



**Deputy Premier of Western Australia
Minister for Health; Tourism**

Our Ref: 25-29884
Your Ref: Petition No 166

Hon Brian Ellis MLC
Chair
Standing Committee on Environment and Public Affairs
Parliament House
PERTH WA 6000

Dear  Chair

Thank you for your letter of 19 September 2012 seeking comment on the terms of petition No 166 – Cessation of Chlorination of Busselton Water Supply and attached submissions.

I am pleased to provide the following comments.

I am on record as supporting and commending the Busselton Water Board on its decision to review and improve the level of protection that will be given to the Busselton community.

Chlorination of drinking water is a proven public health measure with an excellent track record of safety and effectiveness of more than one hundred years. Chlorination is an effective disinfection process that will protect consumers of Busselton's drinking water from microbiological contamination of the water supply.

All relevant scientific literature, including that of the World Health Organisation, the National Health and Medical Research Council, Australia's peak health research body, and the United States Environmental Protection Agency, clearly indicate that treating drinking water with chlorine is not only safe, but essential for the provision of a residual barrier to prevent microbiological contamination.

Please find attached to this letter responses provided by the Department of Health (DOH) to the matters raised in your letter in relation to alleged health effects of chlorination and the chemistry and microbiology of the water.

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In summary, I believe that procedures established by the DOH are satisfactory to investigate any alleged complaint. I have also directed the DOH to advise me of any adverse health effects that can be clinically proven to be caused by the chlorination of drinking water. I am advised that, to date, no claim of adverse health effects has been substantiated by any medical evidence, nor has any claim been forwarded to the DOH for investigation.

Despite claims made in the submission, there is simply no evidence that chlorination of the Busselton water supply has introduced any harm, nor is there evidence that it has been ineffective, nor is there any evidence that the risk management process employed by Busselton Water or its agents was inadequate or was inconsistent with the multi-barrier risk management framework set out in the "*Australian Drinking Water Guidelines*".

I can confirm for the Committee that, in the absence of any evidence of a health risk presented to me by the DOH, there are no sound public policy grounds or public health grounds for acceding to the petitioners' request to immediately cease chlorination of Busselton's drinking water supply or to convene an Inquiry.

I have instructed the DOH to stand ready to provide further evidence to your Committee relating to the technical matters referred to in the petition. In the mean time, please find enclosed for your reference correspondence from July 2012 from the Chair of the Advisory Committee for the Purity of Water to Ms Helen Shervington, the Chairperson of Busselton Water Board, which is relevant to a number of matters raised in the petition. I have also enclosed background reference material about the role and function of the Advisory Committee.

I trust that this information is of assistance.

Yours sincerely



Dr Kim Hames MLA
DEPUTY PREMIER
MINISTER FOR HEALTH

Att.

16 OCT 2012

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Claims of health problems since chlorination of the drinking water supply

A number of claims have been made that allege a variety of adverse health effects from, or cast doubt on the safety of, chlorination of the Busselton drinking water supply, or of chlorination of drinking water in general.

The entirety of the basis for the alleged health claims made in the petition appears to be set out in item 1 on page 1 of the supporting submission, which states that:

“Busselton residents have forwarded personal accounts of the significant distress, illness and injury they have and are enduring to the Tabling Member. As their appointed representative she is in the best position to comment on the ill effects of chlorination on her constituents.”

This statement does not constitute medical evidence of any health effect, nor, in the absence of any medical data, does it provide any reasonable grounds for expecting there to be demonstrable adverse health effects.

Based on existing evidence from the scientific literature, there is no plausible mechanism whereby drinking water with the minimal level of residual chlorine as maintained in Busselton's drinking water supply would cause adverse health effects of the nature alleged by the petition and the supporting document. The chlorine in Busselton's drinking water supply may, however, have caused a noticeable aesthetic change in the taste and odour of the water, particularly on its initial introduction earlier in 2012.

Nevertheless, the Department of Health (DOH) has established a reporting process with Busselton Water to record and refer any adverse health-related effects to a local health practitioner for immediate investigation. At a meeting scheduled for 19 October 2012 in Busselton, the DOH will meet with local medical practitioners and invite them to forward any reasonable concerns to the DOH for further investigation.

The DOH stands ready to investigate in good faith any case referred to it by a medical practitioner in Busselton, where the practitioner gives his reasons for believing there are reasonable grounds for considering that chlorination of the Busselton water supply has been a factor in the development of adverse health effects in a patient.

To date, and despite intensive local media coverage and local publicity generated in Busselton in recent months about the introduction of chlorination to Busselton's water supply, no claim has been substantiated by any medical evidence, nor has any claim been forwarded to the DOH for investigation.

Claims relating to *Naegleria* risk

The “*Australian Drinking Water Guidelines*” (the Guidelines), published by the National Health and Medical Research Council, Australia's peak health research body, provides an authoritative reference on what defines safe, good quality drinking

water, how it can be achieved and how it can be assured. The Guidelines state (underlining is our emphasis):

“Two groups of free-living amoebae, Naegleria and Acanthamoeba, have been responsible for human infections in Australia. Infection is opportunistic and generally results from contact during recreational bathing, or domestic uses of water other than drinking. Public water supplies can contaminate swimming pools. The occurrence of these organisms is unrelated to faecal contamination and their ecology in aquatic environments is more complex than that of enteric protozoa.”

“Cerebral infection by Naegleria fowleri is strictly waterborne and although rare is usually fatal. Since these amoebae are able to colonise piped water supplies, disinfection at the water source may not adequately control them unless the disinfectant pervades the whole distribution system.”

As free-living environmental organisms, Naegleria are not associated with faecal contamination and can be detected in the absence of Escherichia coli. Whilst only Naegleria fowleri has caused amoebic meningitis, other species of thermophilic Naegleria may indicate the potential presence of N. fowleri.

Detection of any thermophilic Naegleria in drinking water should therefore initiate corrective actions while speciation is undertaken to determine if N. fowleri is present. A detection of thermophilic Naegleria is likely to indicate that preventive measures and barriers have failed.

Naegleria are most likely to enter a water supply system at the source or at breaks in the sealed system such as open reservoirs and tanks. Under favourable conditions, they can proliferate in pipework and tanks. Under unfavourable condition, Naegleria can encyst and when in this state are more resistant to disinfection, readily surviving in tank sediments and pipe biofilm. Unless chlorine residual is continuous, decystation to the active trophozoite form will remain a threat.

Free chlorine or chloramine residual at 0.5 milligrams per litre or higher will control Naegleria fowleri, provided the disinfectant residual persists throughout the water supply system at all times.”

[Naegleria Lovaniensis is one of a number of thermophilic Naegleria species.]

In summary, chlorination was introduced to the Busselton water supply because it was the disinfection process that is most effectively able to mitigate the thermophilic Naegleria risk in this water supply, in part by its ability to provide a persistent free chlorine residual throughout all parts of this extensive water supply system.

Chlorination is similarly applied to other drinking water supplies throughout Western Australia with a similar Naegleria risk profile or with similar water chemistry without any problems.

In particular, the assertion on Page 3 of the supporting submission, that:

"It is unreasonable to suggest the presence of Naegleria Lovaniensis means that Naegleria Fowleri is present in Busselton's water and will be detected."

... is misleading and the following statement on page 3 that "Busselton Water has been chlorinated for no valid reason." is incorrect.

It is reasonable and responsible to suggest that the persistent detection of *Naegleria Lovaniensis*, or any other thermophilic *Naegleria* species, in Busselton's extensive unchlorinated water supply (i.e. prior to chlorination) meant that this water supply system was very susceptible to contamination from other thermophilic *Naegleria* species, including *Naegleria fowleri* and that the absence of a chlorine residual helped to provide environmental conditions suitable to the growth, transmission and spread of this potentially fatal pathogen. All thermophilic *Naegleria* species thrive in the same temperature range, which is similar to the usual temperature range of the Busselton water supply.

Despite the variety of claims made in the supporting document, there is no scientific evidence that chlorination at the levels used in Busselton is ineffective against *Naegleria*, nor is there any evidence that the micro-organisms *Giardia* or *Cryptosporidium* present a risk to or are in any way relevant to the circumstances at Busselton.

There is likewise no evidence that chlorination of the Busselton water supply has introduced any harm, nor is there evidence that it has been ineffective, nor is there any evidence that the risk management process employed by Busselton Water or its agents was inadequate or was inconsistent with the multi-barrier risk management framework set out in the Guidelines.

Claims relating to the chemistry of Busselton's drinking water supply

It is true that the predominant form of chlorine in water changes with the pH of the water, as well as with a number of other factors such as the water's buffering capacity, temperature. In general terms, higher pH levels favour the formation of hypochlorous acid over hypochlorite ion.

The subsequent interpretation or assertion that Busselton has "unique water chemistry" or that chlorination is thus assumed to be ineffective is without merit. The author appears to have misunderstood the maximum individual pH result of 8.4 in the distribution system as if it was the average, with the pH of the Busselton water supply being in the range of 7.0 to 8.4, with a mean of 7.9.

The effectiveness of the chlorine in Busselton's water supply is measured by the free chlorine residual throughout the distribution system and the ongoing absence of micro-organisms such as *Escherichia coli* and thermophilic *Naegleria* species.

The free chlorine residual in this system is predominantly in the range of 0.5 to 0.9 milligrams per litre, which is in the range required for effective management of thermophilic *Naegleria* and well below the maximum level of 5 milligrams per litre set as the health-related guideline value for chlorine in the Guidelines.

Provided the free chlorine residual is maintained throughout the distribution system at the correct level and *Escherichia coli* and thermophilic *Naegleria* species remain absent, pH ranging occasionally up to 8.5 is immaterial. By this measure, the introduction of chlorine, accompanied by an average water pH of 7.9, has been very effective.

Most of the other material on page 8 of the supporting submission is either factually incorrect or an erroneous interpretation selectively applied to facts.

In particular, the following assertions from page 8:

“Water with pH of 8.4 or 8.6 (but not > pH 9.5) is highly desirable as drinking alkaline water contributes to an alkaline body. As alkalinity decreases the blood becomes more acid and less able to fight off deterioration and disease because proper body function is impaired.”

... and the long expressions of opinion from lower page 8 “As indicated in the table ...” to “... and *Naegleria* in cyst form?” on the top of page 9, are suppositions that are entirely without merit and bear no relationship to any known empirical observation or fact. In particular, the level of copper in Busselton’s drinking water supply is at or below the detection limit and complies at all times with the Guidelines.

The Department of Health and the interdepartmental Advisory Committee for the Purity of Water continue to closely monitor the introduction of chlorination to Busselton. This process ensures that public health is protected at all times and that the amount of chlorine used to treat Busselton’s water supply complies at all times with the health-related criteria in the Guidelines.

Claims relating to ultra-violet disinfection

Page 9 of the supporting statement refers to ultra-violet disinfection being used “*in too many places to mention*”. Whilst it is of course true that ultra-violet disinfection is used in many locations, as part of a multi-barrier approach, the supporting document invites the reader to infer that ultra-violet disinfection is used by itself, or usually used by itself, without a chlorination step.

The document fails to clarify that in most circumstances where ultra-violet disinfection is used, this is done in conjunction with chlorination, not instead of it. In particular, drinking water supplied to New York City is presently chlorinated and will continue to be chlorinated when the new filtration and ultra-violet disinfection plant that is under construction comes on line.

Claims relating to Engineering Hazards

Claims made (page 11) regarding the increased length of the reticulation system and the potential to add UV treatment systems fail to recognise the contamination risks associated with complex distribution systems. While the water distribution system was small with short direct routes of supply water travelled in a single one-way path to the consumer (with a travel time measured in hours). As Busselton has expanded the distribution system has become more interconnected with recirculation and areas of low and reverse flow (with travel times measured in days). With the increased size of the distribution system there is a greater risk of barrier breach and without some form of residual system within the water supply it is possible for water to become "seeded", by microbiological contaminants. Additional UV treatment systems do not have the ability to provide a residual disinfectant capacity to protect the expanding community of Busselton.



Your ref
Our ref
Enquiries Dr Richard Lugg (08 9222 2453)

Ms Helen Shervington
Chairperson
Busselton Water Board
P.O. Box 57
BUSSELTON WA 6280

Dear Ms Shervington

CHLORINATION OF BUSSELTON'S DRINKING WATER SUPPLY

On behalf of the State's Advisory Committee for the Purity of Water, I would like to reiterate our strong support for your Board's decision to chlorinate Busselton's drinking water supply. On 17 November 2010 I wrote conveying the Committee's commendation of the Board for committing to the important public health initiative of permanent continuous chlorination.

Our support is based on the effectiveness of chlorination, which is the most commonly used water disinfection system around the world, and provides the most lasting and reliable protection, from the water treatment plant to the customer's tap. This protection is particularly important in Western Australia, where high water temperatures exacerbate the potential for the growth of harmful microorganisms within the distribution system.

Water suppliers such as Busselton Water have a duty of care to ensure that effective barriers against microbiological contamination are maintained *throughout the entire drinking water distribution system* at all times. This is a key principle of the comprehensive risk management framework set out in the *Australian Drinking Water Guidelines*.

Alternative disinfectants such as ozone, chlorine dioxide or ultraviolet light do not provide ongoing protection from recontamination after treatment. Permanent continuous chlorination is the only practical option that will provide the residual disinfection and protection that is needed for Busselton.

Since my previous letter, the Advisory Committee has been kept closely informed by your Manager, Production and Supply, Mr Neels Kloppers, of progress towards the goal of permanent continuous chlorination, and of developments since its progressive introduction from 12 April 2012.

We know that problems from the sloughing of biofilms have been largely brought under control, and that dirty water and taste and odour complaints have settled down, as predicted. I understand that problems of water discolouration from colloidal iron have also been brought under control.

We are aware of continuing disquiet in the town, which appears to be largely centred on claims of adverse health effects from the introduction of chlorination. However no such medically documented claims have been made to the Department of Health. Claims of this nature are not seen elsewhere in Western Australia, nor are they substantiated in the medical literature.

I understand there have also been a number of other claims, including that the Board's decision making process was inconsistent with the *Australian Drinking Water Guidelines* and has somehow contradicted international treaties, or that the levels of chlorine in Busselton's drinking water supply are "toxic."

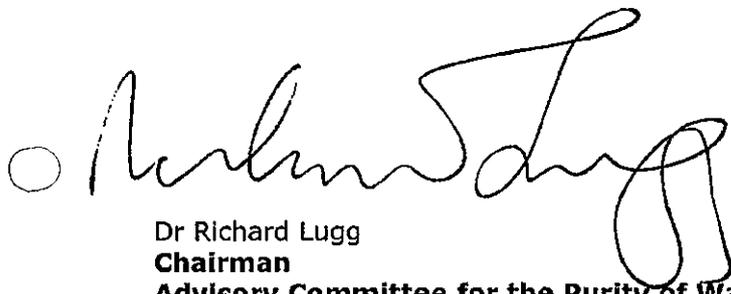
I would like to reassure your Board that the procedures followed in relation to the chlorination of Busselton's drinking water supply have been fully consistent with the *Australian Drinking Water Guidelines*. They are also in accord with the requirements contained in the Board's Memorandum of Understanding with the Department of Health.

I would be willing to meet with yourself and Board members at a convenient time to underline and elaborate on these points and to learn first hand of the difficulties and concerns that you have experienced since the introduction of chlorination to your water supply.

I am pleased to advise that the Advisory Committee resolved at its most recent meeting to reiterate its strong support for the achievement of permanent continuous chlorination in Busselton, and its commendation of your Board for its initiative and its commitment in this regard.

I would be grateful if you could bring this to the formal attention of the Board at its next meeting.

Yours sincerely



Dr Richard Lugg
Chairman
Advisory Committee for the Purity of Water

25 July 2012

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The Advisory Committee for the Purity of Water

The Advisory Committee for the Purity of Water is a non-statutory inter-departmental committee that operates under the chairmanship of the Department of Health. Amongst other functions, the Committee provides advice to the Ministers for Health and Water on protecting, monitoring and managing drinking water quality and fosters inter-agency co-operation on related matters.

The history of the Committee

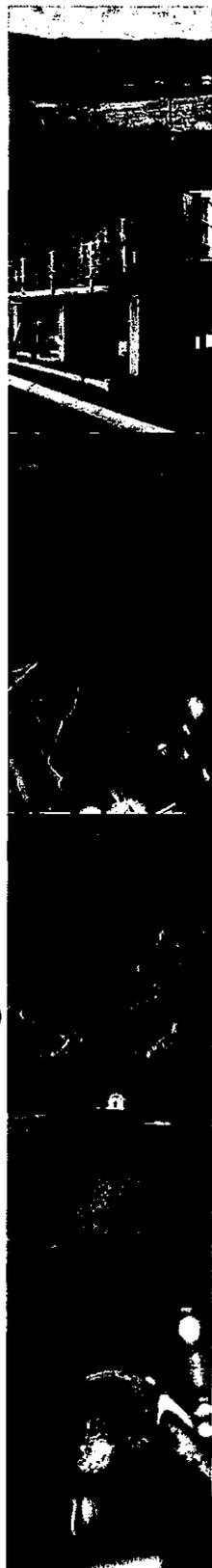
The Committee was originally established in 1925 to address drinking water quality issues and to provide a link between the then Department of Water Supply Sewerage and Drainage and the Department of Health. It was comprised of senior officers from each department and was empowered to communicate directly to the then Minister for Works.

From the first meetings, the Advisory Committee identified the importance of secure catchment areas and adequate chemical treatment processes and sought representation from senior officers from the Departments of Agriculture, Conservation and Land Management and the Chemistry Centre of Western Australia.

In response to the water industry reforms of 1995, the Advisory Committee resolved to transfer the Chair and Secretariat to the Department of Health, to amend its Terms of Reference and to provide advice to the Minister for Health. Additional members from the Department of Water, the Economic Regulation Authority, AqWest, Busselton Water Board and Parsons Brinckerhoff were invited to join the committee to better reflect the water industry in Western Australia.

With the implementation of the 2004 "Australian Drinking Water Guidelines", the Advisory Committee created two specialist sub-committees – one focussing on source protection and catchment management, the other focussing on drinking water sampling, results and monitoring. Both sub-committees provide additional expertise to review, monitor and advise the full Committee on any issue affecting drinking water supplies within the State, from catchment to consumer.

The Advisory Committee continues to evolve, reflecting the diverse and complex issues associated with the provision of drinking water in a changing environment. However, its primary role of ensuring that Western Australians have access to safe drinking water which they can trust remains unchanged.



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What is the role of each Committee?

The main role of the Advisory Committee for the Purity of Water is to provide sound health-related advice pertaining to the quality of drinking water to both the Minister for Health and the Minister for Water. In this role the Advisory Committee determines the water quality compliance requirements for all drinking water providers across the State.

The Minister for Health has the lead responsibility with respect to issues of health, however it is customary for both Ministers to jointly accept the recommendations of the Advisory Committee.

Members are at liberty to discuss matters openly and frankly. Issues that may be commercial and in-confidence are dealt with accordingly.

The Results Sub-Committee and the Source Protection Sub-Committee have been established to provide specialised support for their respective areas of interest. To ensure close liaison, the Chair for each sub-committee is a member of the full Committee and the secretariat attends all meetings. Advisory Committee members may attend sub-committee meetings at any time.

The Terms of Reference of the Advisory Committee and the Source Protection Sub-Committee and the current membership of all committees can be found on the back pages of this document.

It should be noted that the Committees do not have an incident management or emergency response role.

When do the Committees meet?

Advisory Committee for the Purity of Water	
Frequency	Four times each year
When	Six weeks after each financial quarter
Duration	Three hours
Location	Grace Vaughan House, Shenton Park

Results Sub-Committee	
Frequency	Four times each year
When	Four weeks after each financial quarter
Duration	Three hours
Location	Grace Vaughan House, Shenton Park

Source Protection Sub-Committee	
Frequency	Monthly
When	Third week in each month
Duration	Three hours
Location	Rotating venues between agencies

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How is drinking water regulated in Western Australia and where does the Advisory Committee for the Purity of Water fit in?

Regulation of drinking water in Western Australia is divided into licensed and non-licensed providers, with the Advisory Committee an integral part of the monitoring framework.

The Economic Regulation Authority licenses larger providers such as the Water Corporation, Aqwest, Busselton Water Board, the Rottnest Island Authority and Hamersley Iron Pty Ltd. As part of the license arrangement each licensed water provider is required to establish a binding Memorandum of Understanding for Drinking Water Quality with the Department of Health.

All other non-licensed drinking water providers, such as caravan parks, roadhouses, camps, small or remote communities and mine sites are monitored directly by the Department of Health, through either Local Government environmental health officers or by direct reporting by mine sites or the Department of Housing (under the Remote Area Essential Service Program).

Through both sub-committees the Advisory Committee reviews all drinking water monitoring and catchment management activities undertaken throughout the State. Combining this information with scientific and industry knowledge, the Advisory Committee is able to identify and respond to longer term trends and anomalies that may affect public health in Western Australia.

Would you like more information?

For more information about any aspect of the Advisory Committee for the Purity of Water please contact:

Mr Richard Theobald
Secretary
Advisory Committee for the Purity of Water
Department of Health
P.O. Box 8172
Perth Business Centre WA 6849

Telephone: 08 9388 4999

Email: richard.theobald@health.wa.gov.au

www.public.health.wa.gov.au/2/640/2/drinking_water.pm

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Advisory Committee for the Purity of Water - Terms of Reference

(as endorsed by the Minister for Health on 15 April 1998)

- To advise the Hon Minister for Health and the Executive Director Public Health on matters relating to the regulation of drinking water quality.
- To advise the Ministers for Health and Water Resources on any matter effecting the quality of drinking water that is referred to the Committee by either Minister or initiated by the Committee.
- To report to the Ministers from time to time on any matter arising out of these Terms of Reference that the Committee considers should be brought to their attention.
- To recommend alternative quality criteria or guideline values for drinking water in various parts of the State, where those recommended by the National body may be inappropriate.
- To regularly review the results of the routine and any special tests carried out by any water provider, the Health Department of Western Australia and local governments on drinking water supplies available to the public from both public and private sources.
- To review and advise on arrangements and procedures adopted for monitoring the quality of drinking water.
- To keep under review trends or practices that might adversely affect the quality of catchment run-off or groundwater used or available for use.
- To consider and advise on proposed developments or practices that might affect the quality of catchment run-off or groundwater used or available for use for drinking water supplies.
- To advise on special studies or surveys relating to the quality of drinking water to receive reports on such studies or surveys, and recommend any actions considered necessary.
- To foster inter-departmental cooperation for the efficient carrying out of action taken under the above Terms of Reference.
- To seek advice and Committee input as required and from specialist organisations to accomplish the above Terms of Reference.

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Drinking Water Source Protection Sub-Committee - Terms of Reference

(as endorsed by the Advisory Committee on 8 August 2011)

- To assist the Advisory Committee for the Purity of Water to protect Public Drinking Water Source Areas, consistent with the Australian Drinking Water Guidelines catchment to consumer risk based multiple barrier framework.
- To receive and provide advice on water quality monitoring data in Public Drinking Water Source Areas.
- To ensure that source protection issues of concern are passed on within respective agencies for appropriate action.
- To provide feedback on the nature and extent of agency responses to source protection issues or incidents.
- To provide input to the development of agency protocols dealing with source protection issues.
- To keep all agencies informed of relevant source protection developments.
- To provide advice on legislative changes that may have an impact on drinking water quality issues.
- To consider the implications of State, National and International policy and practice in relation to the protection of drinking water quality in Public Drinking Water Source Areas.

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Membership details - 2011

Advisory Committee for the Purity of Water

Senior representatives from:

Department of Health (Chair and Secretariat)
Department of Environment and Conservation
Department of Agriculture and Food
Department of Water
Economic Regulation Authority
Aqwest (Bunbury Water Board)
Busselton Water Board
Parsons Brinckerhoff
Water Corporation
Chemistry Centre

Source Protection Sub-Committee

Representatives from:

Department of Water (Chair and Secretariat)
Department of Health
Water Corporation

Results Sub-Committee

Representatives from:

Department of Health (Chair and Secretariat)
PathWest Laboratory Medicine
Parsons Brinckerhoff
Water Corporation
Chemistry Centre

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