

Gas Sampling Requirements for Baseline Water-Well Testing for Coalbed Methane / Natural Gas in Coal Operations

March 2014

Effective March 29, 2014, the Alberta Energy Regulator (AER) has taken over jurisdictional responsibility for water and the environment with respect to energy resource activities in Alberta from Alberta Environment and Sustainable Resource Development.

As part of this jurisdictional transfer, the title page of this guide now carries the AER logo and a new publication date. However, no other changes have been made.

For more information, contact the AER Customer Contact Centre at 1-855-297-8311 or inquiries@aer.ca.

**Gas Sampling Requirements for Baseline Water-Well
Testing for Coalbed Methane/Natural Gas in Coal Operations**

June 2006

GAS SAMPLING REQUIREMENTS FOR BASELINE WATER-WELL TESTING FOR COALBED METHANE /NATURAL GAS IN COAL OPERATIONS

INTRODUCTION

The *Gas Sampling Requirements for Baseline Water-Well Testing for Coalbed Methane/Natural Gas in Coal Operations* is supplementary to the *Standard for Baseline Water-Well Testing for Coalbed Methane/Natural Gas in Coal Operations*. The sampling requirements apply both to **new** Coalbed Methane (CBM) wells and to **existing energy wells that are recompleted** for CBM production, which are above the base of groundwater protection. The base of groundwater protection is the depth below which groundwater is saline (has a concentration of total dissolved solids greater than 4000 mg/L).

The term “water wells” referred to in this guide refers to active water wells (domestic, pasture, livestock, etc) and to wells in the Alberta Environment provincial Groundwater Observation Network¹.

The Standard and these Gas Sampling Requirements are effective as of May 1, 2006.

OUTCOMES

As part of Alberta Environment’s integrated policy framework to ensure that CBM development is balanced with environmental protection, the *Standard for Baseline Water-Well Testing for Coalbed Methane/Natural Gas in Coal Operations* will contribute to achieving the following outcomes:

- Continued protection of provincial groundwater resources and Albertans’ groundwater supplies,
- Facilitation of responsible CBM development, and
- Consistency with the government’s *Water for Life* strategy.

The *Standard for Baseline Water-well Testing for Coalbed Methane/Natural Gas in Coal Operations* provides:

- Consistent protocols for testing, sampling and analyzing groundwater,
- Scientific information to support achievement of the outcomes, and
- A regulatory basis for water well testing and baseline data collection prior to CBM development.

REVIEW OF THE BASELINE TESTING DATA

Data collected from baseline water-well testing will be submitted to Alberta Environment and the landowner/occupant. Six months after the effective date, Alberta Environment will conduct a preliminary review of all data collected, followed by a comprehensive review after 12 months. Alberta Environment will review the data to determine if the outcomes listed above are achieved, and will prepare a report within 18 months summarizing the results, and conclusions and recommendations from the review. The data will also be used to determine the need to improve the Standard.

WATER WELL COMPLAINTS

If a landowner/occupant perceives a change in well water quantity or quality after CBM development, then they should:

1. Register his/her complaint with Alberta Environment using the 24-hour hotline (1-800-222-6514)
2. Notify the CBM developer and request retesting of their water well. CBM developers must design the retesting program to address the landowner/occupant’s concerns.

¹ Information on and locations of wells in the provincial Groundwater Observation Well Network can be found at <http://www.gov.ab.ca/env/water/gwsw/quantity/waterdata/gwdatafront.asp>

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Gas Collection

CBM developers are required to collect free gas samples² from all water wells located within 600 meters of CBM well(s) **prior to** drilling new CBM wells or the recompletion of existing wells for CBM development. If there are no water wells located within a 600 m radius of the proposed CBM well(s), CBM developers must sample, test, and collect and analyze free gas from the closest water well within a 800 meter radius.

Free gas may be collected during the yield test required in the *Standard for Baseline Water-Well Testing for Coalbed Methane/Natural Gas in Coal*. CBM developers must ensure that wells are properly purged in order to collect free gas samples that are representative of the formation.

Free gas samples must be collected using a gas-water-separator, a flow-through cell capable of separating gas, or an equivalent method. Gas-water-separators are commercially available or can be designed and constructed by the user. Water passing through the gas-water-separator must not be heated, and the gas collected must not be exposed to the atmosphere. Water must be passed through the gas-water-separator at an appropriate rate to collect gas. If a y-fitting is used to channel some of the water from the well into the gas-water-separator, the flow rate before the y-fitting should be low enough to prevent gas bubbles from being preferentially diverted away from the gas-water-separator. Furthermore, flow into the gas-water-separator must be balanced with outflow. If the inflow rate is greater than the outflow rate, pressure will build up in the gas-water-separator, and gas will not be exsolved.

Gas samples must be collected and stored in an industry accepted or laboratory recommended gas-sampling container. CBM developers should collect samples in duplicate whenever possible in case samples are lost or sample containers fail.

The volume of gas produced per unit volume of water passed through the gas-water-separator (gas/water ratio) must be recorded. If there is insufficient gas to obtain a sample for laboratory analysis during testing, the volume of gas produced per unit volume of water passed through the gas-water-separator must still be recorded.

CBM developers should verify with the laboratory performing the gas analysis the volume of gas required to perform both isotopic and compositional analysis. A sample volume between 100 and 200 cubic centimeters is typically required by labs for each analytical run.

CBM developers must record and submit information to Alberta Environment on the location in the well-water distribution system where the gas sample was collected. If the gas sample was taken from a location after the pressure tank, CBM developers must also record and submit information on the type, condition, make and model of the pressure tank (internal bladder, floating roof, etc.) to Alberta Environment. Gas samples must not be taken after the hot water tank or water conditioning units (e.g., water softener, reverse osmosis unit, etc.).

Gas Analysis

All free gas samples collected from water wells must be submitted to an accredited lab for molecular compositional analysis. Detection limits for gas compositional analysis must range between 10 and 100 parts per million.

A minimum of 20% of free gas samples collected from water wells around each CBM well must undergo isotopic analysis, up to a maximum of 10 samples per CBM well. At least one gas sample must be

² Although the standard requires measurement of “free gas”, Alberta Environment is conducting research on the merits of “dissolved gas” sampling.

submitted for isotopic analysis per CBM well. Samples submitted for isotopic analysis should be collected from water wells that are evenly distributed within the 600 m baseline-testing radius. In addition, if there is significant variation in water well completion depths, then the samples submitted for isotopic analysis should reflect the range of completion depths.

Isotopic analysis must include analysis of stable carbon isotope ratios of carbon dioxide, methane, ethane, propane, and butane, if present in the gas sample.

Background Water Well Information

CBM developers should also collect information on:

- Whether landowners/occupants have observed or have reason to suspect the presence of gas in the water prior to initiating the Baseline Water-Well Testing Program;
- The location of the water well in relation to buildings and other features on the property (e.g. adjacent to a house, in a stockyard, etc.);
- GPS coordinates of the well (NAD 83 Latitude and Longitude to 6 decimal places);
- The year the well was drilled
- What the water well is used for (e.g. household, agriculture, etc.);
- Variations in water use throughout the year (e.g. seasonal use, etc.);
- Increases in water use within a timeframe of about 5 years (past or anticipated);
- Any significant increase/decrease in well use 72 hours prior to sample collection;
- Whether the well is open to any coal bearing zones;
- Field parameters (e.g., EC, pH, temperature)
- Maintenance performed on the well (e.g., pump service, shock chlorination, etc.);
- Any other factors which may influence the condition of the water well or water level.