

BY ANDREW NIKIFORUK

**J**essica Ernst is a combative Alberta businesswoman with an unusual problem: she can set her tap water on fire. No kidding. After filling up a plastic pop bottle, the owner of Ernst Environmental Services, a well-respected oil-patch consulting company, can light a match and create a blue or yellow flame, complete with a rocket-like roar. Ever since she made the explosive discovery last November, the environmental-impact scientist has been asking a lot of questions about aggressive shallow-gas developments in booming Alberta.

Ernst now finds herself at the centre of a major resource controversy, as well as something of a folk hero. "She has been a lightning rod for rural Albertans, as well as a source of credible information," says Liberal environment critic, David Swann. Ernst has not only forced major groundwater investigations, but also prompted Alberta's leading oil-and-gas regulator, the Energy and Utilities Board (EUB), to temporarily suspend contact with her for alleged security reasons. The board's legal counsel, Rick McKee, now endearingly refers to her as a "pain in the butt."

The shy 49-year-old oilpatch consultant says that the ongoing controversy has been a very unwelcome experience. "I'd rather be running my business in peace," explains Ernst, who frequently works with major oil and gas firms and First Nations on northern wildlife issues. "But I had no choice. The regulators just didn't do their due diligence."

Her tale began in 2003 with the rapid development of coal-bed methane (CBM) in the Horseshoe Canyon formation, in central Alberta. CBM is an unconventional resource (the oilsands of natural gas) that requires more drilling and pipelines to develop than does old-fashioned natural gas. "It is a low-volume, high-capital-cost resource that tells you something about the maturity of the Western Canadian Sedimentary Basin," says Calgary-based



Jessica Ernst is at the centre of a major controversy

## Fire water

Jessica Ernst could set her tap water aflame. Was it a natural occurrence—or a side effect of gas drilling?

Scotia Capital oil-and-gas analyst Peter Doig. "We are getting to the bottom of the natural-gas barrel."

Unlike conventional gas, CBM often sits in shallow coal seams, where much of the province's groundwater is located. (In fact, nearly 650,000 Albertans get their drinking water from aquifers.) As a "tight" or unco-operative gas, CBM also requires extensive hydraulic fracturing ("fracing")

to get it flowing. Fracing uses massive volumes of fluids or gases to open up the formation to release more gas. Extensive CBM developments have sparked numerous groundwater controversies in the United States, where the resource now accounts for 9% of that nation's gas supply.

Alberta's industry claimed that the Canadian experience would be much different—and that the drilling of 50,000

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CBM wells in the Horseshoe Canyon, over a 20-year period, would be well regulated. A groundwater workshop organized by the Canadian Council of Ministers of the Environment came to different conclusions. In 2002, as CBM companies arrived in Ernst's backyard, researchers at the conference issued a prescient warning to industry, government and landowners alike. Given that the resource lies near aquifers or requires the removal of water in order to be produced, their report concluded that CBM development shouldn't take place "without adequate baseline groundwater knowledge."

Ernst actually asked for that baseline data, but it was never provided. As a consequence, her water nightmare began, in 2003, when EnCana Corp. started an extensive CBM drilling program around the hamlet of Rosebud, just an hour's drive northeast of Calgary. First her water taps started to whirr and hiss. "I thought I was having plumbing problems," Ernst recalls. But then, she got distracted by another impact of CBM drilling. When the roaring noise of a nearby compressor station, operated by EnCana, began to disturb her, Ernst spent several months trying to get the company and the EUB to muffle it. (CBM gas has little pressure and needs to be vacuumed up with a network of compressor stations.)

Meanwhile, Ernst says, she thinks her water quality steadily declined. By the

contact" with her, on Nov. 24, 2005. The banishment arose from Ernst's efforts to secure reliable sound tests on the noisy compressor stations. After documenting two noise studies Ernst alleges were faulty (she says the microphones weren't properly placed, while the EUB contends the studies were done by a "reputable and independent" firm and that it offered to redo them at a time of her choosing with mics wherever she wanted), she fired off an e-mail to landowners, warning them that the regulator was planning to weaken its noise controls. The letter ended with a

about Ludwig in a publicly circulated e-mail could be deemed "a criminal threat" to anyone. But it was returned unopened.

Ernst, however, wasn't the only resident of Alberta's booming CBM fields experiencing problems. A neighbour, Fiona Lauridsen, noted fizzing bubbles in well water, among other surprises. "The whole family suffered severe skin irritation in the shower on Christmas Eve," she says. Lab tests revealed levels of methane as high as 66 milligrams per litre. "It was an astonishing level," says Lauridsen.

In late January, even the EUB quietly



Ernst on her land at Rosebud

**"It blew like a rocket and melted the plastic container," Ernst says. "I was in shock"**

spring of 2005, even her two dogs refused to drink it. Whenever she bathed, she says, she got a bad skin burn "that felt like frostbite." She adds that she found strange materials in her water filters. After observing thick white smoke coming off the water one day, Ernst decided to fill up a plastic bottle and conduct an experiment. She waited five minutes and then put a match to it. "It blew like a rocket and melted the plastic container," she recalls. "I was in shock."

Private lab tests ordered and paid for by Ernst later revealed 44,800 parts per million of methane or 29.4 milligrams per litre. The United States Geological Survey considers anything above 28 milligrams per litre a dangerous public-health concern.

Ernst, however, couldn't report the matter to the EUB because it had just instructed its staff "to avoid any further

one-liner: "Someone said to me the other day: 'You know, I am beginning to think the only way is the Wiebo Way.'" Wiebo Ludwig, an evangelical cleric, began a \$10-million vandalism campaign against the oil and gas industry, in the late 1990s, after sour gas allegedly poisoned members of his family.

Ernst, who doesn't own a gun and is dutifully employed by the oilpatch, was dumbfounded by the EUB's action and to this day calls it "intimidation." Davis Sheremata, an EUB spokesman, explains that "the decision to temporarily suspend contact with Ms. Ernst was unprecedented within the EUB and was done in response to a threat that was made involving our staff. Threats against our staff won't be tolerated." Ernst immediately dashed off a letter asking how a comment

acknowledged problems with shallow CBM drilling and fracing. The regulator's Directive 027 banned any further fracing at less than 200 metres in depth without fully assessing all potential impacts first, to protect nearby water wells. It added that "there may not always be a complete understanding of fracture propagation at shallow depths and that programs are not always subject to rigorous engineering design."

In late February, Ernst, Lauridsen and Dale Zimmerman, a farmer in Wetaskiwin, Alta., went public with their burning water at the provincial legislature, because, as Ernst put it, "I wasn't getting any calls from the regulator." The revelations sparked immediate action from Premier Ralph Klein and Environment Minister Guy Boutilier. "Whatever is necessary to be done will be done," said Klein. The issue also made big headlines in rural Alberta. At one public meeting about CBM in the farming community of Trochu, a two-hour drive northeast of Calgary, Ernst received a standing ovation from 600 con-

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cerned farmers after giving a presentation on natural-gas contamination in water.

In March, representatives of Alberta Environment finally showed up at Ernst's residence to do some testing. Within weeks of that work, the government replaced her well water with truck deliveries. She asked for the government's written protocol for gas sampling in water but says it took her four months to get it.

At the same time, both industry and government emphasized that methane naturally occurred in the province's groundwater. Alberta Environment noted that 906 water wells in the province had gas "assumed to be methane" in their water, and that nearly 26,000 water wells had coal seams present. That revelation merely alarmed Ernst. "It was all the more reason to do baseline testing before they drilled," she says. "They knew. All the companies should have tested for dissolved methane and gas composition."

Many of Ernst's clients in the oilpatch also started to pass on what she viewed as disturbing information by the Canadian Association of Petroleum Producers and other sources about the scale of natural-gas contamination in groundwater in the province. Even a 2003 article in the *Oil-field Review*, a quarterly technical journal, noted poor gas-well construction combined with faulty cement casing routinely resulted in "leaks of gas into zones that would otherwise not be gas-bearing." It added that gas migration occurs everywhere—in "shallow gas wells in southern Alberta, heavy oil producers in eastern Alberta and deep gas wells in the foothills of the Rocky Mountains." An industry newsletter, *GasTIPS*, reported one Alberta study even found that 57% of wells drilled between a depth between 1,900 and 5,900 feet "develop leaks after the primary cement job."

Maurice Dusseault, a B.C.-based civil engineer, gas migration expert with 28 years' experience in the field and the author of some 400 articles on petroleum-related subjects, confirms that the seepage of natural gas from poorly cased oil and gas wells into groundwater is a well-documented problem. "We haven't been good stewards of our groundwater near gas wells," he says. "I don't blame the companies. I feel the EUB and other provincial regulatory agencies have been lax in protecting groundwater and in enforcement." The EUB, however, insists it "is extremely stringent in its enforcement of gas migration," and that cases of groundwater contamination are rare.

After doing more research, Ernst learned that isotopic fingerprinting was the only definitive way to investigate suspected groundwater contamination from gas wells. The technique, which identifies gases from different formations and then matches them to gases found in water samples, was pioneered by Karlis Muehlenbachs, a 62-year-old geochemist at the University of Alberta. Muehlenbachs even used the technique to clear a company of contamination charges during the Ludwig controversy. At Ernst's insistence, Alberta Environment finally ordered isotopic fin-

### Alberta's oilpatch regulator insists that it is "extremely stringent" and contamination is rare

gerprinting of four gas wells and three water wells in Rosebud, in March.

Shortly after the fingerprinting tests, McKee, the EUB's legal counsel, met with Ernst, on June 8, to discuss her case. Liberal MLA David Swann sat in as a witness, and Ernst taped the exchange.

"You are too intelligent and too capable... to just start bashing us," said McKee. "I have learned that being reasonable doesn't work," replied Ernst. At the end, McKee promised Ernst an audience with the EUB, adding, "I want to have you reinvigorated and reinjected into the process."

Although Alberta Environment won't comment yet on the latest test results, Muehlenbachs says the situation is neither black nor white—and that the province's groundwater is no longer pristine. "We've been drilling for 70 years," he says. "There are leaks everywhere." In the Zimmerman case, Muehlenbachs suggests that contamination possibly resulted from industry activity, but no good baseline data on the methane content of the water exists. "It's ambiguous," he explains. In the Rosebud area, Muehlenbachs found propane and butane in several water wells, a clear signature of possible leaks from deeper gas formations. "Unless someone threw a Bic lighter down the well, it's a sure sign of contamination," Muehlenbachs says. But the lack of good baseline water data again clouds the issue. "What gas was there in the first place and how much was added—you have to guess."

Bev Yee, assistant deputy minister of Alberta Environment, said she cannot comment directly on any of the investigations, because they are incomplete and are currently under review by the Alberta Research

Council. "We have established no direct ties to coal-bed methane," she insists.

Yee explained that the government introduced a new baseline water testing program, on May 1, but admitted that baseline data hadn't been "gathered consistently" in the past. When asked about a 2005 report, by Komex International Ltd., a global environmental consulting firm, that pointedly identified a "lack of monitoring wells" in Horseshoe Canyon and other oil and gas formations as "clearly evident," Yee replied: "I've taken that report into consideration." She added that the

government will be looking at enhancing the monitoring network.

Yee says that the government currently has no requirement for companies to fingerprint their gas or to make that information publicly available, something Ernst, Muehlenbachs and other scientists consider an essential procedure. An independent scientific panel may soon review the topic, as well as all other standards associated with groundwater monitoring, Yee adds.

Ernst now suspects that shallow drilling and fracing for CBM have aggravated an existing problem: natural gas migration from shallow wells, as well as older wells, due to unprecedented activity. In the past four months, she says she has had about 100 calls from rural residents, and nearly half dealt with water contamination of some kind. "We have the right to safe water," she argues.

Liberal MLA Swann now accuses the Alberta government of outright negligence—and has called upon the EUB and the Canadian Association of Petroleum Producers to hold a one-day forum on natural-gas migration into groundwater. At a series of public meetings in rural Alberta, in June, he says he found "a high degree of skepticism and cynicism about government regulators."

To Muehlenbachs, resource exploitation in Alberta has simply galloped ahead of basic science on groundwater. He says that industry and government regulators really don't know enough about the state of groundwater in one of the most heavily drilled landscapes in North America. "They need to have some curiosity about how mother nature works and what happens when we fiddle with it." □