ERCB Energy Resources Conservation Board
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Bulletin 2011-35

December 20, 2011

Surface Casing Vent Requirements for Wells

This bulletin clarifies Section 6.100(4) of the *Oil and Gas Conservation Regulations* (*OGCR*) and provide additional surface casing annular flow testing options to *Interim Directive 2003-01: (1) Isolation Packer Testing, Reporting and Repair Requirements, (2) Surface Casing Vent Flow/Gas Migration Testing, Reporting and Repair Requirements, (3) Casing Failure Reporting and Repair Requirements* (*ID 2003-01*). This clarification specifies the requirements for surface casing vent exemptions. As the ERCB already considers wells that meet the criteria in this bulletin of low risk to public safety and the environment, it has historically granted exemptions on a case-by-case basis for wells that meet these criteria. Although the ERCB has not previously required wells without vent assemblies to test for surface casing annular flow, the ERCB now requires them to be tested. If surface casing annular flow is detected, a vent assembly must be installed to allow for further testing. The new testing requirements will further reduce the risk to public safety and the environment by ensuring that companies and the ERCB can take appropriate action as required in *ID 2003-01*.

This bulletin supersedes all previous surface casing vent assembly exemptions issued under Section 6.100(4) of the *OGCR*. These exemptions are not applicable to thermal wells, which require a vent assembly. Acceptable testing methods for exempt wells with no surface casing vent assembly have been included in an attachment to this bulletin.

Background

- Section 6.100(1) of the *OGCR* states:

  > the annulus between the second casing string and the surface casing [must be] open to the atmosphere in the manner described in subsection (2).

  Currently, licensees must install a vent assembly to comply with this requirement.

- Section 6.100(4) of the *OGCR* states:

  > The Board may exempt a well from the requirements of this section [installing a vent assembly] if the well pressures are such that annulus vents are not necessary, or if special circumstances require the vents to remain closed except when checking for pressure in the surface casing.

  This section does not include exemption criteria.

- Section 2.3 of *ID 2003-01* states:

  > Within 90 days of drilling rig release, licensees must test new wells for a vent flow.

  The interim directive does not include requirements for testing wells with no vent assembly.

Exemption Criteria for Section 6.100(4) of the *OGCR*

Exemption criteria intended to clarify Section 6.100(4) of the *OGCR* follows. In the event of a gas flow, see the attachment for further testing procedures.

Existing Wells

Wells drilled before the release of this bulletin that have surface casing but no vent assembly are not required to install a vent assembly if

- the true vertical depth of the well is less than 1000 metres (m),
- the gas deliverability is less than 28 10^3 m^3 per day absolute open flow (AOF),
- the hydrogen sulphide (H_2S) content is 0.00 moles per kilomole,
- the licensee has completed a satisfactory surface casing annular flow test using the testing procedures in the attachment, and
- there is no evidence of surface casing annular flow of gas, water, or liquid hydrocarbon.

If gas, water, or liquid hydrocarbon is migrating to surface, the licensee must

- install a permanent vent assembly on the well that meets the criteria outlined in Section 6.100(1) of the *OGCR*, and
- test, report, and repair the vent flow in accordance with *ID 2003-01*.

Licensees are required to test all existing wells by October 2013.

New Wells

Effective immediately, wells drilled with surface casing, as defined in *Directive 008: Surface Casing Depth Requirements*, do not require a vent assembly if

- the well meets all exemption criteria for existing wells,
- the maximum pressure gradient of all zones penetrated is less than 10 kilopascals per metre,
- the well is drilled in an established area as defined in *Directive 008*,
- the production casing cement returns are visible at surface, and
- the surface casing stub is at or above ground level.

If gas, water, or liquid hydrocarbon is migrating to surface, then the licensee must

- install a permanent vent assembly on the well that meets the criteria in Section 6.100(1) of the *OGCR*, and
- test, report, and repair the vent flow in accordance with *ID 2003-01*.

The licensee is required to test new wells within 90 days of the release of the drilling rig.

Documentation

Once a well has been tested, the licensee must document the test method, results, and conclusions. This information must be made available to the ERCB on request. As required in *ID 2003-01*, the licensee must retain documentation on the surface casing annular flow test for at least two years after the date of abandonment.

General

The ERCB's compliance assurance process is in *Directive 019: ERCB Compliance Assurance*. A list of risk assessed noncompliances is available on the ERCB website at www.ercb.ca under Industry Zone: Compliance and Enforcement: Risk Assessed Noncompliance.

Any questions regarding this bulletin, the attachment, or any other matter relating to Section 6.100 of the *OGCR* or *ID 2003-01* may be directed to the ERCB Well Operations Section by e-mail at welloperations@ercb.ca.

<original signed by>

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Attachment

Attachment

Types of Surface Casing Annular Flow Testing Procedures and Gas Identification Techniques

This attachment supplements the surface casing flow requirement identified in ERCB *Directive 020: Well Abandonment* by outlining the acceptable procedures and equipment for testing wells as referenced in *Bulletin 2011-35* dated December 20, 2011. Alternative testing methods may be acceptable and will be reviewed by the ERCB on a case-by-case basis.

Testing Procedure for Identifying Surface Casing Annular Flow

The following steps should be considered when evaluating the need to install a surface casing vent assembly if the surface casing stub **is** exposed:

1) Identify the presence of gas by using either one of the monitoring instruments listed below or an alternative method approved by the ERCB.
2) Confirm that the gas is not from background sources (e.g., biogenic methane, hydrocarbon-based soil contamination, etc.).
3) If hydrocarbon gas is present, a surface casing vent assembly is required (see *Bulletin 2011-35)*.
4) After the vent is installed, further testing is required in accordance with *Interim Directive 2003-01: (1) Isolation Packer Testing, Reporting and Repair Requirements, (2) Surface Casing Vent Flow/Gas Migration Testing, Reporting and Repair Requirements, (3) Casing Failure Reporting and Repair Requirements*.

The following steps should be considered to determine if further testing is required. The ERCB will accept a buried casing annular volume check if the surface casing stub **is not** exposed.

1) Create holes 30 centimetres (cm) deep and a maximum of 64 millimetres in diameter at four points around the well at a distance of 30 cm from the wellbore.
2) Isolate the hole from atmospheric contaminations for two to five minutes.
3) Insert measuring equipment at least 25 cm into the hole, ensuring a seal at surface to prevent atmospheric gas from mixing with soil gas.
4) Take the reading, and if gas is present, expose the surface casing and follow the above testing procedure for exposed surface casing.

Licensees must be aware of the surrounding environment when using sampler devices such as the lower explosive limit (LEL) meter, toxic vapour analyzers (TVA), and photoionization detection (PID) instruments. In addition, licensees must take into consideration other methane sources such as biogenic methane (swamp gas), hydrocarbon-based soil contamination, and gas migration. Atmospheric conditions such as temperature, wind speed, and humidity must be suitable for drawing a detection sample. Licensees must also sample according to manufacturers' standard operating procedures to ensure that a proper sample is obtained.

As the source of the surface casing annular flow may be difficult to determine, an organized and methodical sample process should be in place so that a proper inspection can be conducted. The process must be documented and should include a sketch or diagram of the grid search for reference.

Gas Identification Techniques

The ERCB considers the following testing and monitoring devices acceptable for testing purposes. However, other methods and/or testing equipment (such as acoustical or ultrasonic detection equipment) may also be acceptable and will be evaluated by the ERCB on a case-by-case basis.

Below are acceptable monitoring devices and techniques that are acceptable for surface casing annular flow testing procedures.

1) Soap test

Spray a soap solution in the annulus between the surface casing and the next casing string. Observe the annulus to determine if any bubbles have formed. If no bubbles are observed, the well is presumed to have no detectable emissions or leaks. If any bubbles are observed, further investigation is required.

2) Portable gas detector method

A suspected surface casing annular flow source can be successfully detected using a portable gas detector. This is done by placing an LEL meter (which draws a sample into the instrument) close to the surface casing to determine whether gas is present. A number of factors may influence the test's success and each LEL meter will operate slightly differently. Therefore, it is important to follow the original equipment manufacturers' operating specifications. If no gas is detected, the test is finished. If gas is present, further steps must be taken to quantify the leak.

3) Photoionization detection instrument

For a PID instrument to be effective for leak detection, it must be set up by the factory to analyze methane gas (CH_4). This will ensure that the instrument is not affected by other hydrocarbon gases, chemicals, water, or contaminated soils.

4) Toxic vapour analyzer

The TVA (i.e., flame ionization detector) is an instrument similar to the PID.

5) Portable laser methane detector

As with the PID instrument, the portable laser methane detector is set to analyze CH_4. As a result, this detector is totally unaffected by other hydrocarbon gases, chemicals, water, or contaminated soils.

6) Infrared camera method

A suspected surface casing annular flow source can be scanned with an infrared emissions camera and the identified leak video recorded. If a gas leak is detected, a digital photo of the leak source is taken and the leak identification information is entered into the leak survey data collection sheet.

Testing Conditions

Environmental conditions such as smog, smoke, high humidity (e.g., fog, rain, snow, sleet), and wind will inhibit subtle gas leak detection. The ability to detect leaks drops significantly when used in ambient temperatures below -10ºC.

Documentation

Licensees must retain all documentation related to testing methods, results, and conclusions.