

All About Critical Sour Wells

This fact sheet explains what a critical sour well is, the special safeguards such a well requires, and how these safeguards protect Albertans from sour gas blowouts.

What is a critical sour well?

A critical sour well is a sour gas well that could potentially release large quantities of hydrogen sulphide (H_2S), causing significant harm to nearby people. When deciding if a sour gas well should be considered critical, the Energy Resources Conservation Board (ERCB) examines factors such as how complex the drilling will be and how many people live in the community.

What is sour gas?

Sour gas is natural gas that contains some amount of H_2S .

What is H_2S ?

H_2S is the chemical formula for hydrogen sulphide, a toxic gas formed by the breakdown of organic materials. It can be found in natural gas, oil, sewage, swamps, and stockyards and in the processing of pulp and paper. The gas is colourless, but you would recognize its “rotten egg” smell even at low concentrations.

At higher concentrations, it stops people and animals from breathing, and so if it's not handled properly, it can be deadly. Because H_2S is heavier than air, it tends to accumulate in low-lying areas.

How is the decision made to classify a well as critical?

All applications to the ERCB to drill oil or gas wells must take into account the possibility of encountering sour gas. If the ERCB's first evaluation shows that there may be H_2S , then the application is examined further.

The ERCB uses two major criteria to determine if a sour well is to be classified as critical:

- how close the well is to an urban centre or public facility, such as a major recreational facility, and
- the potential H_2S release rate during the drilling stage.

The potential H_2S release rate is determined by both the percentage of H_2S in the gas and the rate at which H_2S that can be delivered to the surface. This is measured in cubic metres per second at standard pressure and temperature.

For example, a well may have both a weak flow of gas with only 1 per cent H_2S content but still be critical if it is very close to a town. But a gas well with 10 per cent H_2S content located in a remote location without people nearby might not be classified as critical.

What special planning is required for a critical well?

A critical well requires a detailed drilling plan that addresses all aspects of the proposed operation. The plan must be reviewed and approved by the ERCB before a critical well is licensed. Once a well is classified as critical, drilling preparations must meet all the operational and safety-related requirements set out by the ERCB. The drilling plan for a critical well includes

- well design,
- equipment,
- drilling procedures,
- training and supervision,
- inspections, and
- emergency response planning.

How does an operator prevent equipment failure?

The equipment used when drilling a critical well must be resistant to the harmful effects of sour gas and must contribute to blowout prevention. For example, the quality of the drill pipe used for critical wells must be premium and the pipe must be inspected to ensure that it meets the latest standards.

What is a blowout?

A blowout is an uncontrolled flow of gas, oil, or other well fluids from a wellbore into the atmosphere. A blowout usually results from a combination of factors, such as human error and equipment failure.

In case equipment does fail, do critical wells have backup equipment?

Yes. Backup equipment provides a second line of defence to ensure that well problems are controlled in the early stages, before developing into full-scale blowouts. Two examples illustrate these safeguards: first, there must normally be a second or backup degasser on site (a device that removes unwanted gas from drilling fluids), and second, there must be twice as much drilling mud in reserve at the site as will be needed. Mud is the liquid mixture circulated through the wellbore during drilling that is so important in holding back subsurface pressure.

Can human error be prevented?

No amount of regulation can guarantee that workers at a critical well will never make a mistake. However, errors can be reduced with proper training and supervision. The basic rule is that critical wells must have well-qualified and experienced drilling crews. Rig managers and supervisors must have a current Enform Second Line Supervisor BOP Well Control certificate. Supervisors, rig managers, and drillers all must have H₂S Alive Certification and experience drilling sour wells.

Who inspects critical wells?

The responsibility for inspection rests primarily with the company drilling the well and the well-site supervisor. Daily and weekly inspections are conducted both by company personnel and by the drilling contractor.

ERCB field staff check the company's ongoing inspection records and conduct independent inspections, as well. At most critical wells, there is at least one ERCB inspection prior to or during drilling in the critical zone. Critical well inspections are quite detailed. If serious problems are found, drilling operations are suspended, if safe to do so, until the deficiencies have been corrected. For more information on ERCB inspections, see [EnerFAQs No. 3: Inspections and Enforcement of Energy Developments in Alberta](#).

How do I find out if a well near me is critical?

The best place to start is with the company drilling the well. If you know the company name, call its nearest office. However, if you would like more information, contact the nearest ERCB Field Centre. Telephone numbers for all ERCB offices are included at the end of this EnerFAQs.

As part of the detailed emergency plan for a critical well, each company must contact everyone within a certain distance of the proposed well site. The company should provide you with information about its plans and seek your input. The company will not receive a drilling licence until this work has been completed.

If the company cannot satisfy your concerns or answer all your questions, please contact the nearest ERCB Field Centre, and we will assist you.

What if the worst happens and a critical well does blow out?

If, for any reason, blowout prevention procedures fail, a series of complementary emergency response plans are triggered to protect people's health and safety. This may include igniting the well (setting it on fire). Ignition converts the H₂S to sulphur dioxide, which disperses more effectively because the heat carries it up, resulting in lower ground-level concentrations.

Am I protected by the emergency response plan (ERP)?

Every company drilling or operating critical sour wells is required to have a site-specific emergency response plan (ERP). If you live in an area where sour gas drilling is likely, be assured that no company will receive permission from the ERCB to drill a critical well until it has prepared an ERP tailored to the specific circumstances of that well, with detailed attention to such things as weather patterns, terrain, nearness of people, and anticipated release of H₂S.

How is the emergency planning zone (EPZ) around a critical well determined?

An emergency response zone (EPZ) is the area around a well where full-time residents and visitors to the area, such as campers and hunters, would be at risk in the event of a blowout. The size of the EPZ depends on the potential release rate of H₂S and other specific circumstances. If you live inside an EPZ, the company will meet with you to discuss measures to be taken in an emergency and any special needs you may have, such as transportation or special health considerations.

What if I live outside the EPZ? How am I protected in case of a blowout?

If a blowout should occur, the ERCB will establish an Emergency Operations Centre to coordinate the work of the provincial emergency response team. An ERCB Communications staff member will keep people in the general area informed of any action that may be required to protect their health and safety.

One of the first activities initiated in a sour gas blowout is the monitoring of air quality downwind from the well. Mobile equipment is set up to track the plume and to identify concentrations of gas both inside and outside the EPZ. If the emergency response team determines that there is a danger, residents will be evacuated or the well ignited to protect the public.

What happens once a critical well has been drilled? How am I protected then?

The emergency provisions in place for drilling critical wells also extend to their ongoing operation and maintenance. Once a critical well is ready to be placed on production, you will be protected by an emergency response plan designed to suit this phase of development.

Why drill critical sour gas wells at all?

The ERCB must decide if a company should be allowed to drill a critical well having regard for the broad public interest—that is, what is best for all Albertans—while still being concerned about possible negative impacts on individuals.

The sour gas industry is a vital part of Alberta's economy. Natural gas heats our homes, generates electricity, and supplies us with an array of valuable consumer products. Sulphur, a by-product of sour gas, is used in making fertilizers and many other chemical products. Canada is one of the world's largest exporters of sulphur. Drilling is the only sure way to find and produce natural gas and to determine how much Alberta has in reserve to meet future needs.

Additional Information

For additional information on the ERCB or its processes or if you have general questions about oil and gas in the province of Alberta, contact the ERCB's Customer Contact Centre: Monday to Friday (8:00 a.m. - 4:30 p.m.) at 1-855-297-8311 (toll free) or 403-297-8311.

This EnerFAQs is one in a series.

- [No. 1: What Is the Energy Resources Conservation Board?](#)
- [No. 2: Having Your Say at an ERCB Hearing](#)
- [No. 3: Inspections and Enforcement of Energy Developments in Alberta](#)
- [No. 4: All About Critical Sour Wells](#)
- [No. 5: Explaining ERCB Setbacks](#)
- [No. 6: Flaring and Incineration](#)
- [No. 7: Proposed Oil and Gas Development: A Landowner's Guide](#)
- [No. 8: Coalbed Methane](#)
- [No. 9: The ERCB and You: Agreements, Commitments, and Conditions](#)
- [No. 10: Public Health and Safety: Roles and Responsibilities of Agencies That Regulate Upstream Oil and Gas](#)
- [No. 11: All About Appropriate Dispute Resolution \(ADR\)](#)
- [No. 12: Oil Sands](#)
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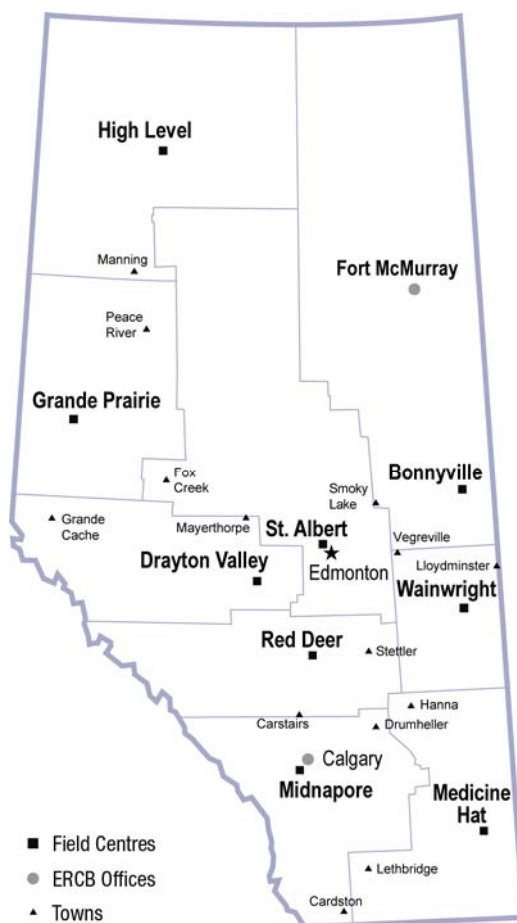
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Publications may either be viewed at the ERCB library or obtained from Information Services. Both are housed on the main floor of the ERCB head office in Calgary. Publications may also be downloaded free of charge from the ERCB Web site www.ercb.ca. To obtain a print or CD copy of a specific publication, contact ERCB Information Services by phone (403-297-8190), fax (403-297-7040), or e-mail Infoservices@ercb.ca.

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ERCB Offices

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Customer Contact Centre Inquiries@ercb.ca	1-855-297-8311 (toll free) 403-297-8311
Fort McMurray Regional Office 2nd Floor, Provincial Building 9915 Franklin Avenue Fort McMurray, Alberta T9H 2K4	780-743-7214
Edmonton (Alberta Geological Survey)	780-422-1927



Field Centres

Bonnyville	780-826-5352	Midnapore	403-297-8303
Drayton Valley	780-542-5182	Red Deer	403-340-5454
Grande Prairie	780-538-5138	St. Albert	780-460-3800
High Level	780-926-5399	Wainwright	780-842-7570
Medicine Hat	403-527-3385		