

# CAPP Hydraulic Fracturing Operating Practice: BASELINE GROUNDWATER TESTING

## OVERVIEW

To support CAPP's Guiding Principles for Hydraulic Fracturing, seven Operating Practices have been developed in collaboration with CAPP member companies. These Operating Practices strengthen industry's commitment to continuous performance improvement in shale gas, tight gas, and tight oil development.

The Baseline Groundwater Testing Operating Practice supports the Guiding Principles: **“We will safeguard the quality and quantity of regional surface and groundwater resources, through sound wellbore construction practices, sourcing fresh water alternatives where appropriate, and recycling water for reuse as much as practical”**; and **“We will continue to advance, collaborate on and communicate technologies and best practices that reduce the potential environmental risks of hydraulic fracturing.”**

## WHAT DOES THIS PRACTICE MEAN?

CAPP and its member companies are committed to protecting fresh groundwater sources. This practice outlines the requirements for companies to test domestic water wells within 250 metres of shale gas, tight gas and tight oil development, and to participate in longer term regional groundwater monitoring programs. The purpose of these programs is to establish baseline characteristics of the groundwater pre-development, and to analyze whether there have been changes over time.

This practice includes two aspects: domestic water well testing, where companies will develop programs to test existing camp wells, domestic wells and natural springs with landowner consent; and regional groundwater monitoring, where industry will work with government and regulators to design and implement regional groundwater monitoring programs.

## HOW WILL THIS WORK?

Under this Operating Practice, companies will undertake domestic water well sampling programs and participate in regional groundwater monitoring programs. This practice includes:

- Testing water wells within 250 metres, or as specified by regulation, of a wellhead before drilling shale gas, tight gas or tight oil wells.
- Establishing procedures to address and track stakeholder concerns that pertain to water well performance, including notifying the appropriate regulator.
- Collaborating with government and other industry operators in nearby regions to broadly understand regional groundwater quality and quantity through monitoring programs or studies that reflect good judgment and sound science.

## TECHNICAL DESCRIPTION

**The purpose** of this practice is to describe minimum requirements for baseline testing of fresh (non-saline) groundwater in shale gas, tight gas and tight oil development areas.

**The objective** of this practice is to enable and demonstrate conformance with the following CAPP Guiding Principles for Hydraulic Fracturing:

**We will safeguard the quality and quantity of regional surface and groundwater resources, through sound wellbore construction practices, sourcing fresh water alternatives where appropriate, and recycling water for reuse as much as practical.**

**We will continue to advance, collaborate on and communicate technologies and best practices that reduce the potential environmental risks of hydraulic fracturing.**

## BACKGROUND

Hydraulic fracturing is a controlled operation that pumps a fluid and a propping agent through the wellbore to the target geological formation at high pressure in multiple intervals or stages, in order to create fractures in the formation and facilitate production of hydrocarbons. Hydraulic fracturing is a safe and proven way to develop natural gas and oil; it has been used throughout the oil and gas industry for about 60 years.

Baseline testing establishes the characteristics of groundwater prior to shale gas, tight gas or tight oil development, and enables the assessment of potential changes in fresh groundwater characteristics over time. Appropriately designed regional groundwater studies can be useful in assessing broader groundwater characteristics and behaviour, and are typically conducted co-operatively with government agencies or other third-party professionals. For example, industry is working with Geoscience BC to complete regional water assessments within the Horn River and Montney basins in British Columbia.

## SCOPE

This practice applies to CAPP member companies engaged in the development of shale gas, tight gas or tight oil resources through the application of hydraulic fracturing processes in Canada. While use of this practice is voluntary (subject to applicable laws and regulations), CAPP strongly encourages its use by member companies.

The practice is to be utilized to guide the effective design, execution and quality assurance aspects of baseline fresh groundwater testing programs associated with shale gas, tight gas or tight oil development. This includes both those conducted on a domestic water well basis by individual operators, and those conducted on a regional basis by government and industry co-operatively, in support of hydraulic fracturing operations.

## Operational Requirements

CAPP member companies meet or exceed the following requirements for domestic water well testing and regional groundwater monitoring:

- Baseline groundwater testing programs must be designed and carried out under the direction of a qualified groundwater professional.
- All monitoring, purging, sampling methods and testing equipment must be selected based on the parameters being monitored and be consistent with established protocols for testing, sampling and analyzing groundwater.

### A) Domestic Water Well Testing

Individual companies will develop sampling programs for existing camp wells, and domestic wells and natural springs with landowner consent.

1. Domestic water wells within 250 metres of the wellhead, or as required by regulation, will be tested once prior to drilling of shale gas, tight gas or tight oil wells.
2. Baseline water quality testing should include analyses to allow comparison with appropriate water quality standards. This testing will at a minimum include:
  - a. Relevant inorganic and organic constituents identified in the Guidelines for Canadian Drinking Water Quality, published by Health Canada on behalf of the Federal-Provincial-Territorial Committee on Drinking Water (CDW). This summary table is updated regularly and published on Health Canada's website ([www.healthcanada.gc.ca/waterquality](http://www.healthcanada.gc.ca/waterquality)).
  - b. The presence or absence of free natural gas in the water. If appropriate, gas in water analyses should include isotopic fingerprinting.
3. A water deliverability test will be conducted to establish well yield.
4. Each individual company will have a procedure in place to address concerns from stakeholders related to changes in water well performance. This procedure will include notification to the appropriate regulatory agency, the tracking of concerns and documentation of how they were addressed.

### B) Regional Groundwater Monitoring

In the absence of existing programs, or regional studies, industry will work with government and regulators to scope, design, develop and implement regional groundwater monitoring programs.

1. The extent and intensity of the groundwater monitoring program shall reflect good judgment and sound scientific analysis.
2. Where feasible, collaboration between government and operators in geographically similar regions will be encouraged. This is intended to improve efficiency and expand monitoring program scope to enhance understanding of groundwater quantity and quality at a broader scale.
3. Baseline water quality testing should include analyses to allow comparison with appropriate water quality standards. This testing will at a minimum include:
  - a. Relevant inorganic and organic constituents identified in the Guidelines for Canadian Drinking Water Quality, published by Health Canada on behalf of the Federal-Provincial-Territorial Committee on Drinking Water (CDW). This summary table is updated regularly and published on Health Canada's website ([www.healthcanada.gc.ca/waterquality](http://www.healthcanada.gc.ca/waterquality)).
  - b. The presence or absence of free natural gas in the water. If appropriate, gas in water analyses should include isotopic fingerprinting.
4. Each monitoring well will be instrumented with a dedicated data-logger or some other means for periodic water level monitoring.



## Performance Measures

Conformance with this practice will be confirmed by demonstrating that procedures are in place to ensure a baseline groundwater testing program is conducted prior to drilling.

## Reporting Expectations

To the extent permitted by privacy legislation and with proper consent, data collected from baseline groundwater testing will be shared with landowners who have the right to use the water and other CAPP member companies upon request. This data will be a component of a program to assess regional groundwater quality and will be shared with the appropriate agencies who undertake such a program.

## DEFINITIONS

**Domestic water well:** An opening in the ground, whether drilled or altered from its natural state, for the production of groundwater used for drinking, cooking, washing, yard or livestock use.

**Free natural gas:** Free gas is defined as gas that readily comes out of solution at atmospheric pressure and ambient temperature.

**Fresh (non-saline) groundwater:** Groundwater that has a total dissolved solids (TDS)

content less than or equal to 4,000 mg/L or as defined by the jurisdiction.

**Propping agent (Proppant):** Typically non-compressible material, most commonly sand, added to the fracturing fluid and pumped into the open fractures to prop them open once the fracturing pressures are removed.

**Shale gas, tight gas and tight oil:** For the purposes of this practice, shale gas, tight gas and tight oil refers to unconventional resources from low permeability

reservoirs being developed using horizontal wells with multi-stage hydraulic fracturing.

**Water deliverability test:** A field test to estimate the flow capacity of the water well under existing conditions (e.g., using the landowner's pump). Water is withdrawn from the well for a fixed duration (usually 1 hour) before the pump is turned off and the water level is allowed to recover.