

Improving water quality in **RURAL SASKATCHEWAN**

BY DR. HANS PETERSON



SOME say the tap water in rural Saskatchewan is perfectly fine. Indeed, one government official termed a bitter tasting water in one town as “delicious”. Well, you do not need to drive far in that town to pick up a 19 L bottle of water that has been treated to a higher standard. Comments like “Oh, I would not drink our town’s tap water!” abound. Sometimes, the water not only tastes bad, it smells horrible! Another government official refused to comment on the quality of the tap water in a different town, a town which he represented. An independent source said that this town has a typical rural Saskatchewan taste to its water that he would describe as “atrocious.”

So here we are, in one of the richest jurisdictions on Earth, with possibly the most prosperous bottled water industry in Canada! What is happening?

In pre-historic times, Saskatchewan was covered by an inland sea. Eventually the inland sea gave way to our current ecosystem. Unfortunately, the seawater became today’s ground water. And, we have a lot of it. The Hatfield aquifer is enormous, it is up to 30 kilometres wide, and 50 metres deep. Given the marine history of these aquifers, we have some of the most challenging ground water sources anywhere in the world. The federal government conducted a study to test these ground water sources. One of the most common findings of this study was that the water was “untreatable.”

This is the label the Department of Indian Affairs put on Yellow Quill’s ground water several years ago. An additional problem at Yellow Quill was that their surface water was tainted by the Town of Kelvington’s sewage lagoon effluent. This was clearly an “impossible” water treatment challenge.

I was asked to conduct and review a number of pilot studies at Yellow Quill that showed that commonly used technologies simply failed to treat Yellow Quill’s “untreatable water”. While I assessed and discounted these traditional, but limited, treatment methods, the consulting engineering company sent out two of their specialists with some 50 years of conventional treatment experience between them to show me how to make those technologies work. Within a few weeks those specialists went back home admitting total failure. The Yellow Quill raw water was proving to be “untreatable.”

At this point, I ended up spending a lot of time on the phone with engineers and scientists across the globe. The water to be treated had 8.5 mg/L of iron, 0.25 mg/L of manganese, as well as 0.017 mg/L of arsenic, 11 mg/L of dissolved organics, and 4.7 mg/L of ammonium. The raw water smelled bad, which also meant there were reduced gases in it. If you are a water treatment person you would likely by now have exclaimed

“Oh no!” many times. Normally, problems do not exist alone, but usually one raw water source does not contain every problem imaginable. At Yellow Quill, every problem imaginable was present. I later found out that Yellow Quill was not an exception in terms of having such poor quality water.

I tried adding more chemicals, I tried ultraviolet radiation, I tried ozone, and I tried mixtures of hydrogen peroxide and low wavelength UV (the United States Environmental Protection Agency uses this combination to destroy toxic organic compounds). The result of most of those treatments was water looking like a thick brown paint. I started to realize that the more chemicals and oxidation strategies I tried, the worse the water became. Maybe one cannot treat bad quality water which is loaded with chemicals with more chemicals? It is fascinating (and shameful) that various organizations, governing bodies and companies, are still trying to do this in Saskatchewan.

So, what is the solution? How do we treat this awful water without chemicals? If we do not know what the problem is, we have two problems. However, here in front of me I had found the problem,

adding more chemicals to water that is already full of chemicals is fundamentally wrong. I have since learned that it cannot be done. However, I have also learned that there is a much better way to treat water and that is to get help from Mother Nature and let beneficial bacteria do the job!

After a lot of initial testing, biological treatment showed some promise. The senior engineer at Yellow Quill and I saw the beginnings of a new treatment process. We started to think about what we might call it. We adopted an unusual working name, “The Albatross.” It is not widely known that an albatross is said to be able to sleep and fly at the same time. It tied in nicely with our goal to develop a process that would be easy to operate and produce great water with little attention.

After 20 months of trial and error, and a lot of hard work, a treatment process was developed for Yellow Quill that could treat its “untreatable” water. The process was given a new name, the Integrated Biological and Reverse Osmosis Membrane (IBROM) treatment process. Yellow Quill adopted the IBROM and, in 2004, Yellow Quill’s nine-year boil

water advisory was finally lifted. In 2005, the head operator at Yellow Quill and I traveled to the United Nations headquarters in New York to give a presentation about the IBROM process. That spring the Indigenous Environmental Network had selected the IBROM process as the most positive water development in indigenous communities globally.

The IBROM treats poor quality raw water in such a way that the distributed water not only meets Guidelines for Canadian Drinking Water Quality, but all international standards, regulations, and guidelines as well. When you treat bad water, you need better treatment! By the end of this year there will be 23 IBROM plants successfully operating in Western Canada. One tribal council in Saskatchewan will have IBROM water treatment plants in seven (all) of its communities.

IBROM plants are now treating seven million litres of water per day, and municipalities are starting to embrace the process with plants in both Saskatchewan and Alberta.

For details, visit www.safewater.org or www.safedinkingwaterteam.org.