

What's Missing?

by Jessica Ernst

Landowner in
Alberta's HorseShoe Canyon
CBM Play ... or

Am I a Guinea pig?

Photo by Chris Schwarz,
Edmonton Journal



I have lived at my place since 1998
CBM CAME

My water dramatically changed
Whistling taps and blowing gas
Dogs repelled by the water

Sudden chemical burns to skin and eyes.
No longer able to get suds out of soaps and shampoo.

Sudden pristine sinks and toilets

WERE DID THE GAS COME FROM?

Fracturing our aquifers?

Dewatering our aquifers?

Bacteria?

Cumulative adverse effects from so many resource wells and multiple shallow fractures?

Leaking resource wells?

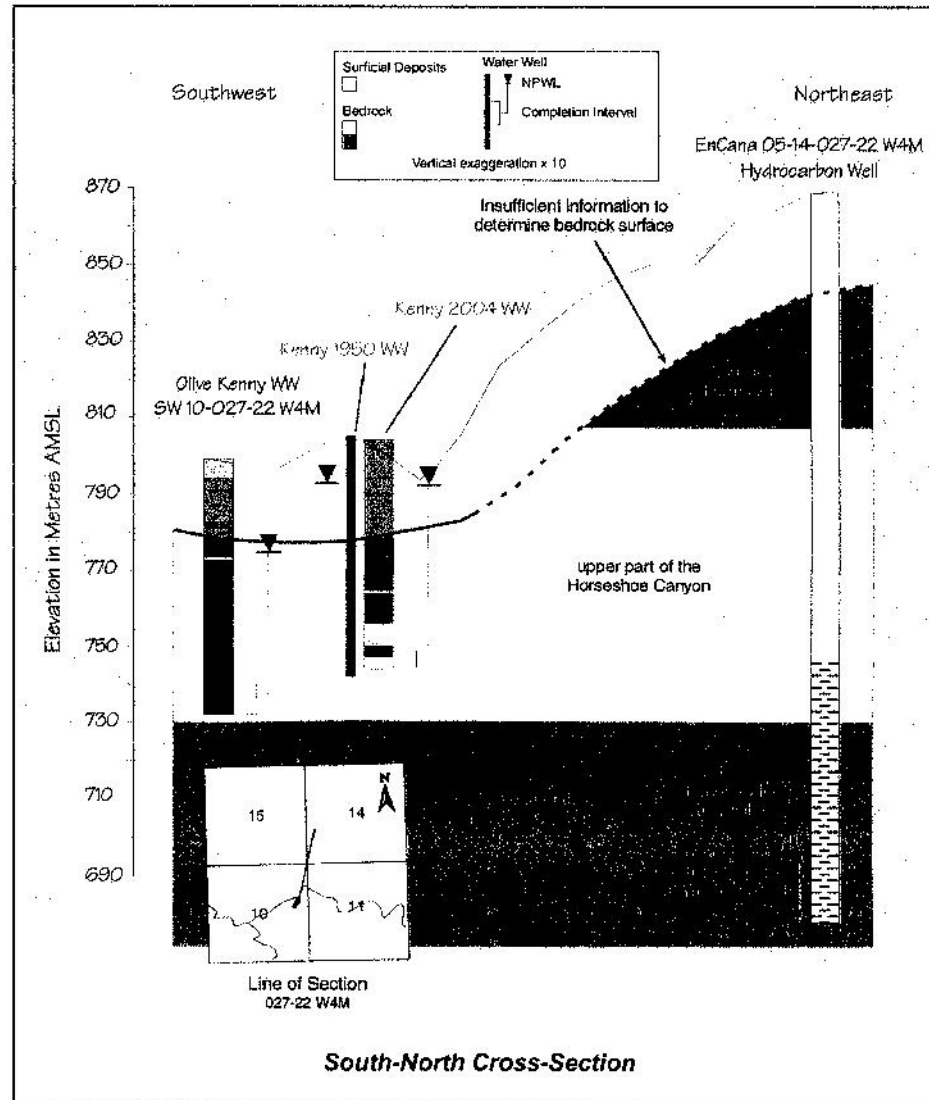
Nature?

6. INTERPRETATION

6.1. Aquifers

The SK 1950 WW and the SK 2004 WW are completed in the same hydraulic unit within the upper part of the Horseshoe Canyon Formation. The elevations of the water levels in both water wells are similar; there is no significant difference in the chemical quality of the groundwater from the two water wells and pumping from the SK 1950 WW causes measured drawdown in the water level in the SK 2004 WW. The vertical relationship between the elevation of the completion depths and the non-pumping water levels in the SK 1950 WW and the SK 2004 WW is shown in the adjacent cross-section.

Also shown on the cross-section is the EnCana 05-14 Gas Well and the perforation interval of the gas well when stimulated on 02 Mar 04. The cross-section shows the top of the perforated interval at an elevation of 747.45 metres AMSL, which coincides closely with the top of the completion interval of the SK 2004 WW.



The stimulation of the EnCana 05-14 Gas Well used nitrogen gas and the estimated pressure outside the perforations is nine megaPascals. Based on an aquifer model, the pressure change measured at the SK 1950 and SK 2004 water wells as a result of the stimulation would be in the order of 0.2 kiloPascals. As a result of



What is wrong with this picture?

- Three men seriously injured on sampling day
- After the damages or contamination some companies are reluctant to “cough up the data”
- How do landowners get the gas well data after the fact?
- Regulators and some proponents use lack of baseline data to exonerate industry!

EUB presents to labs, Jan 2005



Water Issues

- ◆ Not unique to CBM
- ◆ Impact on domestic water wells
- ◆ Groundwater contamination
- ◆ Shallow drilling, completion, and stimulation practices
- ◆ Potential dewatering impacts on overlying aquifers
- ◆ Gas migration potential
- ◆ Mixing of various water qualities
- ◆ Ongoing work with AENV – non-saline water policy
- ◆ Water analyses, measurement and monitoring

Natural methane in water wells

Industry experts advised that natural methane in water is usually at low levels and does not dramatically change.

CAPP study at Lloyd found dissolved levels to be very low, usually < 1 mg/l

EUB study on methane in water wells from coal found it to opposite to what regulators and CSUG claimed
Methane was not detected in 10/12 wells

Dr Bernard Mayer found free gas seldom encountered in water wells (free gas vs. dissolved methane tests>??).

Dr. Muehlenbachs, U of A, Isotopic fingerprints very negative, usually no propane, butane, pentane, etc.

AENV has advised there is:

“little information on composition of gas in
water wells”

Monitoring program very weak in Alberta

3 monitoring wells drilled this spring at
Rosebud

Dr. Bernard Mayer, U of C advised:

Monitoring Requirements

- A) Thorough characterization of **produced gases and fluids** from CBM wells
- B) Thorough characterization of **groundwater and its dissolved gases** prior to the commencement of CBM production
- C) Careful monitoring of **groundwater quality** during CBM production

Shallow Groundwater

The knowledge of the chemical and isotopic composition of shallow groundwater in east-central Alberta is **very sparse**.

This is a **major problem**, because detailed knowledge of the chemical and isotopic composition of shallow groundwater prior to commencement of industrial activities is extremely important for a quantifiable assessment of the potential impact (or lack thereof) of future CBM operations on shallow aquifers.



AGg
applied geochemistry group

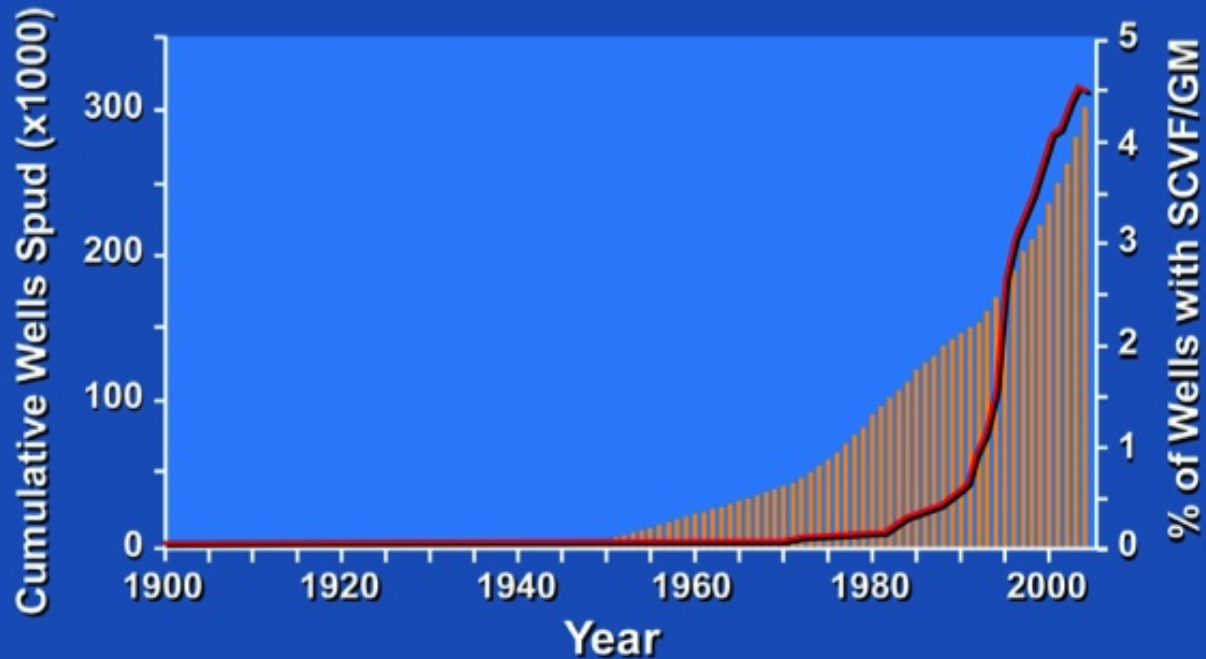
Industry has advised the AEUB
that:

Shallow fracturing has harmed oilfield wells
and

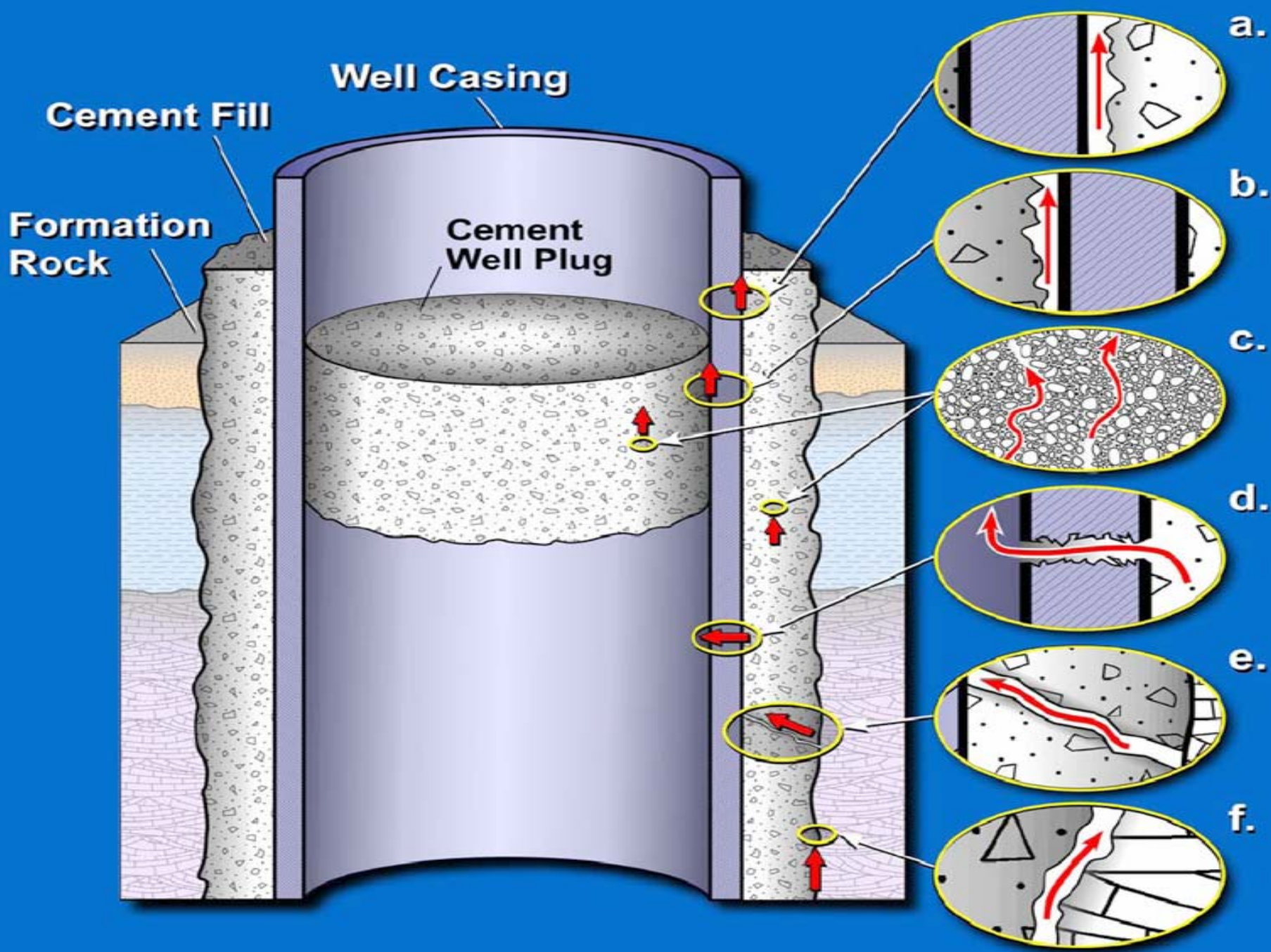
“there may not always be a complete
understanding of fracture propagation at
shallow depths”

(from AEUB Directive 027)

Wells with SCVF/GM Compared with Wells Drilled - Cumulative -



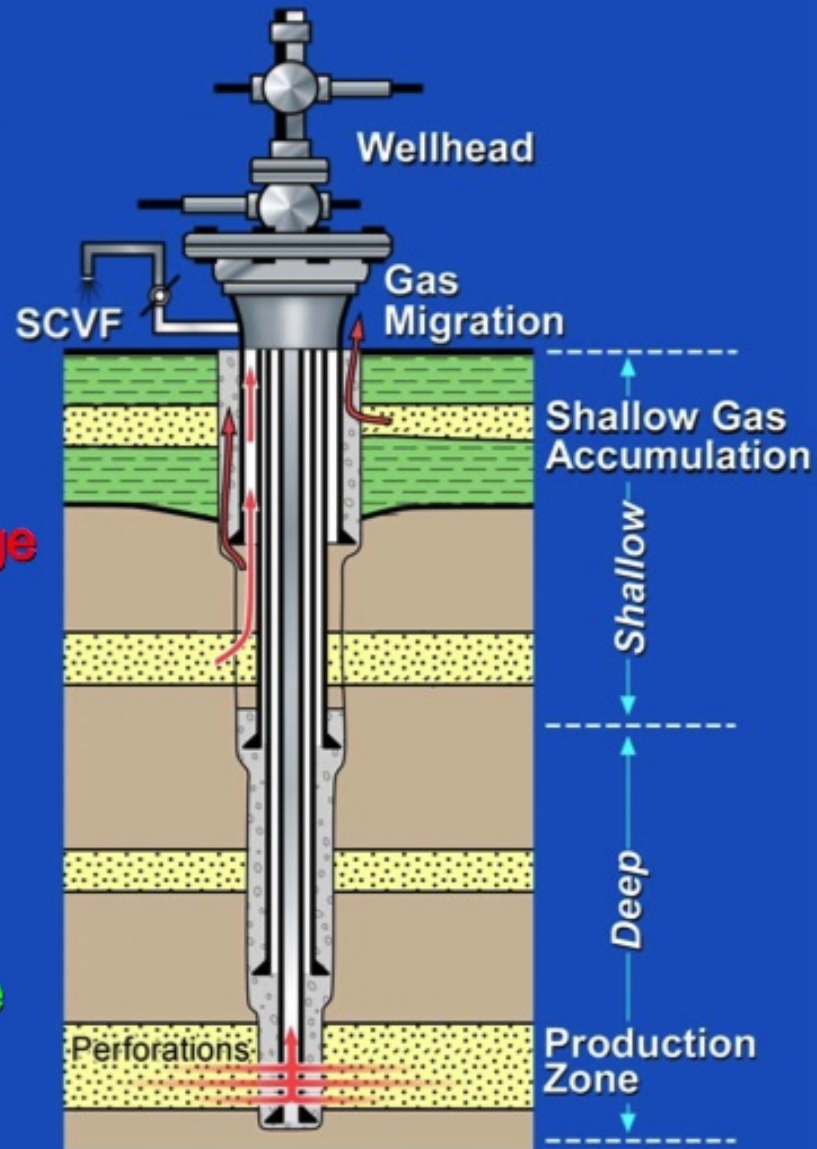
- Cumulative Wells Spud
- % of Cumulative Wells with SCVF/GM



Leakage Potential along a Well

Shallower, upper part
Higher potential for leakage

Deep, lower part
completed in
producing zones
Less potential for leakage



Levels of methane (in mg/l)
dissolved in Rosebud groundwater:

30 mg/l- 66 mg/l
risk of explosion at 1 mg/l

CBM contaminated well water in USA.
Isotopic fingerprinting used

12 mg/l methane initially; dropped to **0.1 mg/l.**

Fine by regulator; family relocated

AENV Investigation

Isotopic fingerprinting results for **methane**:

Hamlet water -40

Dr. Mayer's study 75 CBM wells -54

Dissolved gas in groundwater occasionally detected

“There is often no free gas phase in natural groundwater”

EUB study 7 CBM wells -57 to -59

AENV Investigation

Isotopic fingerprinting results for **ethane**:

Hamlet water: AENV collected too little water for analysis of ethane

Landowner Water Well -40.62

Dr. Mayer's study CBM wells
(average) -37

EUB study 7 CBM wells -38.95 to -45.89

Microbial gas (Dr. Muehlenbachs) no ethane
Shallow groundwater (Dr. Mayer) no propane

Regulator still in denial

- Even though these contaminants also found by regulator in Rosebud water:
- BTEX
- C8+
- Petroleum Distillates
- Propane, butane, pentane, hexanes, heptanes, etc

AENV's Standard - Optional

Hexanes

Heptanes

C8+

Benzene

Toluene

Ethyl-Benzene

Xylene

WHY OPTIONAL?

Dissolved vs. Free Gas

If only detect presence of gas – protects industry, not landowner or groundwater

Why is dissolved methane test optional?

“the standard is currently restricted to analyzing the composition and isotopic values of free gas, and hence does not provide baseline information for the dissolved gas phase” Dr. Mayer

Some companies refusing to provide this inexpensive test. Why?

Gas well gas vs. water well gas

Why are only gases from water wells
fingerprinted?

What will the fingerprints be matched to?

Metals

- Lost circulation
- Drilling additives
- Spills
- CBM waste water reinjection – leaks?
- Potential for commingling of aquifers

Why are metals not even optional on AENV's template?

Increase in methane in groundwater may
cause increase in:

Strontium

Barium

(Omni McCaan, 2007)

Why not test for these?

Is this industrial gas migration or natural?



- “serious problem”(1 out of 20 resource wells)
- Landowner blamed instead of comprehensive testing of resource wells
- Regulators misinform the public – why deny the problem?
- “I feel the EUB and other provincial regulatory agencies have been lax in protecting groundwater.” Maurice Dusseault CB Magazine Sept 19, 2006

Conclusions

If it were your land, your business, your family's health, and your water, what would you wanted tested and when?

Dissolved gas and free gas

Isotopic fingerprinting of resource wells -

SCVF/GM and production gas

BTEX, PAH's, Metals

What can you do?

- Provide full baseline and ongoing data collection
- This protects you, landowner and groundwater
- Tell the government what you think is missing
- Question the need to perf & frac above base of groundwater protection