Flaring and Venting Recommendations For Coal Bed Methane Final Report

Prepared by the
Flaring and Venting Project Team
for the
Clean Air Strategic Alliance
Board of Directors

March 2005

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By consensus, the CASA board of directors approved this report and the recommendations within at its March 17, 2005 meeting.

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About CASA

The Clean Air Strategic Alliance (CASA) is a non-profit association composed of stakeholders from three sectors – government, industry and non-government organizations such as health and environmental groups. All CASA groups and teams, including the board of directors, make decisions and recommendations by consensus. These recommendations are likely to be more innovative and longer lasting than those reached through traditional negotiation processes. CASA's vision is that the air will be odourless, tasteless, look clear and have no measurable short- or long-term adverse effects on people, animals or the environment.

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Glossary Of Terms And Acronyms

CAPP: Canadian Association of Petroleum Producers

CBM: Coal bed methane

CSUG: Canadian Society for Unconventional Gas

EUB: Alberta Energy and Utilities Board

Flaring: Flaring is the burning of natural gas that cannot be economically conserved.

FVPT: Flaring and Venting Project Team

Guide 60: Refers to EUB *Guide 60*, June 1999 and *Guide 60: Updates and Clarifications*, February 2001. The EUB regulates upstream petroleum industry flaring and venting according to the methods outlined in this Guide.

MAC: Multi-Stakeholder Advisory Committee, a multi-agency group led by Alberta Energy, and co-chaired by Alberta Environment, charged with reviewing and making recommendations on CBM development in Alberta.

Mcf: Thousand cubic feet

MMscf/D: Million standard cubic feet per day

NGC: Natural gas from coal

SEPAC: Small Explorers and Producers Association of Canada

Tcf: Trillion cubic feet

Venting: Venting is the release of natural gases to the atmosphere where conservation or flaring is not practical due to gas volumes being too small or incapable of supporting combustion.

1. Introduction

Coal bed methane (CBM), also known as natural gas from coal (NGC), is showing promise as an important new source of energy in Alberta. It is estimated that there is over 550 Tcf of CBM in the province. Although there are not yet many CBM wells currently in commercial production, a large number of exploratory wells are being drilled, especially in the shallow coal deposits underlying the Calgary-Edmonton corridor east of Highway 2. There were an estimated 2400 wells province-wide by the end of 2004, producing over 100 MMscf/D of CBM.

CBM has been undergoing a review since 2003 by a Multi-stakeholder Advisory Committee (MAC) led by Alberta Energy and co-chaired by Alberta Environment.[1] In spring 2004, the MAC agreed that the CASA Flaring and Venting Project Team (FVPT) should develop recommendations for the regulation of flaring and venting associated with CBM development.

In June 2004, the CASA Board approved the addition of the following objective to the Terms of Reference for the Flaring and Venting Project Team:

> 10. Review information and develop recommendations for the regulation of flaring and venting associated with coal bed methane/natural gas from coal development

Stakeholders from the Canadian Society for Unconventional Gas (CSUG), the industry association for CBM development, were subsequently invited to participate in this part of the team's work.

The project team's focus was around reducing the amount of gas that flared or vented before the well produces commercially viable volumes of gas. Once approved by the CASA board of directors, the recommendations will be provided to the Alberta Energy and Utilities Board (EUB) for inclusion in *Guide 60.*[2]

2. Existing Framework For Flaring And Venting Of Coal Bed Methane

A. EUB Guide 60

The EUB regulates flaring and venting for gas wells through performance and reporting requirements, permits, and data collection, as detailed in *Guide 60*. Because no significant water is encountered, dry CBM wells are tested in a manner similar to conventional shallow gas wells, and the same rules and regulations apply.[3] *Guide 60* requirements are viewed by the project team as largely adequate for testing of dry CBM wells.

Due to the extended (over one year) dewatering period required for testing of wet CBM wells, especially during early evaluation and piloting, some believe that the extended duration tests and higher volume limits for these types of CBM test wells may, in the future, require some modification to *Guide 60*.

Venting is not permitted by the EUB except in cases where the gas is not able to support stable combustion. This may occur when the gas flow rates are very low or intermittent, or when the extracted gas cannot be ignited due to insufficient energy content. Low energy content can result

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[1] For more information on the work of the MAC, see http://www.energy.gov.ab.ca/335.asp

[2] *Guide 60* (June 1999) and *Guide 60*: *Updates and Clarifications* (February, 2001) may be viewed or downloaded at http://www.eub.gov.ab.ca/BBS/requirements/Flaring/default.htm.

[3] See section 3.8 of *Guide 60*: Well Test Flare Volumes and Approval Requirements

from high levels of nitrogen being flowed back after nitrogen fracturing operations. In these cases, the gas may be vented initially but must be flared once it is capable of supporting combustion.

B. Flaring and Venting Project Team Recommendations – September 2004

In September 2004, the CASA Board approved recommendations put forward by the FVPT regarding well test flare management. In addition to recommendations for improved pubic notification of well test flaring activities, the FVPT agreed that flaring and venting should only be conducted long enough to determine the economic viability of gas conservation and the data necessary to size the conservation equipment.

The group did not reach agreement on the length of time that this would require. It was proposed and accepted that data be gathered that would allow the duration requirements of well tests to be assessed. Where warranted, extensions would be provided for an agreed to set of reasons. If an extension is needed for a specific well, reasons for the extension should be provided to the EUB.

The Flaring and Venting Project Team is to be reconvened in Q2 2005 to review the data and develop recommendations regarding the time limit for well testing, including reasons for extensions, for implementation no later than January 1, 2006.

3. Flaring And Venting For Coal Bed Methane In Alberta

There were several issues that the FVPT considered in its review of flaring and venting for CBM:

- The definition of wet and dry CBM
- The need for different requirements for flaring and venting of a) wet and b) dry CBM
- The need for more data or information with respect to certain matters
- Nitrogen injection and its impact on flaring and venting of CBM wells

These issues and corresponding recommendations are described below.

A. An Overview of Wet and Dry Coal Bed Methane in Alberta

Each CBM basin poses its own unique challenges. In some formations, the coal is dry and CBM can be extracted in the same way as conventional natural gas from shallow formations ("dry CBM"). In other formations, the coal must be dewatered to reduce the pressure and allow the gas to be extracted ("wet CBM").

Because CBM is predominantly clean-burning methane and contains no heavy hydrocarbons, the flares are similar to the flames that burn in home furnaces, except larger in scale. Neither sour gas nor heavy hydrocarbons are associated with Alberta's CBM and therefore do not complicate testing practices for these wells.

Currently, most CBM wells are found in one of the following three CBM formations in Alberta: Horseshoe Canyon, Mannville and Ardley (see Figure 1 below). Due to their flow characteristics, pressures and gas quality, "dry" Horseshoe Canyon wells are analogous to conventional shallow gas wells commonly found in Alberta and comprise about 90% of the CBM well activity to date, including several commercial wells. The Mannville and Ardley formations may be wet CBM wells that require extensive dewatering periods in the early exploration and pilot stages, and must be tested for long periods to evaluate their potential. No commercial wells exist in these latter areas at this time.

B. Recommendations for Dry CBM

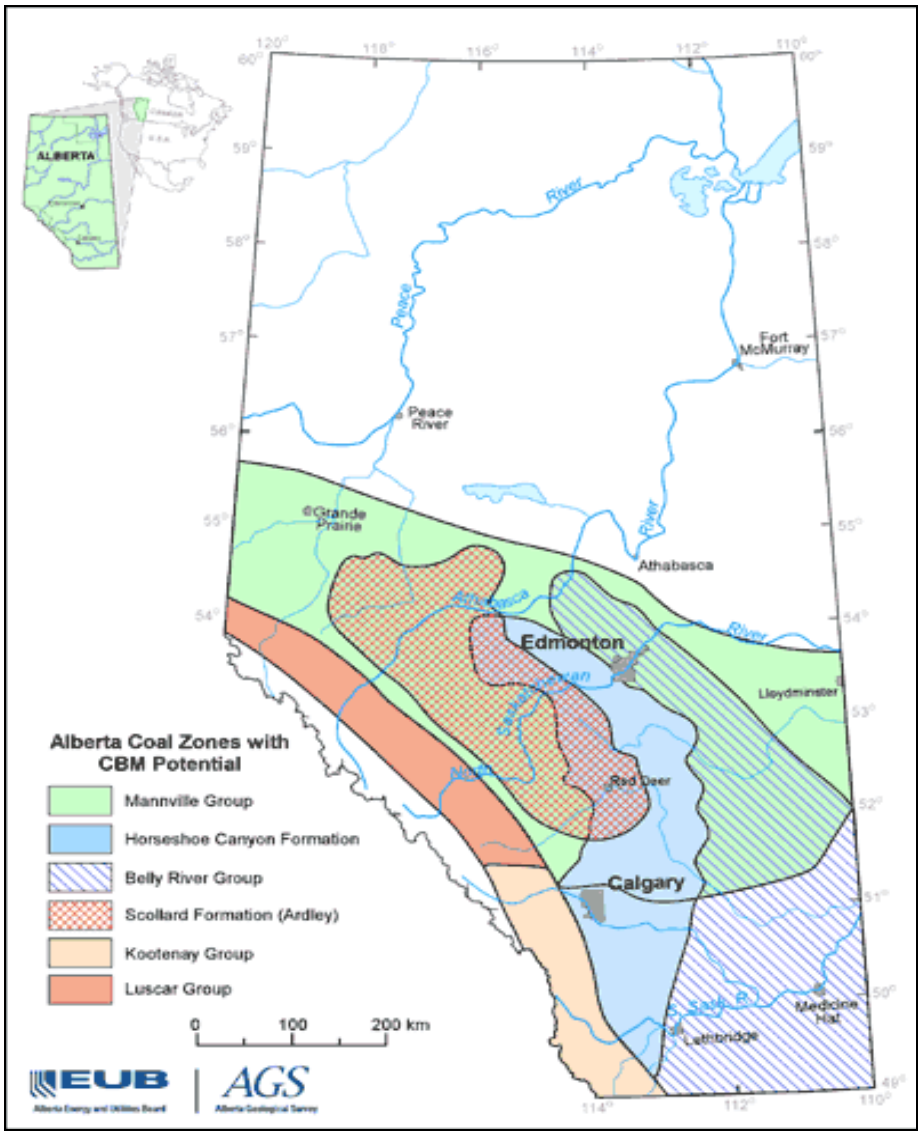

Figure 1: Alberta Coal Zones with CBM Potential (courtesy EUB)

The FVPT has classified dry CBM wells as CBM wells producing less than $1m^3$ of water per operating day.[4] As noted above, these wells are in most respects similar to conventional shallow gas wells in Alberta. Venting is not recommended and short-term flare tests with relatively small test volumes are the desired practice. Nonetheless, the FVPT agreed that additional data should be collected and that the FVPT should reconvene to review the data to determine if any additional

[4] For all recommendations in this report, the water rate used to specify the difference between wet and dry CBM wells for the purposes of gas flaring or venting has no effect or relation to compliance with any requirements in the Water Act. CBM operators are required to follow the "Alberta Environment Guidelines for Groundwater Diversion for Coal bed Methane/Natural gas-in-coal Development - April 2004" whenever non-saline groundwater is anticipated to be encountered in their operations, regardless of the rate or volume of non-saline groundwater that may be produced.

recommendations are warranted in relation to the time period for flaring and venting of dry CBM wells.

Accordingly, the FVPT recommends the following:

1. The EUB, in partnership with CAPP and SEPAC, set up a program to collect one month of data on the flaring and venting associated with CBM wells producing less than $1m^3$ of water per operating day across the province. Data to be collected includes the duration of flaring and/or venting, volumes of gas flared and/or vented, and reasons if the flaring and/or venting extends longer than 72 hours.

2. The Flaring and Venting Project Team be reconvened in Q2 2005 to review the data and develop recommendations regarding the time period for flaring and venting associated with CBM wells producing less than $1m^3$ of water per operating day for implementation January 1, 2006.

3. Until January 1, 2006, for CBM wells producing less than $1m^3$ of water per operating day, flaring and venting (including clean up and testing) is limited to a total period of 120 hours for development wells and 720 hours for other wells (period is not necessarily consecutive, i.e., excludes shut-in time) per zone tested unless an extension has been specifically granted by the EUB.

4. If additional time for flaring or venting of CBM wells producing less than $1m^3$ of water per operating day is needed, the EUB must be contacted as soon as possible with the reasons for the extension, but not later than the end of the 120 or 720 hour period.

   Extensions may be granted:
   - To clean up the well bore in unique situations;
   - Where stabilized flow has not been reached; or
   - Where there have been mechanical problems with the well.

   After the well test, the well must be shut-in until gas conservation is implemented.

5. Existing flaring permit thresholds continue to apply as outlined in *Guide 60: Updates and Clarifications* available at http://www.eub.gov.ab.ca/bbs/products/guides/g60/g60-updates.pdf. This includes a permit threshold of 200 10^3m^3 for wells which are already tied in, 400 10^3m^3 for development wells, and 600 10^3m^3 for exploratory wells. These thresholds correspond to Tier 3, Tier 2, and Tier 1 as defined in *Guide 60* (see section 3.8.1, Feb 2001, *Guide 60: Updates and Clarifications*)

C. Recommendations for Wet CBM

The FVPT has classified wet CBM wells as CBM wells producing more than $1m^3$ of water per operating day.[5] Wet wells need dewatering that may take several months to determine if the well is commercial.

Accordingly, the FVPT recommends the following:

6. For CBM wells producing more than $1m^3$ of water per operating day, flaring or venting must cease (gas must be conserved) within 6 months of gas production for an individual well

[5] See footnote 4

exceeding 100 10^3m^3 for any three-month period (approx. 1100 m^3/day). Shorter tie-in periods must be pursued whenever possible. Operators must notify the EUB as soon as gas production exceeds 100 10^3m^3 for any three-month period at a CBM well producing more than $1m^3$ of water per operating day that is flaring or venting.

For CBM wells producing more than $1m^3$ of water per operating day that do not trigger the above (i.e., 100 10^3m^3 for any three-month period), flaring and venting is limited to the lesser of:

- a total period of 18 months, including the period to tie the well in, or,
- a total volume of 400 10^3m^3 for Tier 2 (development) wells or 600 10^3m^3 for Tier 1 (other) wells, per zone tested. Wells that are already tied-in would be treated as Tier 3 and allowed a maximum flare volume of 200 10^3m^3.

7. If additional flare times or volumes are needed to test a CBM well producing more than $1m^3$ of water per operating day, the operator must make a written request for such to the EUB as early as possible and in no case later than the end of the 18 month or volume allowance flare or vent period. Any extension request must include the reasons for the extension. Extensions may be granted to allow for additional flare time or volume for reservoir evaluations or where other special circumstances warrant.

D. Nitrogen Injection and Flaring

Nitrogen gas is used by the industry to "fracture" dry CBM wells. It also makes up approximately 80% of the air that we breathe. Fracturing opens channels in the CBM formation that allow more gas to flow to the well. After fracturing the formation, the nitrogen must be flowed out of the well during a "clean-up" phase. Initially, the produced gas from the well cannot be flared because nitrogen levels reduce the energy content of the gas, rendering it incombustible. As the clean-up continues, nitrogen levels decrease, allowing ignition of the gas. The gas produced during the clean-up phase cannot be tied into sales gas pipelines because of the energy content and nitrogen concentration required by the purchase agreements specifications.

At this time, it is not known whether there are other economically feasible technologies that could be used for dry well clean up or whether there are other technologies that can be used to remove nitrogen from dry CBM wells. One of the challenges is the continuous decline of nitrogen concentration in the gas stream as clean up occurs.

The Flaring and Venting Project Team therefore recommends:

8. A literature review should be conducted by CAPP by May 31, 2005 to determine whether there are any methods other than flaring or venting to remove nitrogen from CBM wells.

9. Operators of wells negotiate to allow gas with higher nitrogen content to be delivered into pipelines.

4. Framework Review

In keeping with a previous recommendation regarding review of the entire flaring and venting framework in 2007, as approved by the CASA Board in September 2004, the FVPT recommends as follows:

10. The Flaring and Venting Project Team review the flaring and venting framework for Coal Bed Methane when it reconvenes in the first quarter of 2007.

Appendix A: Flaring and Venting Project Team Revised Terms of Reference

Flaring/Venting Project Team
Revised Terms of Reference

Purpose:

- To assess the performance and make recommendations regarding the Alberta solution gas flaring management framework.
- To develop recommendations to address a broader range of flaring and gas venting issues in Alberta.

Objectives:

1. Determine whether the solution gas flaring reduction targets for 2000 and 2001 have been met
2. Determine, based on improved information, firm future reduction targets, time lines and threshold volumes for solution gas flaring
3. Evaluate the royalty treatment of flared and vented gas and cost sharing programs and their implication for achieving future reduction targets
4. Evaluate the approval process and determine if fixed term approvals are required
5. Review performance requirements and efficiency standards, and determine the feasibility of combustion efficiency standards for all flares
6. Assess research findings and their implication for management of flaring and venting.
7. Review information on gas venting and mitigation approaches and recommend a venting management framework, including short-term actions and long-term strategies
8. Review and develop recommendations with regard to EUB Guide 60, and Guide 60 Updates and Clarifications document.
9. Develop recommendations for a strategy to respond to the issues associated with flaring and venting.
10. Review information and develop recommendations for the regulation of flaring and venting associated with coal bed methane/natural gas from coal development

Note: Objectives #1-6 came from Section 6.0 of the CASA Flaring Project Team's 1998 report: *Management of Routine Solution Gas Flaring in Alberta*. To reflect the broader scope of the Flaring/Venting Project Team, objectives #3 and 6 have been expanded to include all flaring and venting, and #5 to include all flaring.

Context:

The Terms of Reference for this Project Team supports the objectives identified in CASA's *Business Plan 1999-2002*, fits well within the priorities, values, and expectations of the Board, and is in accordance with the CASA vision for air quality.

Recommendations developed by the Project Team will reflect CASA's goals for air quality in Alberta, namely: 1) Protect the Environment; 2) Optimize Economic Performance and Efficiency; and 3) Seek Continuous Improvement.

Report to the CASA Board:
The Flaring and Venting Project Team will report to the CASA Board in September 2004, with an addendum to this report that will focus on recommendations relating to on Coal Bed Methane development to follow in November 2004.

Membership:
The Alberta Energy and Utilities Board

Alberta Department of Energy

Alberta Environment

Upstream Oil and Gas Industry, both heavy oil and conventional oil

Alberta Association of Municipal Districts and Counties

Prairie Acid Rain Coalition

Alberta Health and Wellness

Resident for Accountability in Power Industry Development

Small Explorers and Producers Association of Canada

Alberta Cattle Commission

Pembina Institute

Wild Rose Agricultural Producers

Canadian Association of Petroleum Producers

Appendix B: Flaring and Venting Project Team List of Members

Name	Organization Name
Karina Bodo	Alberta Health and Wellness
Michael Brown	Alberta Energy and Utilities Board (EUB)
Terri Carroll	Small Explorers & Producers Association of Canada (SEPAC)
Jeff Cormier	Alberta Department of Energy
Peter Davis	Government of BC, Oil and Gas Commission
Keith Denman	Clean Air Strategic Alliance
Gur Dhaliwal	Alberta Department of Energy
Randy Dobko	Alberta Environment
John Drinkwater	BP Canada
Bart Guyon	Alberta Association of Municipals Districts and Counties
Chris Hay	Imperial Oil/CPPI
Wayne Hillier	Husky Energy
Ahmed Idriss	Clean Air Strategic Alliance
Martha Kostuch	Bert Riggall Environmental Foundation & PARC
Alexander MacKenzie	Alberta Health and Wellness
John Parr	Canadian Natural Resources Limited
Ian Peace	Residents for Accountability in Power Industry Development (RAPID)
Mike Queenan (Alt)	Residents for Accountability in Power Industry Development (RAPID)
Barry Ranger	Small Explorers & Producers Association of Canada (SEPAC)
Doreen Rempel	MGV Energy Inc./CSUG
Michael Rodyniuk	Alberta Beef Producers
Chris Severson-Baker	Pembina Institute
Al Smandych	Alberta Energy and Utilities Board (EUB)
Ralph Smith	Wildrose Agricultural Producers
Jim Spangelo	Alberta Energy and Utilities Board (EUB)
John Squarek	Canadian Association of Petroleum Producers (CAPP)