

Interim Directive

ID 2003-01

January 30, 2003

TO: All Oil and Gas Operators

Note: References to *Informational Letter (IL) 99-4 EUB Enforcement Process, Generic Enforcement Ladder, and Field Surveillance Enforcement Ladder* on page 1 and in Section 1.5 Enforcement and 2.6 Enforcement have been replaced by *Directive 019 EUB Compliance Assurance – Enforcement* (Latest release: February 20, 2007)

- 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 Alberta Energy and Utilities Board (EUB) has streamlined and consolidated the reporting processes for isolation packer test results, surface casing vent flows (SCVFs), gas migration (GM), and casing failure, as detailed in this interim directive (ID).

This ID replaces the following documents, which are rescinded:

- *Informational Letter (IL) 94-18: Isolation Packer Tests—Testing and Reporting Requirements*
- *ID 99-3: Surface Casing Vent Flow/Gas Migration (SCVF/GM) Testing and Repair Requirements*
- *IL 89-19: Casing Failure Reporting*

This ID provides details on the following changes:

- 1) Effective January 30, 2003, an electronic data capture system for Digital Data Submission (DDS) will be in place for licensees to submit isolation packer test data, surface casing vent flow/gas migration reports, and casing failure reports. The DDS applications system will be available on the EUB's Web site <www.eub.gov.ab.ca> beginning January 30, 2003. Licensees requiring access to DDS should call (403) 297-2626 or (403) 297-6630. While the EUB prefers that these types of reports be submitted electronically effective January 30, 2003, hard copy data submissions will be accepted until March 31, 2003.
- 2) Failure to meet the testing, reporting, and repair requirements in any category of this ID will result in escalating consequences of enforcement for noncompliance in that category in accordance with *Informational Letter (IL) 99-4: EUB Enforcement Process, Generic Enforcement Ladder, and Field Surveillance Enforcement Ladder*.
- 3) A licensee may request an extension of a deadline for meeting the requirements set out in this ID by submitting the request to the EUB Well Operations Section.

- 4) A licensee has 20 days from the date of receiving an audit request to submit the required data. This was previously 10 days.
- 5) A licensee must complete isolation packer repair programs within 90 days of failure detection (test failure). This was previously 30 days.
- 6) A licensee must repair serious vent flows within 90 days of failure detection. Previously this deadline was one year.

Further information regarding the information in this ID can be obtained from the EUB Well Operations Section at (403) 297-5290.

1 ISOLATION PACKER TESTING, REPORTING, AND REPAIR REQUIREMENTS

1.1 Regulation

Section 6.120 of the Oil and Gas Conservation Regulations requires all injected fluids, other than potable water, to be isolated from the production casing above the production packer. Section 7.050 requires the production casing in a well producing sour gas with a concentration greater than 50 moles per kilomole to be similarly protected, unless the well is produced by artificial lift.

1.2 Testing and Repair Requirements

The EUB requires the licensee

- 1) to conduct packer isolation tests annually, and
- 2) to have the test results certified as conclusively proving hydraulic isolation by personnel qualified, through training and experience, to make such interpretations.

When packer isolation tests do not prove hydraulic isolation, the licensee must complete necessary remedial work and retest for packer isolation. The licensee must begin repair planning immediately and repair, retest, and report the repair results to the EUB within 90 days of failure detection. A licensee may submit to the EUB Well Operations Section a request for an extension to the repair deadline, if exceptional circumstances exist.

1.3 Reporting Requirements

Licensees must submit isolation packer test results using the DDS Packer Test Reporting application by September 1 of each year. The new DDS Packer Test Reporting application will now list all wells that the EUB believes require isolation packer tests performed on them. (Previously, licensees were not provided with an initial list of wells to test.) If a well that should be tested is not listed, licensees must perform the test as required by regulations and report the test results using the DDS system. If a well is listed that does not appear to require testing, the

licensee should contact the EUB Well Operations Section to request that the well be removed from the list.

Note that if as a result of packer testing, a casing failure is discovered, the casing failure must be reported separately.

1.4 Records Retention

The licensee must keep all packer isolation testing and repair information on file for the life of the well plus two years. The EUB will use an audit system to confirm licensees' compliance and to help measure the effectiveness of the packer test reporting process. Upon written notification that the well has been selected for audit, the licensee must submit the required information within 20 days.

1.5 Enforcement

In accordance with *IL 99-4*, the following enforcement ladder applies to noncompliance related to isolation packer testing.

Level of Enforcement	Example of Noncompliance
Minor Level 1	(1) Errors in reporting. (2) Failure to respond to written notification from the EUB in the time provided. (3) Failure to submit a response to an audit in the time provided.
Major Level 2	(1) Failure to complete and submit the necessary reporting of required packer testing by September 1 of each year. (2) Failure to perform repairs and to report repair results to the EUB within 90 days of failure detection. (3) Failure to retain the required records.
Major Level 3	(1) Initial major item combined with a demonstrated disregard for the regulations/ requirements or fraudulent activities. (2) Failure to take action on a Major Level 2 item. (3) A second Major Level 2 item recorded within 12 months.

1.6 Recommended Test Procedures

The EUB has developed recommended test procedures to provide guidance for evaluation of the test results. Licensees should design a test procedure that best suits their specific well situation and will provide an accurate evaluation of the hydraulic isolation of the tubing/casing annulus. In all cases, the person who will certify the test results should review the test procedure prior to conducting the test to ensure that the test method is adequate to prove hydraulic isolation. Variations to the recommended test procedure should be clearly identified and retained on file with the test results.

In general, the EUB will accept, as a maximum, a 3 per cent pressure decline over a 10-minute interval as a successful packer isolation test. However, factors such as annular fluid capacity and

the mode of operation should be considered when designing the test and evaluating the test data. Prior to beginning the test, the following information should be measured and recorded:

- tubing pressure
- casing pressure
- annular fill/bleed-off volume

The EUB-recommended test procedures are set out below.

CASE 1—Casing pressure greater than 1400 kilopascals (kPa) prior to bleed down

- Bleed down the casing pressure to 0 kPa.
- Record the shut-in pressure after 24 hours and evaluate any pressure increase. If the pressure increase is less than 42 kPa (3 per cent of 1400 kPa), the test is considered satisfactory.

CASE 2—Casing pressure less than 1400 kPa prior to bleed down

- Bleed down the casing pressure to 0 kPa.
- Pressure test the casing annulus to 1400 kPa and allow pressure to stabilize.
- After the well has stabilized, record the pressure over a 10-minute test interval.
- Bleed off the test pressure to 0 kPa and record the shut-in pressure after 24 hours.
- In the casing annulus pressure test, if the pressure change is less than 3 per cent of the test pressure over the 10-minute test interval and if the pressure increase after the 24-hour shut-in period is less than 42 kPa, the test is considered satisfactory.

CASE 3—No initial casing pressure

- Pressure test the casing annulus to 1400 kPa and allow pressure to stabilize.
- After the well has stabilized, record the pressure over a 10-minute test interval. If the pressure change is less than 3 per cent of the test pressure, the test is considered satisfactory.
- Bleed off the casing pressure.

2 SURFACE CASING VENT FLOW (SCVF)/GAS MIGRATION (GM) TESTING, REPORTING, AND REPAIR REQUIREMENTS

2.1 Regulation

Section 6.100 of the Oil and Gas Conservation Regulations specifies that the annulus between the second casing string and the surface casing of a well completed to produce oil or gas or to inject any fluid must be left open to atmosphere and describes the equipment and minimum working pressure required. The licensee must test the surface casing for a vent flow or gas migration in the manner set out below. If a surface casing vent flow or gas migration problem is detected, the licensee must report and repair it as set out below.

2.2 Definitions

Surface Casing Vent Flow (SCVF) is the flow of gas and/or liquid or any combination out of the surface casing/casing annulus (often referred to as internal migration).

A SCVF is **serious** if there is a

- 1) vent flow where any usable water zone is not covered by cemented surface casing and/or by the cement of the next casing string (Oil and Gas Conservation Regulations, Section 6.080, subsection 4) (see note below.); or
- 2) vent flow with a stabilized gas flow equal to or greater than 300 cubic metres per day (m^3/d) and/or equal to a surface casing vent stabilized shut-in pressure greater than
 - a) one-half the formation leak-off pressure at the surface casing shoe, or
 - b) 11 kPa/m times the surface casing setting depth;
(The criterion of 11 kPa/m, or half the known formation leak-off pressure, was chosen to avoid exceeding the fracture gradient. The surface shut-in pressure may vary with formation leak-off pressure, density of the fluid in the annulus, depth to fluid, lost circulation zones, or other well conditions that would limit the allowable shut-in pressure); or
- 3) vent flow with hydrogen sulphide (H_2S) present; or
- 4) hydrocarbon liquid (oil) vent flow; or
- 5) nonusable water vent flow (any water with total dissolved solids greater than 4000 milligrams per litre [mg/l]);
- 6) usable water (as defined by Alberta Environment) vent flow where the surface shut-in pressure is as in (2)(a) or (b); or
- 7) vent flow due to wellhead seal failure or casing failure; or
- 8) vent flow that constitutes a fire, public safety, or environmental hazard.

Note that a SCVF where any usable water zone is not covered by cement may be considered nonserious if

- 1) the vent flow with a stabilized gas flow is less than $300 \text{ m}^3/\text{d}$; and
- 2) the surface casing vent stabilized shut-in pressure does not exceed 9.8 kPa/m times the surface casing setting depth; and
- 3) the vent flow is only gas (no hydrocarbon or water); and
- 4) there are no producing domestic or agricultural water wells from the unprotected aquifers within a 1 km radius; and
- 5) the vent flow is not deemed serious in any other category.

If a producing domestic or agricultural water well from an unprotected aquifer is subsequently established within the 1 km radius, the licensee of a well that has previously been considered to have a nonserious SCVF must complete the reporting and repair requirements outlined in Sections 2.3 and 2.4 of this interim directive.

An SCVF is **nonserious** if it has not been classified as a serious vent flow.

Gas Migration (GM) is a flow of gas that is detectable at surface outside of the outermost casing string (often referred to as external migration or seepage). A GM is **serious** if there is a fire or public safety hazard or off-lease environmental damage, such as groundwater contamination. A GM is **nonserious** if it has not been classified as serious migration.

2.3 Testing and Reporting Requirements

2.3.1 Testing for SCVF

Within 90 days of drilling rig release, licensees must test new wells for a vent flow. Within 30 days of initial detection of an SCVF problem at a well, the EUB must be notified via the DDS SCVF/GM system. After reporting a nonserious SCVF, the licensee must perform an SCVF test on the well on an annual basis for the next five years, measuring the flow and stabilized pressure buildup to detect possible change. Annual test results do not need to be reported. If there is no change in the flow and pressure after five years of testing, or if the vent flow dies out, no further testing is required. However, if a nonserious vent flow becomes serious, the licensee must notify the EUB by DDS within 30 days of the test. Licensees must check all wells for a vent flow prior to abandonment.

2.3.2 Testing for GM

Within 90 days of drilling rig release, licensees must test new wells for GM problems in Townships 45-52, Ranges 1-9, West of the 4th Meridian, and Townships 53-62, Ranges 4-17, West of the 4th Meridian. If a GM problem is detected, the licensee must notify the EUB by DDS within 30 days. While GM testing will only be enforced in the problem regions specified, the EUB recommends that industry check all wells for GM at the time of abandonment.

If as a result of testing for vent flow or gas migration, a casing failure is discovered, the casing failure must be reported separately.

If a flow is detected after completing the initial test, the licensee must report the incident using the DDS SCVF/GM application. EUB *Guide 20: Well Abandonment Guide* outlines SCVF/GM testing procedures.

2.4 Repair Requirements

The licensee of a well determined to have a **serious** SCVF/GM problem as defined above must repair the problem as soon as possible and not later than 90 days from discovery. If the licensee plans to request a deferral of repair as outlined in Section 2.4.3, the request must be received by the EUB Well Operations Section within 90 days from the failure date.

Nonserious SCVF/GM problems must be addressed at the time of well abandonment. Should a nonserious SCVF/GM problem escalate to the serious category, the licensee must conduct repairs within 90 days of determining the change in category. A licensee may submit to the EUB

Well Operations Section a request for an extension to the repair deadline, if exceptional circumstances exist. Once an SCVF or GM repair has been attempted, regardless of the repair result, the licensee must notify the EUB Well Operations Section.

2.4.1 Option 1—Routine Repair Program (EUB approval not required)

The EUB does not require industry to submit proposed repair programs for routine SCVF/GM repairs, provided that all of the following conditions are incorporated and followed in the repair program:

- The source depth or formation of origin is clearly identified.
- A method acceptable to the EUB is used to determine the source (e.g., gas analysis, noise/temperature surveys, logs).
- The SCVF/GM problem is stopped or eliminated by perforating and cementing the casing(s) at or below the source. **Note that pumping of any type of fluid down the surface casing annulus is NOT an approved repair option.**
- The cement and additives used in the repair program meet EUB minimum cement requirements (see *Guide 9: Casing Cementing Minimum Requirements* and *Guide 20: Well Abandonment Guide*).
- The casing is pressure tested to the maximum operating pressure for 10 minutes with no pressure drop recorded.

2.4.2 Option 2—Nonroutine Repair Program (EUB approval required)

If the licensee designs a repair program that deviates from the criteria outlined in Option 1 or if the initial attempt was unsuccessful in eliminating the flow, a repair program must be submitted to the EUB Well Operations Section for approval prior to implementation. The program must include all of the following:

- method used to identify source of the SCV/GM flow,
- all relevant logs,
- casing and cementing details,
- base of groundwater protection depth,
- complete details of the proposed repair program,
- proposed perforating depth if greater than 10 m above the identified source, and
- summary of initial operations to repair the flow.

2.4.3 Option 3—Deferral of Repair (EUB approval required)

There are two ways to defer repair of a serious vent flow: produce the vent flow and/or cap the well with pressure remaining on the annulus. Approval to defer repairs on serious vent flows must be received before work begins.

a) SCVF Production

The licensee must submit an application to the EUB Well Operations Section to produce any serious vent flow. An application is not required to produce a nonserious vent flow.

The application must show the following in detail:

- The source depth or formation of origin has been clearly identified.
- The licensee owns the mineral rights to produce the source formation.
- The cemented portion of the surface casing or the next casing string covers the deepest known groundwater.
- The flow has been analyzed and determined to be sweet (0 per cent H₂S).
- A pressure relief device will be installed to ensure that excessive pressure is not exerted below the casing shoe when the system is shut in.
- A check valve will be installed downstream of the pressure relief device to prevent backflow.
- The vent flow will be continuously measured and reported on the monthly production reports.
- The vent flow will be tied in and placed on production within 60 days of receiving approval.
- The licensee confirms in writing to the EUB Well Operations Section the date the vent flow is tied in.

The EUB will rescind the approval to produce if the licensee fails to comply with any of the above conditions and will require that the SCVF be repaired immediately.

b) Capping with Pressure

The objective of any abandonment is to cap the well without pressure remaining on the casing annulus. The EUB will consider an application to cap a well with pressure only after the licensee has made serious attempts to completely eliminate any vent flow. The EUB Well Operations Section will review all applications to ensure that the licensee has considered every option to eliminate the problem. An application to cap a well with pressure must meet the requirements listed in *Guide 20: Well Abandonment Guide*.

2.5 Records Retention

The licensee must keep all SCVF/GM testing and repair information on file for the life of the well plus two years. The EUB will use an audit system to confirm licensees' compliance and to help measure the effectiveness of the SCVF/GM regulatory process. Upon written notification that the well has been selected for audit, the licensee must submit the required information within 20 days.

2.6 Enforcement

In accordance with *IL 99-4*, the following enforcement ladder applies to noncompliance related to SCVF/GM.

Level of Enforcement	Example of Noncompliance
Minor Level 1	(1) Errors in reporting. (2) Failure to respond to written notification from the EUB in the time provided. (3) Failure to submit a response to an audit in the time provided.
Major Level 2	(1) Failure to perform SCVF/GM tests as required. (2) Failure to report a known SCVF/GM. (3) Producing a vent flow that does not meet the SCVF production requirements. (4) Failure to retain the required records. (5) Failure to repair a serious SCVF/GM.
Major Level 3	(1) Initial major item combined with a demonstrated disregard for the regulations/requirements or fraudulent activities. (2) Failure to take action on a Major Level 2 item. (3) A second Major Level 2 item recorded within 12 months. (4) Failure to eliminate cross-flow of hydrocarbon or freshwater zones.

3 CASING FAILURE REPORTING AND REPAIR REQUIREMENTS

3.1 Regulation

The Oil and Gas Conservation Regulations, Section 12.141, requires that the licensee of a well notify the EUB immediately on detection of a casing leak or failure and, if requested by a representative of the EUB, provide a report assessing the leak or failure, including a discussion of the cause, duration, damages, proposed remedial program, and measures to prevent future failures.

3.2 Definition

A casing leak or failure is any loss of casing integrity, including casing damage that results in suspension of operations or in abandonment of the well.

3.3 Reporting and Repair Requirements

The licensee of the well must report a casing failure incident within 30 days of initial detection using the DDS Casing Failure application. The licensee must begin repair planning immediately and perform remedial action within 90 days of the reporting date. A licensee may submit to the EUB Well Operations Section a request for an extension to the repair deadline, if exceptional circumstances exist. Once a casing failure repair has been attempted, regardless of the repair result, the licensee must notify the EUB Well Operations Section.

3.4 Records Retention

The licensee must keep all casing failure testing and repair information on file for the life of the well plus two years. The EUB will use an audit system to confirm licensees' compliance and to help measure the effectiveness of the casing failure regulatory process. Upon written notification that the well has been selected for audit, the licensee must submit the required information within 20 days.

3.5 Enforcement

In accordance with *IL 99-4*, the following enforcement ladder applies to noncompliance related to casing failures.

Level of Enforcement	Example of Noncompliance
Minor Level 1	(1) Errors in reporting. (2) Failure to respond to written notification from EUB in the time provided. (3) Failure to submit a response to an audit in the time provided.
Major Level 2	(1) Failure to report a known casing failure. (2) Failure to retain the required records. (3) Failure to repair a casing failure.
Major Level 3	(1) Initial major item combined with a demonstrated disregard for the regulations/requirements or fraudulent activities. (2) Failure to take action on a Major Level 2 item. (3) A second Major Level 2 item recorded within 12 months.

[Original signed by]

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Board Member