October 5, 2002.

The Board directs Compton to give serious consideration to the recommendations provided by the Whites' experts. It appears that in the past, Compton has not followed through on its commitments in this regard. The Board acknowledges that Compton has committed to implement all but one of Mr. Picard's recommendations.

The Board directs Compton, during all routine maintenance at the 10-13 well site, to purge all surface equipment with sweet fuel gas prior to depressurizing the equipment to a portable flare stack.

4.3.9 Pipeline Issues

In its Memorandum of Decision to the prehearing meeting, *Decision 2003-88*, the Board identified the “integrity of existing pipelines and facilities” as one of the issues to be examined in the hearing of Compton’s applications. The Board further clarified the issue, in response to a motion filed by Compton prior to the hearing, with the following:

The Board will not be reviewing the Chestermere Pipeline licence in this hearing. The specific pipeline integrity issues addressed by the Board’s Decision 2000-20 are not considered to be within the scope of this hearing.

The Board will only hear evidence on the pipeline integrity issue as it relates specifically to the additional throughput volumes of gas that would be attributed to the proposed wells. This evidence would be heard for the specific purpose of assisting the Board with respect to its assessment of the proposed wells.²

The Board has had regard for the above clarification in considering the evidence related to the Chestermere pipeline in this proceeding.

In assessing whether the existing pipeline can safely transport the potential increased volume of gas and/or fluids from Compton’s proposed new wells, the Board believes that several specific issues must be examined, namely:

- adequacy of pipeline capacity to accommodate the anticipated increase in throughput volumes,
- future need for pipeline capacity,
- effects of increased volumes of gas on the pipeline,
- effect of varying compositions of production fluids on the pipeline,
- possible effects of well testing directly into the pipeline,
- adequacy of the corrosion management program implemented by the pipeline operator, and
- adequacy of monitoring of pipeline operating conditions and change in the pipeline corrosion management program when necessary.

With respect to the increased volumes of gas that might be carried in the pipeline, Compton stated that additional gas throughput was expected to increase the pipeline operating pressure and flow rate, but that these changes in operating conditions would not exceed those specified by the existing pipeline licence. Compton also stated that it would not apply for any amendment to that licence to allow for higher operating pressures or higher pipeline capacity.

Compton estimated that the unutilized licensed pipeline capacity for the horizontal well program (at the time when the horizontal wells would be brought on) would be $524.1 \times 10^3 \text{ m}^3/\text{d}$ (18.6 mmcf/d) raw. Calculations indicated that the unused pipeline capacity was sufficient to allow the drainage of up to $27.9 \times 10^6 \text{ m}^3$ (98.5 bcf) of gas over a 14.5-year period. By comparison,

² Board letter dated September 7, 2004.

Compton's independent reserve analyst estimated the remaining raw gas reserves for the entire project area at $19.3 \times 10^6 \text{ m}^3$ (68 bcf) as of December 31, 2003. On that basis, Compton stated that its proposed new wells would not require additional pipeline capacity.

Compton submitted that increased throughput would have a positive impact on the pipeline, as the increased pressure might help prevent sulphur deposition and the higher flow was expected to provide better sweeping of the pipeline, resulting in fewer solids and liquids potentially dropping out in the pipeline. The Board agrees that these factors should be beneficial to the corrosion control of the pipeline, but cautions that they should not be interpreted as replacement for any portion of an established and carefully administered corrosion mitigation plan.

Compton stated that the pipeline segment from 11-24-22-29W4M to 10-13-22-29W4M had been most recently internally inspected by inline inspection in October 2003. Analysis of the inspection results indicated that three sections of pipe may have had defects greater than 25 per cent wall loss, and subsequently those three sections were excavated and replaced by the installation of new pipe. The Board is therefore satisfied that the existing pipeline between 11-24 and 10-13 is suitable for continued service, subject to proper maintenance as provided through the use of the corrosion mitigation plan and subject to any future repairs as might be determined necessary through the use of the CSA Z662-03 standard and engineering evaluation.

The Board notes that the next downstream segment (from 10-13 to A10-02) was last internally inspected by inline inspection in 2000 and was scheduled for a repeat inspection in 2005. The Board agrees that this would be prudent, and the Board expects Compton to have the 10-13 to A10-02 pipeline segment inspected and the results reviewed with EUB staff prior to the end of 2005.

Compton stated that gas from the Belly River and Turner Valley wells north of the 11-24 well also flowed into the Chestermere pipeline at the 11-24 location and that this non-Crossfield production was not expected to present an additional corrosion hazard to the pipeline, as the waters from the Belly River wells were separated out at site and the non-Crossfield gas had a much lower H_2S content. Compton further stated that the use of corrosion inhibitors, pigging, and sulphur dispersant at the Crossfield wells should provide extra assurance that no unusual corrosive conditions should result in the 11-24 to 10-13 segments.

With respect to completion activities and well testing, Compton described the process by which fluids produced after drilling and completion would be removed using three-stage separation before allowing only the reservoir gas to enter the pipeline at 10-13. Equipment used for these purposes would be designed to appropriate B31.3 standards for sour gas service and in accordance with NACE requirements. Measurement of pH and chloride contents would be done to determine when the effluent was clean enough to return directly to the pipeline.

The Board notes that the White family's expert stated that corrosion and materials engineering details had not been included in Compton's submitted materials for either the construction of new piping and surface facilities or the temporary surface equipment associated with testing of the wells. The Board finds that while not all details of the equipment were provided at the hearing, the separation and well testing process is well within normally accepted industry practice and standards and, managed properly, should present no undue hazard, as well as ensure that unusually corrosive fluids are not introduced into the pipeline.

The Board recognizes that in highly sour pipeline systems such as this, the careful development and execution of a competent corrosion mitigation program is paramount. The Board was particularly interested in how Compton managed its corrosion mitigation program, as monitoring of production characteristics and system modifications and then responding to changes in those are crucial. Compton described how it had worked towards improving its corrosion mitigation program over the last several years and noted that Mr. Duncan's technical review also had recognized improvement in that regard. Compton stated that it currently had an established and documented process by which to evaluate operational change and determine whether mitigation plan amendment was necessary. The Board also noted Compton's acknowledgement of the ongoing necessity of corrosion mitigation and its commitment to continuing those programs.

The Board reiterates that the intent of this hearing was not to re-evaluate the operation of the Chestermere pipeline. Accordingly, the Board did not require Compton to file all available information in regard to pipeline operations. The Board is satisfied that Compton currently has in place a corrosion management system that meets the requirements contained in the CSA Z662 standard, the *Pipeline Act*, and the *Pipeline Regulation*. The Board finds that the existing pipeline can safely transport the potential increased volume of gas and/or fluids from the proposed new wells. The Board expects that Compton will continue to administer its corrosion mitigation program to no lesser standard than has been demonstrated or to whatever higher standard should be necessary for the remaining lifetime of the pipeline system.

If the applied-for wells are approved, the EUB Operations Group will continue its annual inspection of this pipeline operating system to ensure that the appropriate action is taken in the event that there is any deterioration in the condition of the pipeline or reduction in operating or maintenance practices. The Board expects Compton to continue to be diligent in its efforts to maintain the integrity of this pipeline and to provide any necessary assistance to EUB staff in this regard.

The Board notes that Compton has committed to cause the Chestermere pipeline to be abandoned or ceased to be used as a sour gas pipeline within the timeframe specified in the LRD agreement. The Board will condition any well licence approvals to reflect this commitment.

4.3.10 Conclusion on the Well Licence Applications

After a thorough review of the evidence as described in the preceding sections, the Board is satisfied that Compton has established the following:

1. The proposed wells offer the potential for benefit to the parties directly involved, as well as to the province.
2. The drilling and completion plans submitted by Compton are technically sound. Compton has considered the hazards and included appropriate safety features within the drilling plan, having regard for the nature of the wells proposed.
3. The risk posed by the drilling of the wells is low.
4. The Chestermere pipeline can safely handle the increased volumes and content of the gas production from the proposed wells.

Taking these factors into consideration, the Board finds that the proposed wells can be drilled, completed, and operated safely. However, the well licences will only be issued if Compton can gain the Board's approval of its ERP, which is currently incomplete, as discussed in Sections 4.4 and 4.5 of this decision. If Compton gains the Board's approval of its ERP at a future date, the Board will issue the well licences at that time.

With respect to the term of any well licences issued, the Board is not prepared to extend the validity of well licences for a period of three years after issuance. The Board finds that the window for depletion of this reservoir is closing rapidly. The Board will make it a condition of any approval that the licences will therefore expire on January 1, 2008. Licences for wells that have not been spudded by that date will become invalid.

The Board will make it a condition of the approvals that the wells and surface facility at the 10-13 site must be abandoned and removed 15 years from the date of the first well licence approval or July 1, 2021, whichever is earlier.

The Board notes that Compton has committed to abandon the 11-24 well within 7.5 years of the date of issuance of the first applied-for well licence. In light of Compton's stated intention and the integral nature of the early abandonment of facilities to Compton's overall plan for the area, the Board will make this a condition of any licences issued for the applied-for wells.

The Board also expects that reclamation activities will be initiated as soon as possible after the abandonment of the aforementioned wells and surface facilities.

4.4 Application to Reduce the Emergency Planning Zone

Having concluded that the wells can be drilled safely, the Board's consideration must now turn to the management of the potential hazard in the unlikely event of a release.

EUB *Guide 71* governs the initial calculation of an EPZ. Specifically, Section 2.1 provides:

2.1 Determination of the Emergency Planning Zone (EPZ)

The EPZ is a priority area surrounding a well, pipeline, or facility where immediate response actions are required in the event of an emergency. A licensee must determine an initial EPZ using the defined methodology that delineates the area of greatest immediate impact from an uncontrolled release of hydrogen sulphide (H₂S) or HVP product.

From the evidence provided, the Board perceives that the purpose of the EPZ has been interpreted in different ways by various parties. The Board wishes to clarify the concept and purpose of an EPZ:

- The EPZ should reflect the level of risk associated with proximity to a sour gas operation. The size of the zone reflects a geographical area where immediate and focused actions must be taken to protect the public from fatalities or irreversible health effects as a result of a release of and exposure to H₂S.
- The operator and the local authorities share responsibility for emergency response both within and beyond the EPZ. The Board expects that roles and responsibilities will be

coordinated by all parties involved in emergency response. However, Compton retains overall responsibility for the ERP.

The Board notes that Compton calculated the EPZs for its well licence applications based on maximum potential cumulative H₂S release rates as prescribed by Section 7.9.2 of EUB *Guide 56*. The Board recognizes, however, that the arithmetical calculation of an EPZ pursuant to this formula may not be conducive to an optimal level of safety and emergency response planning in all circumstances.

EUB *Interim Directive (ID) 2001-5* allows for an applicant to apply for a reduced EPZ of a minimum radius of 4 km, provided that there is a commitment to ignite a well release within 15 minutes and the applicant can satisfy the Board that its ERP provides an equivalent or better level of protection for the public as would be provided under the full calculated EPZ scenario. Accordingly, Compton must be able to demonstrate to the Board that its ERP, based on response within the proposed reduced EPZ, is equivalent to or greater than a plan based on the calculated 15 km EPZ in terms of implementing public protection actions. The ERP must also contain a detailed action plan to address the hazard of exposure to SO₂, including for individuals who may be more sensitive to the effects of the identified hazards.

ID 2001-5 also provides clarification of how the EUB administers its requirements for determining the size of EPZs, including the use of reduced EPZs, and how it reviews ERPs. *ID 2001-5* also introduces new requirements on an interim basis. One such requirement is the submission of an ERP, in conjunction with the application for a reduced EPZ, that addresses a distance equal to twice the size of the reduced EPZ or equivalent to the distance of the calculated H₂S EPZ, whichever is less, in order to address the hazard of exposure to SO₂. This area is often referred to as the notification zone or the emergency awareness zone (EAZ). *ID 2001-5* mandates that if there is a situation that requires immediate ignition, notification of the emergency must be given to all individuals beyond the reduced EPZ to a distance twice the reduced EPZ or the distance to the calculated H₂S EPZ, whichever is less, so that action may be taken voluntarily, such as leaving the area until the release is controlled to avoid any exposure to SO₂.

Accordingly, in the context of Compton's application for a reduced EPZ, if the Board were to approve a reduced EPZ of 7.5 km in radius or greater, the EAZ would equate to the calculated EPZ of 14.97 km (completion scenario), as the calculated EPZ is less than the equivalent of twice the distance of the reduced EPZ (15 km).

The Board is aware that the notion of enhancing public safety through a reduction in the size of an EPZ may seem counterintuitive to some. To appreciate the relationship between EPZ size and protection of public safety, it must first be understood that the calculated unreduced EPZ is based on the assumption of an indefinite unignited release of sour gas into the atmosphere. In such a case, the evacuation of all persons in the calculated zone would likely be a necessity.

Evacuation of all persons within the timeframe required may be feasible in a sparsely populated area, but would not be realistic in an area that is heavily populated or geographically difficult. To attempt full evacuation of a heavily populated area within the timeframe required could create a different type of hazard, where transportation routes may become congested, reducing the effectiveness and purpose of public protection measure intended to prevent exposure to H₂S.

The approval of a reduced EPZ carries with it the mandatory requirement that immediate (i.e., within 15 minutes) ignition occur, thus limiting the hazard presented by unignited H₂S gas. Ignition of the release will result in the conversion of most of the H₂S to SO₂. Although SO₂ also presents a serious hazard, the additional plume rise from combustion results in significant dispersion, thereby reducing exposure to the hazard at ground level.

A smaller EPZ, which reflects the revised hazard footprint by taking into account site-specific aspects (gas composition, operating parameters, mitigation measures, safety equipment) is more protective of public safety because it is based on a realistic assessment and cautious management of the hazard. The Board has adopted this perspective in considering the appropriateness of the size of Compton's proposed reduced EPZ.

The determination of EPZ distances entails a combination of science and expert judgement. The Board believes that whatever approach or combination of approaches is taken, the result must include the establishment of appropriate zones and a plan for management of those zones that are sensitive to the unique aspects of the particular area.

The approaches to determining the size and shape of an EPZ for any application are

- the EUB *Guide 56* nomograph calculation (unreduced EPZ),
- air quality and dispersion modelling (quantitative measures), and
- qualitative considerations, such as the density of population, natural features and boundaries, the response capabilities of the company and the municipal authorities, and past EUB experience based on robust emergency response planning criteria.

In assessing the above factors, the Board had regard for the evidence, as well as the opinions of those experts who appeared at the hearing, with respect to how these factors should influence the size of an EPZ. In the following sections, the Board discusses each individual factor listed above and then provides its conclusions on the overall results.

In its assessment, the Board has been particularly focused on two related questions:

- What is an appropriate size for the EPZ associated with Compton's proposed wells?
- Which portion of the EPZ should be subject to evacuation as the primary protection measure, and which portion should be subject to sheltering indoors in the event of an uncontrolled release?

4.4.1 The EUB Nomograph Calculation (Unreduced EPZ)

The initial size of a sour well EPZ is determined by the wellhead absolute open flow (AOF), according to the type of well operation. The H₂S release rate is determined by multiplying the maximum H₂S content by the wellhead AOF. There is no consideration given for ignition in determining the maximum potential H₂S release rate.

The Board notes that no party proposed that the calculated EPZ radius of 12 km (drilling) or 15 km (completion) should be used as the basis for Compton's ERP. The Board agrees with the parties that it would be inappropriate to use either the 12 km or the 15 km as the EPZ size on

which to base a manageable ERP in this circumstance. As noted earlier, the calculated zone does not take into account the fact that the wells would be ignited or site-specific characteristics, such as densely populated areas. The Board finds that the key question is whether the proposed reduced EPZ provides for a realistic assessment of the hazard and an ERP that is equally protective of the public as would be provided for by the calculated radius of 12 km or 15 km.

4.4.2 Air Quality and Dispersion Modelling

The Board is of the view that an EPZ and a hazard distance are not necessarily interchangeable concepts, but are often viewed as such. In the context of Compton's applications, the Board considers the "hazard distance" to denote the distance from the well beyond which serious irreversible health effects are not predicted under cautious yet reasonable assumptions. The hazard distance is predicted from dispersion modelling of an unignited release of H₂S. When dispersion modelling is performed using an approach acceptable for emergency planning purposes, the predicted hazard distance may be used as a starting point for establishing an EPZ. The final EPZ size is generally based on the initial estimate of hazard distance, but takes into account additional factors, such as topography, population distribution, transportation access, and any other factors that may influence public safety.

Although not required in *ID 2001-5*, the Board considers that dispersion modelling submissions to the hearing offered a useful tool in evaluating the level of public protection afforded by Compton's ERP, including the use of the proposed reduced EPZ.

Informed modelling assumptions and judgements are crucial to generating reliable results. The Board notes the FLRG's position, supported by most interveners, that it is crucial to determine a reasonable estimate of the distance that the hazards from a sour gas plume would extend to under poor atmospheric dispersion conditions and then to match the applicable response of evacuation, sheltering indoors or notification to the appropriate people. The Board agrees with this approach.

The debate between competing dispersion modelling results encompasses a disagreement over the reliability of one particular model over another or, as was the case in this hearing, over appropriate input parameters.

In determining the appropriate hazard distance for defining the size of the EPZ, the Board has adopted a cautious approach to the modelling results due, in part, to uncertainty created by the wide range of individual modelling input parameters presented at the hearing. Further, it is the Board's view that additional risk mitigation measures must be taken with respect to the proposed wells, given their proximity to Calgary, than might be required in less densely populated areas.

Compton performed dispersion modelling using the draft version of EUBMODELS, a protocol using a standardized model. The Board acknowledges that there is currently uncertainty regarding the final parameters to be included in EUBMODELS. The FLRG's consultant, RWDI, performed dispersion modelling using a proprietary model (referred to at the hearing as RWDIMODELS) that has been relied upon in previous Board proceedings both in support of and in opposition to applications for reduced EPZs. As both models are based on the SLAB dispersion model, the Board accepts that the models will yield comparable results. The Board is satisfied that structural variations in the two models used do not inhibit effective comparative analysis of modelling results.

Although the models are not substantially different, Compton and RWDI used different input parameters to the model. In its analysis of the evidence, the Board finds the most important modelling parameters to be ignition time, stagnation temperature, meteorology, drag coefficient, H₂S release rate, and H₂S concentration endpoints. The Board observes that small changes in some of these parameters, both individually and in combination, can produce significant differences in the dispersion modelling results, irrespective of the particular model used. The Board heard evidence offering substantially different views as to why particular parameters were to be preferred in assessing the extent of the H₂S hazard. Often, these differences stemmed from divergences in the parties' interpretations of a "worst case" versus a "reasonable" estimate of the hazard.

The Board notes that the time to ignition was an important parameter used in the dispersion modelling evidence. The Board finds that with all other parameters remaining the same, a decrease in ignition time will lower the predicted hazard distance. The Board finds that Compton has demonstrated that it has the capability to ignite an uncontrolled release of sour gas at the proposed wells within 15 minutes. However, the Board finds that there was not adequate evidence to justify the use of an ignition time of less than 15 minutes for purposes of determining the size of the hazard zone.

The Board accepted the maximum H₂S release rates as calculated by Compton for the drilling, completion/servicing, and production scenarios. The interveners did not dispute these rates. The Board notes that due to the permanent packer assembly that the Board requires Compton to maintain in place during completion and servicing operations, the drilling scenario yields the highest release rate and should be used for the purpose of determining hazard distances.

Although Compton elected not to reduce the length of the horizontal portions of the proposed wells, it supplied dispersion modelling evidence for the completion and servicing cases for reduced horizontal lengths that showed a reduction in the corresponding maximum release rates.

The Board notes that the dispersion modelling showed that in some cases a lower release rate would predict a larger hazard zone, introducing a degree of uncertainty into the modelling results. It is the Board's view that even the best modelling results are only estimates of the complex interactions of many variables. The uncertainty in the completion and servicing modelling as submitted by Compton supports the cautious approach adopted by the Board in considering the dispersion modelling evidence. As such, the Board has assessed the size of the EPZ based on Compton's applied-for maximum 1500 m horizontal wellbore length for each well.

The Board is of the view that for emergency planning purposes, modelling parameters should be selected to balance caution with reasonableness and be based on sound technical information. Arbitrary selection of modelling parameters yielding larger or smaller hazard distances is not acceptable for emergency planning purposes.

The Board finds that the input parameters chosen by Compton could be considered reasonable for emergency planning purposes in certain situations. However, due to the proximity of the wells to Calgary and the severity of the H₂S hazard, the Board was guided by its view that in this instance the public interest demands that a more cautious approach be taken. The Board also

acknowledges the CHR's concern that health effects could extend beyond Compton's applied-for reduced EPZ and could create adverse health impacts on susceptible populations in particular.

Based on its assessment of the modelling results, the Board finds that the predicted H₂S hazard distance and corresponding EPZ radius of 9.7 km, as determined and advocated by the FLRG, is consistent with a more cautious approach. The Board recognizes that under certain situations, the predicted hazard distance may extend beyond 9.7 km. Similarly, the Board understands that the predicted hazard distance under other conditions could be less than the 4 km modified reduced distance, as advocated by Compton.

The Board finds that the major hazard to the public from an ignited well release would arise from SO₂, which was evaluated by Compton; predicted concentrations of SO₂ were found not to exceed the evacuation criteria set out in *Guide 71*. Compton's assessment was supported by RWDI. The Board is satisfied that during an ignited well release, it is very unlikely that SO₂ concentrations would reach levels that would trigger evacuation outside the EPZ, based on the criteria set out in *Guide 71*.

The Board acknowledges the CHR's concerns regarding the potential for concentrations of SO₂ to become sufficiently elevated as to cause health effects on susceptible individuals. Although the predicted levels of SO₂ are less than the evacuation criteria set out in *Guide 71*, the modelling does show that there could be levels of SO₂ that could require additional public protection measures if the release were to be prolonged. The Board requires appropriate monitoring programs to be incorporated in the ERP, such that the emissions can be monitored on an ongoing basis and the appropriate mitigative action can be taken, including for susceptible individuals.

The Board is satisfied that consultation and education as part of the development and implementation of Compton's ERP would allow susceptible individuals to be effectively sheltered following the ignition of a release. The Board finds that an EAZ of 15 km is adequate to provide a level of safety protective of the public.

The Board acknowledges that emissions of fine particulate matter (PM_{2.5}), polycyclic aromatic hydrocarbons (PAHs), carbon disulphide, and other products of incomplete combustion (PICs) may occur during an ignited well release, in addition to emissions of SO₂.

Based on the examination of the CHR, the Board considers that the main hazard from an ignited well release is SO₂, and the other pollutants may be considered secondary hazards. The Board is satisfied that assessing the air quality impacts of the main hazard, SO₂, is sufficient for emergency planning purposes.

4.4.3 Qualitative Considerations

Parties to the proceeding provided useful qualitative information for the Board's consideration.

Carma expressed concern about protection of its construction employees who may be working beyond Compton's proposed reduced 4 km EPZ. Carma stated that some of these workers may not have vehicles or easy access to sheltering indoors. BurnsWest stated that it did not have confidence in Compton's ERP to protect transient users and residents on its property. The Board

notes that Rocky View could not recommend approval of Compton's application, as it believed that the 4 km EPZ did not provide for adequate public safety.

Other interveners, including the Whites, Carma, the Evanses, Mr. Baiton, Mr. Queenan, Mr. Burditt, Erin Woods, and the CCC, submitted that the Board should take a more protective approach in determining the appropriate size of the EPZ, on which Compton could then base an appropriate ERP for the area. The City of Calgary stated that it was relying on the Board to determine the size of the EPZ. However, the City stated its concern that Compton, charged with the responsibility of implementing the ERP, appeared overly confident that an incident would not occur and that everything would go according to plan in the event of an emergency.

Issues were raised by the municipal authorities intervening in the hearing with respect to Compton's approach to working with them beyond the proposed reduced 4 km EPZ.

All parties were in agreement that Compton's applications present unique challenges for determining the appropriate approach to ensuring public safety. The Board agrees with the parties that unique challenges are present in the area surrounding Compton's proposed energy development. The Board finds that the modelling evidence does not adequately take into account these challenges, which include

- ranching and farming operations,
- mixed nonresidential uses, such as gravel pits and golf courses,
- increasing density and encroachment of country residential development,
- the Bow River and river valley,
- numerous highways and other major transportation arteries, and
- a densely populated urban area.

The Board finds that the determination of the appropriate EPZ in the context of Compton's proposed energy development requires consideration of all of the relevant factors and the development of an ERP in keeping with the Board's requirement to maintain an equivalent or higher level of public safety as would be provided by the calculated EPZ.

Based on the qualitative factors at issue, the Board concludes that Compton's proposed reduced 4 km EPZ would not provide an equivalent or higher level of public safety as would be provided by the EPZ calculated based on the H₂S release rate nomograph.

4.4.4 Conclusion on the Application for a Reduced EPZ

Based on its consideration of all of the factors discussed above, the Board denies Compton's application to reduce the EPZ to a modified 4 km with an associated 8 km EAZ. The Board notes that Compton's proposed EPZ ranged from 4 to 5.7 km in radius, which would have resulted in an EAZ ranging from 8 to more than 12 km, corresponding to twice the boundary of the proposed EPZ. The Board is of the view that an ERP based on a reduced zone of that size would not be sufficiently protective of public safety, given the circumstances surrounding Compton's proposed energy development.

Under normal circumstances, within the context of the applications before the Board, all that would have been required in terms of a decision would have been to deny the applied-for 4 km reduced zone. However, the parties involved in the hearing made it clear that they wished the Board to make a decision on what it would find acceptable, if it was not prepared to accept the proposed 4 km reduced zone. The Board was influenced by the general desire of the parties for certainty as to the future of energy and urban development in this area. For these reasons, the Board is rendering a decision on an appropriate EPZ size for the proposed wells.

The Board finds that a consolidated ERP that provides for a combination of sheltering indoors and evacuation must be developed to a total radius of 9.7 km from the 10-13 site. The Board has reached its conclusion in this regard after considering both modelling and qualitative factors that pointed to a similar distance. In addition, the Board has set the EAZ at a 15 km radius, in accordance with the requirements of *ID 2001-5* (i.e., the lesser of the unreduced original EPZ or twice the reduced EPZ). In keeping with its cautious approach, the Board has used the 15 km unreduced EPZ from the completions case as a basis for the size of the EAZ, notwithstanding the fact that for all other purposes, the relatively lower release rate associated with the drilling case has been accepted.

4.4.5 Appropriate Sheltering and Evacuation Distances

The Board is mindful that in past rulings it has interpreted *Guide 71* to require evacuation of all persons residing within an EPZ to be the primary protection measure. In most situations, the Board has found evacuation to be the most appropriate approach to protecting public safety. The Board is also aware that sheltering is a commonly used approach to protecting the public in heavily populated areas, such as those in proximity to Compton's applied-for energy development.

An understanding of the considerations involved in determining when sheltering is appropriate may assist in interpreting Table 5 and Figure 2, which follow. As stated in *Guide 71*, sheltering must be considered the primary protective measure in limited circumstances when

- there is not enough time or warning to safely evacuate the public that may be at risk,
- residents are waiting for evacuation assistance,
- there is a sour gas release of limited duration,
- the location of a release has not been identified, and/or
- the public would be at higher risk if evacuated.

The Board has set out in Section 4.5.2 of this decision an approach based on the implementation of progressive public safety measures, involving both evacuation and sheltering, which provide for the safety of all persons within the 9.7 km EPZ.

Sheltering in place is the practice of moving or remaining indoors prior to or during a sour gas release of limited duration. The Board considers that sheltering in place is an effective response to such a release. Sheltering indoors creates a buffer between persons and the hazard that may be in the outside air. Moving or remaining inside a building protects the public by using the reservoir of clean indoor air to dilute contaminated air that infiltrates from outdoors.

Should an ignited release continue for a substantial period of time, resulting in the public being exposed to concentrations of SO₂ at levels that may cause discomfort or health effects, evacuation must be considered. The Board finds that this is particularly applicable in the case of long-term exposure of susceptible individuals to SO₂, regardless of whether *Guide 71* evacuation criteria have been met.

The Board agrees with the FLRG and Compton that it is not reasonable to attempt an evacuation of large and densely populated urban areas. The Board agrees with the FLRG that any organization, Compton not excepted, would have difficulty in executing an effective evacuation of large urban areas within the short timeframe associated with an uncontrolled release of gas.

Based on testimony from both Compton and the FLRG, as well as its own knowledge and assessment, the Board finds that the evacuation of urban neighbourhoods would not be as effective a public protection measure as would sheltering indoors, particularly taking into consideration that any release of H₂S would be of short duration (less than 15 minutes). Further, the Board agrees with both Compton and the FLRG that the residents most at risk from a blowout are the rural residents in closest proximity to the proposed wells. The Board agrees with the FLRG that evacuating large populations unnecessarily may divert resources away from those rural residents most at risk.

The Board directs Compton to revise its ERP based on a 9.7 km EPZ, incorporating a mandatory evacuation zone with a minimum radius of about 5 km. The Board directs that residences and businesses within Compton's proposed reduced EPZ should remain in the evacuation zone as shown in Figure 1. The Board directs Compton to develop its ERP based on an average evacuation zone radius of 5.7 km. Surrounding the evacuation zone (EPZ 1), Compton must provide in its ERP for a sheltering zone of an additional radius of about 4 km (EPZ 2). The combined radius of EPZ 1 and EPZ 2 of 9.7 km would define the size of the reduced EPZ. The concept of the relationship of the zones to one another is illustrated in Figure 2. The Board notes that as a result of a particular situation, evacuation of individuals in the sheltering zone and the EAZ or sheltering within the evacuation zone may also be required.

The Board emphasizes that EPZ 1 (evacuation zone) is equal to or greater in size than Compton's proposed reduced EPZ. Further, as discussed above, the Board has determined that the EAZ radius must be increased to 15 km, as opposed to the 8 km proposed in Compton's application for a reduced EPZ.

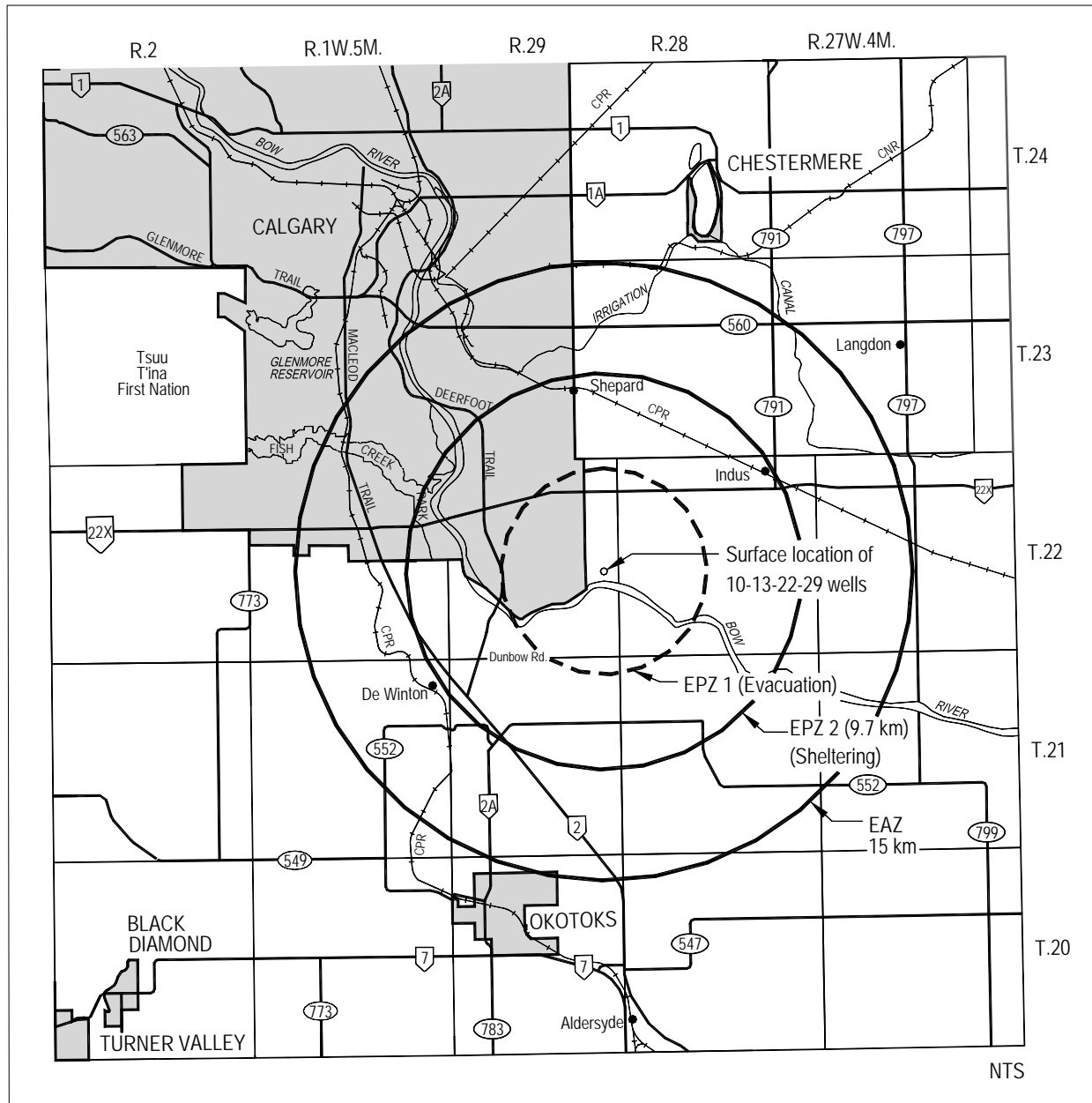


Figure 1. Map showing EPZ 1 (Evacuation), EPZ 2 (Sheltering), and EAZ

Note that the EPZ 1 boundary is subject to final determination by Compton and municipal authorities.

The following table summarizes the parties' positions and the Board's determination of these issues:

Table 4. Board-Determined EPZ and EAZ Distances

Description	Emergency response	Per Compton (km)	Per FLRG (km)	Board-determined (km)
EPZ 1	Evacuation	Nominal 4 (varies 4 - 5.7)	± 5	± 5 (see Figure 1)
EPZ 2	Sheltering and, if necessary, evacuation	None	± 4.7	± 4.7
Total EPZ		Nominal 4 (varies 4 - 5.7)	9.7	9.7
EAZ	Notification and, if necessary, sheltering or evacuation	8	N/A	15

4.5 Emergency Response Plan

The Board acknowledges that Compton's ERP was based on its applied-for 4 km EPZ. The Board further acknowledges Compton's own evidence that the plan was in need of significant revision. The Board here offers general observations regarding the content of the plan as submitted, along with its expectations regarding the content of any new or revised plan based on the reduced EPZ of 9.7 km.

The Board is of the view that the fundamental objectives of emergency response planning are preparedness and response, as well as ensuring ready access for the public, the municipal authorities, and the energy operator to the information necessary to respond effectively to an emergency. An ERP provides the foundational protocols to ensure that effective public protection actions are taken in the event of an incident.

4.5.1 The ERP Filed by Compton

The Board is cognizant of the interveners' evidence regarding the evacuation and communication challenges associated with the area surrounding the location of Compton's proposed energy development. An ERP that would be effective for this area must address many issues, including some not normally faced by an applicant, such as dense urban development, ongoing construction, high traffic volumes, and large gravel pit operations. The Board acknowledges the interveners' request for improved relations between Compton and the community. The Board concurs with this request and believes that regular two-way communication is crucial to the success of applications characterized by unique and challenging circumstances.

Based on evidence from the hearing, the Board is concerned that Compton's communication with the stakeholders impacted by its applied-for facilities has historically been compromised. The Board is mindful that Compton faced unusual challenges relative to the nature and scope of the applications, as well as the complex circumstances that characterize the area surrounding the proposed energy development. Nonetheless, the Board considers that some of Compton's difficulties in this respect resulted from Compton's approach to public consultation.

The Board is of the view that Compton and its consultant took the approach that it was acceptable to meet the Board's minimum requirements for conducting public consultation. In so doing, Compton created the perception that it views public consultation as a requirement to be met or an obstacle to be surmounted, as opposed to a method for ensuring an ongoing exchange of information with interested and concerned stakeholders. The Board observes that this

approach has led to the further perception, as articulated by the interveners and reinforced at the hearing, that Compton is unresponsive and unilateral in its actions.

The Board reminds Compton that its guidelines for public consultation, as set out in *Guides 56* and *71* and in *ID 2001-5*, are to be interpreted as baseline expectations only. The Board explicitly advises applicants that the specific circumstances of each application must be taken into account in designing and implementing any public involvement program. The Board is of the view, especially in circumstances as complex as those surrounding Compton's applications, that a broad, inclusive and, above all, an *ongoing* public involvement program should have been implemented and rigorously maintained. The Board reminds Compton in this regard that its expectations for public involvement include both early initiation and maintenance through to abandonment and reclamation of the applied-for facilities; in other words, the applicant's responsibility for public consultation does not conclude once its applications have been filed with the Board.

Based on the evidence, the Board suggests to Compton that there is benefit to be gained from the corporate recognition of the value in maintaining ongoing, open, and informative relationships with the people and communities affected by its operations. The Board expects the companies it regulates to place top priority on relationships with stakeholders. In this regard, the Board reminds Compton that the Board alone has the discretion to determine who is a party impacted by an energy development, proposed or existing; Compton is expected to be inclusive in its dealings with stakeholders.

The Board is of the view that successful and sustainable communications between Compton and its stakeholders must be founded on mutual respect, open communication, and cooperation. On this basis, the Board strongly urges Compton to consider creating dedicated functions within the company for environmental, health, and safety issues, as well as for stakeholder relations.

Almost all of the interveners suggested improvements to Compton's ERP and public consultation. For the most part, the Board finds that the suggestions by interveners were well reasoned and thoughtful, and the Board expects that Compton will consider the issues raised and how to address them. In general, the Board finds that the FLRG's suggestions were in keeping with the Board's expectations for public consultation and for ERPs. The Board suggests that Compton should carefully consider the FLRG's evidence and submissions.

The Board finds that the site-specific portions of Compton's ERP were, at a high level, structurally sound for purposes of addressing public protection requirements within Compton's proposed reduced 4 km EPZ. Overall, however, the ERP lacked detail and was deficient in many crucial areas. The following points illustrate some key deficiencies:

- Lack of attention to the BurnsWest property: Compton did not appear to understand that there were additional uses for this property apart from the gravel pit.
- Practicalities of evacuating a dispersed operation such as a gravel pit or the large number of gravel trucks that use the site daily.
- Lack of knowledge regarding the state of the alternative evacuation route for BurnsWest, which was unlikely to be a practical route for large gravel trucks in all types of weather.
- Failure to contact Carma to obtain its agreement to situate the air monitoring stations

- Lack of awareness of the hazards, i.e., ongoing construction in the area, tending to diminish the effectiveness of the air monitoring stations.
- Failure to consider the potential evacuation needs of Carma workers outside the reduced EPZ who might not have transportation or access to sheltering indoors.
- Failure to establish performance measures for the contract emergency responders or to adequately factor in the travel time from those responders' home base in Airdrie to the 10-13 site.
- Inadequate consideration of the nature of communication with school bus drivers and the safety of school children.
- Failure to update the EPZ map and boundary to reflect its commitment to include at least one resident in the EPZ.
- Failure to correlate the warning time associated with a potential blowout condition to the time necessary to execute its ERP.
- Apparent passive approach to determining whether residents had concerns regarding to its applications.

The Board notes Compton's assertion that an ERP is a work in progress requiring continuous revision in order for the document to be useful in the event of an emergency. At the same time, the Board is concerned that Compton did not identify known corrections to the Board at the time of adopting its evidence in the hearing. The Board believes that a significant amount of cross-examination at the hearing could have been eliminated if Compton had been forthcoming in identifying all of the areas of its applications (including its ERP) that had been changed or required updating since the filing of the original documents. The Board is of the view that this approach would have enhanced the interveners' trust in Compton's ability and commitment to prepare and implement a sound ERP.

In light of the unique characteristics of the area surrounding the applied-for energy development, the Board finds that close cooperation and communication between Compton, the City of Calgary, the MDs of Rocky View and Foothills, and the CHR are essential to the provision of effective public protection measures for the area.

The Board holds the applicant responsible for ensuring that an ERP is developed that appropriately addresses the roles and responsibilities of all responders. There must be coordination and a clear understanding of agreed-upon roles and responsibilities among the applicant and all local government agencies. In this respect, the applicant relies on the assurances of local government agencies that the latter are capable of carrying out their responsibilities as defined in the *Government of Alberta Upstream Petroleum Incident Support Plan*. Further, the Board requires that the applicant consult with these local agencies during the initial stages of developing its ERP in order to confirm the availability of resources needed to ensure the effectiveness of the plan and the various parties' acceptance of their respective roles and responsibilities.

The Board acknowledges the concerns expressed by the municipal authorities intervening in this proceeding with respect to having been unable, to date, to finalize public safety protocols

associated with the proposed project. Given specific mandates and the provisions set out in the *Disaster Services Act*, the Board understands the statutory responsibilities of the authorities having jurisdiction to provide emergency and disaster services within their respective municipal boundaries. On that basis, the Board appreciates why the municipal authorities viewed collaborative response details for Compton's original ERP as contingent upon finalization of the size of the EPZ. The Board finds, however, that this particular impediment has been removed through the establishment of an EPZ size. The Board now expects the various parties to cooperate in the preparation of a revised ERP. In that regard, the Board notes the assurances offered by the City of Calgary, the CHR, and Rocky View to work with Compton once a reduced EPZ was established.

The Board notes that Compton took the approach that emergency response accountability beyond the proposed reduced EPZ lay with the municipalities. The Board wishes to clarify that response *within and beyond* the EPZ is a shared responsibility, but that Compton bears ultimate accountability for ensuring the protection of public safety. As such, the Board expects that Compton will work proactively and collaboratively with the local agencies to identify and adopt appropriate emergency response protocols for the proposed wells.

4.5.2 ERP for the Reduced Zone of 9.7 km

Compton must prepare a new or substantially revised ERP that is adapted to the unique circumstances in the area surrounding the proposed energy development.

The Board notes that the FLRG suggested incorporating a unified command approach into Compton's ERP, involving progressive public protection measures within and beyond the EPZ. The Board understands this concept to mean that both Compton and the local authorities would adopt a collaborative approach to implementing public safety response actions. After careful consideration, the Board is satisfied that this approach addresses many of the unique characteristics of the area. The Board finds several advantages to this approach in the context of Compton's proposed energy development:

- There would be less differentiation in the level of response between the evacuation zone (EPZ 1) and the sheltering zone (EPZ 2), as appropriate public protection measures would be initiated in both zones concurrently at the onset on an incident (see Table 5).
- The ERP would more effectively address the site-specific considerations that must be accounted for when implementing a successful emergency response.
- Compton and the various municipal authorities would jointly initiate public protection measures (EPZ 2), thereby fostering a more time- and resource-efficient approach to phasing in public protection measures.

The Board is of the view that the unified command approach complements the phased approach to emergency response set out in this decision. Further, the Board finds that the unified command approach lends itself to collaborative planning and response, resulting in appropriate and effective response actions adapted to the nature of the incident.

A key premise of the unified command model is that responders, both government and industry, hold the goal of public protection in common. As such, there is a shared desire to implement

mutually agreed-upon response strategies. The process of unified command encompasses joint decision-making, teamwork, and sharing resources and responsibilities. This is in contrast to the more traditional “command and control” model wherein there is a single decision-making authority, while other participants serve in an advisory role only.

The Board finds that the phased approach, as illustrated in Table 5 and Figure 2, implies joint roles for Compton and the responsible municipal agencies. The Board anticipates that a collaborative and coordinated response would have the effect of reducing the individual burden of action required from each responder and would limit duplication of resources.

According to *Guide 71*, all incidents are classified as either alert or emergency (level 1, 2 or 3). An understanding of what each level of emergency denotes in terms of the nature of the hazard and the response actions required may assist in interpreting Figure 2, which follows. The following definitions of level of emergency and associated response actions are drawn from *Guide 71*:

- Level 1 – immediate control of the hazard becomes progressively more complex due to deteriorating conditions. Special needs persons to be notified and offered voluntary evacuation.
- Level 2 – imminent and/or intermittent control of the hazard is possible. Primary public protection measures, such as evacuation and sheltering, are initiated.
- Level 3 – imminent control of the hazard is not possible. Ignition of the release is required.³

The Board notes that the phased approach to emergency response incorporates innovative concepts and protocols. This approach both accounts for the unique circumstances characterizing Compton’s proposed energy development and exceeds the minimum requirements in *Guide 71*. The Board expects that Compton and the responsible municipal authorities will develop planning strategies that best address implementing the phased public protection measures set out in this decision. The Board also notes that EUB staff will be available as a resource to Compton and the municipal agencies involved in the redevelopment of Compton’s ERP based on the phased approach.

The Board further notes that the size of the EAZ is intended to delineate a predefined area where the public may be provided with information and direction in relation to the hazard during an incident. As a minimum, notification and evacuation of the EAZ must be based on monitored levels of H₂S and SO₂, as provided in [Appendix 5](#) (*Guide 71*, Table 7: Notification and evacuation requirements outside the EPZ). The Board expects Compton’s revised ERP to provide the appropriate level of detail regarding the notification of the public within the EAZ. Broadcast media (radio and television) would be one of the means used to notify residents within the EAZ in the event that immediate evacuation of the area becomes necessary. Evacuation of the area must occur through a coordinated response between Compton’s ERP and the municipality plan.

³ As directed in *ID 2001-5*, approval of a reduced EPZ is contingent upon immediate ignition of any uncontrolled release of H₂S.

Table 5. Summary of Public Protection Measures for EPZ 1, EPZ 2, and EAZ

Levels of Emergency	Public Protection Measures*		
	EPZ 1	EPZ 2	EAZ
1 (Low) <ul style="list-style-type: none"> Deteriorating conditions Control and relief systems functioning correctly On-site condition, possible off-site impact 	<ul style="list-style-type: none"> Activation of Compton ERP Activation of City of Calgary and Municipalities ERP Notification Evacuation is initiated 	<ul style="list-style-type: none"> Activation of Compton ERP Activation of City of Calgary and Municipalities ERP Notification of status Prepare to initiate shelter-in-place instructions in event the incident escalates 	<ul style="list-style-type: none"> Information is conveyed to public at large through media releases Further direction or action is assessed by members of unified command
2 (Medium) <ul style="list-style-type: none"> Imminent and/or intermittent control of the hazard is possible Some control and/or relief systems not operational On-site condition, possible off-site impact 	<ul style="list-style-type: none"> Mandatory evacuation Isolation of EPZ 1 Prepare to ignite (ignition will occur if criteria for ignition in <i>ID 2001-5</i> have been met) <p>Continued implementation of Compton ERP, City of Calgary and municipal districts' municipal emergency plans (MEPs)</p> <p>Note: residents will be asked to shelter-in-place only if sheltering criteria outlined in <i>Guide 71</i> are met</p>	<ul style="list-style-type: none"> Initiate shelter-in-place instructions <p>Note: further direction or action is assessed by members of unified command</p> <ul style="list-style-type: none"> Continued implementation of Compton ERP, City of Calgary and municipal districts' MEPs 	<ul style="list-style-type: none"> Information and updates are conveyed to public at large through media releases Further direction or action is assessed by members of unified command Continued implementation of Compton ERP, City of Calgary and municipal districts' MEPs
3 (High) <ul style="list-style-type: none"> Imminent control of the hazard is not possible Key control and relief systems not operational Potential for public safety to be jeopardized 	<ul style="list-style-type: none"> Ignition Continue appropriate public safety actions Continue monitoring of air quality (H₂S and SO₂) to determine if additional public safety measures need to be taken in EPZ 2 and EAZ Continue implementation of Compton ERP, City of Calgary and municipal districts' MEPs 	<ul style="list-style-type: none"> Monitor EPZ 2 air quality to determine if evacuation requirements (H₂S and SO₂) in Table 7 of <i>Guide 71</i> (see Appendix 5) have been met. If any of the requirements have been met, take the corresponding notification/evacuation action Continue implementation of Compton ERP, City of Calgary and municipal districts' MEPs 	<ul style="list-style-type: none"> Activation of Upstream Incident Support Plan Continued implementation of Compton ERP, City of Calgary and municipal districts' MEPs Once ignition has occurred, EAZ occupants are notified so that action may be taken voluntarily to avoid exposure to SO₂ If SO₂ levels reach or exceed 5 ppm (15-minute average), 1 ppm (3-hour average), or 0.3 ppm (24-hour average), evacuation is mandatory

*In all public safety actions taken, the affected public will be updated regularly.

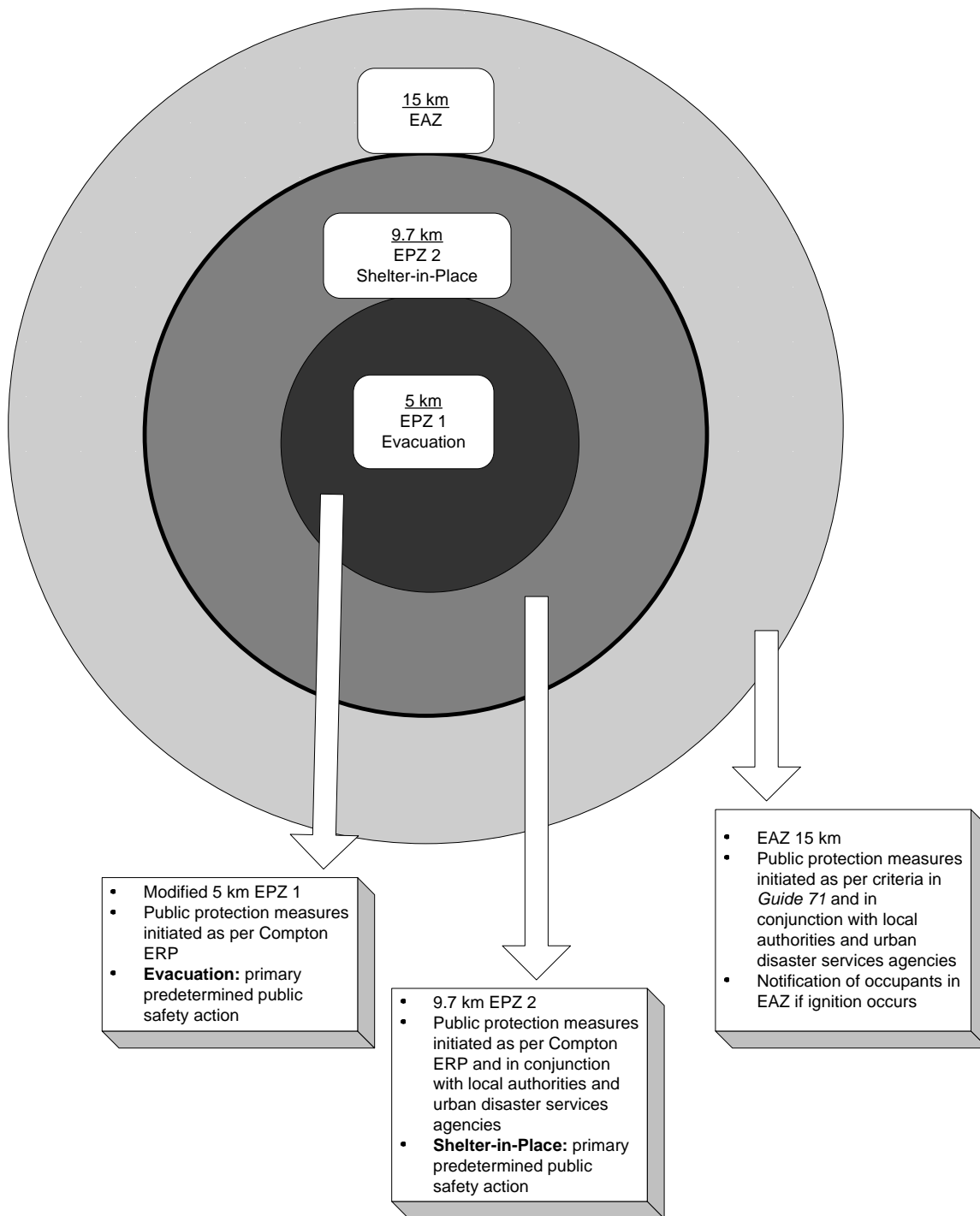


Figure 2. Concept of emergency planning zones

In its original ERP, Compton proposed the placement of nine stationary air monitors and described the protocol for dispatching two additional mobile air monitoring units prior to entering the sour zones. The Board concurs with Compton's placement of the air monitors for purposes of EPZ 1, provided that Compton can address Carma's concerns regarding the protection and reliability of the monitors in construction zones. The Board directs Compton to work with the developers in the area to determine optimal placement of the monitors on lands currently under development.

Additionally, given Gerald White's health sensitivities, the Board, in Section 4.3.5 of this decision, directed Compton to place an air monitor in Mr. White's yard during drilling, completion, and the first three months of production operations.

The Board acknowledges that some interveners requested an opportunity to review Compton's amended ERP prior to the Board issuing any approval. The Board cautions that ERPs are often voluminous and complex and may include more information than what some parties may find useful. The Board directs Compton to provide, at a minimum, an updated and detailed public information package to all interested parties for review and comment. The Board expects Compton to discuss with those parties included in the ERP how it has incorporated their concerns and the provisions it has put in place to protect their safety.

The Board notes that the Evanses requested to be relocated if the construction of the Shepherd ditch were to coincide with Compton conducting operations in the sour zone, as their residence is located on a dead-end road. Further, the Board notes that BurnsWest expressed a concern as to how its area users, staff, and residents would be protected in the event of a release of sour gas. The Board finds that the parties located south of the proposed wells and north of the Bow River have limited egress options.

Some interveners stated that they may be outdoors for extended periods of time, particularly during the period that the Compton expects to be conducting operations in the sour zones. These parties were concerned about how they would be contacted and notified in the event of an emergency.

The Board expects Compton to take into account in its amended ERP the particular needs and circumstances of all area residents and users. Compton's ERP must detail the procedures that will be in place to ensure that residents can be located, notified, and protected in the event of an emergency. The plans and procedures must be consistent with the time available before a release of sour gas occurs.

In addition to the conceptual approaches set out above, the Board directs Compton to develop a comprehensive ERP based on the areas both within and beyond the complementary EPZs (i.e., EPZ 1 and EPZ 2) and to submit the document to the Board for review and approval in the timeframe specified in the following section. The Board expects Compton to consult appropriately with all affected parties prior to submission of a revised ERP.

Some of the required components are as follows:

- Describe Compton's success in working cooperatively with all municipal responders.
- Provide a detailed response protocol section to address the area beyond EPZs 1 and 2.

- Describe the public education approaches developed for both evacuation and sheltering.
- Provide relocation during sour zone drilling and completion to George White's and Gerald White's families.
- Provide nonautomated personal notification to those who have requested it within EPZ 1.
- Update public consultation, including, but not limited to, all permanent residents, existing construction sites, Burnco employees and tenants of BurnsWest Corporation, and bus companies and drivers with routes in the area.
- Include an up-to-date map of the area, ensuring that all entities are accurately illustrated.
- Develop a detailed notification protocol to all local media.
- Confirm and include a list of response times for the contract services required to implement the ERP.
- Provide a detailed account of isolation protocols, including, but not limited to, roadblock personnel and availability.
- Provide daily drilling status reports to the EUB's Midnapore Field Centre.
- Provide daily drilling status reports to the MDs of Rocky View and Foothills, the City, and the CHR while operating in the sour zone, upon request.
- Amend the ERP to include 7 days per week, 24 hours per day unrestricted access by the City's Disaster Services Division personnel to the drilling control centre, subject to appropriate safety issues.
- Provide ERP training materials to the municipal responders and allow them to participate and observe in the training sessions.
- Amend the ERP to provide for prompt communication to the EUB of all changes in emergency status.
- Amend the ignition section to capture the test firing protocol and discharge capabilities of the Firefly units.
- Describe the exercise protocol and timing schedule for each exercise.
- Conduct a minimum of two major deployment exercises with the actual drilling and response crews, the first prior to drilling the horizontal sections for the first set of wells, and the second prior to drilling the horizontal sections for the second set of wells. The ERP shall be updated between the drilling of the second and third wells.
- Conduct two tabletop exercises prior to conducting completion operations on both sets of wells.
- Allow Emergency Management Alberta, the Municipal District of Rocky View, the Municipal District of Foothills, and the City to evaluate the exercise and provide recommendations. Compton must provide copies of full ERP exercise material, not only design specifications, to participants in advance.
- Include amendments resulting from each exercise pertaining to implementation.

The Board notes Compton's commitment to execute an ERP exercise in conjunction with the municipal authorities to the satisfaction of all concerned before drilling commences. The Board will make it a condition of its approvals that Compton may only enter the first sour zone following successful completion of a major ERP deployment exercise.

The Board further notes Compton's commitments not to drill any other wells in the Okotoks area while operating in the critical zones and not to engage in any other projects of similar magnitude during the drilling and completion of the applied-for wells.

The Board expects that Compton will, in addition, incorporate any commitments it has made during the course of the proceeding into its revised ERP. Further, the Board expects that Compton may also incorporate suggestions that might arise from its consultation with interveners during the development of its revised ERP.

As previously discussed, many parties had concerns about communication with Compton in general and about concerns specific to their own situation. The Board considers that compliance by Compton with the requirements in *Guide 56* and *Guide 71* will address the specific concerns of the interveners, for example, with respect to notification, consultation, and special needs individuals, which includes the susceptible population.

5 NEXT STEPS AND REFILING

The Board directs Compton to advise the Board by August 15, 2005, if it wishes the Board to continue to process its applications in accordance with the Board's determinations in this decision. If Compton advises the Board that it does not intend to pursue these applications further or if the Board has had no response from Compton by the above referenced date, the Board will consider the applications withdrawn and close its files.

In the event that Compton elects to pursue approval of its applications, Compton must file a complete ERP by November 1, 2005. Irrespective of the November 1, 2005, deadline for submission of a revised and complete ERP, the quality of the consultation program must not be compromised. Therefore, should Compton not be able to meet the deadline set out by the Board, the Board directs Compton to submit a request for an extension to the deadline to the Board in advance of November 1, 2005. Compton is also required to offer each intervener group the opportunity to offer comment during the development of the revised ERP.

Upon receipt of the revised ERP, the Board will issue notice to the parties registered at the hearing. At such time, the Board will determine the appropriate process to finalize its consideration of the revised ERP, although it will, at a minimum, give those parties at the hearing an opportunity to comment in writing on the finalized ERP.

Dated in Calgary, Alberta, on June 22, 2005.

ALBERTA ENERGY AND UTILITIES BOARD

<original signed by>

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

<original signed by>

Gordon Miller
Board Member

<original signed by>

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

APPENDIX 1 HEARING PARTICIPANTS**Principals and Representatives**
(Abbreviations used in report)**Witnesses**

Compton Petroleum Corporation (Compton)
 A. L. McLarty
 L. H. Olthafer

E. Sapieha, C.A.,
 of Compton
 D. Longfield, P.Eng.,
 of Compton
 W. Cover, P.Eng.,
 of Compton
 G. Follensbee, P.Eng.,
 of Compton
 W. Mrochuk, C.E.T.,
 of Compton
 R. Bissett,
 of Bissett Resource Consultants Ltd.
 R. Brown,
 of Bissett Resource Consultants Ltd.
 G. Crooks, P.Eng.,
 of Jacques Whitford Environment Limited
 J. Kenny, P.Eng.,
 of ATECH Application Technology Limited

Adjacent East Owners
 S. Munro

J. Newton
 N. Baiton

N. Baiton, P.Eng.

G. Burditt

G. Burditt

BurnsWest Corporation (BurnsWest)
 J. Burns
 T. Clark

J. Burns

Calgary Health Region (CHR)
 L. Manning

T. Lambert, Ph.D.
 D. Stefani

Carma Developers Ltd. (Carma)
 D. C. Edie

R. F. E. Clark

City of Calgary (the City)
 L. Gosselin
 K. West

P. Cochrane
 Chief W. Morris
 H. Reinfliesch

Coalition of Concerned Communities
 D. Brett

(continued)

APPENDIX 1 HEARING PARTICIPANTS (continued)**Principals and Representatives**
(Abbreviations used in report)**Witnesses**

Erin Woods Community Association

I. Peace

E. Thomas

I. Peace

B. and J. Evans

B. K. O'Ferrall, Q.C.

D. Naffin

B. Evans

S. Franklin

S. Franklin

Friends of Medicare

P. Brown

H. Chase

H. Chase

Front Line Residents' Group (FLRG)

G. S. Fitch

K. Hughes

Gecko Management Consultants

J. Hemstock, P.Eng.

R. McManus

RWDI West Inc.

I. Dowsett, R.E.T.

A. Springer, P.Eng.

A. Cheung

M. Christensen

J. Pearson

B. Pincott

N. Oloman

Municipal District of Rocky View

B. Evans

C. Tomalty

Chief T. West

Ollerenshaw Ranch

S. Carscallen, Q.C.

B. Robinson

G. Brown

P. Taylor

R. and S. Pearson

J. Laycraft

R. Pearson

B. Pincott

B. Pincott

M. Queenan

M. Queenan

(continued)

APPENDIX 1 HEARING PARTICIPANTS (concluded)

Principals and Representatives
(Abbreviations used in report)**Witnesses**

A. G. Soutzo
 S. Carscallen, Q.C.
 B. Robinson

H. Thimm

H. Thimm

White Family
 R. C. Secord

F. White
 G. White
 G. White
 P. White
 H. Hindson
 C. Duncan, P.Eng.
 D. Picard, P.Eng.

Alberta Energy and Utilities Board staff

J. R. McKee, Board Counsel
 B. Kapel Holden, Board Counsel
 A. Cosijn
 J. Schlager
 J. Amoruso
 A. Beken, P.Eng., P.Geol.
 L. Best
 C. Cassidy
 B. Curran
 S. Etifier
 D. Grzyb, R.E.T.
 T. Molik
 J. Pane, B.Sc.
 B. Poole Bellows
 D. Samuelson, C.E.T.
 L. Schmidt, C.E.T.
 K. Siriunas, P.Eng.

APPENDIX 2 SUMMARY OF CONDITIONS

This section is provided for the convenience of readers. In the event of any difference between the conditions in this section and those in the main body of the decision, the wording in the main body of the decision shall prevail. The number following each item below is the page on which it is stated in the decision report.

1. Given that completion operations would yield the highest potential release rate, the Board asked Compton at the hearing to consider the use of a permanent production packer that would be installed prior to the initiation of any completion operations and would not be removed from the well, even in the event of a subsequent packer failure. The adoption of this completion practice would ensure that the highest potential release rate would be that associated with the drilling scenario. The Board notes that Compton committed at the hearing to follow the procedure suggested by the Board, thereby limiting the maximum release rate to below that of the drilling rate. The Board will make this a condition of any well licences that are granted. 20
2. Conduct a test firing of each of the specific Firefly units that would be deployed on site during the drilling and completion of the wells. These tests are to be conducted on site, provided that the testing can be done safely, having regard for the site-specific conditions at the time of the test and obtaining prior agreement to the test from the landowner. If the on-site test is not possible for the aforementioned reasons or any others that it may not be aware of, the Board would accept an off-site test, provided it was conducted immediately prior to the transfer of the Firefly units to the well site. If an off-site test is required, the Board would prefer a site in relatively close proximity, such as a neighbouring farm or gravel pit, if possible, to minimize any travel-induced disruption to the functioning of the units. The Board is aware that this test would reduce the discharges available in each unit from 20 to 19, but is satisfied that the presence of the fuel gas-supplied ignition system would be capable of maintaining ignition if an uncontrolled flow from the well were to extinguish itself. 22
3. Test the satisfactory functioning of the under-rig igniter on site before drilling commences. 22
4. Revise the sections of the applications addressing drilling, completion, and testing to reflect the commitments and revisions made as a result of the hearing and this decision and resubmit them at the time that it submits any revisions to its ERP. 22
5. Provide an independent nitrogen booster system connected to the shear ram via a shuttle valve, in addition to the accumulator system and the nitrogen backup system. This booster system must comprise a minimum of three 34 000 kPa, 50 litre nitrogen bottles. These nitrogen bottles must each contain a minimum pressure of 30 000 kPa and be connected to the shuttle valve with a 34 000 kPa fireguard hose. A minimum 34 000 kPa regulator must be installed in the above system and set at 24 000 kPa. 22
6. There may be no drilling or completion operations in the critical sour zones of the wells during the months of December, January, and February. 22
7. Notify EUB Field Surveillance staff so that detailed inspections may be conducted prior to drill-out of the intermediate casing shoe, prior to removal of the bridge plug during completion operations, and during the testing of each well. 22

8. Test the quantity and quality of George White's water well before and after drilling and completion operations. 22
9. The Board is satisfied that the concerns of the White family may be addressed by their relocation during drilling and completion operations. The Board will make it a condition of any licence to require Compton to offer to relocate Gerald White's and George White's families during drilling and completion operations. The Board expects the parties to agree upon the details of the relocation. 24
10. The Board notes that Compton has committed to cause the Chestermere pipeline to be abandoned or ceased to be used as a sour gas pipeline within the timeframe specified in the LRD agreement. The Board will condition any well licence approvals to reflect this commitment. 30
11. With respect to the term of any well licences issued, the Board is not prepared to extend the validity of well licences for a period of three years after issuance. The Board finds that the window for depletion of this reservoir is closing rapidly. The Board will make it a condition of any approval that the licences will therefore expire on January 1, 2008. Licences for wells that have not been spudded by that date will become invalid. 31
12. The Board will make it a condition of the approvals that the wells and surface facility at the 10-13 site must be abandoned and removed 15 years from the date of the first well licence approval or July 1, 2021, whichever is earlier. 31
13. The Board notes that Compton has committed to abandon the 11-24 well within 7.5 years of the date of issuance of the first applied-for well licence. In light of Compton's stated intention and the integral nature of the early abandonment of facilities to Compton's overall plan for the area, the Board will make this a condition of any licences issued for the applied-for wells. 31
14. The Board notes Compton's commitment to execute an ERP exercise in conjunction with the municipal authorities to the satisfaction of all concerned before drilling commences. The Board will make it a condition of its approvals that Compton may only enter the first sour zone following successful completion of a major ERP deployment exercise. 50

APPENDIX 3 SUMMARY OF DIRECTIONS

This section is provided for the convenience of readers. In the event of any difference between the directions in this section and those in the main body of the decision, the wording in the main body of the decision shall prevail. The number following each item below is the page on which it is stated in the decision report.

1. The Board finds Case B to be the preferred approach to the drilling and completion of the four wells and expects that Compton will adhere to this scenario unless early drilling results warrant a change. The Board directs that a proposal to change the sequence of drilling and completion from that described in Case B be discussed with all of the interveners prior to submitting a request to the EUB's Operations Group for approval of the requested change. 23
2. Regardless of whether Gerald White's family is relocated, the Board directs Compton to place a stationary air monitor in the family's yard during drilling and completion and for the first three months of production operations. 24
3. The Board directs Compton to give serious consideration to the recommendations provided by the Whites' experts. It appears that in the past, Compton has not followed through on its commitments in this regard. The Board acknowledges that Compton has committed to implement all but one of Mr. Picard's recommendations. 27
4. The Board directs Compton, during all routine maintenance at the 10-13 well site, to purge all surface equipment with sweet fuel gas prior to depressurizing the equipment to a portable flare stack. 27
5. The Board directs Compton to revise its ERP based on a 9.7 km EPZ, incorporating a mandatory evacuation zone with a minimum radius of about 5 km. The Board directs that residences and businesses within Compton's proposed reduced EPZ should remain in the evacuation zone as shown in Figure 1. The Board directs Compton to develop its ERP based on an average evacuation zone radius of 5.7 km. Surrounding the evacuation zone (EPZ 1), Compton must provide in its ERP for a sheltering zone of an additional radius of about 4 km (EPZ 2). The combined radius of EPZ 1 and EPZ 2 of 9.7 km would define the size of the reduced EPZ. The concept of the relationship of the zones to one another is illustrated in Figure 2. The Board notes that as a result of a particular situation, evacuation of individuals in the sheltering zone and the EAZ or sheltering within the evacuation zone may also be required. 39
6. In its original ERP, Compton proposed the placement of nine stationary air monitors and described the protocol for dispatching two additional mobile air monitoring units prior to entering the sour zones. The Board concurs with Compton's placement of the air monitors for purposes of EPZ 1, provided that Compton can address Carma's concerns regarding the protection and reliability of the monitors in construction zones. The Board directs Compton to work with the developers in the area to determine optimal placement of the monitors on lands currently under development. 48
7. The Board acknowledges that some interveners requested an opportunity to review Compton's amended ERP prior to the Board issuing any approval. The Board cautions that ERPs are often voluminous and complex and may include more information than what some parties may find useful. The Board directs Compton to provide, at a minimum, an updated and detailed public information package to all interested parties for review and comment.

The Board expects Compton to discuss with those parties included in the ERP how it has incorporated their concerns and the provisions it has put in place to protect their safety. 48

8. In addition to the conceptual approaches set out above, the Board directs Compton to develop a comprehensive ERP based on the areas both within and beyond the complementary EPZs (i.e., EPZ 1 and EPZ 2) and to submit the document to the Board for review and approval in the timeframe specified in the following section. The Board expects Compton to consult appropriately with all affected parties prior to submission of a revised ERP. 48
9. The Board directs Compton to advise the Board by August 15, 2005, if it wishes the Board to continue to process its applications in accordance with the Board's determinations in this decision. If Compton advises the Board that it does not intend to pursue these applications further or if the Board has had no response from Compton by the above referenced date, the Board will consider the applications withdrawn and close its files. 50
10. In the event that Compton elects to pursue approval of its applications, Compton must file a complete ERP by November 1, 2005. Irrespective of the November 1, 2005, deadline for submission of a revised and complete ERP, the quality of the consultation program must not be compromised. Therefore, should Compton not be able to meet the deadline set out by the Board, the Board directs Compton to submit a request for an extension to the deadline to the Board in advance of November 1, 2005. Compton is also required to offer each intervenor group the opportunity to offer comment during the development of the revised ERP. 50

APPENDIX 4 COMMITMENTS

The Board notes that during the hearing Compton committed to conduct certain activities in connection with its operations that are not strictly required by the EUB's regulations or guidelines. 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 Compton to carry out the commitments or to advise the Board if, for whatever reasons, it cannot fulfill a commitment. The Board would then assess whether the circumstances regarding the failed commitment warrant a review of the original approval. The Board notes that the affected parties also have the right to request a review of the original approval if commitments made by Compton remain unfulfilled.

In the transcript, dated January 18, 2005, at page 1210, line 13, in response to a request made by Presiding Board Member Mr. Berg, Compton undertook to provide a list of commitments made during the hearing. The list of commitments provided by Compton was entered into the hearing as Exhibit 39-019a.

The commitments summarized below are compiled from Exhibit 039-019a, as well as from the Board's review of the hearing transcripts. Following each numbered commitment is the date, page, and line on which it appears in the transcript.

One commitment for which no specific transcript excerpt was identified by Compton, but was confirmed by Compton in Exhibit 039-019a, is as follows:

Both Firefly units will at all times during sour operations be aimed directly toward the subject well.

The Board also notes that in Exhibit 039-039(b), Compton confirmed Mazeppa Processing Partnership's (MPP's) commitment to abandon the Chestermere pipeline north of the Bow River within 15 years of the issuance of well licences on terms acceptable to Compton.

1. Regarding the 15-year term:

- Compton commits to cease all activities on the existing and applied-for wells after 15 years. Compton will remove and reclaim the sites at the time operations cease. [January 11, 2005: page 70, lines 12-15]

2. Regarding consultation obligations post-approval:

- Compton acknowledges that it has continuing responsibility, once it obtains licences, to work with the interveners and stakeholders, on a going forward basis. [January 11, 2005: page 219, line 24, to page 220, line 5]
- Compton commits to continue to work with all municipal authorities and other affected parties to ensure proper and efficient communication. [January 11, 2005: page 222, lines 7-14]

3. Regarding an ERP exercise:
 - Compton commits to develop an exercise and work through it with the authorities such that it will be done to the satisfaction of all concerned before drilling proceeds. [January 12, 2005: page 272, lines 1-5, 10-13, and 19-21]
 - Compton commits to a minimum of two full-scale exercises of its emergency response plan. [February 2, 2005: page 3604, line 20, to page 3606, line 7]
4. Regarding shut-in of the 10-13 well during drilling operations:
 - Compton commits that during drilling operations, all wells on the 10 of 13 site will be shut in. [January 27, 2005: page 2836, lines 21-24]
5. Regarding Compton's preparedness to consider alternative drilling schedules:
 - Compton will be prepared to work with the Board in to determine whether steps can be taken to shorten drilling time without compromising safety and where desirable will agree to take such steps. Examples were to pre-set conductor pipe and surface casing. [January 13, 2005: page 515, line 14, to page 516, lines 3-8]
6. Regarding amendment to the existing pipeline license:
 - Compton will restrict production to within current pipeline capacity. [January 13, 2005: page 527, lines 8-18]
 - Compton will not install well site compression at the 10-13 site. [January 18, 2005: page 1250, lines 1-12]
7. Regarding the use of an incinerator stack:
 - Compton does not intend to incinerate any gas during completion operations. Testing will be conducted in line using a compressor for injection into the pipeline. [January 13, 2005: page 550, lines 15-18]
8. Regarding the inspection of the drilling pipe:
 - All pipe will be inspected in detail upon delivery, along with the records of the pipe and the mill certificates. [January 13, 2005: page 562, line 16, to page 563, line 4]
9. Regarding the protection of groundwater:
 - Compton commits to setting surface casing below the groundwater aquifer and to cement the full length of the intermediate casing to protect the aquifer. [January 13, 2005: page 624, lines 13-24]
 - Compton will test the Whites' water well for quantity and quality of water prior to commencement of drilling operations and after rig release and completion operations. [March 4, page 8104, line 16]
10. Regarding the use of a compressor:
 - In order to achieve zero emissions, Compton commits to having a temporary compressor on site during completion. [January 13, 2005: page 680, line 22, to page 681, line 2]
11. Regarding dust control:
 - Compton will use appropriate watering measures to control dust. [January 13, 2005: page 646, lines 1-10]

12. Regarding the use of a non-odourized fuel source:

Compton commits that the fuel source to this well site will be sweet fuel gas that will not be odourized. [January 13, 2005: pages 678, line 23, to page 679, line 2]

13. Regarding the use of current IRPs and technology:

- Compton commits that the drilling and completion programs will conform to the updated IRPs. [January 14, 2005: page 772, line 22, to page 773, line 4]

14. Regarding the training of on-site personnel:

- Compton commits that all on-site personnel will have H₂S Alive training and these people will receive detailed training as to their responsibilities in case of an incident. [January 17, 2005: page 969, line 24, to page 970, line 1; January 18, 2005: page 1160, lines 15-23]

15. Regarding documentation of on-site safety drills:

- Compton commits to keep records of all on-site drills, which will include the date, the time, and who participated, as well as the results of the drill and any remedial efforts that may be necessary. [January 17, 2005: page 973, lines 9-13]

16. Regarding a test of the Firefly Ignition System:

- Compton agrees to a test firing of the Firefly. [January 17, 2005: page 1001, lines 3-10]

17. Regarding willingness to delay operations due to unsuccessful drills or needed equipment:

- Compton commits to halt operations until drills yield satisfactory results and until all necessary equipment is on site. [January 17, 2005: page 1004, lines 12-23]

18. Regarding the recovery of completion fluids:

- Compton intends to recover all of the completion fluids and not allow them to go down the pipeline. [January 17, 2005: page 1011, lines 7-9]

19. Regarding the circumstances in which gas will be flared:

- Gas will be flared only in an emergency situation wherein the tank became over-pressured. Rather than risk the tank rupturing, the valve would open first and direct the gas to the flare. [January 17, 2005: page 1057, lines 11-17, and page 1058, lines 12-18]

20. Regarding the circumstances in which gas will be incinerated:

- Compton will only incinerate gas in a situation where sweet gas is used to purge the separators and the compressor. Sweet gas below pipeline pressure will be incinerated. [January 17, 2005: page 1059, line 18, to page 1060, line 3]

21. Regarding steps to protect the Firefly units from damage:

- In an effort to prevent damage to the Firefly units, Compton commits to locate the remote controls and also the units in areas removed from vehicular traffic and to surround them with visibility fencing. At least once per shift or once every 12 hours, the well site supervisor and the rig manager will inspect both the remote controls and the

units to ensure that no damage and no contact with the equipment have occurred.
[January 18, 2005: page 1186, line 22, to page 1187, line 10; page 1187, lines 16-24]

22. Regarding replacement drilling supervisors:

- Compton will ensure an alternate person is available to replace any supervisor who is forced to leave the site unexpectedly. [January 18, 2005: page 1230, lines 6-11 and lines 22-25]

23. Regarding conducting multiple sour gas projects at one time:

- Compton commits that it will not be engaged in any other projects of similar magnitude during the drilling and completion of the proposed wells. [January 18, 2005: page 1249, lines 12-15 and lines 19-21]

24. Regarding publication of air monitoring data:

- Compton undertakes to provide all air monitoring results to any member of the public requesting it. [January 20, 2005: page 1733, lines 19-20]

25. Regarding planting trees to obscure the view of the facilities from the Whites' residence:

- Compton will landscape the 10-13 site, which will include the planting of trees. [January 24, 2005: page 2159, line 24, to page 2160, line 3 and lines 23-24]

26. Regarding abandonment of sour gas facilities:

- Compton will abandon all sour facilities at the expiration of the 15-year period. [January 26, 2005: page 2624, line 24, to page 2625, line 3]

27. Regarding the placement of air monitoring stations on private property:

- Compton will consult with landowners and gain their permission before placing air monitors on their property. [January 26, 2005: page 2635, lines 1-13; January 31, 2005: page 3102, lines 7-13, and page 3103, lines 1-11]

28. Regarding the drilling of other wells in the area while in the critical zones of the proposed wells:

- Compton will commit not to drill any other wells, including shallow wells, in the area while in the critical zone. [January 27, 2005: page 2859, line 9, to page 2860, line 15]

In its review of the transcripts of the hearing, the Board also identified the following two commitments made by Compton that were not identified in Exhibits 039-019(a) or (b):

29. Adoption of Mr. Picard's recommendations:

- Compton has agreed to adopt the recommendations in Mr. Picard's report with the exception of one: that a new complaint tracking form be designed by Compton. [March 4, 2005: page 8107, line 17-22]

30. Agreement between Compton and City of Calgary:

- Compton has agreed to enter into an agreement with the City of Calgary with respect to confirming the responsibility for emergency response costs. [January 27, 2005: page 2823, line 14, to page 2824, line 6]

APPENDIX 5 H₂S AND SO₂ CONCENTRATIONS FOR EVACUATION

H₂S concentrations in unevacuated areas	Requirement
1 ppm (1-hour average)	Notification of hypersusceptible individuals must begin.
Below 10 ppm (1-hour average)	Hypersusceptible individuals must be informed of the concentrations and advised to leave the area if health symptoms persist or increase. All other individuals should consider leaving the area and seek medical advice if health symptoms develop.
Exceeds 10 ppm (3-minute average) for 8 hours or more	Local conditions must be assessed and all persons may be advised to evacuate.
Approaching 20 ppm (3-minute average)	Immediate evacuation of the area must take place or the release must be ignited.
SO₂ concentrations in unevacuated areas	Requirement
0.3 ppm (24-hour average)	Immediate evacuation of the area must take place.
1 ppm (3-hour average)	
5 ppm (15-minute average)	

Source: *Guide 71*, Table 7: Notification and evacuation requirements outside the EPZ.