



Water Well Investigations

Introduction

Alberta Environment recognizes the need for conservation and protection of Alberta's groundwater resources and aims to provide a consistent approach* to all water well related concerns.

Alberta Environment places very high priority on ensuring that all incidents are responded to appropriately. It is the legal responsibility of water well drillers to drill and construct – and of owners to maintain – wells in accordance with the regulations.

Increased coalbed methane development has raised awareness about gases in water wells. Gas in water wells is not new. Gases like carbon dioxide, nitrogen and methane are commonly found in groundwater.

Elevated gas levels in a water well may result from excessive pumping. This can depressurize the aquifer, resulting in a release of gases that are dissolved in the groundwater. Elevated gas levels can also be the result of bacterial growth in a poorly maintained water well, producing gases such as carbon dioxide and/or methane.

What a water well inspector needs to know

In response to a well water complaint call, an Alberta Environment inspector or investigator will ask questions designed to characterize the **nature** of the incident; whether the well water is for human consumption, the well water's **quality** (sediment in well, gas in water, bacteriological or chemical change, presence of bacterial growth in or on domestic fixtures) and its **quantity** (reduced static level, reduced recovery rate, owner's pumping rate, etc.)

Other questions may include: location of the incident, its legal land description, the name of the landowner and the **type of activity** believed to have caused the incident. Suspected activities include but are not limited to: seismic, oil, gas or coalbed methane gas drilling, water well drilling, groundwater diversion, surface or subsurface disturbance such as dewatering activity, gravel pits, pipelines, flooding or substance release.

If seismic activity is suspected as a cause, please call Alberta Sustainable Resource Development's 24-hour complaint hotline at (780) 427-3932.

*This approach is guided by Alberta's *Water Act*, Water (Ministerial) Regulations Part 7, Groundwater Evaluation Guideline (February 2003), Alberta Environment Guidelines for Groundwater Diversion for Coalbed Methane/Natural gas in Coal Development (April 2004) and Standard for Baseline Water Well Testing for Coalbed Methane in Coal Operations (April 2006).

The inspector/investigator will request information about who conducted or is conducting the activity believed to have caused the incident, and if an industry representative has already been called. Note: if there is a suspected health concern related to the well water complaint, the local Regional Health Authority should also be called.

An Alberta Environment inspector will gather information on the water well's history, through questions about its age, depth, location in relation to stock, septic fields, buildings and location of other active or abandoned water wells.

The well owner may also be asked about the water well's construction and performance (pumping rate, available records, number of stock watered, number of household residents, irrigated area, water usage, pump elevation etc.)

Other questions may include: when the water well was last maintained (e.g. shock chlorinated), who performed maintenance, when any recent pump tests were carried out and when the most recent water chemistry analysis was taken.

Oil/gas industry complaints

If a water well complaint is suspected to be related to oil, gas or coalbed methane exploration, contact the company involved directly and phone Alberta Environment, through the 24-hour environmental hotline: 1-800-222-6514 or the nearest Alberta Environment regional office.

Alberta Environment may ask the company to conduct an investigation or hydrogeology study, using a qualified specialist. Alberta Environment reviews this information to determine if additional information is required, such as potential loss of drilling fluid, the geological zone affected, any contaminant loss into an aquifer or possible gas migration through a water-bearing coal seam.

Alberta Environment staff work closely with Alberta Energy and Utilities Board (EUB) staff in cases where it is suspected that oil and gas activity has impacted a water well. EUB staff can provide information on the resource wells (e.g. location, completion, production, oilfield waste management.)

Water well construction complaints

Water well construction issues can cause a loss of water quality and quantity. A poor surface seal and/or a well located in a low spot may result in surface water leakage into a water well. Older steel casings can corrode, which can lead to surface water inflow or mixing between aquifer zones. Contact a driller for assistance if you suspect improper well construction. Information about well construction and maintenance is available in the *Water Wells that last for Generations* publication from Alberta Agriculture Food and Rural Development..

Multiple aquifer complaints

It is not uncommon for water wells to draw water from more than one zone. Excessive pumping from these wells can result in a depletion or reduced water yield from some of these zones. The result could be a reduced well yield or silt in pumping water. A qualified driller should be contacted to address these situations.

Bacteria-related complaints

Water quantity and quality issues may be caused by the presence of bacteria, related to poor well maintenance. Orange, black or red colouring on domestic fixtures, especially inside the toilet tank can mean the water well or the distribution system has developed iron-related or sulphate reducing bacteria. Consult *Water Wells that last for Generations* and/or a water driller for appropriate disinfection measures.

Where a water well is used for domestic purposes, Alberta Environment refers any complaints involving elevated coliforms or the presence of *E. coli* to the local Regional Health Authority,

Field inspections of water wells

If outside influences appear to have impacted a water well, field verification is necessary. Water well inspections vary depending upon the water well type (dug or drilled), the nature of the complaint, whether water quantity or quality is impacted, and the well's location (depth of well, elevation of the static or non-pumping water level and elevation of the water bearing zone.)

Abandoned wells

The well owner is required to reclaim a water well when it is no longer used as a water supply, is in a poor state of repair or produces water unsuitable for drinking.

A driller is legally responsible for well water abandonment, where construction problems or inadequate yield are encountered.

In conclusion

Many water well complaints can be resolved quickly, as they are usually stem from water well construction or maintenance.

Resolving water well complaints where well construction and/or maintenance issues are not evident can be difficult. The time required to resolve these complaints tends to be site-specific, depending on the information available about the water well, the resource well and the area's hydrogeology.

All analytical results from a water well inspection are provided to the complainant.

Information

For more information, visit our website at www.environment.gov.ab.ca or call 310-0000 and ask for the environment office nearest you.

For environmental complaints or emergencies, call the 24-hour environmental hotline at 1-800-222-6514.