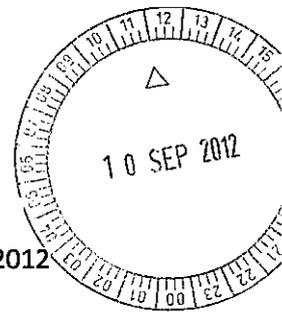


Standing Committee on Environment and Public Affairs
GPO: Box A11
Perth WA 6837

2 nd of September 2012



Re: Petition No 166 – Cessation of the Chlorination of the Busselton Water Supply

Dear Committee Members,

My submission relates specifically to two points in the Petition:

1. The soundness of the risk assessment analysis, findings and reports of Consultants Hunter Water Australia; and
2. The merit of replacing the UV system with chlorination plants when many pathogens are chlorine resistant.

I am formally trained as a chemist and engineer in the field of waste and potable water plant design, most of my knowledge is based on experience with highly qualified water and wastewater practitioners.

It is my understanding the decision to chlorinate the Busselton water supply was on expert advice from the boards nominated water consultants as a result of Busselton Water's desire to come into line with the 2004 ADWG. The recommendations made were in light of samples revealing the presence of *Naegleria lovaniensis*. The consultants have used a report on a study undertaken by French Scientists Michel Pelandakis and Pierre Pernin to infer a relationship between the *Naegleria lovaniensis* and *Naegleria fowleri*. As a result of the use of this report *Naegleria lovaniensis* has been adopted as an indicator organism for the potential threat by the harmful amoeba *Naegleria fowleri*.

It is also my understanding that *Naegleria fowleri* has never been detected in the water distribution system. Information on the web indicate *Naegleria fowleri* will not be found in the artesian water extracted by Busselton Water however may be introduced when pipe work is open up for maintenance purposes with the organisms entering from the general environment.

The entry of amoebas such as *Naegleria fowleri* entry to the body is via nasal passages not ingested by mouth, the prime risk to infection is the emersion of the head into water such as swimming pools and spas both of which are heavily chlorinated as a general practice. If however the owner does not chlorinate effectively then there is a risk to infection.

It is my understanding deaths associated with *Naegleria fowleri* are from swimming pools both private and public during periods of high water temperature not from drinking water.

As a water practitioner we adopt many methods of disinfection primarily to kill gut orientated infectious organisms such as e-coli and viruses commonly found in wastewater and untreated potable water supplies. Without exception the use of chlorine alone is not a guarantee to kill all potentially dangerous organisms, as a general practice we adopt a train of techniques to satisfy specifications set by the Department of Health. Typically we would use a barrier technique first such as nano membrane filtration followed by ultraviolet light radiation and sometimes chlorination. The aim here is a wide spectrum of techniques targeting not one specific organism but many.

My professional issues with a chlorination strategy alone not incorporating other techniques is the risk of infection is not negated, yes *Naegleria lovaniensis* could be managed however other organisms will

PUBLIC

flow through the chlorination net. In addition Busselton Water has been effective in eradicating *Naegleria lovaniensis* using portable chlorine units and conducting spot chlorination.

It is my understanding Busselton Water is under financial pressure to reduce costs as board charges to customers are fixed by state government bodies. Maintaining both chlorination and ultraviolet light disinfection systems would be cost restrictive. It is also my understanding the way in which the water supply is chlorinated limits the opportunity to incorporate ultraviolet light in the process.

The consultants have identified rightly that the water drawn from the aquifer is consistently above 24 degrees. However the consultant's reports state clearly that the source water's integrity is not in question. The water in the underground pipes in the summer months in some parts of the reticulation system maybe over 24 degrees temperature but for the majority of the year it is under this temperature. My concern is by only chlorinating the water supply the real potential of contamination by *Giardia Lambda* and *Cryptosporidium* can occur similar to *Naegleria fowleri* without chlorination. In the presence of chlorine these organisms have a self protection system forming cysts. The cyst form is resistant to chlorine and are very hard to kill. Information on the web indicates water experts believe over 63% of health related water problems are caused by *Giardia* and *Cryptosporidium*. The optimum temperature for the proliferation of these two pathogens (should a breach to the reticulation system occur) is less than 24 degrees.

Healthy individuals infected by these parasites experience cholera like illness: watery diarrhea, headache, abdominal cramps, nausea, vomiting and low-grade fever. For the immune-compromised, however, the results of the infection are much more severe; the parasite can severely damage the liver and respiratory tract as well as the gall bladder and pancreas. Information indicates a 40-50% mortality rate for the immune-compromised. Those at risk include cancer patients undergoing chemotherapy, infants, kidney dialysis patients, aids patients and others with suppressed immune systems.

Busselton has always been the place to live later in life with good weather, flat topography and high quality chemically free water supply.

It is my insertion that the Busselton Water Board has made a limited decision, not informed the general public to the down side of chlorination only the perceived upside. Has negated contamination risks in one area replacing with new risks not publically advertised.

The argument illustrated in this letter are well known by all professionals working in the water wastewater industry and undoubtedly known by Busselton Water.

The case to chlorinate is based on residual disinfection from treatment facility to customer. Expanding the ultraviolet light disinfection to stations along the distribution pipe work will accomplish similar outcomes. In a Case Study by Aquionics when the plant was first installed it was estimated at 2.2 times more for installation but given that the main plant was already in place it would not have be higher than the 3.5 million they spent and the operational costs of UV are estimated as 75 % less than chlorination.

It is well accepted in the industry ultraviolet light disinfection in clear water such as Busselton's is a 100% kill of all organisms including bacteria, viruses and *Naegleria fowleri*. This is consistent with the findings of local Hydrologists Rockwater Pty Ltd who conducted testing to determine the effectiveness of Busselton Water's UV disinfection plants toward the end of lamp life. Hunter Water Australia's UV System Review July 2009 refers to testing conducted including the presence of *Naegleria lovaniensis* before UV treatment and states "However in the sample taken post UV, the laboratory (Path West) could not detect the organism."

10/10/10
10/10/10

A return to expanded ultraviolet light disinfection systems is requested and maintains the pristine water characteristics known worldwide.

Yours sincerely

A handwritten signature in black ink, appearing to read "Tony Johansen". The signature is fluid and cursive, with the first name "Tony" being more prominent than the last name "Johansen".

Tony Johansen

PUBLIC