

ENERGY RESOURCES CONSERVATION BOARD

Calgary Alberta

**SHELL CANADA LIMITED
APPLICATIONS FOR WELL, FACILITY,
AND PIPELINE LICENCES
WATERTON FIELD**

**2011 ABERCB 007 Errata
Applications No. 1614134, 1614144, 1614145,
1614198, and 1614210**

The Energy Resources Conservation Board (ERCB/Board) issued *Decision 2011-007* arising from the hearing that commenced on October 19, 2010, and concluded on November 1, 2010, in Pincher Creek, Alberta. Shell Canada Limited has since brought to the attention of the Board factual errors in paragraphs 14, 64, and 66. The Board has reviewed Shell's comments and agrees that these paragraphs in the decision report contain clerical errors that require correction in order to properly express the Board's reasoning.

The Board amends paragraphs 14, 64, and 66 to read as follows:

[14] Subsequent development in the area tied in additional wells to the Carbondale system through a Rilsan[®]-lined pipeline from LSD 6-3-6-3W5M and later through an HDPE-lined pipeline from LSD 15-20-6-3W5M. To provide operational flexibility, additional parallel pipeline loops were added from the 7-20 well to the 12-9 well, from the 12-9 well to the 6-12 site, and from the 6-12 site to Junction J.

[64] The Board notes that Shell indicated that its mitigations were focused on reducing new access and that it was contributing to maintaining grizzly bear habitat on a regional basis by reclaiming older sites at Waterton 9 and Waterton 12. The Board finds that this is an acceptable approach.

[66] The Board is of the view that *Directive 060*, Section 3.3.1(1), which requires operators to obtain a permit to flare sour gas from any well classified as a critical sour well, overrides the small volume exemption that Shell is pursuing. The Board notes that the application for a flaring permit must include SO₂ dispersion modelling indicating the operator will meet the current ERCB low-risk criteria. The application would also include a flaring management program to avoid predicted exceedances. The Board does not accept Dr. Norman's assertion that the three days of flaring will result in unacceptable short-term (hourly) and long-term (annual) impacts to the area. In any event, if exceedances were predicted, flaring would not be permitted without an appropriate flare mitigation plan to alleviate the exceedances.

The Board hereby approves the above-noted corrections to *Decision 2011-007*.

Dated in Calgary, Alberta, on May 3, 2011.

ENERGY RESOURCES CONSERVATION BOARD

< *Original signed by* >

M. J. Bruni, Q.C.
Presiding Member



Shell Canada Limited

Applications for Well, Facility, and Pipelines Licences
Waterton Field

March 9, 2011

ENERGY RESOURCES CONSERVATION BOARD

2011 ABERCB 007: Shell Canada Limited, Applications for Well, Facility, and Pipeline Licences,
Waterton Field

March 9, 2011

Published by

Energy Resources Conservation Board
250 – 5 Avenue SW
Calgary, Alberta
T2P 3G4

Telephone: 403-297-8311

Fax: 403-297-7040

E-mail: infoservices@ercb.ca

Web site: www.ercb.ca

CONTENTS

1	Decision	1
2	Introduction.....	1
	2.1 Applications.....	1
	2.2 Interventions.....	1
	2.3 Hearing	1
	2.4 Operations and Construction History	2
3	Jurisdiction.....	4
4	The Applications.....	5
5	The Well Application.....	5
	5.1 Need.....	6
	5.2 Emergency Response.....	6
	5.3 Location.....	8
	5.3.1 Subsurface Issues.....	8
	5.3.2 Environment	9
	5.3.3 Traditional Uses.....	13
	5.3.4 Alternative Locations	13
	5.4 Future Development	15
	5.5 Traffic on Seven Gates Road.....	16
	5.6 Conclusions about the Well Application.....	18
6	The Pipeline Applications.....	19
	6.1 Need.....	19
	6.2 Emergency Response.....	19
	6.3 Risk.....	20
	6.3.1 Risk Assessments	20
	6.3.2 Failure Frequency.....	21
	6.3.3 H ₂ S Modelling.....	21
	6.4 Pipeline Operations	23
	6.4.1 Odour Complaints	23
	6.4.2 Corrosion Prevention and Hydrate Control.....	24
	6.4.3 Corrosion Detection.....	25
	6.4.4 The Pipeline Annulus	25
	6.4.5 Management of Change.....	26
	6.4.6 Other Operational Issues	27
	6.5 Conclusions about the Pipeline Applications.....	27
7	The Facility Applications.....	28
	7.1 The Fuel Gas Compressor	28
	7.2 Conclusions about the Fuel Gas Compressor.....	29
	7.3 The Gas Battery	29
	7.4 Conclusions about the Gas Battery.....	29
8	Further Recommendations and Conclusions	29
Appendix 1	Hearing Participants	31
Appendix 2	Summary of Conditions, Commitments, and Recommendations	33
Figure 1	Map of Project Area.....	37

ENERGY RESOURCES CONSERVATION BOARD

Calgary Alberta

**SHELL CANADA LIMITED
APPLICATIONS FOR WELL, FACILITY,
AND PIPELINE LICENCES
WATERTON FIELD**

**2011 ABERCB 007
Applications No. 1614134, 1614144, 1614145,
1614198, and 1614210**

1 DECISION

[1] Having carefully considered all of the evidence, the Energy Resources Conservation Board (ERCB/Board) hereby approves Applications No. 1614134 and 1614144 for a well and a fuel gas compressor subject to the conditions herein provided, and denies Applications No. 1614145, 1614198, and 1614210 for a gas battery, fuel gas pipeline, and production pipeline respectively.

2 INTRODUCTION

2.1 Applications

[2] Shell applied to the ERCB for a licence to drill a well, referred to by Shell as the Waterton 68 well (WT68 well), and submitted four related applications to construct and operate two pipelines and one facility and to amend an existing facility licence (collectively referred to as the project).

2.2 Interventions

[3] The Board received a number of objections from landowners, residents, traditional land users, recreational users, and a community group, stating concerns about public safety, the environment, personal impacts, the location of the proposed well, and Shell's operational history. Shell engaged in the ERCB Appropriate Dispute Resolution program with some of the parties that objected to its applications; however, not all the issues were resolved.

2.3 Hearing

[4] The Board held a prehearing meeting in Pincher Creek, Alberta, which commenced and concluded on February 10, 2010, before Board Members M. J. Bruni, Q.C. (Presiding Member), J. D. Ebbels, LL.B., and T. L. Watson, P.Eng.

[5] After having participated in the prehearing meeting, but prior to the issuance of the prehearing decision report, Board Member J. D. Ebbels passed away. The remaining two panel members constituted a quorum and their decisions with respect to the prehearing meeting are set out in *Decision 2010-021*.

[6] The Board issued a Notice of Hearing on May 25, 2010, setting a final submission date of August 30, 2010, for all interested parties and a final response submission date of September 27, 2010, for the applicant. In a letter dated August 16, 2010, Mike Judd, an intervener, requested a delay in the deadline for the submission of intervener evidence. The Board responded in a letter dated August 23, 2010, and extended the deadlines for both the final submission and the final

response by one week. The Board received numerous other requests for submission date extensions for specific documents and considered each on an individual basis.

[7] The Board held a public hearing in Pincher Creek, Alberta, which commenced on October 19, 2010, and concluded on November 1, 2010, before Board Members M. J. Bruni, Q.C. (Presiding Member), T. L. Watson, P.Eng., and B. T. McManus, Q.C. A site visit was held on Tuesday, October 19, 2010, on the first afternoon of the hearing. Those who appeared at the hearing are listed in Appendix 1.

2.4 Operations and Construction History

[8] The events and information in this section assisted the Board in its consideration of Shell's applications. They have been summarized from the evidence and subject applications, Shell's licence history in the area, previous Board decisions, and a previous investigation report relating to Shell's operations in the area.

[9] In March 1995, the Alberta Energy and Utilities Board (EUB; predecessor to the ERCB) approved Shell's application to construct a 32 kilometre (km) steel pipeline (Carbondale system) from wells located in the upper Carbondale River area to connector pipelines supplying the Shell Waterton gas plant (the plant). The pipeline was designed to carry sour natural gas with a maximum hydrogen sulphide (H₂S) content of 32 per cent.

[10] The Carbondale system, commissioned in September 1995, tied in three wells: one well located at Legal Subdivision (LSD) 7, Section 20, Township 6, Range 3, West of the 5th Meridian (7-20 well); another at LSD 12-9-6-3W5M (12-9 well); and the third well at LSD 6-12-6-3W5M (6-12 site). Line 45, a 4-inch (10 centimetre [cm]) line transported production from the 7-20 well to the 12-9 well tie-in. From there, line 46, a 6-inch (15 cm) line, carried the combined production of the 7-20 and 12-9 wells to the well tie-in at the 6-12 site. From that point, line 53, a 6-inch line, carried the combined production to LSD 1-7-6-2W5M (Junction J). Line 42, an 8-inch (20 cm) line, carried production from Junction J towards the plant. Original construction of the pipelines did not include any physical internal corrosion barrier (liner). The Board found the map, submitted by Jean Sheppard, an intervener, to be very helpful and a revised version of it has been included as Figure 1 to assist the reader in locating the above-mentioned locations.

[11] On December 18, 1995, after only a few months' service, a failure occurred on line 42 of the Carbondale system, about 600 metres (m) downstream of Junction J at LSD 13-5-6-2W5M. Following an investigation and internal pipeline inspections, it was determined that a 3 millimetre (mm) perforation resulting from internal corrosion caused the leak. Repairs were made to line 42 and other pipelines in the Carbondale system and service was resumed.

[12] A failure on line 46, about 5 km upstream of Junction J, was discovered on August 18, 1997. A local rancher noted the odour of sour gas and found a dead cow and calf near the pipeline. Investigation determined the failure occurred due to sulphide stress cracking of a girth weld of a pipe segment that had been replaced as a result of the previous corrosion inspection work.

[13] Following reinstatement of the repaired pipeline system, local residents requested that the EUB hold a public inquiry into the operation of the Carbondale system. The EUB agreed and in March 1999 an inquiry was held. Findings of the inquiry resulted in Shell being required to

remove certain components of Junction J and to replace significant portions of lines 42, 46, and 53. Shell opted to install nylon (Rilsan[®]) liner in lines 46 and 53. The liner was to function as the primary method of internal corrosion control. Operations resumed in August of 2000.

[14] Subsequent development in the area tied in additional wells to the Carbondale system at LSD 15-20-6-3W5M and LSD 15-10-6-3W5M. To provide operational flexibility, additional parallel pipeline loops were added from the 7-20 well to the 12-9 well, from the 12-9 well to the 6-12 site, and from the 6-12 site to Junction J. Most of these newer pipelines were lined with Rilsan[®].

[15] Operational issues arose that indicated to Shell that the Rilsan[®] liners were deteriorating due to the composition of the fluids in the Carbondale system. It was found that methanol had permeated and moved through the Rilsan[®] into the annular space and had also degraded the Rilsan[®] by leaching out plasticizer and depositing it in the annulus. Shell believed that better corrosion inhibition performance would be obtained by using high density polyethylene (HDPE) liners with external grooves. Subsequently, Shell began to use HDPE liners in new construction and to selectively retrofit existing lined pipelines with new HDPE liners. Some segments of pipeline continued operating without plastic liners using conventional corrosion control measures. As production from the various wells declined or ceased, unused segments of the pipeline system were discontinued in accordance with regulatory requirements.

[16] In 2001 and 2002, further development occurred north and east of the Junction J, including the Shell Waterton 61 well and the Hunt Oil 10-7 well, both located at LSD 10-7-6-2W5M (10-7 site) near the existing sour gas wells at LSD 5-20-6-2W5M (5-20 site) and LSD 6-17-6-2W5M (6-17 site). Production from this area was carried to a junction at the 6-17 site through either line 61, a 6-inch line, or the former Hunt pipeline, also a 6-inch line, both running from the 10-7 site to the 6-17 site. Production from the original wells at the 5-20 site and 6-17 site was carried south through Junction J to the Waterton gas plant. Production from the newer developments at the 10-7, 6-17, and 5-20 sites was carried north from the 10-7 site and 6-17 site to the 5-20 site, then east through the Waterton Junction and south to the plant. This system was known as the Castle River system and much of it was initially lined with Rilsan[®], though some of the segments were later retrofitted with HDPE and some segments remain unlined.

[17] The Carbondale and Castle River systems operated without further corrosion-related releases until November 2007, at which time a rupture occurred (2007 failure) on line 61, an HDPE-lined pipeline of the Castle River system that carried production from the 10-7 well to a junction at the 6-17 site.

[18] The Board issued an investigation report (2008 report) on October 7, 2008. It was determined that corrosive fluids trapped between the liner and the steel pipeline corroded the steel pipe until it could not support the internal pressure and a rupture occurred. The 2008 report identified four major factors contributing to the failure. The factors included: (1) nonprotective scale rendered the batch inhibitor ineffective, (2) corrosive materials and nonprotective scales present in the annulus did not allow formation of protective scales and promoted corrosion, (3) a combination of liquids and debris partially blocked the annulus vent system and created conditions that exacerbated the corrosion, and (4) there was insufficient flow/velocity in the annulus vent system to effectively sweep liquids and solids from the annulus.

[19] In addition to the 1995, 1997, and 2007 failures described above, there were other sources of emissions or odours reported to the ERCB, including the following:

- November 2002: a methanol/water spill due to a flange gasket failure during liner changeover on property owned by the interveners Kim Barbero and Sylvia Barbero (the Barberos). The line was not in service when the failure occurred.
- October 2003: a methanol/water spill between the 6-12 site and Junction J. The failure occurred during the hydro test of the liner changeover. The line was not in service at the time.
- November 2007: sour odours during pigging activities following the 2007 failure. A 2-inch fuel gas piping elbow leaked due to pinhole corrosion. The line was not in service at the time.
- December 2007: sour odours from the site of the 2007 failure due to an inadequate pipeline cap. The line was not in service at the time.
- March 2008: sour odours at a flange between the 12-9 site and the 6-12 site due to a leak from a cracked flange. The line was not in service at the time.
- April 2009: sour odours from surface piping at LSD 16-7-7-2W5M in the Burmis system arising from a leak from a crack adjacent to a weld cap. The line was not in service at the time.
- September 2010: a leak from a valve on a blind flange at LSD 3-13-4-1W5M.

3 JURISDICTION

[20] Shell stated that although other regulatory agencies may have issued approvals relating to the project, such as the mineral surface lease (MSL) and the pipeline agreement (PLA), those dispositions did not relieve the Board from its obligation to scrutinize the applications. That scrutiny includes a consideration by the Board of whether approval of the applications is in the public interest.

[21] The Castle-Crown Wilderness Coalition (CCWC) stated that the Board has the authority to deny the applications if it finds that their approval is not in the public interest, regardless of whether surface leases for the proposed facilities may have been granted to Shell. In its argument, the CCWC referred to previous decisions of the Board in which the Board found that approval of certain applications was not in the public interest even though surface leases had been granted.

[22] David Sheppard and Jean Sheppard (the Sheppards) and the Barberos, intervening parties, stated that the Board must decide if approval of the project was in the public interest. They stated that while the Board does not have jurisdiction over grizzly bears or the use of roads, the Board has an obligation to look at the impacts from the project on things like wildlife and road usage when it decides if the applications should be approved or denied.

[23] Mr. Judd, an intervener, stated that the Board did not have jurisdiction at the practical, day-to-day level over wildlife resources or the health and welfare of Albertans, as those are managed by other government departments or agencies. However, he also stated that the Board must consider the proposed project's potential to impact the environment. He argued that under the Board's broad power to consider the public interest and the environment, the Board has jurisdiction to consider impacts on wildlife and human health within the context of its regulatory scheme.

Findings of the Board

[24] The Board's jurisdiction in these matters is straight forward. Under the *Energy Resources Conservation Act*, the *Oil and Gas Conservation Act*, the *Pipeline Act*, and their respective regulations, the Board has exclusive jurisdiction to approve or deny the development proposed in the subject applications. The Board must consider whether the project is in the public interest, having regard to the social, economic, and environmental effects of the project. This is in addition to any other matters the Board may or must consider when deciding whether to approve the applications.

[25] Shell has received an MSL and PLA from Alberta Sustainable Resource Development (SRD) for the surface or near-surface facilities, indicating that Shell has met SRD's requirements for such dispositions. In deciding whether to approve or deny the applications, the Board will consider all relevant factors, including, as mentioned above, whether the proposed development is in the public interest.

4 THE APPLICATIONS

[26] The Board will address the issues respecting the well application, pipeline applications, and facilities applications in separate parts of this decision.

[27] In reaching the determinations contained in each part of this decision, the Board has considered all relevant materials constituting the record of this proceeding, including the written and oral evidence and the arguments provided by each party. Accordingly, references in each part of this decision to specific parts of the record are intended to assist the reader in understanding the Board's reasoning relating to a particular matter and should not be taken as an indication that the Board did not consider all relevant portions of the record with respect to that matter.

5 THE WELL APPLICATION

[28] **Application No. 1614134:** Shell applied, pursuant to Section 2.020 of the *Oil and Gas Conservation Regulations (OGCR)*, for a licence to drill the WT68 well from surface location LSD 10-1-6-3W5M (10-1 site), about 5.8 km southwest of Beaver Mines, Alberta, to bottomhole location LSD 12-36-5-3W5M to obtain gas from the Rundle Group Formation with a maximum H₂S concentration of 35.6 per cent.

[29] The Board considers the relevant issues respecting the well application to be need, emergency response, location, future development, and traffic.

5.1 Need

[30] Shell submitted that the purpose of the WT68 well would be to confirm and possibly produce a new Mississippian Rundle gas pool (the new pool), identified using seismic data. It estimated the resource to be in the order of 250 billion cubic feet [7.08 billion m³] of gas. It stated that finding new gas pools would help it to maintain gas production at the plant and the estimated life of the plant could be extended by two years, creating opportunity for continued employment, contributing to the local economy, and providing royalties to the Crown.

[31] Intervenors questioned the need to develop the resource and wondered if it was worthwhile considering the plant life would only be extended by two years. They also questioned the need to develop sour gas in areas that may be considered by some as special when sweet gas reserves in the province are plentiful and the value of natural gas is low.

Findings of the Board

[32] The Board notes that the Government of Alberta is the owner of the resource and that Shell is in possession of a mineral lease that gives it the right to explore and develop the Crown's resources. The Board accepts that Shell has the right to explore for the resource. Shell has pursued this right by conducting seismic activities, and in so doing, has identified a potential new gas pool. The proposed WT68 well is an exploratory well and will be the mechanism by which Shell investigates the potential of the new pool. The Board notes that parties questioned the need to develop sour gas; however, no parties provided any experts, reports, or technical evidence to speak to this assertion. In spite of the lack of evidence presented at the hearing about whether or not the resources in the area need to be developed, the Board accepts the need for the WT68 well to allow Shell to pursue its right to explore for the Crown's resources, as provided by Crown Mineral Rights Lease No. 5504100518.

5.2 Emergency Response

[33] Shell submitted that during well drilling and completions, the site would be manned twenty-four hours a day and there would be four permanent air monitors in-place at the site. Also, in the event of a well control problem, there would be hours', or perhaps days', advance notice of an incident. During that time, Shell could commence its emergency response procedures, such as notifying the public and locating recreational users within the area. Shell explained that location and identification of the public within the emergency planning zone (EPZ) would begin well ahead of drilling into sour zones. It would use rovers to monitor the area during normal operations. The rovers would travel the road and trail systems and visit campsites, creating a base map of recreational activity. Intervenors argued that there are numerous ways into the backcountry other than the existing road and trail systems that would allow people to be in the area without Shell knowing. Mr. Barbero questioned if Shell would be able to locate him or his family in the backcountry as they access the area by foot, quad, or horseback. He also said that he often runs into people hiking in the backcountry. Shell stated that it could have up to eleven personnel available within thirty minutes to respond in the event of an incident and that its drilling and completions emergency response plan (ERP) adequately addressed the geographic characteristics of the area. Further, it stated that it would know who was in the area from information collected by its traffic monitoring units.

[34] Shell indicated that, in the event of an emergency, helicopter support could be called on from Canmore, Edmonton, Kelowna, Fernie, and Calgary. Richard Smith, an expert for the Orich-Fisher group and CCWC, voiced concern about the limitations of the helicopters, stating that they could only be used during daylight hours, could not be used in inclement weather, were located far away and needed time to deploy, and required trained personnel to act as spotters to visually locate persons in the backcountry.

[35] Shell stated that several learnings about emergency response, resulting from the 2007 failure, were incorporated into the WT68 well drilling and completions ERP; one being the change to a new emergency notification system. Some interveners questioned how the emergency notification system would benefit them, given the poor and unreliable cell phone coverage in the area and the considerable time they spend in the backcountry. Shell stated that residents without telephone coverage are similar in nature to transients except that residents may have the ability to shelter in place and that its ERPs do not require anyone to have a cell phone for effective response. Some interveners indicated that Shell's new emergency notification system did not function as it was supposed to.

[36] Shell indicated that a planned ERP exercise would be the best way to demonstrate its proficiency in emergency response procedures. Tony Messer, an expert for the Orich-Fisher group, stated that the ERP exercise would be beneficial in helping interested parties understand the ERP. Shell committed to conducting a major exercise of its drilling and completions ERP prior to spudding the WT68 well. It stated that stakeholders could be involved as observers at an emergency operations centre established during the exercise and that they would be able to provide feedback about the exercise, as well as provide input into the design of the exercise. Some interveners indicated a willingness to participate in the exercise if Shell offered. Some suggested that the exercise had to be "blind" and that only top management should know that it was a simulation. Intervenors also suggested that the exercise be held in adverse conditions, be true to life, and be spontaneous.

Findings of the Board

[37] The Board accepts that during drilling and completion operations there may be advanced notice of an emergency and the site will be manned continuously. Therefore, any incident should be immediately detected and a response initiated.

[38] The Board understands the interveners' concerns about the use of helicopters to locate persons in the backcountry such as response time, availability, and dependence on weather. However, the Board also understands that the primary measure for locating backcountry users would be ground personnel, and notes that the use of helicopters to locate backcountry users is an added response mechanism. Furthermore, given that traffic monitoring units would collect information about vehicles entering into the area and the development and use of recreational area maps, the Board accepts Shell's ability to locate residents and others within the backcountry during the drilling and completion operations.

[39] The Board expects licensees to incorporate learnings from exercises or incidents in its ERPs and public safety programs. The Board recognizes that Shell adopted some of its learnings resulting from the 2007 failure by incorporating a new emergency notification system into its ERPs for the purposes of these applications. The Board urges all stakeholders to cooperate with Shell when it conducts tests of this and other systems designed to protect the public.

[40] The Board heard from some interveners that they did not have confidence in Shell's ability to respond to an emergency, but that they would participate in an ERP exercise and wished to provide input into that exercise. The Board is of the view that community involvement in the ERP exercises may increase the community's confidence in Shell's ability to respond to emergencies. Therefore, the Board, as a condition of its approval, requires Shell to conduct a drilling and completions ERP exercise prior to spudding the WT68 well and to involve interested stakeholders in the development and implementation of and follow-up to that exercise

5.3 Location

5.3.1 Subsurface Issues

[41] Shell submitted that the best surface location to drill the WT68 well from would be LSD 12-36-5-3W5M, which would allow a vertical wellbore and was the most economic and technically feasible. However, after having considered surface impacts, it determined that the 10-1 site and planned trajectory of the wellbore with a lateral displacement of about 1.8 km to the target provided a challenging but acceptable level of drilling risk with respect to borehole instability. Shell maintained that drilling from the proposed 10-1 site would enable it to intersect the maximum number of fractures over multiple Mississippian reservoir intervals, providing for improved subsurface selection of future wells and potentially minimizing the total number of wells required to produce the reservoir efficiently.

[42] Consideration was given to the 6-12 site as a potential drilling site. Shell stated that changing the surface location of the WT68 well to the 6-12 site would add about 700 m of wellbore through the Fernie and the Kootenay coals and take an additional twenty to twenty-five days to drill. It maintained that reaching both primary and secondary targets would become too technically challenging as the wellbore would need to "come back in" on itself to hit the secondary target before going down to hit the primary target. Considering that the directional drilling required intersecting both targets high up on the structure, Shell stated that the technical risk of drilling from the 6-12 site would be too high and would compromise the secondary target, thus increasing the probability of needing another well to evaluate that target.

[43] Stuart McDowall, an intervener, took the position in his September 3, 2010, submission that exploration could be done from an existing site, such as the 6-12 site. Neither he nor any other parties provided evidence or experts to speak to the geological or drilling issues respecting any location.

Findings of the Board

[44] The Board finds that drilling the WT68 well as a vertical well from LSD 12-36-5-3W5M would increase the footprint of the project and would likely cause increased environmental impacts. While Shell did evaluate other potential surface locations, the Board finds that the 10-1 site is the most appropriate for reducing the project's overall footprint and enabling the successful drilling and evaluation of the pool.

5.3.2 Environment

The Environmental Assessment (EA)

[45] Shell predicted that environmental impacts in the project area would be small and insignificant. The project would be located in an area with existing development and disturbances, including recreational use, residential use, ranching, and other oil and gas infrastructure. Interveners argued that the existing cumulative effects of development and human use had been devastating for many wildlife populations in the area and that the identification and analysis of site-specific and cumulative environmental impacts done by Shell should be considered insufficient to satisfy the requirements of *Informational Letter (IL) 93-09: Oil and Gas Developments Eastern Slopes (Southern Portion)*. Shell responded that it provided assessments of cumulative effects in its 2007 EA and 2009 EA Addendum and those assessments appropriately considered Shell's future plans in the area.

Findings of the Board

[46] To be useful, an EA must be of sufficient detail to allow the Board to determine whether the project's potential economic benefits and mitigation programs outweigh its potential environmental impacts. *IL 93-09* states that a proponent must match the degree of the environmental assessment to the nature and extent of the project. Given that the proposed WT68 well is an exploratory well, the Board finds that the scope of the EA was commensurate with the proposed project and that it satisfied Shell's assessment obligation under *IL 93-09*.

[47] The Board notes that all parties agreed that there will be some environmental effects associated with the 10-1 site. The disagreement is about the magnitude and the ecological significance of those effects. The Board expects Shell to minimize the environmental effects and to offset those that are ecologically significant.

Access Management

[48] Shell was of the view that most cumulative effects in the area result from motorized access. It had implemented an access management policy involving no net increase in public motorized access as a result of its projects.

[49] Shell stated that it consults with SRD on a regional basis to implement restrictions on new and existing access and that since the proposed project would be adjacent to Seven Gates Road, no new access would be needed and regional access would not change. Shell indicated that it was pursuing a reduction of its facility footprints through abandonment of old wells and planning of new wells, as well as by sponsoring area wildlife research projects. Interveners argued that Shell had not proposed approaches to effectively reduce road densities on a regional or local basis and that Shell's efforts to mitigate illegal access and Alberta's Castle Access Management Plan are not working. Shell responded that while illegal access was occurring, there was reasonable public compliance with the plan and that Shell did not have the authority to enforce access restrictions on public roads and trails.

[50] Shell stated that the Global Forest Watch report about linear disturbances, access densities, and grizzly bear core security areas was general in nature and noted that the authors acknowledged their report was in need of field verification and refinement. Peter Lee, one of the authors of the Global Forest Watch report and an expert for the CCWC and Mr. Judd, stated that

vehicular management as regulated by the Castle Special Management Area was a substantial failure.

Findings of the Board

[51] The Board supports the view that access control is key to minimizing effects on wildlife, but notes that it is the role of SRD, not the Board or Shell, to identify and implement regional plans. The Board notes that there is an MSL issued for the 10-1 site and recognizes the authority and decision of SRD in this regard. Having said that, the Board has the responsibility to consider the predicted impacts of the WT68 well. Based on the evidence before it, the Board finds that the proposed 10-1 site for the WT68 well, which is located on an existing access road and has a small area of disturbance, provides the least possible impact to the area, as it would require no new access while still providing Shell with an acceptable level of risk for reaching its subsurface targets.

[52] The Board is of the view that the Global Forest Watch report is an initial high-level analysis of access density in the area and does not provide any information on intensity or timing of trail use or related specific ecological effects. Further, the Board notes that reduction of Shell's existing industrial footprint, as recommended by interveners, is occurring in the south part of the Waterton Field through the abandonment of wells, but there has been no analysis or timeline provided with regards to its completion, so it is difficult to understand the quality or quantity of offset which would be provided. This type of evidence would be helpful to the Board in its consideration of future applications in the area.

Rare Plants

[53] Shell stated that it would use mitigation measures found in its environmental protection plan (EPP), including the use of an appropriate native seed mix and, as an interim measure, the planting of trees and suitable grasses, and that the eventual reclamation of the site would be done in consultation with SRD. Further, it would try to alleviate some of the impacts to rare plants through mitigation measures such as avoidance and transplanting. Avoidance would be the primary means of mitigation and would be accomplished by contouring the lease site to avoid rare plants as indicated in the EPP. Intervenors argued that disturbance at the site from this project would not be minor. They stated that Shell would grade, fill, and level the site with large earth moving equipment and that avoidance was not possible because there was nowhere to move the well on the 10-1 site without significantly compromising rare and endangered plants.

[54] Shell proposed transplanting as a secondary mitigation measure. It stated that it was currently growing 150 limber pine seedlings that it planned to introduce in appropriate areas. Shell stated that transplanting had not yet been tested extensively and that it would implement this approach in consultation with SRD in an effort to minimize impacts. Shell stated that it understood SRD was currently developing a recovery plan for the limber pine. One intervener, David Laskin, described the limber pine as ecologically significant and a keystone species, providing food for Clarke's nutcrackers and other birds, squirrels, black bears, and grizzly bears. He indicated that there was no documented evidence that limber pine can be transplanted successfully. Cliff Wallis and Cleve Wershler, experts for the CCWC and Judd-Latham group, also advocated avoidance and indicated that transplanting was not likely to be successful.

[55] In its 2007 EA and 2009 EA Addendum, Shell identified six rare plant species and one rare vegetation community located on or near to the well site. Mr. Wallis and Mr. Wershler, through

what they described as a cursory field review, identified three additional species of rare plants. Shell acknowledged that it had not discussed the rare plants it found on this site with SRD.

Findings of the Board

[56] The Board recognizes that there will be an incremental loss of rare plants if the WT68 well proceeds as proposed by Shell. Based on the information provided by Shell, it is not possible to determine if entire populations will be removed or only portions of populations.

[57] The Board notes that all parties agreed that transplanting has not been proven as a mitigation method for any of the rare plants found in the project area. Although Shell described avoidance as its primary means of mitigation for rare plants, it is difficult to see how Shell will avoid disturbances to rare plants and portions of the rare plant community within the lease at the 10-1 site.

[58] The Board understands that the environmental field report Shell submitted to SRD is based on a vegetation survey conducted for Shell on November 15, 2005 that identified no rare plants on the 10-1 site. SRD subsequently issued the MSL in June of 2006. Since that time, nine rare vegetation species and one rare plant community have been identified at the 10-1 site and immediately adjacent areas. The Board expects Shell to follow through on its commitment to provide this new information to SRD.

[59] The Board notes that some of the rare plants, such as the limber pine and white bark pine, are listed as endangered species under the *Alberta Wildlife Regulation AR 143/97 (the Wildlife Regulation)* and SRD may require a recovery plan. Additionally, the Board recommends that Shell monitor the effectiveness of its rare plant transplant program and make this information available publicly.

Wildlife

[60] There was general agreement among the parties that the use of open access routes by motorized vehicles and increased interaction with humans were two of the primary threats to grizzly bear persistence. Interveners submitted that the open road density recommended in SRD's Grizzly Bear Recovery Plan had already been exceeded for this region. Shell acknowledged the concerns of stakeholders and wildlife experts about the importance of limiting access. It acknowledged that the project was in an area zoned as Critical Wildlife by SRD's Integrated Resource Plan and that the area was considered important winter range for elk and deer. Shell said that it would abide by SRD's condition to avoid major disturbances from December 20 to April 30, although there would be routine operational activity during these periods. Additionally, Shell indicated that it would voluntarily avoid the period of December 15 to 20.

[61] Interveners provided evidence regarding grizzly bear use in the area, including an e-mail from the SRD regional biologist stating that SRD trail cameras had identified eight grizzly bears using the Mount Backus area. More evidence was provided by Mr. Judd, who reported signs of bears and indicated that bears use and access the area. The Sheppards also listed a host of food sources for bears at the 10-1 site and in the immediate area. Shell acknowledged the presence of grizzly bears in the area, bear foods and evidence of foraging at the site, and the potential for denning in the vicinity.

[62] In its EA, Shell stated that no high quality grizzly bear habitat would be lost as a result of the proposed project. It stated that there would be no significant adverse effect on wildlife, including foraging habitat and mortality risk for grizzly bears, as well as populations, habitat, and regional movements for elk. Interveners argued that no detailed or long-term studies were conducted on elk use in the area to support Shell's conclusion that there would be no significant effects on elk populations. They argued that key wildlife species and habitat would be significantly compromised by the development of the 10-1 site, and that in June 2010 the Government of Alberta designated grizzly bears as a threatened species under the *Wildlife Regulation*. They also noted that the project was in an area of the Castle that had been designated as core grizzly bear habitat. Dr. Barrie Gilbert, an expert for the CCWC and Judd-Latham group, stated that the effects on the threatened grizzly population and vulnerable elk population are likely biologically significant and that grizzly and elk habitat would be incontrovertibly compromised by further development. Shell stated that direct impacts on low- to moderate-quality habitat would occur, but did not feel that the project would contribute to any adverse impacts on grizzly bears.

Findings of the Board

[63] The Board notes that Dr. Gilbert stated that grizzly bear denning locations are not limiting and the e-mail from the SRD regional biologist indicated that the area is highly productive for grizzly bears. Thus, although there may be some incremental loss of grizzly bear habitat, it is likely that foraging habitat is extensive, and the Board expects that loss of habitat due to this project will not be significant.

[64] The Board notes that Shell indicated that its mitigations were focused on reducing new access and that it was contributing to maintaining grizzly bear habitat on a regional basis by reclaiming older sites at Waterton 6 and Waterton 12. The Board finds this is an acceptable approach.

Sulphur Dioxide (SO₂) Modelling

[65] Shell submitted that a temporary sour gas flaring approval would not be required as the volume of sour gas associated with flaring of sour vapours from the production test unit would not exceed the limits set out in the small volume exemption in *Directive 060: Upstream Petroleum Industry Flaring, Incinerating, and Venting*, Section 3.3.2(2). Shell also provided SO₂ modelling for the flaring and a flaring management program to avoid predicted exceedances of the hourly ambient objective. Dr. Ann-Lise Norman, an expert for Mr. Judd, submitted that continuous flaring of tank vent emissions would have an unacceptable impact on hourly and annual SO₂ concentrations. Dr. Norman acknowledged she used incorrect stack parameters in her submission and stated that she had remodelled with the correct parameters and her conclusions remained the same. She maintained that the annual average predictions based on continuous flaring were representative of the expected impact and that annual predictions did not have to be adjusted for the three-day flaring duration or the reduced impact as a result of the Flaring Management Program. Dr. Stuart Batterman, an expert for the CCWC and Sheppard-Barbero group, stated that the risk from an ignited H₂S release resulting in an SO₂ release may be greater than the risk from an unignited H₂S release. Shell argued that experience had shown that when a release was ignited the hazard was greatly reduced and stated that if monitoring indicated that the permissible levels set out in *Directive 071* were exceeded, evacuation would occur. Dr. Shuming Du, an expert for the CCWC and Sheppard-Barbero group, provided SO₂ modelling for well

blowouts that showed that evacuation may be required. Shell submitted that SO₂ modelling of well blowouts is not an ERCB requirement.

Findings of the Board

[66] The Board is of the view that *Directive 060*, Section 3.3.1(1), which requires operators to obtain a permit to flare sour gas from any well classified as a critical sour well, overrides the small volume exemption that Shell is pursuing. The Board notes that the application for a flaring permit must include SO₂ dispersion modelling indicating the operator will meet the current Alberta Ambient Air Quality Objectives. The application would also include a flaring management program to avoid predicted exceedances. The Board does not accept Dr. Norman's assertion that the three days of flaring will result in unacceptable short-term (hourly) and long-term (annual) impacts to the area. In any event, if exceedances were predicted, flaring would not be permitted without an appropriate flare mitigation plan to alleviate the exceedances.

[67] The Board rejects Dr. Batterman's statement that the risk of ignited H₂S resulting in an SO₂ release may be greater than an unignited H₂S release. This is based on the incorrect assumption that the plume rise of an SO₂ release would be similar to that of an H₂S release. It is clear to the Board that the risk to the public due to the SO₂ produced from an ignited H₂S release is far less than the risk due to potential exposure to an H₂S release that is not ignited.

5.3.3 Traditional Uses

[68] Traditional land users spoke of the 10-1 site and surrounding area as places used for collecting, camping, praying, dreams, visions, ceremonies, fasting, and offerings, and also spoke of Mount Backus as an ancestral vision quest site. Shell stated that it was aware of the offerings located on and near the 10-1 site. Certain interveners expressed willingness to work with Shell, but asked Shell to avoid the "little hill" and wondered why Shell could not move the well site a short distance. Shell submitted that although members of the Piikani and Kainai attended the hearing, the leaders of those First Nations did not.

Findings of the Board

[69] The Board appreciates the unique perspective and understanding that traditional land users have brought to the Board for its consideration of the applications.

[70] The Board accepts that Shell followed the normal course in obtaining SRD approval as evidenced by the MSL. Further, as none of the official leaders of any First Nation group submitted objections to the applications or attended the hearing, the Board is satisfied as to the acceptance of the site by the leadership of these groups. To be certain, although the evidence of the traditional land users referred to the importance of the 10-1 site to their culture and history as members of a First Nation, the Board did not consider that the evidence raised a question of aboriginal or treaty rights, as that term is used in Canadian constitutional law, that the Board had jurisdiction to consider in this proceeding.

5.3.4 Alternative Locations

[71] Shell submitted that it had acquired all of the requisite surface rights from SRD, the government agency responsible for managing the Crown lands on which the project would be located, and noted that this was a strong indication that its project was in compliance with all

applicable land-use planning and environmental requirements imposed by SRD. Interveners argued that the Board should not rely or put too much weight on the issuance of the MSL as SRD was not at the hearing to address its reasons for approving the 10-1 site.

[72] Shell stated that it gave serious consideration to an alternative location at LSD 15-1-6-3W5M that had been proposed by the interveners, but SRD would not approve that location because of environmental concerns. Other surface locations Shell considered included the 6-12 site, the west half of Section 36, the southwest quarter of Section 1, the southwest quarter of Section 31, and sites along Highway 774. Shell considered economic, environmental, and stakeholder issues, as well as the need for new access roads, the need for new pipelines, pipeline routing and length, the ability to do in-line testing, the need for flaring, the ability to place development wells on the lease, and engineering and geological factors. Shell concluded that the 10-1 site was the most suitable location as it was already disturbed and affected by non-native agronomic species, there was an existing access road so no new access would be needed and regional access would not change, it was close to existing pipeline infrastructure, allowing in-line testing to reduce flaring, and there was the potential to drill a development well from the 10-1 site. The site would have a small incremental surface disturbance relative to most of the other potential locations, which would require disturbing larger areas.

[73] Interveners took issue with Shell's characterization of the 10-1 site as already disturbed; instead, they called the disturbance minimal, resulting from recreation and easily restored. They described the 10-1 site as a place of great beauty and remarkable biodiversity and spoke extensively about the flora and fauna. They were also concerned about the visual impacts of placing a facility at this site and said Shell's visual impact assessment did not address winter or consider the power line and focused on visibility from the residences. They suggested that not only was the 10-1 site a poor choice aesthetically, but that there were no other places in the immediate area that were equally accessible to the public and provided scenic views of the continental divide, river valley, and prairie panorama. They stated that if Shell was allowed to drill at the 10-1 site, it would be leveled and never recover. This was a concern as the 10-1 site had been used by locals, traditional land users, and recreationalists, and their use of the site would be lost if the project was allowed to go forward. Interveners stated there would be no new access, but countered that there would be lots of new activity on the road and this activity was what would cause the problem.

Findings of the Board

[74] The Board agrees with the interveners that the 10-1 site has minimal disturbance and has heard their concerns about the proposed surface disturbances and how those will impact the way the interveners use the site. The Board does not expect that mitigations provided by Shell, such as using a lay down flare stack, installing fencing, and using paint colours that blend in with the surrounding area, will satisfy the concerns of the interveners and expects that some of the scenic nature of the site and some of its accessibility for recreational use will be lost. The Board accepts the evidence put forward by Shell that it considered alternative sites and its reasons for discounting those sites. The Board understands that if it only considered surface disturbance, the 6-12 site would be the best location; however, the 6-12 site is not a viable option due to the subsurface issues discussed previously in this report. From the perspective of ease of drilling, a site directly above the targets would be preferred; however, this is not acceptable as it would require much more new infrastructure and create much more disturbance. Therefore, given the subsurface target requirements, the need to explore the resource, the relatively small area of new

disturbance, its location along an existing access road, and the lack of an acceptable alternative surface location, the Board finds that the surface impacts of drilling from the 10-1 site are reasonable.

5.4 Future Development

[75] Shell had proposed the WT68 well as an exploratory well for the new pool and stated that if it were successful, it might want to drill up to five more wells, including two in the next five years. Interveners submitted that they were putting forth their concerns now, as they did not see any way that Shell would not go ahead with the developmental wells if the exploratory well were successful. Mrs. Sheppard added that Shell had been pretty good at drilling successful exploratory wells in this area and did not see the Board easily turning down other wells if this exploratory well were successful.

[76] Residents and business owners south of Mount Backus presented numerous concerns about future development wells that they feared could potentially be located close to their properties. The Orich-Fisher group, comprising interveners with property on the south side of Mount Backus, stated that it was not credible that Shell did not have a plan in mind for the location of future wells and submitted that these wells would be immediately west of their properties. Shell stated that it had been forthright and transparent about future development plans and had provided plans based on the information that it had at the time. It stated that the first development well could be drilled at the proposed 10-1 site and the number and locations of the development wells would depend on the reservoir characteristics discovered from the WT68 well. Elaine Voth, an intervener residing south of Mount Backus, stated that she was confused by Shell's statements about not knowing where future wells would go as she recalled hearing about five more wells and infrastructure to be located on the south side of Mount Backus.

[77] The Orich-Fisher group argued that Shell had not complied with *IL 93-09*, which was intended to avoid piecemeal development. The CCWC added that *Directive 056: Energy Development Applications and Schedules* and *IL 93-09* direct applicants to look at the development in terms of the exploratory well, what was expected to happen after, and what effect the development would have on the region and Shell had chosen not to share this with the residents. They submitted that these applications had less detail than the 2007 applications and disregarded both *IL 93-09* and the proliferation and planning provisions of *Directive 056*. Shell submitted that it had met or exceeded the requirements of *IL 93-09, Bulletin 2007-35: Clarification of Informational Letter 93-09 (Bulletin 2007-35)*, and *Directive 056, Section 8.3: Sour Gas Planning and Proliferation Application Requirements*, by providing the best overview it could of its future development plans as part of its public consultation program, maintained that the level of information provided was more than sufficient for an exploratory well, and that future development was also addressed in its EA.

Findings of the Board

[78] The Board notes that the WT68 well is an exploratory well and that clear guidance with regard to the proposed project is given in *IL 93-09*, which states that the appropriate level of information is a function of the nature of the proposed development and the relative environmental sensitivity of the area proposed to be developed. *IL 93-09* acknowledges that a definitive development plan is usually not possible at the outset and requires that an outline of the conceptual development be provided. *Bulletin 2007-35* also states that "if" development is

past the initial exploration stage, a proponent must prepare a complete development plan with detail appropriate for the stage of development, which is unique to each situation. The Board is of the view that Shell has complied with this requirement. In its consultation package, Shell provided an overview and map of its plans for exploration and development north of Mount Backus for the next five years, including its planning for the four known gas pools, the locations of wells in those pools, and the prospects for exploration of the new pool. Shell also provided an EA and stated that the first development well could be drilled from the existing 10-1 site and described the modifications that would be required at the 10-1 site to accommodate a development well. The Board finds this level of information to be sufficient for an exploration well.

[79] The Board understands that the lack of detail provided by Shell about its future development plans does not satisfy the questions of the interveners, specifically with regard to their concerns about potential applications for development on the south side of Mount Backus. However, the Board cannot consider the impacts of potential future applications. Moreover, the Board is of the view that if Shell were, at this time, to provide a full development plan without the information that it might obtain from an exploration well, the plan would be highly speculative and thus of little real assistance to the Board or area residents. On the other hand, if the WT68 well were to prove successful, Shell would gain substantial information about the pool and what developments may be required. At that time, should Shell choose to pursue production from the pool, it would be required to create a more comprehensive development plan and conduct the necessary consultation before proceeding with any future applications for development. The Board is of the view that a development plan based on data obtained from an exploratory well will be more useful, especially to area residents who live south of Mount Backus, than a plan prepared with speculative data.

5.5 Traffic on Seven Gates Road

[80] Shell described the public part of Seven Gates Road as a “reasonable country gravel” road and the private part of the road as narrower with poor sight lines. It submitted that the existing road was a primary reason for choosing the 10-1 site as Shell could access the lease and locate the pipeline right-of-way along the existing gravel road.

[81] Intervenors spoke extensively about the traffic encountered on the road, the type of work done by Shell, and the numbers and types of vehicles involved. Shell stated that it expected that once on production and under normal operating conditions, there would be no increase in traffic associated with the proposed new well. Mr. Sheppard stated that when Shell conducted routine activities, it was quiet, but he did not agree that the well would not result in new traffic as experience had shown that the wells and pipelines in the area were high maintenance. Mr. Barbero reiterated this viewpoint, stating that “there’s been very few times that we have had what you could call just normal day-to-day operations; there’s always some project going on.” Shell stated that there would be an increase in traffic during construction and drilling operations and provided data detailing the number of round trips expected during drilling and construction. Intervenors disputed Shell’s evidence that its use of the road averaged three vehicles per hour. They argued that the average was misleading as traffic was not spread out evenly during the day.

[82] Intervenors’ concerns about the traffic along Seven Gates Road included the nature and volume of traffic; blind spots; narrow sections; snow plowing and ice; the safety of persons

walking, cycling, or riding horses; and dust. One resident described traffic and dust on the Seven Gates Road as a “never ending source of aggravation.” An extensive discussion of dust included the impact of dust, dust mitigation, and the use of lignosulphonate for dust control, lignosulphonate application, and lignosulphonate monitoring of the Barberos’ dugout. Shell stated that measures are set out in its traffic code of conduct to mitigate the effects of traffic and control dust and that it would commit to monitoring traffic during construction of the project. Interveners agreed that some measures, such as the placement of a traffic monitor and, at certain times dust control, have positive effects, but said that some of the traffic-related impacts were immitigable. They claimed that Shell had reneged on its commitment to monitor the Barberos’ dugout and suggested that when Shell changed staff, knowledge of commitments was not handed down.

Findings of the Board

[83] The Board notes that the Seven Gates Road is the only access road to the valley for residents, recreational users, and Shell. Therefore, the Board expects that regardless of the outcomes of these applications, the concerns about traffic on that road will remain.

[84] The Board accepts that under “normal operations,” there may be little or no increase in traffic on the Seven Gates Road associated with the proposed WT68 well. Given the history of operations in the area, the maintenance and monitoring that will be required for the WT68 well and existing wells, facilities, and pipelines, the Board finds that it is likely that for a considerable period of time there will be heavy traffic on the Seven Gates Road.

[85] The Board recognizes that there are road safety issues such as blind spots, and narrow sections, and concerns about the safety of walkers, cyclists, and horseback riders. The Board expects that if Shell carefully implements and monitors its traffic code of conduct, it can provide appropriate mitigation for these safety issues.

[86] The Board recognizes that nuisance issues such as dust and noise can be aggravating for residents, especially over a long period of time and when added to other issues relating to oil and gas development. However, the Board does not accept that these concerns are immitigable. Rather, given the success of past mitigation measures, the Board expects Shell to carefully implement and monitor its traffic code of conduct, and thereby provide appropriate mitigation with regard to dust and noise.

[87] The Board is concerned about the intervener statements indicating that Shell has not followed through on its commitments. The Board finds that in order for the community to regain confidence, Shell must follow through on its commitments when dealing with nuisance issues such as dust and traffic. The Board is of the view that during normal operations Shell’s adherence to its traffic code of conduct for the Seven Gates Road and its other commitments will provide it with the opportunity to show the local community that Shell is willing and able to follow through on its commitments.

[88] The Board, as a condition of its approval, requires Shell to control dust on the Seven Gates Road by watering the road as required based on the weather, road use, and road condition during drilling and completion of the well. The Board, as a condition of its approval, also requires Shell to have a traffic monitor close to the junction of Seven Gates Road and Highway 507 during drilling and completions of the well. Further, the Board recommends that Shell report on a

quarterly basis any complaints it receives about dust and traffic to the Waterton Advisory Group (WAG) and the ERCB.

5.6 Conclusions about the Well Application

[89] The Board accepts the need to explore the Crown's resource and recognizes that Shell has been granted the right to do so and that it intends to do so by drilling an exploratory well from a surface location at LSD 10-1-6-3W5M to a potential new Mississippian Rundle gas pool.

[90] The Board finds that Shell has demonstrated that it will be able to effectively respond to an emergency during the drilling and completion of the well. The Board is satisfied that the development of recreational use maps, the use of a traffic monitoring unit, the availability of response personnel, the continuous monitoring by twenty-four hour on-site staff and gas monitors at the 10-1 site, and the adoption of any learnings from the ERP exercise will guard the safety of persons in the area. However, the Board understands that area residents have concerns regarding Shell's ability to effectively respond to an emergency. With this in mind, the Board, as a condition of its approval, directs Shell to conduct a drilling and completions ERP exercise prior to spudding the WT68 well and to involve interested stakeholders in the development and implementation of and follow-up to that exercise.

[91] The Board accepts the evidence put forth by Shell that an exploratory well from LSD 10-1-6-3W5M provides an acceptable level of risk with regard to the likelihood of successful exploration of the potential new Mississippian Rundle gas pool and notes that no party put forth experts or technical evidence to refute the likelihood of success or to show that an alternative location could be successful.

[92] The Board notes that SRD approved the LSD 10-1-6-3W5M location and accepts the evidence put forth by Shell about its consideration of alternative sites and reasons for discounting those sites.

[93] The Board is of the view that there is a need to explore the resource in the potential new Mississippian Rundle gas pool. In turn, Shell will be in a position to understand what, if any, development would be required to develop that resource. It will then be able to complete a development plan and consult with stakeholders about that plan. Stakeholders will also be in a better position to understand the development and consider the impacts of that development upon them. Should Shell then decide to pursue applications to develop the resource, it will be able to come to the Board with applications that have the information necessary for the Board to understand the impacts of those applications within the context of the entire development. Given the need to explore the resource, the need for a development plan, the acceptability of Shell's drilling and completion ERP, and the lack of evidence supporting any other alternative to successfully explore the resource, the Board has decided to approve Application No. 1614134 for a licence to drill an exploration well from the 10-1 site. The Board wishes to emphasize that this approval is, for the reasons mentioned above, intended to allow exploration of the resource. At this time, the Board is not prepared to allow production from the well.

6 THE PIPELINE APPLICATIONS

[94] **Application No. 1614210:** Shell applied, pursuant to Part 4 of the *Pipeline Act*, for approval to construct and operate a pipeline to transport natural gas with a maximum H₂S concentration of 32.0 per cent from LSD 10-1-6-3W5M to LSD 6-12-6-3W5M. The proposed production pipeline would be about 1200 m in length, with a maximum outside diameter of 168.3 mm, and would operate as a level-2 pipeline.

[95] **Application No. 1614198:** Shell applied, pursuant to Part 4 of the *Pipeline Act*, for approval to construct and operate a pipeline to transport fuel gas with no H₂S from LSD 6-12-6-3W5M to LSD 10-1-6-3W5M. The proposed fuel gas pipeline would be about 1200 m in length, with a maximum outside diameter of 60.3 mm.

[96] The Board considers the relevant issues respecting the pipeline applications to be need, emergency response, risk, and pipeline operations.

6.1 Need

[97] Shell submitted that the production and fuel gas pipelines are needed to allow in-line testing and to assist in minimizing sour gas flaring. If the WT68 well were to prove successful, the production pipeline would be needed to transport gas to the 6-12 site, where the production would enter Shell's existing infrastructure.

Findings of the Board

[98] The Board accepts that production and fuel gas pipelines would be needed to allow production from the WT68 well and to assist in the operations of a gas battery at the 10-1 site. However, the Board does not agree that the pipelines are needed to test the well.

6.2 Emergency Response

[99] Interveners expressed confusion and uncertainty with emergency response measures that they could be called upon to follow during an incident. Shell submitted that the technical concepts of emergency response plans are complicated and hard to understand. It recognized the issues and concerns expressed by interveners. Members of the Orich-Fisher group stated that information needs to be provided to residents in a different manner. Mr. Barbero mentioned that WAG had been useful for getting information on complex issues, such as emergency response zones. Shell stated that it had done the best it could to meet with people that had concerns and it would not do anything different from the consultation it had conducted.

[100] Interveners expressed concerns about the pool of resources available to Shell for emergency response duties, questioned response times, and doubted Shell's ability to know where everyone in the backcountry would be. Shell stated that its primary measure for search and rescue operations would be personnel on the ground. It indicated that while its responders might not have search and rescue training as described by Mr. Smith, an expert for the Orich-Fisher group and the CCWC, its staff had participated in a number of search and rescue organizations, had other training that would complement search and rescue activities, and were residents of the area with benefit of local knowledge, including the backcountry. Shell further indicated that it had mutual aid agreements with agencies such as SRD, the Royal Canadian Mounted Police, and Pincher Creek Fire Department Search and Rescue. Kevin Kelly, an intervener who had been a

member of the Beaver Mines volunteer fire department, indicated that in five years with that organization, he had never dealt with mutual aid agencies, whether it was search and rescue or disaster services, or with Shell about Shell's activities in the area.

[101] Shell indicated that the best demonstration of its response capabilities would be through the major exercise it committed to conduct prior to spudding the WT68 well. The Orich-Fisher group acknowledged this exercise and argued that an exercise based on a pipeline release scenario would be more beneficial, as Shell would not have as much time to implement emergency response as it would in a drilling release scenario.

Findings of the Board

[102] The Board is of the view that even though an ERP does contain technical information, it should not be complex and hard to understand. As the ERP is primarily a procedure manual for a responder to ensure public safety in an emergency, it must provide quick access to critical information.

[103] The Board recognizes that residents have a role to play in emergency response. Residents must understand the information and directions provided by the licensee in the public information package and residents should follow the directions contained therein, as they could be life saving. The Board notes that *Directive 071: Emergency Preparedness and Response Requirements for the Petroleum Industry* states what information must be included in the public information package, but it does not prescribe the style. The Board suggests that Shell consider redesigning its public information package to respond to the residents' feedback and to make the information easy to recognize as important and understand.

[104] The Board understands that there are many petroleum developments operating safely in areas with similar terrain and geography. If this development had been proposed for another area, the procedures for locating residents within the backcountry may have been deemed acceptable. However, as this area has some history of pipeline releases and, considering the lack of effective continuous monitoring and the intermittent presence of Shell personnel as compared to the continuous presence of personnel during well drilling and completions, the Board is of the opinion that additional measures must be developed to effectively respond to potential pipeline and production incidents.

[105] Significant time was spent at the hearing dealing with concerns related to the history of operations in the area, including past incidents and releases (descriptions of which were provided). The Board notes that most of these were related to or associated with pipeline and production operations. Given this history of operations, the Board is of the opinion that an ERP exercise addressing a pipeline/production scenario would benefit the community and Shell. The Board recommends that Shell conduct such an exercise and involve interested stakeholders in its development and implementation, as well as in the follow-up to the exercise.

6.3 Risk

6.3.1 Risk Assessments

[106] Shell submitted a screening-level assessment of the public safety risk associated with the proposed facilities. It provided the annual chance of lethality near the well and pipelines and

concluded that the risks were acceptable. Interveners argued that the risk assessment did not account for less serious health effects of H₂S and was not a public health assessment. They expressed concerns about the assessment not considering the health effects of exposure to H₂S and the method used to determine the probability of lethality. Shell submitted that it used the Major Industrial Accidents Council of Canada (MIACC) values for risk acceptability criteria and noted that MIACC values have been used in many risk assessments reviewed by the ERCB.

[107] Interveners argued that inputs such as failure frequency, probabilities of meteorology, and the selected hole sizes were inappropriate. They stated that the risk assessment was not a worst-case scenario and argued that given the results of the screening assessment, a refined cumulative assessment should have been provided. Shell countered that conservative assumptions lead to over predictions of risk, that the risks were acceptable, and that a refined assessment would likely result in reduced predictions and acceptable risks.

Findings of the Board

[108] While the Board does not require risk assessments, the information provided may, in certain cases, assist the Board in reaching its decisions on the applications. Unfortunately, it is apparent to the Board that the public generally does not differentiate between health risk assessments, which focus on non-lethal effects, and safety risk assessments, which focus on the risk of fatality. Having said that, at the prehearing meeting interveners requested and Shell agreed to submit a safety risk assessment for the purposes of these applications. As risk assessments are not required by the Board, the Board declines to make a finding as to the substantive contents of Shell's risk assessment, but has reviewed its contents in arriving at its decision on the applications.

6.3.2 Failure Frequency

[109] Shell submitted that it initially used the Alberta average sour gas pipeline failure frequency for its risk assessment and estimated the rupture frequency of its Waterton sour gas pipeline gathering system to be the same as the industry average and the leak frequency to be less than the industry average. Shell argued that it was appropriate in its determination of failure frequencies to use the entire Waterton complex pipeline system and the three operational failures that had resulted in off-lease releases. The interveners argued that failure rates in the area were much higher than what Shell has stated and that if the higher failure rates were used, the risk would be unacceptable according to MIACC criteria. Interveners provided several scenarios to define the length of the pipelines and the number of failures that could be used to determine the failure rate.

Findings of the Board

[110] The Board finds that the failure rates used in Shell's risk assessment were inappropriate. Failure rates across the whole province are not applicable to this system and the failure rates properly attributable to this system may indicate an increased risk to the public.

6.3.3 H₂S Modelling

[111] Shell used SLAB, a dense gas dispersion model, for modelling the release of H₂S from its wells and pipelines. Dr. Du, an expert for the CCWC and Sheppard-Barbero group, stated that given the complex terrain in the area, SLAB, which is a flat terrain model, was not applicable and that CALPUFF was more appropriate. Shell submitted that CALPUFF was not appropriate

as it was not a dense gas model. Both experts agreed that an H₂S release does not rise and that dense gas effects were not important downwind from the source.

[112] Shell submitted that the CALPUFF modelling provided by Dr. Du used default settings, which allowed the release to rise as it travelled over ground at an elevation that was lower than the source. Dr. Du acknowledged that he used the default CALPUFF options. Shell submitted that Dr. Du's modelling used a continuous release that overestimated the impact. Dr. Du stated he had adjusted the EPZ concentration endpoint to account for the duration of the release.

[113] Shell submitted that according to Alberta Environment's (AENV's) Air Quality Model Guideline, an appropriate surface roughness was 100 cm, and that by using the CALPUFF default of 3 cm for surface roughness, Dr. Du's modelling was independent of land-use classification. Dr. Du agreed that 10 cm, as used in ERCBH2S, would be more appropriate for the area. Other interveners argued that the land use classification inputs used by Shell were not appropriate for the area. Dr. Batterman also provided alternative H₂S endpoints and demonstrated that using guidelines from other jurisdictions doubled the EPZ size for the project.

[114] The interveners questioned most of Shell's inputs to the dispersion model. They believed that errors in the inputs made the results questionable. The interveners also argued that five years of AENV meteorological data were available and questioned why Shell used only one year of data. Shell stated that five years of data were available by the time it submitted the applications, but stated that at the time it did its modelling, only one year of data was available.

Findings of the Board

[115] The Board is aware that models are theoretical descriptions of complex processes. It recognizes the inherent uncertainty and has a thorough understanding of how uncertainty must be considered when interpreting results. The extensive discussion at the hearing did not advance the Board's understanding of modelling uncertainty. The Board notes that there is some confusion on Dr. Batterman's part as to what the ERCB uses as endpoints for EPZs, but would like to point out that the ERCB endpoints are well documented in *ERCBH2S: A Model for Calculating Emergency Response and Planning Zones for Sour Gas Facilities, Volume 2*, which was replaced in December 2010 by *ERCBH2S: A Model for Calculating Emergency Response and Planning Zones for Sour Gas Wells, Pipelines, and Facilities, Volume 2*. Finally, the Board notes that the use of the ERCBH2S model is an ERCB requirement, which Shell complied with when it submitted these applications. Further, the ERCBH2S model itself was not a matter for consideration at the hearing.

[116] The Board is of the view that the models and inputs used by Shell are acceptable and that the most important inputs are the source characterization inputs, which were not questioned. The Board accepts the evidence of Shell that dense gas modelling and the use of 100 cm for surface roughness are appropriate. Further, even though the term flat terrain is used to describe the modelling approach, it is appropriate for complex terrain as the modelling assumes that the release follows the terrain, not that the terrain is flat.

[117] The Board is of the view that all inputs, including defaults, must be justifiable. In particular, Dr. Du's use of the default settings that resulted in an elevated H₂S plume over lower elevations, such as would be the case at the interveners' homes in Screwdriver Creek valley, was not appropriate.

6.4 Pipeline Operations

6.4.1 Odour Complaints

[118] Shell submitted that it investigates all odour complaints and, if related to its facilities, addresses them and takes steps to reduce odours. It stated that it was often not aware of odour problems until it was informed of them by residents. The Sheppard-Barbero group submitted that during production, the only way Shell had of detecting a leak was by a drop of pressure in the pipeline and questioned why there were no air monitors in the valley. Shell noted that during production operations, there would be H₂S detectors inside the proposed on-site facility and that supervisory control and data acquisition (SCADA) pressure monitoring was a more effective way of determining an upset of its operations. Shell acknowledged that it was unlikely that pinhole leaks would be detected by the SCADA system; instead they were likely to be detected by area personnel or residents. The Barberos listed 78 cases in which they reported odours to Shell and stated that they were tired of being human H₂S monitors. They were concerned that Shell was downloading the responsibility of leak detection onto them and that they were expected to know a good odour from a bad one and what they should do when they detected odours. The Barberos were of the view that this indicated that Shell found it acceptable to expose the public to small amounts of H₂S. The Barberos asserted that there should be some kind of monitoring system in place to assist in the detection of low-level leaks and provide confirmation of odour complaints. Mr. Judd and other interveners indicated that they had asked Shell for the installation of continuous fence-line monitoring. Shell indicated that monitors were not necessary to ensure the safety of the systems and that they would not add to Shell's ability to respond. Further, it stated that the human nose was very good at detecting odours.

Findings of the Board

[119] The Board is of the view that Shell must improve its off-lease emission controls and must review and revise its off-lease emissions plan for the area. The Board believes that Shell's apparent inability to control its off-lease emissions in the area contributes to a lack of confidence in Shell by the community and causes some residents to question Shell's ability to safely conduct its overall operations in the area. The Board is concerned about this and recommends that Shell report all odour complaints it receives in the area to the ERCB. Positive outcomes with respect to the control of its off-lease emissions will allow Shell to better demonstrate its ability to safely conduct its area operations.

[120] The Board heard evidence that Shell can detect larger leaks by monitoring its SCADA system, which shuts down the pipeline when a leak causes the pressure to drop to 6000 kilopascals (kPa) or when there is a change in pressure of more than 15 kPa per second. Smaller leaks, such as a pinhole leak, creating a change of pressure of less than 15 kPa per second will not automatically shut the system down. The system will continue to operate until the leak is detected by some other means, most likely when someone, possibly a member of the public, detects an odour. The Board does not find this to be acceptable. The Board recommends that monitors be installed at locations agreed upon by Shell and the ERCB, in consultation with Mr. Judd, the Barberos, and the Sheppards. The Board is of the view that properly placed H₂S monitors may provide confirmation of odour complaints and confidence to nearby residents that they will no longer be used as "human H₂S monitors."

6.4.2 Corrosion Prevention and Hydrate Control

[121] Shell argued that the proposed project was significantly different from its installations prior to the 2007 failure. It stated that it applied learnings from that failure to this proposed development, including

- using only an HDPE liner,
- carefully dewatering, drying, and treating the pipeline with a batch inhibitor before liner installation,
- avoiding the use of methanol and increasing pipeline operating temperatures to control hydrates,
- avoiding the use of methanol to troubleshoot or clear the annular space between the pipeline and liner, and
- monitoring annular pressure and collecting and analyzing returns from the vent system.

[122] Shell stated that the corrosion that caused the 2007 failure had begun during the time when the pipeline was lined with Rilsan[®] and had not been arrested when the HDPE liner was installed in 2003. It was possible that the line had not been adequately cleaned and dewatered at the time of the HDPE liner retrofit. This would have left methanol, which was the primary corrosive material, in the annular space. Shell explained that, based on what it had learned from the 2007 failure, it was committing to minimize the use of methanol and to pig pipelines within 48 hours of methanol use. Colin Duncan, an expert for the Sheppard-Barbero group, argued that an operator with hydrate problems would use methanol as methanol was the quickest and surest way to correct hydrate problems.

[123] As an alternative method of hydrate control, Shell planned to increase the operating temperature to between 45°C and 55°C, most likely nearer 45°C, a temperature a few degrees above the hydrate formation temperature. Mr. Duncan stated that he was concerned about operating the pipeline at a higher temperature. He submitted that the HDPE liner would lose yield and tensile strength and the permeability would increase. Further, the higher operating temperature could cause softening of the liner and cause the liner to conform more tightly to girth welds, impair venting, and reduce its collapse resistance.

[124] Mr. Duncan stated that he preferred an unlined system over a lined system and that he had concerns with the management of the lined pipe in the area. Shell noted that the report prepared by Mr. Duncan stated that the installation of an HDPE liner would be a reasonable protective system. Further, Shell stated that it would engage Mr. Duncan or an equivalent advisor in a more detailed review of its integrity management plan for the area and provide a summary document that would be publicly available and reviewed with the ERCB.

Findings of the Board

[125] The Board does not disagree that the pipeline technology and the changes to the pipeline operational procedures described by Shell may address the concerns about the incompatibility of methanol with the previous liner and the resulting corrosion. However, considering the history of failures in the area and how Shell has dealt with operational issues, such as off-lease emissions,

weeds, fencing, dust control, and pipeline maintenance and surveillance, the Board needs Shell to better demonstrate its ability to implement its operational procedures, especially those that impact pipeline integrity and public safety.

6.4.3 Corrosion Detection

[126] Shell submitted that it intends to perform inspections of the new and existing pipelines using radiography at bell hole access points and also using a new in-line inspection tool in lined pipelines. The new inspection tool has the ability to provide information about the thickness of steel behind the liner and works on the principle of volume loss of metal. It is more sensitive to a series of pits or broader corrosion than to finding a single pit and cannot identify the presence of pooled liquids or cracks. It is somewhat less sensitive than tools designed for unlined steel pipelines and has lower limits of detection for individual pits of about 25 per cent depth. It is also possible that the liner could be damaged by multiple passes of the new inspection tool.

[127] Shell stated that it began using this new inspection tool following the 2007 pipeline failure and that it had inspected some of its lined pipelines two or three times since returning them to service. Some of the lines were being inspected at six-month intervals, and there were no indications of corrosion similar to that which caused the 2007 failure. There were some indications of isolated pitting as deep as 20 or 25 per cent of wall thickness along the grooves in the liner, but Shell submitted that corrosion sites of 25 per cent wall loss did not necessarily represent an integrity threat. Shell stated that it would find corrosion before it could become a threat to the integrity of the pipeline.

[128] Mr. Duncan stated that Shell had not provided enough information to allow him to assess the effectiveness of the tool. He was concerned about the sensitivity of the inspection tool as it could not physically contact the steel and he identified the need to validate tool results and conduct replicate runs. Shell reiterated that its primary objective was to prevent corrosion, thus the new inspection tool was an addition to its kit to help confirm that operating changes were effective. Mr. Duncan was concerned about the relative brevity of the operating procedures for the pipelines and was unfamiliar with the changes in the corrosion program that Shell had made since 2007, and thus could not say if they would be effective.

Findings of the Board

[129] The Board notes the lack of technical evidence demonstrating that Shell has the ability to detect corrosion events such as those that may form along the annular grooves. The Board is of the view that, given the history of pipeline failures in the area, Shell needs to be able to detect such events to be able to assess the effectiveness of its pipeline technologies and pipeline integrity procedures in this area. The Board recognizes the work done by Shell testing the new inspection tool and expects that this or some other technology could provide evidence that would better demonstrate that the pipeline technology and pipeline integrity procedures are appropriate for this system.

6.4.4 The Pipeline Annulus

[130] Shell submitted that improvement of vent gas movement and reduction of annular pressure were reasons why it installed a grooved liner as opposed to a smooth liner when it started using the Rilsan[®] liner. The longitudinal grooves were expected to provide alternate paths for the flow

of annular gas. Flow through the annulus would eventually carry annular gas to a scrubber and the pressure would be monitored on a continuous basis by its SCADA system. Mr. Duncan was concerned that a liner with channels created the opportunity to gather corrosives and concentrate them and that venting would not necessarily clear those channels, as exhibited by the 2007 failure. Shell stated that hydrates, iron sulphide, solids, debris, or liquids could contribute to plugging, and sometimes operators would attempt to clear plugging by adding diesel fuel to the vents or using nitrogen to purge them. Mr. Duncan stated that a liner with channels was substantially different than a liner that did not have channels and that venting of the longitudinal channels did remove gas, but was unlikely to move liquids to the vent points. The liquids would accumulate in the channels and absorb H₂S and CO₂, thus forming acids and corroding the internal surface of the steel pipe. He stated that “using the longitudinal channels for venting the permeating gas and liquids, then we have to recognize that we have a high risk of causing failure through long lines of corrosion damage.” Shell acknowledged that there was potential for liquids to form in the annulus and stated that it had procedures in place to try to remove those liquids. Shell argued that the presence of liquids did not necessarily mean that there was a corrosion threat. There were other substances, such as sulphur, chlorides, and methanol, that could damage the protective iron sulphide scale, but Shell did not believe that sulphur or chlorides could migrate through the plastic liner and, to reduce the potential risk, had significantly reduced its use of methanol. Mr. Duncan suggested that the use of the grooved liner shifts the type of failure from pitting to large area corrosion and increases the potential for rupture.

Findings of the Board

[131] The Board notes the lack of technical evidence presented at the hearing to demonstrate that Shell has the ability to detect or remove potentially corrosive materials that may accumulate in the annulus. The Board is of the view that a more rigorous method of monitoring events in the annulus would allow Shell to better demonstrate that it understands and can respond appropriately to conditions within the annulus.

6.4.5 Management of Change

[132] Shell stated that it had a corporate protocol it followed when considering new technologies and new applications of existing technologies. The protocol involved research and development, joint industry studies, in-house research and lab testing, analysis of potential failure modes and effects, and review with field operations personnel. Typically, Shell’s new technologies would be evaluated on a pilot scale before full utilization; however, Shell acknowledged that it had not conducted a pilot study before it first installed the Rilsan[®] liner in segments of the Carbondale system. Shell stated that it had followed internal protocols that were in place at the time, as well as protocols developed in consultation with the supplier of the Rilsan[®] liner material, and Shell believed that the product had superior properties in many respects. However, Shell had not anticipated the effects on the liner that occurred from chemical exposure. The Sheppard-Barbero group submitted that Shell had been using HDPE liners for new pipelines for two years and asserted that that was not enough time to know if the liners were really going to work. They stated that the Rilsan[®] liner experience was a perfect example of what happens when one is not sure.

Findings of the Board

[133] Given the finding of the 2008 report that incompatibility of Rilsan[®] with the composition of fluids in the Carbondale system led to the 2007 failure, the Board is of the view that it is reasonable to expect Shell to provide compatibility testing or field data to demonstrate that HDPE is a suitable liner material for this system. The Board notes the lack of technical evidence presented at the hearing that would have come from such a review and would like Shell to better demonstrate adherence to its management of change procedures.

6.4.6 Other Operational Issues

[134] Shell submitted that it continually reviews its vegetation management plan to look for improvements. It controls weeds by chemical, manual, and mechanical means. It has contractors specifically for weed surveillance and its operators also watch out for weeds. Mr. Barbero argued that the majority of Shell's operators did not know what a weed was. Shell acknowledged that its operators are not trained to identify noxious weeds, but argued that most of its operators are rural, from the area, and familiar with some of the weeds. Shell submitted that in order to remove any vegetative matter so that weeds are not transported elsewhere, all equipment is washed at its yards before and after use. Its weed crews had been along the private portion of the Seven Gates Road four times in 2010. Shell submitted that between 2006 and 2009, there appeared to be an improvement in weed control as there were fewer weed species in 2009 than in 2006. Mr. Barbero argued that Shell was not doing a good job of weed control. He did not dispute that Shell was doing weed control, but he stated that it was not doing enough, and he provided examples of weeds he was concerned about, including downy brome, bow thistle, and Russian thistle.

[135] Wendy Ryan, an intervener, stated that when she viewed the 6-12 site before 2007, it was rundown, the equipment painting was not great, and there was a leak from a pipe that had apparently been wrapped in rags. She stated that she had complained to Shell about what she had seen, Shell responded, and the site was cleaned up. She also provided examples of poor operating practices, such as finding seismic cables left in the wilderness, which she packed out, and a power line that had been left down. Both Mr. Barbero and Ms. Ryan reported finding open pits with fallen fencing. Mr. Barbero cited and provided photos of numerous other examples of poor operational practices and stated that he was constantly reminding Shell to pick up its garbage and to secure its holes to prevent his cattle from falling in. He described a series of errors in the reclamation of a methanol spill, which dragged the reclamation process out for years. He explained that in 2002, Shell spilled 93 000 litres of methanol on his land. Shell replaced the soil very quickly, but with a soil that was not of the same quality. Shell then attempted to remediate the soil, but that attempt failed. Afterwards, the soil was again replaced, this time with a soil with high chloride content and other debris. The next time the soil was replaced, Mr. Barbero approved the soil himself and it was finally approaching normal in about 2006. Shell stated that it worked collaboratively with the Barberos and had completed the remediation to applicable regulatory standards.

6.5 Conclusions about the Pipeline Applications

[136] The Board does not disagree that the operational procedures and pipeline technologies proposed by Shell may work for corrosion mitigation; however, these considerations have been outweighed by examples of its poor operating practices, such as improperly secured open

excavations, odour complaints, pipeline and associated equipment failures, spills, poor reclamation efforts, and weed growth at Shell's facilities. The Board is of the view that Shell, in the way that it has operated its existing infrastructure in this area, has not adequately demonstrated that it has followed its own procedures. Until Shell can better demonstrate compliance with its own procedures, the Board is of the view that it is not reasonable to tie in these additional production volumes and add more pipeline length to the system. Therefore, the Board hereby denies Applications No. 1614198 and 1614210.

[137] The Board directs that Shell must better demonstrate that it can properly operate its infrastructure. This could be achieved by, among other things,

- reducing the pipeline failure frequency on the Carbondale and Castle River systems,
- improving its ability to detect leaks and having fewer off-lease emissions,
- adhering to its traffic code of conduct,
- following through with its commitments, and
- conducting an independent review of its operations and sharing the results with WAG and the community.

[138] The Board understands that Shell has proposed to do in-line testing of the WT68 well and that the Board's decision to not, at this time, approve the pipelines may require Shell to find an alternative method to test the well. The Board, as a condition of its approval, directs that if Shell needs to test the well, the operational plans for this test, either in-line or by flaring, must be submitted to the ERCB for approval.

7 THE FACILITY APPLICATIONS

[139] **Application No. 1614144:** Shell applied, pursuant to Section 7.002(1) of the *OGCR*, for approval to amend the existing Facility Licence No. 28757 to install and operate a 71 kilowatt (kW) fuel gas compressor at LSD 6-12-6-3W5M to provide high-pressure gas for maintenance and other area operations. The maximum H₂S concentration at the existing facility is 32.0 per cent.

[140] **Application No. 1614145:** Shell applied, pursuant to Section 7.002(1) of the *OGCR*, for approval to construct and operate a single-well gas battery at LSD 10-1-6-3W5M to handle production from the proposed well at the 10-1 site. The maximum H₂S concentration would be 32.0 per cent.

[141] The Board considers the relevant issues respecting the facility applications to be need and safety.

7.1 The Fuel Gas Compressor

[142] Shell submitted that its application to the Board to install and operate a 71 kW fuel gas compressor at an existing facility at the 6-12 site would provide high-pressure gas for

maintenance and other operations. The interveners did not submit any reports or provide any expert witnesses with respect to the fuel gas compressor.

7.2 Conclusions about the Fuel Gas Compressor

[143] The Board accepts Shells submissions about the fuel gas compressor. The Board expects that this additional equipment will assist Shell to improve its operations of the Carbondale system and could assist Shell in addressing some of the interveners' concerns in the area, such as their concerns about odours and off-lease emissions. Therefore, the Board hereby approves Application No. 1614144.

7.3 The Gas Battery

[144] Shell submitted that its application to the Board for a licence to construct and operate a single-well gas battery at the 10-1 site would allow Shell to handle production from the proposed well at the 10-1 site. The interveners did not submit any reports or provide any expert witnesses with respect to the gas battery.

7.4 Conclusions about the Gas Battery

[145] The Board accepts that the gas battery would be needed to allow production from the WT68 well. As the Board is not, at this time, prepared to allow production from the WT68 well, there is no need for the proposed gas battery at the 10-1 site. The Board hereby denies Application No. 1614145.

8 FURTHER RECOMMENDATIONS AND CONCLUSIONS

[146] The Board notes that WAG provides a venue for members of the community to participate and provide feedback in a manner beyond individual consultation. It has also allowed Shell to provide information and get input from the community. The Board urges all parties to continue efforts in this regard. Further, the Board finds it appropriate that beyond the ERCB's involvement in WAG, there has been, as part of the ERCB's business of regulating oil and gas developments, considerable technical cooperation between the ERCB and Shell staff. However, much of that is behind the scenes and is not communicated to the public. The Board is of the view that a more open process will allow the public to have input and be aware of the efforts undertaken to address the operational problems in the area. The Board is resolved to have a stronger presence in the area and the formation of a technical subcommittee reporting to WAG will be one of the actions the Board will pursue to further this resolve. The technical subcommittee would meet as issues arise to provide timely review and input on technical issues and would consist of representatives from the public, Shell, and the ERCB who are able to provide competent technical input and, on the part of Shell and the ERCB, have adequate authority. The Board suggests that one of the items that the subcommittee could assist with would be the implementation of the Board's recommendation to Shell to install air monitors, as well as the review of the monitoring data and the preparation of monitoring reports. The Board also recommends that WAG hire an expert, such as Mr. Duncan, paid for by Shell, to assist in a review of Shell's operations in the area and that information from this review be made available through WAG.

Dated in Calgary, Alberta, on March 9, 2011.

ENERGY RESOURCES CONSERVATION BOARD

<original signed by>

M. J. Bruni, Q.C.
Presiding Member

<original signed by>

T. L. Watson, P.Eng.
Board Member

<original signed by>

B. T. McManus, Q.C.
Board Member

APPENDIX 1 HEARING PARTICIPANTS

Principals and Representatives
 (Abbreviations used in report)

Witnesses

Shell Canada Limited

Counsel:

B. S. Gilmour

D. K. Naffin

For Shell:

N. Roe, P.Biol.

R. Creasey, P.Biol.

L. George

L. Auger

A. Dunlop

M. Berry

K. Goertz, P.Eng.

I. Dowsett

W. Springer, P.Eng.

G. Granville

Castle-Crown Wilderness Coalition (CCWC)

E. Voth

M. Sandilands

K. Kelly

J. Kelly

P. Hazelton

J. Huntly

Counsel:

D. P. Bishop

Y. S. Cheng

For the CCWC group:

 James Tweedie, of
 the CCWC

D. Pachal

For the CCWC and Judd-Latham group:

P. Lee

C. Wershler, P.Biol.

C. Wallis, P.Biol.

B. Gilbert, Ph.D.

 For the CCWC group and Sheppard-Barbero
 group:

S. Batterman, Ph.D.

 For the CCWC group and the Sheppard-
 Barbero group:

S. Du, Ph.D.

M. Edelstein, Ph.D.

Sheppard-Barbero group

D. Sheppard

J. Sheppard

K. Barbero

S. Barbero

I. Barbero

Counsel:

J. J. Klimek

For the Sheppard-Barbero group:

C. Duncan, P.Eng.

Orich-Fisher group

B. Orich

For the Orich-Fisher group:

T. Messer

Principals and Representatives
(Abbreviations used in report)

Witnesses

D. Orich
M. Peters
T. Fisher
 Counsel
 B. Carscallen

For the Orich-Fisher group and the CCWC
group:
R. Smith

Judd-Latham group
M. Judd
T. Latham
 Representative:
 M. Sawyer

For the Judd-Latham group:
A. Norman, Ph.D.

With no representation

S. McDowall
H. Healy
E. Crowshoe
M. Plain Eagle
F. Smith
W. Yellow Wings
M. Little Wolf
B. Yellow Wings
E. Small Legs
W. Ryan
D. Laskin

Energy Resources Conservation Board staff

T. Grimoldby, Board Counsel
G. Perkins, Board Counsel
D. Campbell
G. McLean
A. Taksas
M. Zelensky, P.Eng.
C. Ravensdale
B. Greenfield, P. Biol.
D. Grzyb, P.L.Eng.

APPENDIX 2 SUMMARY OF CONDITIONS, COMMITMENTS, AND RECOMMENDATIONS

Conditions generally are requirements in addition to or otherwise expanding upon existing regulations and guidelines. An applicant must comply with conditions or it is in breach of its approval and subject to enforcement action by the ERCB. Enforcement of an approval includes enforcement of the conditions attached to that licence. Sanctions imposed for the breach of such conditions may include the suspension of the approval, resulting in the shut-in of a facility. The conditions imposed on the licence are summarized below.

The Board notes that Shell Canada Limited has made certain undertakings, promises, and commitments (collectively referred to as commitments) to parties involving activities or operations that are not strictly required under ERCB requirements. These commitments are separate arrangements between the parties and do not constitute conditions to the ERCB's approval of the applications. The commitments that have been given some weight by the Board are summarized below.

The Board expects the applicant to comply with commitments made to all parties. However, while the Board has considered these commitments in arriving at its decision, the Board cannot enforce them. If the applicant does not comply with commitments made, affected parties may request a review of the original approval. At that time, the ERCB will assess whether the circumstances regarding any failed commitment warrant a review of the original approval.

Recommendations are provided by the Board to assist the applicant, public, and industry in addressing the issues respecting the applications. It is not intended that the applicant must comply with the recommendations or that affected parties would be able to request a review of the original approval if the applicant does not comply.

CONDITIONS

The Board understands the frustration of residents about the time they spend dealing with matters arising from oil and gas development in the area; therefore, the Board advises that it will look to the quality of outcomes and not the quantity of consultation as a demonstration of success.

- The Board directs Shell to conduct a drilling and completions ERP exercise prior to spudding the WT68 well and to involve interested stakeholders in the development and implementation of and follow-up to that exercise.
- The Board directs Shell to control dust on the Seven Gates Road by watering the road as required based on the weather, road use, and road condition during drilling and completion of the well.
- The Board directs Shell to have a traffic monitor close to the junction of Seven Gates Road and Highway 507 during drilling and completions of the well.
- The ERCB directs that if Shell needs to test the well, the operational plans for this test, either in-line or by flaring, must be submitted to the ERCB for approval.

COMMITMENTS BY SHELL CANADA LIMITED

The following commitments are a part of the list prepared for the Board as an undertaking by Shell and recorded as Exhibit 84.01 of the hearing record. Only commitments about the applications approved in this decision have been included.

- Locate a public access trail along the west side of the lease as per the MSL.
- Work with SRD to discourage/control inappropriate access with gates, boulders, etc., with respect to the area in the vicinity of the 10-1 site.
- Use reasonable efforts to ensure that any permanent lighting installed at the well site will be placed, directed, or shielded in a way to minimize the lightshed down the Screwdriver Creek valley.
- Install lighting that allows external site lights to be turned off when not required for safety or other reasons on the equipment used for ongoing operations at the proposed well site.
- Plant vegetation on the east side of the 10-1 site to enhance the buffer.
- Complete a full mock exercise implementing the Waterton 68 Emergency Response Plan prior to spud of the WT68 well. Stakeholders will have the opportunity to provide input on the design of this exercise and have the ability to observe. It will comply with *Directive 071* and *CSE 731-03*, Appendix K.
- Communicate revised ERP public information package to residents within the EPZ and update public data within the ERP.
- Adhere to its traffic code of conduct for the Seven Gates Road.
- Conduct no heavy operations, such as construction or drilling, in the currently posted wildlife window of December 15 to April 30.
- Implement measures such as avoidance, seed collection, transplanting, propagation, and contouring of the lease site to mitigate impacts to identified area plants and rare plant community.
- Vegetate some areas of the site that are not being used during operations; to minimize erosion during interim reclamation.
- Identify to SRD and update ANHIC database, now known as ACIMS, with the details of the nine rare plant species identified at and near the 10-1 site.
- Communicate the H₂S content of the well to interested stakeholders.
- Conduct noise monitoring to confirm compliance with *Directive 038*, if there is a complaint.

The Board notes that the following two commitments provided in Exhibit 84.01 are actually regulatory requirements and as such must be complied with by Shell.

- Update the drilling plan to include the use of water-based mud for surface casing drilling.
- Modify the Waterton 68 drilling plan to include details regarding the Firefly Blowout Ignition System.

BOARD RECOMMENDATIONS

The following recommendations are summarized from the body of this decision.

Recommendations about the location:

- The Board recommends that Shell monitor the effectiveness of its rare plant transplanting program and make this information publicly available.
- The Board expects Shell to minimize the environmental effects at the 10-1 site and to offset those that are ecologically significant.

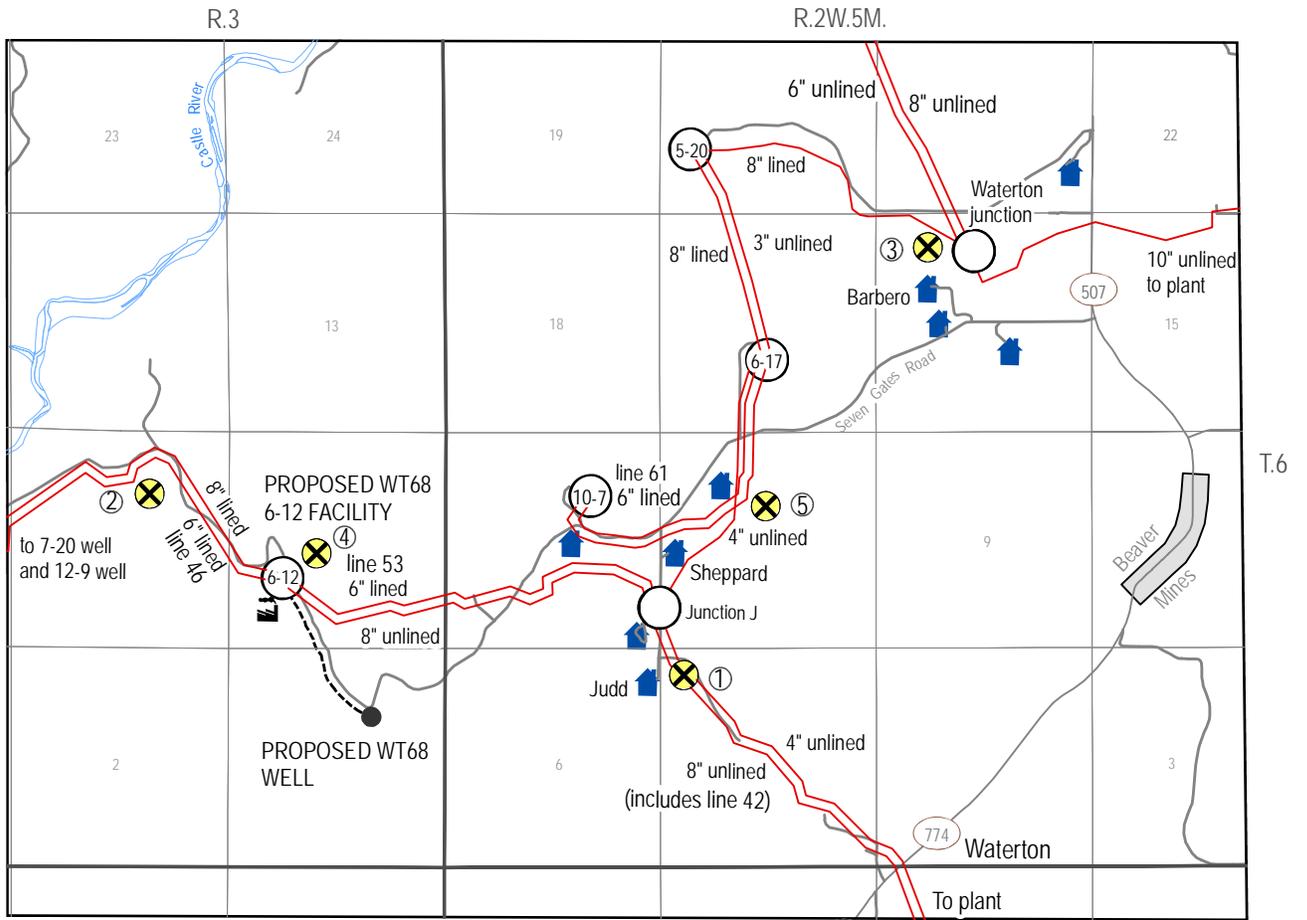
Recommendations about emergency response:

- The Board recommends that additional measures must be developed to effectively respond to potential pipeline and production incidents.
- The Board recommends that Shell conduct an ERP exercise addressing a pipeline/production scenario and involve interested stakeholders in its development and implementation, as well as in the follow-up to the exercise.
- The Board suggests that Shell consider redesigning its public information package to respond to the residents' feedback and to make the information easy to recognize as important and understand.
- The Board urges all stakeholders to cooperate with Shell when it conducts ERP exercises or tests other systems, such as its emergency notification system, that are designed to protect the public.

Other recommendations:

- The Board recommends that Shell report all odour complaints it receives in the area to the Board. Positive outcomes with respect to the control of off-lease emissions will allow Shell to better demonstrate its ability to safely conduct its operations in the area.
- The Board recommends that Shell report, on a quarterly basis, any complaints it receives about dust and traffic to WAG and the ERCB.
- The Board recommends that air monitors be installed at locations agreed upon by Shell and the ERCB and in consultation with Mr. Judd, the Barberos, and the Sheppards.
- The Board recommends the formation of a technical subcommittee reporting to WAG that would meet as issues to provide timely review and input regarding technical issues. The group would consist of representatives from the public, Shell, and the ERCB who are able to provide competent technical input and, on the part of Shell and the ERCB, who have adequate authority.
- The Board suggests that one of the items that a technical subcommittee could assist with would be the implementation of the Board's recommendation to install air monitors, as well as the review of the monitoring data and the preparation of monitoring reports.

- The Board recommends that WAG employ an expert, such as Mr. Duncan, paid for by Shell, to assist in a review of Shell's operations in the area and make the information from this review available to interested persons through WAG.



Legend

- | | | | |
|--|----------------------|--|-------------------|
| | Existing pipeline | | Pipeline failures |
| | Proposed pipeline | 1. 1995 failure | |
| | Proposed facility | 2. 1997 failure | |
| | Proposed well | 3. 2002 - methanol spill (Barberos' property) | |
| | Permanent residences | 4. 2003 - methanol spill (McClellands' property) | |
| | Well site/junction | 5. 2007 failure | |

Figure 1. Map of project area