

On August 4, we recorded an interview with Dr. William Shotyk of the University of Heidelberg, the scientist who identified the unique quality of the water in this corner of Tiny and Springwater townships.

As we were preparing to post the interview on this site, we heard that Shotyk, taking samples on August 21, had noted particulates in the water. We caught up with him the next day at the Elmvale Water Festival.

The first comments relate to this recent observation. The bulk of the interview arises from a report Shotyk submitted to Simcoe County Council on June 30, 2009, on the latest results from new testing this year at a laboratory in Switzerland, which found that there were no detectable pesticides or organic compounds in the water. This result was totally unexpected, given the heavy farming use in the area.

In a June 12 email to County Council, Shotyk offered to explain the report. No member of council has yet taken up his offer.

AUGUST 22 INTERVIEW

Shotyk I've tested that water on the Parnell flow on and off for the past five years – spring, summer, fall and winter. There's never been a particle in the water. Never. Now that doesn't mean that 20 years ago there weren't particles in the water. It doesn't mean that from time to time, the water doesn't run cloudy. I don't have some type of monitoring system in place that's monitoring that. But you look at that and say, well, it was fine before. What has happened now? And what has happened now, well, I don't know what's happened now, but I know that there's now a lot of sediment in the water. More than that I can't say.

You can't link that to what's happening across the road on the dump site?

Shotyk I couldn't do that. You would have to show that these particles are actually coming from there. How to do that? Maybe a groundwater tracing study to show that the water from under Site 41 is flowing toward the Parnell flow. I collected some water samples from that site yesterday. And we will do the testing. And my expectation is that we will now find different results compared to past testing, i.e. our "baseline values." But I don't have those results yet. I'll have to first do the measurements. Until I get that, all I can say is, this is no longer what it used to be. Why that is, is a separate question.

AUGUST 4 INTERVIEW

Simcoe County says this water doesn't meet certain drinking water guidelines

Shotyk - It's about two aesthetic parameters – hardness and iron. And hardness is just how much calcium is dissolved in the water. Calcium bicarbonate. And iron is iron. These things are what are called aesthetic parameters – it's nothing to do with health, it's just if your water's got a lot of calcium when you're making coffee or tea it's going to precipitate in your kettle. So I've said it's kind of a red herring to say the water doesn't meet drinking water guidelines for those aesthetic parameters.

Simcoe County says that to say the water is the purest in the world is misleading

Shotyk - First of all, I never said that. Secondly, to explain to people how clean the water is – how do you explain to your average Joe citizen in this area that the water has a few parts per trillion of lead? The easiest way to explain is to make a comparison with something that everybody understands. Everybody understands that ancient Arctic ice is very very clean and it's widely considered to be the cleanest water on the surface of the Earth, thousands of years old, it's not going to get much better than that.

So the water bubbling out of the ground here is comparable. Sometimes the water I've been testing has significantly less lead than the cleanest layers of Arctic ice. So the people understand that the water's clean with respect to all of these trace metals –I've tested 40 different elements, it's things like cobalt and chrome and copper and nickel and zinc and vanadium - a long list.

Based on testing this water, that's how we documented that all of the bottled waters around the world in PET plastic are all contaminated with antimony that leaches out of the plastic, and that bottled water in glass is contaminated with lead leaching out of the glass. So for certain parameters we could say that this water, bubbling out of the ground, is cleaner than any of the bottled waters. Simply because it's not in a package and it's filtered by Mother Nature.

We can't say it's the cleanest water on Earth because we've not yet tested all of the water on Earth. But I don't know of a water that's cleaner for some of the parameters I have tested. And if the County knows of a water that's cleaner, I would like to know about it. The work on the metals began about five years ago and this year I began to look at the organic contaminants - pesticides and those sorts of things. And that's being done by a colleague in Switzerland, a specialist for pesticides in groundwater. I sampled my favourite artesian flows in Springwater Township, Tiny Township, sent them over to Switzerland, and my colleague analyzed them. Not only could he not measure anything in those water samples, he couldn't detect anything. And he can detect down to a part per trillion of these commonly measured pesticides.

What is the difference between measure and detect?

Shotyk If you can detect something in the water you can say that it's present but you can't measure it because it's so low. But if you can measure it, that means you can measure quantitatively how much is there with a certain accuracy and precision and reproducibility. If I were to say to you that your cup of coffee here has 20 parts per trillion of a certain pesticide that they're using in Kenya where they're growing it, what that means is any reputable laboratory testing the coffee will come up with a value of 20 plus or minus 2 or 3 whatever the uncertainty is. If there's only 5 parts per trillion in your coffee I can detect it but I can't measure it reliably, because it's below my level of quantification.

How does the testing that the Ministry of the Environment does compare

Shotyk - The ministry of the environment has been testing the groundwater throughout Ontario. And they want to know if any of the parameters exceed the drinking water

guidelines. Which the water doesn't. It's less than, less than, less than. But for me, it's not sufficient to know that it's less than a certain level. I want to know how much is there. If it's 10 times lower or 100 times lower or 1000 times lower. I'm not satisfied when a result comes back "less than." I'm measuring at a concentration range far below what the ministry of the environment is concerned with. They want to know whether for instance lead is below 10 parts per billion and I want to know how much lead is in the water.

Is there anything unusual about the methods you use to test the water?

Shotyk - We use the same methods to test this water as we use when we test the ice cores from the Arctic. Most people testing water don't do that. Our plastic bottles are cleaned for three months in our own clean lab in Germany using clean acid that we've distilled twice, we've distilled it ourselves in a quartz still. We've cleaned the bottles ourselves with a clean acid in a clean cabinet so there's no dust, no particles, in a clean lab environment for three months. And every bottle that I use, there's a little drop of acid at the bottom of the bottle – it's clean acid. So when I collect my water sample, that water is now acidic, which means it's preserved. Because if the water's not acidic, this water has a pH of 8 because of the calcium carbonate, if I just collect that water and leave it in a clean bottle, the iron in that water may become oxygenated from the oxygen in the air and then it would precipitate as rust. But when it forms a precipitate of rust, that rust may scavenge, it may grab all of my lead and chromium and all of these things I would get a misleading result. In other words what I measure in the sample is less than what was in the water because it's fallen out. So we have a drop of acid, we collect the water, now the water's acidified, we close that, we package that in three plastic bags, to seal it tight, keep it cold, ship it over to the clean lab. I only collect water from flowing artesian wells, where the water's running all the time. Because if the water's not running and I have to pump it out of the well, how do I pump it out of the well and not contaminate it?

The County says the design of Dump Site 41 will protect the water

Shotyk - I can't comment about engineering designs and landfill and all the rest of it. But I would ask the question, what does that mean to protect the water? Does that mean that the composition of the water will remain as it is today? Or does it mean that the water will only be impacted to the extent that it wouldn't exceed the drinking water guidelines? There's a difference between those two things and I am just asking a question.

What is the difference between those two things?

Shotyk - If this water today has 5 parts per trillion of lead in it, just as an example. That's really, really low. For example, the rain and the snow on the earth may have 100 times more than that. So the groundwater doesn't have very much. The drinking water guideline for lead is 10 parts per billion. So that's 2,000 times higher. Five parts per billion is not going to make you sick. It's a thousand times more lead than the water has today. Here's where we get into this grey area. I am just this scientist who's saying that the water has 5 parts per trillion of lead. That's all I'm saying. Whether it's right or

wrong to change that water in the future, relative to what it is today – that’s an ethical question. That’s where I can’t comment, I can’t say what’s right or wrong.

Can't you take an ethical position on this issue?

Shotyk – I can’t comment professionally - but the question any citizen can ask if the water has been tested by an independent scientist who’s not only not a local resident, has never been a resident, and isn’t even a resident of Canada – I’m a Canadian citizen resident in Germany working at the University of Heidelberg and my specialty is metals in the environment. That’s what I do. If that scientist is establishing the chemical composition of the water and if we know that that water today is clean, then we can ask the question, why don’t we just leave it alone?

If you could tell County Council about the most recent results, what would you say?

Shotyk - I would just present what was in the email and if they had any questions about any aspect of the report I’m happy to answer the questions. In the early days when I did the testing with all the trace metals, that was from 2004, 2005 and 2006. And I did get an opportunity to present that to Simcoe County Council. So I presented all this stuff and made the comparison with the ice that councillors also would understand. So they all knew as regards to the trace metals, the water is very clean. And at some point people raised the question, okay, Shotyk has measured some metals but it’s a farming area, what about all these pesticides? Good question. I had the same question. But I thought to myself, I will never be able to look at the water the same way again because I will now know how much of this pesticide and how much of that is in the water. That was my expectation: Next time I pick up my mug at the farm, I will know. I never would have thought that Jean-Daniel Berset in Switzerland could not measure anything in the water! When those results came back on our farm property, the Parnell flow, the flow at the side of the road right outside of the village of Elmvale, I would never have guessed that a state of the art analytical laboratory, you know, groundwater in a farming area, the results would have come back like that. And Jean-Daniel Berset – and the quotation is in the report – said he has never before tested such a clean groundwater.

What is it about the geological conditions here that makes the water so clean?

Shotyk - Fascinating question and for a scientist that’s like the \$6 million question. I can speculate. Well, I call it an educated guess. If you go to the east of us, there’s these big hills of sand and gravel and stone left behind by the glaciers. So we have hills that are approximately 100 metres high. I am guessing when the rain and the snow are slowly percolating through those hills, it’s mainly forested areas, so in the forest, in our soil, all of the contaminants are being effectively removed by Mother Nature’s filters. And Mother Nature’s filters consist of chemical filters, biological filters and physical filters. The chemical filters are clay minerals, are iron and aluminum and manganese oxide and are humus. Those are our three main chemical filters. Our biological filters – the soil is absolutely full of life. A gram of soil has about a billion organisms in it. In healthy soil, bacteria. and fungi. and all kinds of stuff. And of course the roots of our plants and our

trees and our shrubs - those are our biological filters. Our physical filters are just these tiny pores that exist in the soil which will physically trap contaminants we have in the air. So I think Mother Nature is filtering this water and doing an amazing job.

I will probably get some students involved in trying to understand how is this soil so effective at filtering the water. So that will keep me busy certainly for the next 10 years. I've talked to geochemical experts about how clean this water is. And they say, Oh, Bill, it must be ancient groundwater, that's why it's so clean. I say ok, that makes no sense at all to me because the water's flowing. So we started together with colleagues in physics in Heidelberg, dating the water to find out how old it is. It's not more than 30 years old, so the amazing thing about our lovely water is that at some of the flows, it's actually dirty rainwater from the 1970s, since filtered to perfection by Mother Nature.

This is exciting, really

Shotyk - Scientifically, it's amazing. People have got the message that this is amazing water bubbling out of the ground. Some call it the cleanest water on Earth. I never said that. We can say that some of the parameters that I've been measuring like lead we're measuring sometimes at levels that are comparable to the lowest levels that have ever been measured on the surface of the Earth. At some point, I'm just going to call it zero. That's how clean it is.

We can simply ask the question – if we have this amazing water, right in Elmvale, literally bubbling out of the ground, shouldn't we think about how best to protect that for future generations? But if you look at that artesian flow at the side of the road in Elmvale, that's not where the water comes from. That's just where it's bubbling out of the ground. The source area is somewhere further away. Shouldn't we be thinking about the source of our artesian flows, maybe protecting those, so that we're protecting our water? I think that's the sort of discussion that Site 41, it's been a catalyst for getting people thinking about protecting water and protecting it for future generations.

So certainly site 41 has raised an awful lot of really important issues that all of us should be thinking about. Like how much waste should we really be producing. Mother Nature has been recycling on this same planet that we live on for 4 and a half billion years. Since Day 1. So there is no material that we can't recycle. So we should be thinking about exactly all of that. So if we reuse everything, and recycle everything and the stuff that can't be recycled gets composted, like I'm talking here about the organic stuff, where is the waste?

In the future, if we don't want landfills, if we don't want incinerators, the solution is Zero Waste. And that is certainly do-able. In Switzerland and Germany for the past 20 years I can say I've probably produced more or less no garbage. And I say that because if it doesn't get composted, it gets recycled. So we can do that here in Ontario, but that's new for people here. People are used to, you drive the SUV to the local coffee shop, and you sit there with your engine idling, and you buy a cup of coffee in a throwaway cup with a throwaway lid. And by the way, I go in with my reusable coffee mug to get a cup of coffee and I ask the young lady working there, Can I ask you what do you do with the coffee grounds, do you compost them? And the poor young woman says, No we throw it in the garbage. It is "garbage." Think about the nitrogen and organic matter in those coffee grounds. Why do you throw that in the garbage?

