



National and international experts gathered in Hamilton at the Water New Zealand Drinking Water Workshop to share their thoughts and ideas on how we can guarantee a safe and healthy drinking water supply in the aftermath of Havelock North. **BY MARY SEARLE BELL.**

There was a sobering and unanimous message from the 12 international and New Zealand experts on water safety who attended the one-day workshop at the 2017 Water New Zealand Conference in Hamilton.

We face a real risk of another major contamination crisis unless radical improvements are made in the way we manage drinking water.

Dr Marion Savill, the New Zealand representative of the International Water Association (IWA), moderated the day-long gathering, along with Dr Robert Bos, senior advisor with IWA, who is based in The Hague.

Both Savill and Bos have significant experience and expertise on waterborne pathogens and public health, and have strong views on what went wrong at Havelock North, and how to mitigate the risk, as did the speakers throughout the day.

Interestingly, their voices were strongly united – the outbreak can and should have been avoided and, without action, we risk a similar disaster somewhere else in the country.

What went wrong?

The town of Havelock North gets its drinking water from an aquifer under the Heretaunga Plains. As this was considered a secure source, the water wasn't chlorinated. However, when heavy rain inundated paddocks adjacent to the Brookfield Road bores, sheep faeces contaminated with campylobacter seeped into the aquifer.

As a result, an estimated 5500 people came down with

campylobacteriosis (55 percent of households affected), with some 45 people hospitalised because of the illness. Three deaths have been associated with the outbreak and a number of people continue to suffer ongoing health complications as a result, including increased frailty in the elderly, Guillian-Barré Syndrome, and inflammatory bowel disease.

According to Dr Caroline McElnay, New Zealand director of public health, both the Hastings District Council and the Hawkes Bay Regional Council failed to assess the risks of contamination, and the non-treatment of the water hinged on that assessment.

She also criticised drinking water assessors, saying they were too hands off. Between them, there was a lack of communication.

Regulation failure

Tim Sharp was employed by the Ministry for the Environment at the time of the Havelock North outbreak and represented the ministry at the workshop. He said that the National Environmental Standards for Sources of Human Drinking Water (NES) were brought in to give drinking water suppliers control over the source water they were required to treat. Their primary objective is to reduce the risk of contamination, and therefore source protection is paramount.

Among the issues raised at the Havelock North Inquiry was the failure to embrace NES.

The NES provide the first stage of a multiple barrier approach

to drinking water management by setting requirements for protecting sources of drinking water from contamination.

Sharp said regional councils have specific drinking water catchment obligations under the NES – namely, to ensure that effects of activities on drinking water sources are considered in decisions on resource consents and regional plans – but many are not aware of this.

He said the rule of thumb for resource consents and regional plans is that they must not deteriorate the receiving water quality.

“If an adverse event occurs that could contaminate a drinking water supply, whether that’s a chemical spill or heavy rainfall, notification is required as a condition of resource consent,” he said.

The difficulty is assessing activities that may have an impact on supply, and that “upstream can be a very long way”.

Another problem is that a source protection zone wouldn’t have made an impact in the Havelock North case, as sheep grazing is a permitted activity therefore bypassing the resource consent process. Making it a non-permitted activity would have a big impact across the country.

The problem of poo

In his presentation, Professor David Kay of Aberystwyth University in Wales said the microbial indicators were

screaming that there was a risk in Havelock North.

He said the Clean Water Act in the USA set out the framework for catchment management – the US EPA publishes data of impaired water every week. Its main concern is pathogens (*E. coli* is an indicator of risk they may be present), and the main source of that is agriculture.

“Sheep have 10 times more *E. coli* than humans, and human waste is treated before discharge,” he said.

“We have huge animal-derived microbial loadings – how do we make sure the faecal matter doesn’t get into the water supply? How do we minimise the risk?”

Compounding the problem are storm events. These create episodic pollution, which is difficult to manage.

Kay said that an 18-month-long study of water quality monitoring in the UK showed rainfall was the best predictor of water quality. The Drinking Water Inspectorate project looked at seven drinking water supplies, supplying populations similar in size to Havelock North. Three of these had high animal-derived microbial loadings, although they were treated, and stream loadings during episodic events were incredibly high.

“Small supplies have high microbial loadings in every empirical study to date,” he said.

“The cause is disproportionate to the burden of disease. Treatment systems need to be more efficacious.”



Water treatment for health

Dr Steve Hrudey, professor emeritus at the University of Alberta, Canada, spoke of relevant international experience summarising 38 outbreaks in 13 affluent countries.

He and his wife Elizabeth Hrudey wrote a book on the lessons from recent outbreaks in affluent nations, including the Walkerton *E. coli* outbreak where seven people died and 2300 became ill. They also wrote a subsequent book specifically for frontline personnel.

He said that six guiding principles first developed in 2001 by the World Health Organisation microbial pathogens expert group and the National Health and Medical Research Council of Australia working group on revising the Australian Drinking Water Guidelines are “as relevant now as they were when they were first developed”.

The first, and by far the most important, is: “The greatest risks to consumers of drinking water are pathogenic microorganisms. Protection of water sources and treatment are of paramount importance and must never be compromised.”

Unfortunately, Hrudey said, an initial review of evidence from Part 1 of the Havelock North Inquiry clearly indicated that those responsible for the safety of the drinking water supply had not embraced these principles.

“A multiple barrier approach is needed,” he told delegates. Hrudey also touched on the resistance to chlorination in

some communities saying there is no evidence to support the view that chlorination in the doses prescribed for drinking water would cause illness.

However, the evidence for pathogen illness via drinking water is overwhelming – from as far back as the 1850s – and pervasive.

He said the Hastings District Council had a clear and demonstrated aversion to chlorination – it clearly didn’t understand the risks of not treating the water, describing them as minor. But the risks of chemicals versus that of pathogens are “not even in the same ballpark”.

The question was raised of how we educate the population that chlorination is not a baddie. Hrudey said we can’t blame the public, as they’re inundated with misinformation. The industry experts need to speak up and ensure people are aware that the risk from micro pathogens is much greater than any risk from chemicals.

Multiple barriers a requisite

The reason for multiple barriers stems from the fact that, in many cases, contamination occurs in the reticulation system, not the source. Therefore, relying on just one source of prevention is more vulnerable to failure.

As Hrudey said, “Highly contaminated sources need many barriers, but secure sources need more than one.”

Dr Jamie Bartram, director of the Water Institute at the

University of North Carolina, said that all drinking water sources that are not proven to be secure to expert and accredited government assessors must be disinfected to ensure the safety of the public from pollution of the water.

In the panel session at the end of the day, the question was asked, “Is chlorination part of a set of barriers, or a cover up if your water safety has failed?”

To which, Bartram replied, “Chlorine can be misused”, citing an example where a representative of a water supplier from the USA said that chlorine had been added to the water to fix a problem. Bartram said to him that the chlorine only masked the problem, it didn’t solve it.

The point was also made that water monitoring is not a barrier. Barriers remove contaminants; monitoring validates those barriers.

As Jim Graham, principal scientist at Opus, said in his presentation, *E. coli* monitoring is not a risk management procedure in and of itself, it is an indicator – a verification tool – of whether your risk management is working.

Getting politics out of the water

It is clear there are simply not enough resources being put into establishing safe drinking water supplies. Currently there are not enough assessors, and these people require better training and more funding to ensure they do their job successfully.

Political interference was also raised as a significant obstacle to establishing safe drinking water supplies. Dr Alistair Humphrey, epidemiologist medical officer of health, Canterbury, said politics are influencing the way we regulate – but water regulation must be independent.

“Governance and operations should stay separate,” he insisted.

He said the number of political appointments to governance positions has increased, and regulators have lost their independence as ministers have gotten involved in operational issues.

Jim Graham agreed, and said Stage 2 of the Havelock North investigation revealed that the issues that lead to an outbreak go way wider than the water supplier.

“They are issues that are systemic to the whole industry,” he said.

The inquiry only makes recommendations, however, Graham questioned how many would be taken up and put into action by the government.

The recommendations include changes to drinking water standards. Changes that are “well overdue”, said Graham.

“We need change in the industry. We need leadership,” he rallied.

“In the secure groundwater category, the onus for the security of supply should lie with the supplier. These suppliers must be able to demonstrate the safety of their



water source, particularly if they chose not to chlorinate.”

These comments are strongly backed by Water New Zealand in its submission to Stage 2 of the inquiry.

Havelock North has highlighted the need for a number of changes including the way water sampling is undertaken along with ensuring adequate training and competency.

Graham said drinking water assessors need empowering. They should be an independent body, able to encourage and enforce compliance. To ensure they can function properly, assessors must be well trained and have the aptitude to do the job well. They also need to be well resourced. Their work should be guided by protocols that provide processes to follow.

Working in parallel with the drinking water assessors, the regulatory body needs enforcement officers that have the authority to prosecute individuals and water suppliers. This will help achieve compliance with the regulations and, thus, the overall goal of safe drinking water for everyone.

The Act itself needs to be updated. Currently it requires “all practicable steps to comply with drinking water standards”. This is to be removed – you either comply or you don’t.

Halting the decline

The simple facts of increased population, farming intensification, ageing infrastructure, and the under resourcing and under prioritisation of drinking water are all contributing to a sharp decline in the quality of drinking water supplies.

On top of this, increased adverse weather as a result of climate change is likely to exacerbate transmission of pathogens between animals, from animals to humans, as well as humans to humans.

It is obvious that widespread industry reform is called for.

Currently, there are 67 drinking water suppliers throughout the country. Too many, according to Graham, who said the majority of small suppliers don’t have the capacity and competence to operate at the level they should.

Ideally, that handful of suppliers would have sufficient resources to ensure the professional delivery of safe water.

He called for change to the regulatory structure – a single drinking water regulator – immune from political interference, “similar to the Civil Aviation Authority”, he said.

The very real fear is that without radical improvement in the management of our drinking water supplies, we will relive the Havelock North disaster, sooner or later. **WNZ**