

## OPINION

# A question of colour

My well water is dirty – but why is it purple? Brian Oram investigates

*Brian Oram*



For 30 years, B.F. Environmental Consultants has been addressing issues caused by or associated with poor well construction, lack of maintenance, over-pumping water wells and induced contamination. In a way it is great to be in the water-well and rehabilitation business in Pennsylvania, US, because about 50% of the private wells have a bacterial problem, and in most cases this results in the wells producing water that is brown, red, black, smelly and slimy – but not purple.

It was a Friday a few years back when we got the call from a farmer who had purple well water. The farmer said everything was fine, until “they” started fracking. He was referring to a local natural-gas development company working in northeastern Pennsylvania.

In our region, natural-gas development in the Marcellus Shale started in 2008. By 2012, the natural-gas companies were still relatively new to the area, and they were in the process of conducting seismic surveys, drilling test production wells and installing some initial infrastructure.

I am a fact-based professional, who believes in being open-minded. I believe in the scientific method of trying to identify the

potential causes, developing a hypothesis, conducting the proper testing, finding the cause of a problem, fixing it and then allowing the lawyers to do the rest of the work.

## FIELD TESTING

When we visited the site, the water well was not accessible because the top of the well was buried below grade, so we inspected the plumbing and distribution system. We found the following clues:

- Pin-hole leaks in the distribution system;
- Discoloured brown, purple and black water; and
- Slime coatings in the toilet reserve tanks.

We conducted field testing and found that the pH and conductivity of the water changed within the distribution system, and the purple water was not coming out of the well but from the distribution system. The well-water testing revealed elevated levels of aluminium, iron, manganese and lead, as well as extremely high levels of slime forming and iron bacteria. There was no evidence of methane gas, saline water, barium, strontium or other elements associated with natural-gas drilling.

Based on these findings, we proposed pulling the well-pumping system, camera-surveying the well and then chemically treating the borehole. Since this was a drinking-water well, we used a shock chlorination treatment system that includes recirculation with field screening of the chlorine residual and the oxidation reduction potential of the water.

Because of the extent of the biological growth in the dewatered zone, we had to shock-disinfect the borehole twice. When we conducted follow-up testing, the problem was solved. We also used this observational approach to develop a phone app called Know Your H<sub>2</sub>O?, which is like WebMD for water and available free of charge ([www.knowyourh2o.us](http://www.knowyourh2o.us)).

But what about the purple colour? The colour of the water was altered because the chemical form of manganese was different between the well and within the distribution system. ▼

**“I am a fact-based professional, who believes in being open-minded”**



*A farmer with purple well water feared it was related to fracking*

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