Lead in Drinking Water & Lead Safe™ Tapware Solutions

ADEB Health & Aged Care Conference NSW – 18th July 2019

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Snapshot of the presentation

1. Why we do what we do
2. What's been happening with lead?
3. What 0.01 means?
4. Infield testing methods
5. What affects lead in water?
6. Lead levels in plumbing materials
7. What have we been up to lately?
8. A few new Lead Safe™ taps

1. Why we do what we do

We are passionate about providing **Water Solutions for a Healthier Environment.**

Our key markets are:

Mental Health

Education

Clinical Health

We design and supply specialised taps, water management systems and fixtures for better and safer communities

2. In the press in WA, it's been like this since June 2017

2. NSW has had studies & media coverage since July 2016

Contents lists available at ScienceDirect

Environmental Research

journal homepage: www.elsevier.com/locate/envres

Widespread copper and lead contamination of household drinking water, New South Wales, Australia

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ABSTRACT

This study examines arsenic, copper, lead and manganese drinking water contamination at the domestic consumer's kitchen tap in homes of New South Wales, Australia. Analysis of 212 first draw drinking water samples shows that almost 100% and 56% of samples contain detectable concentrations of copper and lead, respectively. Of these detectable concentrations, copper exceeds Australian Drinking Water Guidelines (ADWG) in 5% of samples and lead in 8%. By contrast, no samples contained arsenic and manganese water concentrations in excess of the ADWG. Analysis of household plumbing fittings (taps and connecting pipework) show that these are a significant source of drinking water lead contamination. Water lead concentrations derived for plumbing components range from 108 μg/L to 1440 μg/L (n=28, mean – 328 μg/L, median – 225 μg/L). Analysis of kitchen tap fittings demonstrates these are a primary source of drinking water lead contamination (n=9, mean – 63.4 μg/L, median – 59.0 μg/L). The results of this study demonstrate that along with other potential sources of contamination in households, plumbing products that contain detectable lead up to 2.84% are contributing to contamination of household drinking water. Given that both copper and lead are known to cause significant health detriments, products for use in contact with drinking water should be manufactured free from copper and lead.

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1. Introduction

Metal contamination of drinking water and its potential health effects has impacted human populations for centuries (Bellinger, 2016). Perhaps most famously, albeit controversially, ancient Rome's use of lead in water supply infrastructure has been argued to have caused lead poisoning that contributed to the fall of the empire (Delile et al., 2014; Evans, 1997; Scarborough 1984; Waldron, 1973). Better understanding of the health impacts and consequent corrosion control measures followed the identification of elevated lead and copper concentrations in drinking water resulting from the use of lead service lines in Boston, United States of

of Flint, in Michigan USA, a public health catastrophe has unfolded after 100,000 residents received drinking water via the reticulated town supply contaminated with lead (example of water testing: n=271 samples, mean – 10.0 μg/L, max – 1050 μg/L, Flint Water Study, 2015) due to the absence of corrosion control measures (US EPA 2016).

Global research of contaminated drinking water supplies has revealed that some contaminants derived from the local environment, such as arsenic and manganese from bedrock, are widespread and pose a persistent problem (Das et al., 1995; Khan et al., 2011, 2012; Lu et al., 2014; Oulhote et al., 2014). The World Health Organisation described the contamination of Bangladesh ground water supplies by the regional bedrock as a 'public health emer-

2. Aldi was in the news in Qld back in July 2017

Choose Bupa, Australia's No. 1 health insurer for overseas visitors.

QT THE QUEENSLAND TIMES

JUST IN NEWS SPORT LIFESTYLE COMMUNITY JOBS MOTORING REAL

Infants who drink formula are most at risk.

HEALTH

Shock tap water health warning

by Frank Chung
25th Nov 2018 12:52 PM

Australian households have been officially advised to run their taps for at least 30 seconds in the morning amid fear of lead poisoning from plumbing products.

The alert was issued in July by enHealth - a standing committee representing federal, state and territory health departments, the Health and Medical Research Council and the New Zealand Min

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Aldi lead contamination: Consumers warned against drinking from taps, amid ACCC investigation

By Kathryn Perrott
Posted 10 Jul 2017, 4:41pm

Taps sold at supermarket chain Aldi may be contaminating drinking water with lead at up 15 times the maximum allowable level, tests by Queensland Health Forensic and Scientific Services show.

The Australian Competition and Consumer Commission (ACCC) has warned people to avoid drinking or cooking with water from the Easy Home spiral spring mixer tap, advertised in Aldi's June 10 catalogue, "until more is known about the health risks that may be posed".

It is believed the tap may be installed in thousands of Australian homes, including 3,000 units reportedly sold in Queensland.

The Queensland Building and Construction Commission (QBCC) said it commissioned the tests on the tap during an investigation into a separate issue.

"Our initial test results show that there is a cause for concern, and that the tapware may cause lead contamination of drinking water," QBCC

ALDI Special Buys $79.99 HOME UPGRADE

PHOTO: The Easy Home spiral spring mixer tap was advertised in the supermarket's June catalogue. (Supplied)

RELATED STORY: Hep A scare prompts Australia-wide recall of frozen berries

RELATED STORY: Garlic bread recalled after fears of plastic contamination

Key points:

- Traces of lead were found in Easy Home spiral spring mixer taps

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- Man arrested in Sydney terror raids was planning to attack 'landmarks': Police
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- Beach closed, man in hospital with 'deep gash' after Sydney shark attack
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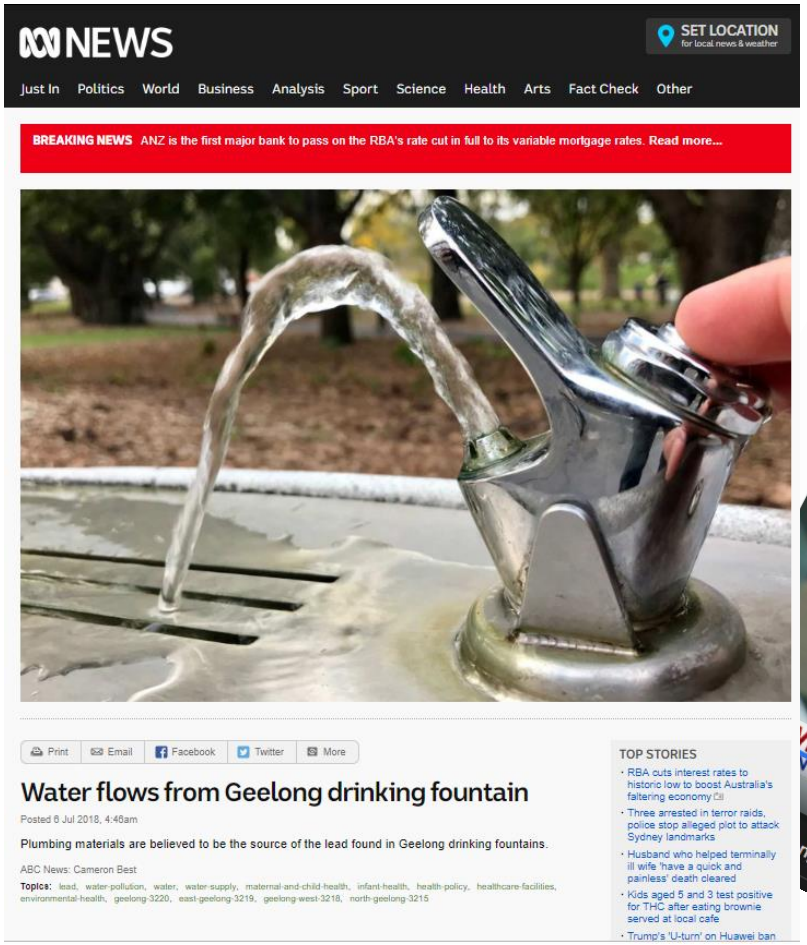
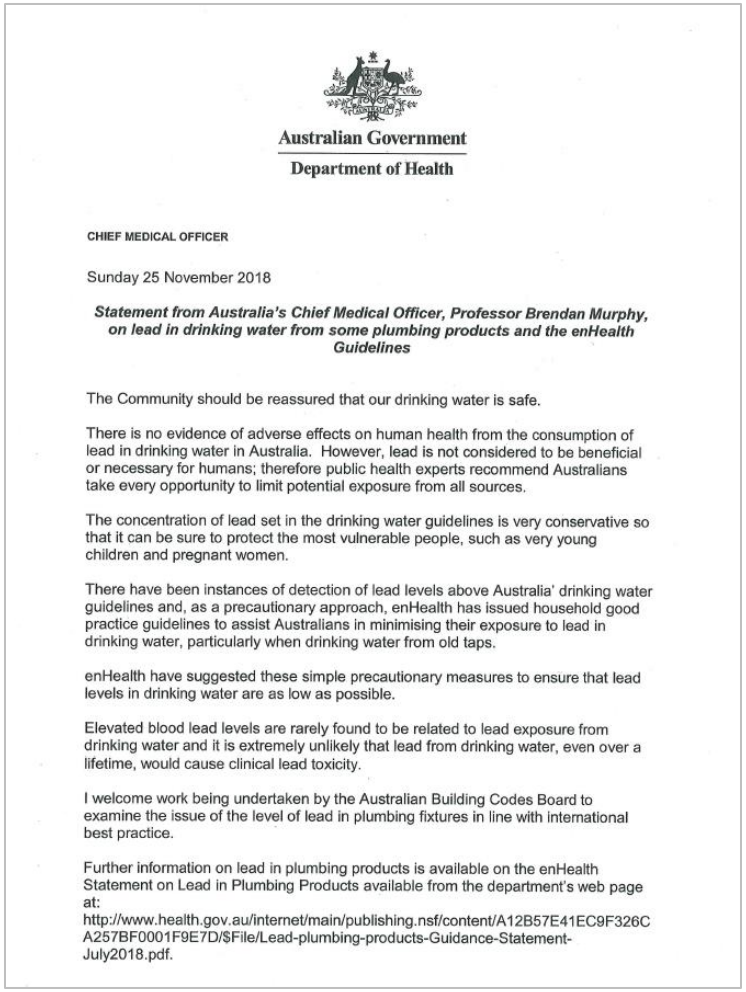
- 'It will always be there': Young

2. In Vic lead issues surfaced in Geelong in May 2018



2. Recently the federal government recognized the issue



Australian Government
Department of Health

CHIEF MEDICAL OFFICER

Sunday 25 November 2018

Statement from Australia's Chief Medical Officer, Professor Brendan Murphy, on lead in drinking water from some plumbing products and the enHealth Guidelines

The Community should be reassured that our drinking water is safe.

There is no evidence of adverse effects on human health from the consumption of lead in drinking water in Australia. However, lead is not considered to be beneficial or necessary for humans; therefore public health experts recommend Australians take every opportunity to limit potential exposure from all sources.

The concentration of lead set in the drinking water guidelines is very conservative so that it can be sure to protect the most vulnerable people, such as very young children and pregnant women.

There have been instances of detection of lead levels above Australia' drinking water guidelines and, as a precautionary approach, enHealth has issued household good practice guidelines to assist Australians in minimising their exposure to lead in drinking water, particularly when drinking water from old taps.

enHealth have suggested these simple precautionary measures to ensure that lead levels in drinking water are as low as possible.

Elevated blood lead levels are rarely found to be related to lead exposure from drinking water and it is extremely unlikely that lead from drinking water, even over a lifetime, would cause clinical lead toxicity.

I welcome work being undertaken by the Australian Building Codes Board to examine the issue of the level of lead in plumbing fixtures in line with international best practice.

Further information on lead in plumbing products is available on the enHealth Statement on Lead in Plumbing Products available from the department's web page at:
http://www.health.gov.au/internet/main/publishing.nsf/content/A12B57E41EC9F326CA257BF0001F9E7D/$File/Lead-plumbing-products-Guidance-Statement-July2018.pdf.

enHealth Guidance Statement - Lead in drinking water from some plumbing products - Good practice for householders – July 2018

Householders can proactively **reduce their potential exposure** to lead in drinking water through the following measures:

- flushing cold water taps used for drinking and cooking for about 30 seconds first thing in the morning……
- choosing plumbing products that have been certified to WaterMark and AS/NZS 4020:2005; and/or have low lead content or are lead free…

There is no need for households to have their water tested for lead.

2. And some state governments are doing their own thing

VICTORIAN SCHOOL BUILDING AUTHORITY

VICTORIA State Government

PRACTICE NOTE

Plumbing Fittings and Piping Systems in New School Buildings and Upgrades

Issued January 2019

Purpose

The Victorian School Building Authority (VSBA) has developed a new standard of risk reduction with respect to brass plumbing fittings in new school buildings or upgrades. This standard is detailed below, under 'New Requirements'.

Audience

This Practice Note is issued to all Principal Design Consultants, Services Engineers and Building Contractors for VSBA and school led projects.

Current Requirements and Context

The current National Construction Code and standards allow for brass tapware and other plumbing fittings that typically contain between 2 and 4.5 per cent of lead. This is higher than the USA standard, which allows up to 0.25% lead. The 2018 Building Quality Standards Handbook also allows the use of brass fittings.

While lead is a naturally occurring substance and Victoria's water supply is safe to drink, lead can leach into drinking water from some lead-containing brass plumbing fittings or piping systems where water has been sitting in contact with them for a period of time.

Stainless steel, copper and plastic plumbing products do not contain lead. [NB: Piping systems are usually comprised of plastic or copper products]. Further, some new brass tapware products are designed to prevent water and lead-containing brass from coming into contact with each other and are, therefore, lead-safe.

New Requirements

Following consideration of these issues, the VSBA will act with an abundance of caution and continually improve all assets located on land owned by the Minister or where there is Crown land managed by the Minister or the Department. The Authority has, therefore, decided on the following measures:

1. lead-free or –safe tapware and piping systems[1] (made from stainless steel, plastic, copper, or lead-free or -safe brass, for instance), are to be installed on all drinking water services in new Victorian schools or in upgrades to existing schools, where the required products are available on the Australian market, and
2. plumbing fixtures, materials and fittings installed in new Victorian schools or in upgrades to existing schools must be certified under the WaterMark Certification Scheme
3. the Building Quality Standards Handbook will be amended to reflect these changes as part of its next annual update
4. the VSBA/DET will provide advice to school principals about best practice tap water usage to assure against potential risks from existing brass plumbing, such as:
   - only using cold water taps to draw cooking or drinking water after flushing or running them for a few seconds, and
   - flushing or running water from the tap furthest away from the primary water source for two to three minutes after a holiday, and
   - collecting flushed water for other use, such as on gardens or for cleaning.

The first change will apply to any capital project in any stage of a design or documentation phase at or after 1 February 2019.

Tom Kirkland
Executive Director
Victorian School Building Authority

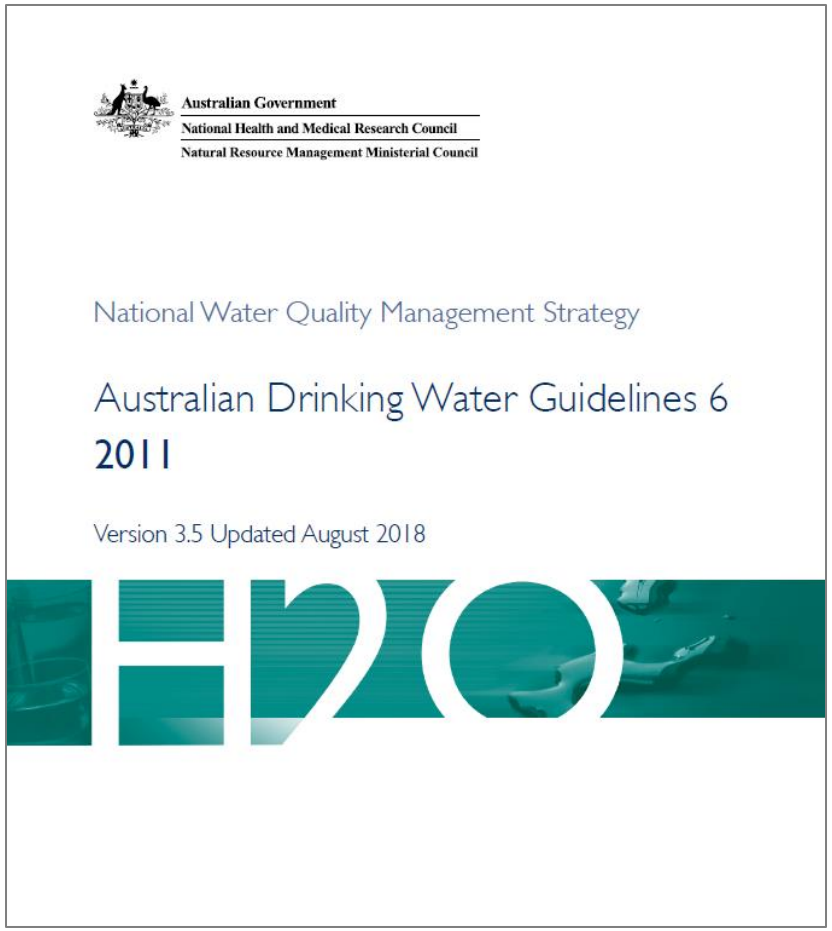
[1] Lead free tapware and piping systems include all of the plumbing infrastructure and fittings used in any drinking water service, including external taps, pipe fittings, breeches and thermostatic mixing valves, for example.

3. What does this number mean?

0.01

0.01mg/L = The **maximum allowable** concentration of **lead** in drinking water.

- Taken from the Australian Drinking Water Guidelines (ADWG).
- Based on a World Health Organisation (WHO) assessment and was determined by the need to protect the groups most at risk - young children, infants and pregnant women.



3. What does this number mean?

The value was determined as follows:

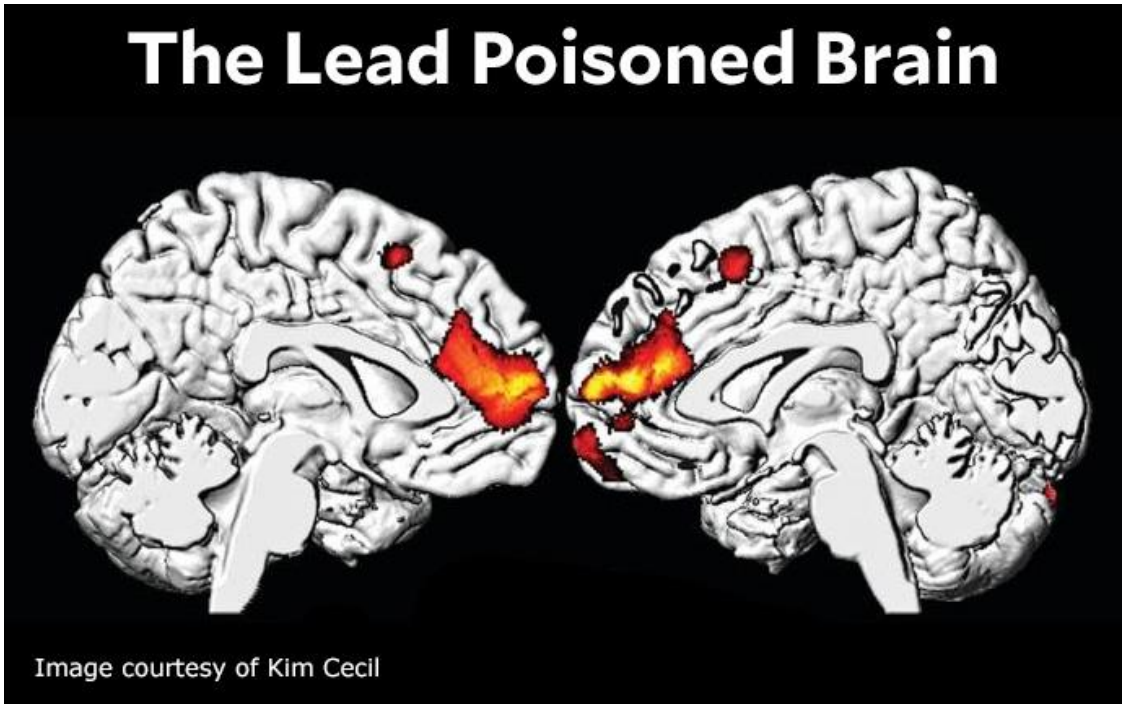
$$0.01\text{mg/L} = \frac{0.0035\ \text{mg/kg body weight per day} \times 13\text{kg} \times 0.2}{1\ \text{L/day}}$$

where:

- *0.0035 mg/kg body weight per day is the lead intake which, based on metabolic studies with infants, does not result in an increase in lead retention (Ziegler et al. 1978. Ryu et al. 1983).*
- *13 kg is the average weight of a child at 2 years of age.*
- *0.2 is the proportion of total lead intake attributable to water consumption. Sufficient data are available to indicate that 80% of intake is from food, dirt and dust.*
- *1L/day is the average amount of water consumed by a young child."*

3. What does this number mean?

There is **agreement** that lead exposure is a **health issue.**



Key Facts – WHO

- Lead is a **cumulative** toxicant that affects multiple body systems and is particularly harmful to **young children**.
- Lead in the body is distributed to the brain, liver, kidney and bones
- There is no known level of lead exposure that is considered safe.
- Lead exposure is **preventable**.

3. What does this number mean?

Ancient Rome's use of lead in water supply infrastructure has been controversially argued to have caused lead poisoning that contributed to the **fall of the empire** *(Delile et al., 2014; Evans, 1997; Scarborough 1984; Waldron, 1973).*

3. What does this number mean?

But there are **different views** amongst experts, authorities and media over:

- whether an individual test finding of > 0.01 means there is an actual health risk,
- or, whether it is more of a **lifetime measure**

To answer this you really need to consider:

- The **typical users** and their **usage patterns**
- WHO says **water is only 20%** of average lead intake
- The long-term **health findings**

enHealth says that in Australia, elevated blood lead levels in people are **rarely found** to be related to lead exposure from **drinking water**.

4. Confusion over in-field water testing methods?

Some of the testing being done in the field in Australia is creating **public concern** about elevated levels of lead in drinking water.

This has the potential to **impact opinion** regarding the possible effects on public health, and the suitability and safety standards of plumbing products & practices.

The testing methods used vary dramatically, and it is possible that some techniques may **not be adequate** in generating accurate data on metal levels in water.

4. Confusion over in-field water testing methods?

Opposing sides both claim to use the methods set-out in the Australian Standard

- AS/NZS 5667.5:1998 – Water Quality – Sampling.

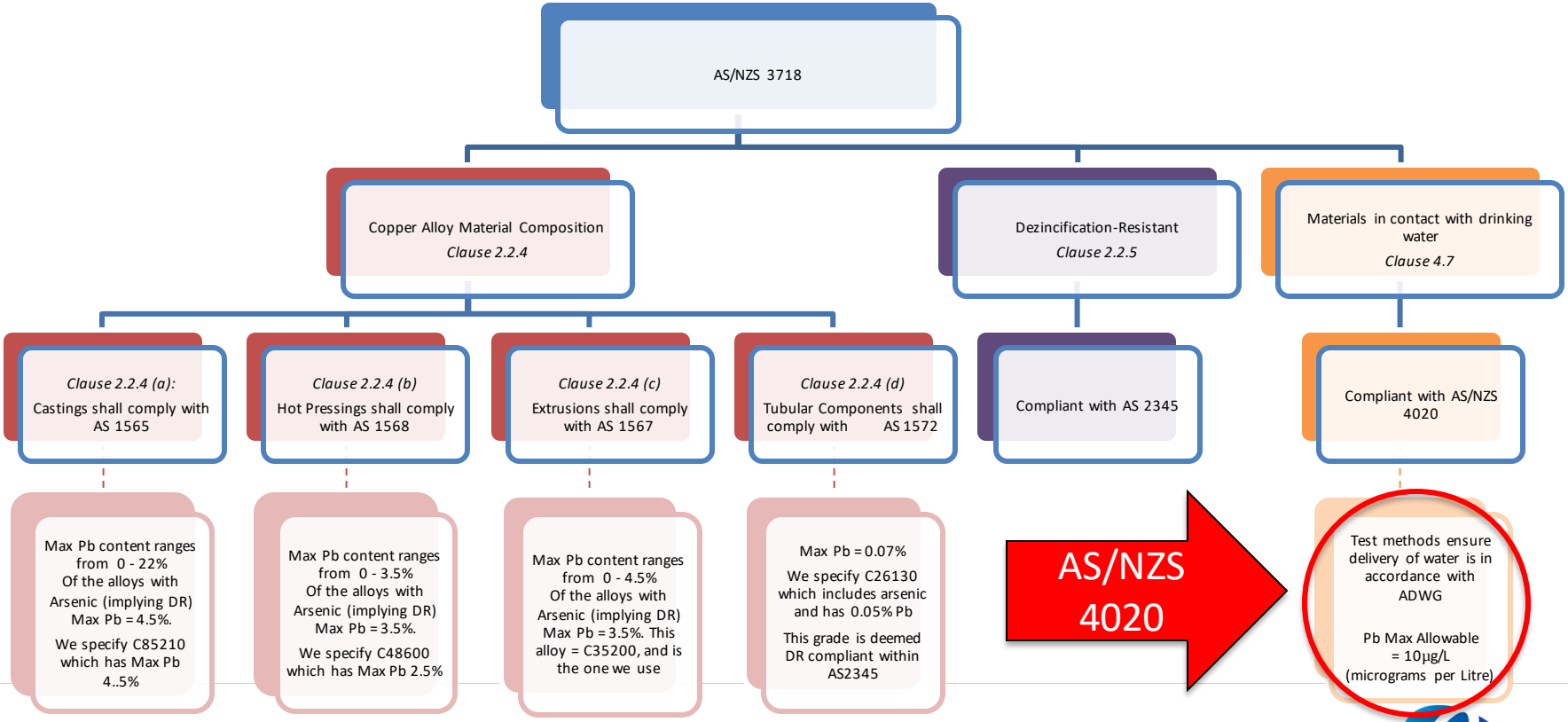
So **who is right**?

- PCH – WA Health or John Holland
- Aldi – QBCC or Aldi
- Perth Stadium – Sunday Times or WA Health

And **internationally** is it USA or Canada or Germany or Australia or…. is it somewhere in-between?

4. Confusion over in-field water testing methods?

What Australian plumbing product manufacturers do now is covered via the **WaterMark** scheme. This is **strictly controlled and audited** to ensure products meet the current levels in the ADWG.



4. Confusion over in-field water testing methods?

Unlike AS/NZS4020, **AS/NZS 5667.5** can be silent or **vague** on key sampling and testing processes. It needs to better address:

- The flushing and/or **stagnation periods**
- The **volume** of water extracts tested
- **Site** specific issues

Otherwise misinformed debate in the media will continue.

A more detailed and scientific method should be agreed and should align with AS/NZS4020. We **have submitted a proposal** to SA to have AS/NZS 5667.5 revised.

5. Confusion over what affects lead levels in water?

Many factors contribute to the **variability** of lead concentration results from drinking water testing, including:

- type of **materials** used in the plumbing system
- **age & complexity** of the plumbing system
- **usage patterns** of inhabitants
- stability of **flow rates** in the system
- **stagnation** and dead-leg areas
- build up over time of a protective mineral crusting or **patina** on the inside of pipes
- **chemicals** introduced into the water supply (eg. chlorine vs chloramine)
- fluctuations in **water quality** (pH and alkalinity)

5. Confusion over what affects lead levels in water?

Many authorities and researchers from around the world speak on these topics:

- Health Canada
- USA's EPA
  - *Flint Michigan, April 2014*
- German Ministry of Health

In Australia, there is a lot of **good research** being done by groups we have dealt with below:

- Macquarie University – Harvey, Handley & Taylor
- University of NSW - Laws
- University of Western Australia - Ghadouani

6. What is happening with lead levels in plumbing materials?

enHealth is supporting efforts to reduce the level of lead in drinking water in Australia from plumbing products and is engaging with authorities to ensure plumbing products in contact with drinking water **do not adversely affect water quality & people's health.**

- This includes **research** to determine the extent that plumbing products may contribute to lead levels in drinking water in excess of the health-related guideline value in the ADWG.

- The installation of plumbing fittings in Australia is overseen by State and Territory plumbing regulatory agencies. These agencies are now collectively working to address the issue of lead in plumbing products at the national level, through the **Australian Building Codes Board** (ABCB).
  - *The ABCB administers the **National Construction Code** (NCC)*

6. What is happening with lead levels in plumbing materials?

Depending on the outcomes of the Regulatory Impact Statement (RIS), **changes may be made** by the **ABCB** to the **NCC (2022)** as to what levels of lead & other elements will be allowed in plumbing products:

- It is likely this would then cascade down into the relevant Australian Standards (eg. AS/NZS 4020) and WaterMarks (eg. AS/NZS 3718)
- Indications are that Australia is **likely to follow** something similar to the **USA**'s Safe Drinking Water Act (SDWA) legislation (effective 2014), which defines lead free as:
  - *Not more than a weighted average of **0.25%** when used with respect to the wetted surfaces of pipes, pipe fittings, plumbing fittings, and fixtures*
- Though… it is still possible Australia may opt for a zero level of lead

7. What has Galvin Engineering been up to?

GalvinClear® = Lead Safe™ Technology

Whilst our traditional commercial taps are manufactured from quality DZR brass, meet strict Australian Standards, and are totally safe for potable water, we are offering our customers a **greater level of choice** due to the demand for Lead Safe™ taps in the community.

7. What has Galvin Engineering been up to?

GalvinClear® Lead Safe™ = Quality + Safety

Products marked with our GalvinClear® Lead Safe™ logo have been redesigned and re-engineered to provide safer water delivery by utilising specialist materials such as **Stainless Steel** or plastic materials that are free of Lead, and **DZR brass that is low in Lead**.

Like with our traditional taps, our GalvinClear® Lead Safe™ taps are tested to **AS/NZS 4020**, have WaterMark certification, go through in-house testing in our Test Laboratory and rigorous infield testing.

7. What has Galvin Engineering been up to?

What are GalvinClear® Lead Safe™ products made of?

As 'lead free' is not currently defined by law or plumbing codes in Australia and New Zealand, we have based our definition of Lead Safe™ on the USA's SDWA definition of lead free

- *Not more than a weighted average of 0.25% lead…….*

Depending on the commercial application, we are currently using several metallic materials:

- **316 Stainless** Steel with 0% Lead - Lead Free
  - *Used in drinking bubblers*
- ***DZR Brass with ≤ 0.25% lead*** *- Lead Safe™*
  - *Used in thermostatic mixing valves & taps, drinking bubblers and push button taps*

7. What has Galvin Engineering been up to?

Lead Testing at UWA

THE UNIVERSITY OF WESTERN AUSTRALIA

SEEK WISDOM

Anas Ghadouani
BSc MSc PhD
Professor and Programme Chair for Environmental Engineering
Head, Aquatic Ecology and Ecosystem Studies

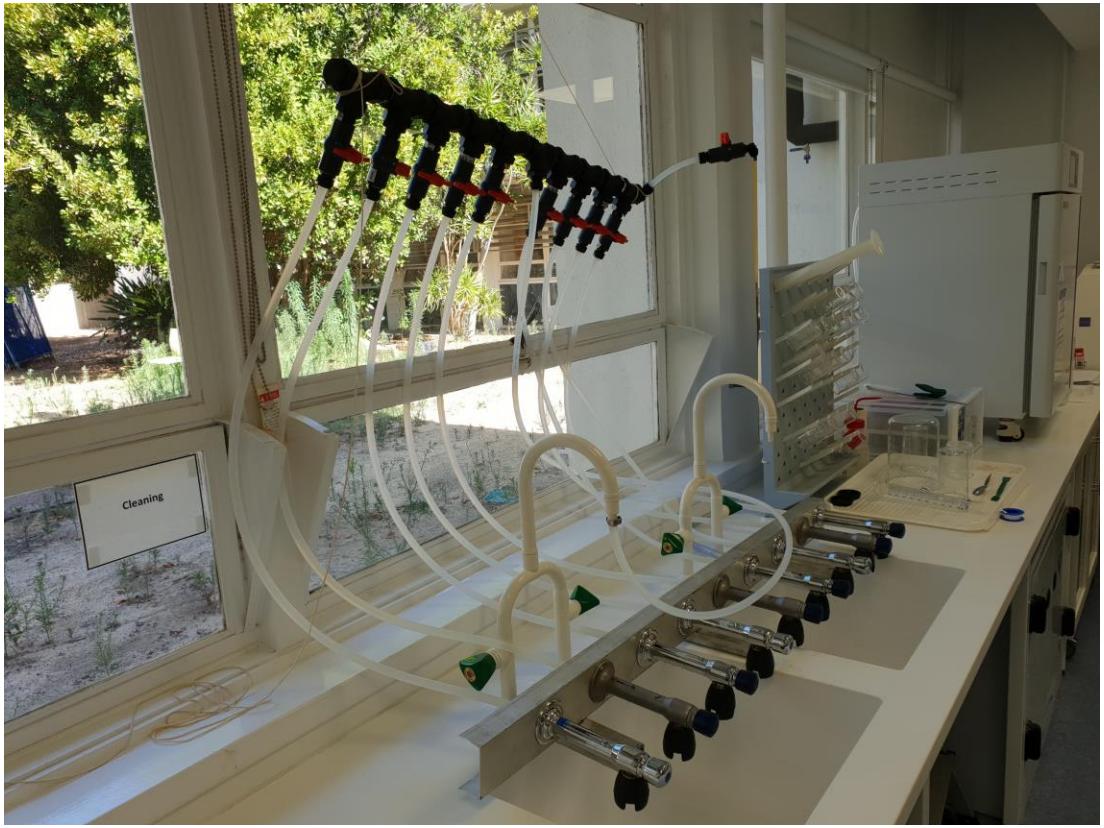


Image of Galvin Engineering taps being tested at UWA

8. Lead Safe™ Taps for Hospitals & Aged Care Facilities

CliniMix® Lead Safe™ Thermostatic Progressive Mixers

Hob Basin Taps

Wall Basin Taps

Shower Mixers

6. Lead Safe™ Taps for Hospitals & Aged Care Facilities

CliniMix® Lead Safe™ Thermostatic Progressive Mixers

- Designed to provide **stable** mixed temperature and **rapid shut down** in the event of cold or hot water supply failures
- Enables water to be mixed **closer to the point of discharge**
  - *Minimising warm water which can provide an ideal condition for legionella bacteria to grow.*
- Smooth internal and external components
- Features a **hygienic laminar flow outlet**.
- The long lever sequential control handle is easy to access for users and provides more precise control of temperature
  - *Water flow always starts from cold for safe usage.*
- Unique **thermal disinfection** bypass feature
- All servicing and commissioning can be done without removing the device
  - *Easy to access isolators help to minimise the time of commissioning and maintenance.*
- Hands Free Progressive Mixers include **hygiene rinse** feature which can be set to activate at regular 12, 24 or 48 hour/s intervals to remove any stagnant water
  - *This will reduce the number of metals that may leach into the water from the plumbing system, and assist in minimising the growth of bacteria such as Legionella*

8. Lead Safe™ Taps for Schools & Child Care Facilities

Ezy-Drink ® Lead Safe™ Stainless Steel Drinking Bubblers

Horizontal Taps

Electronic Taps

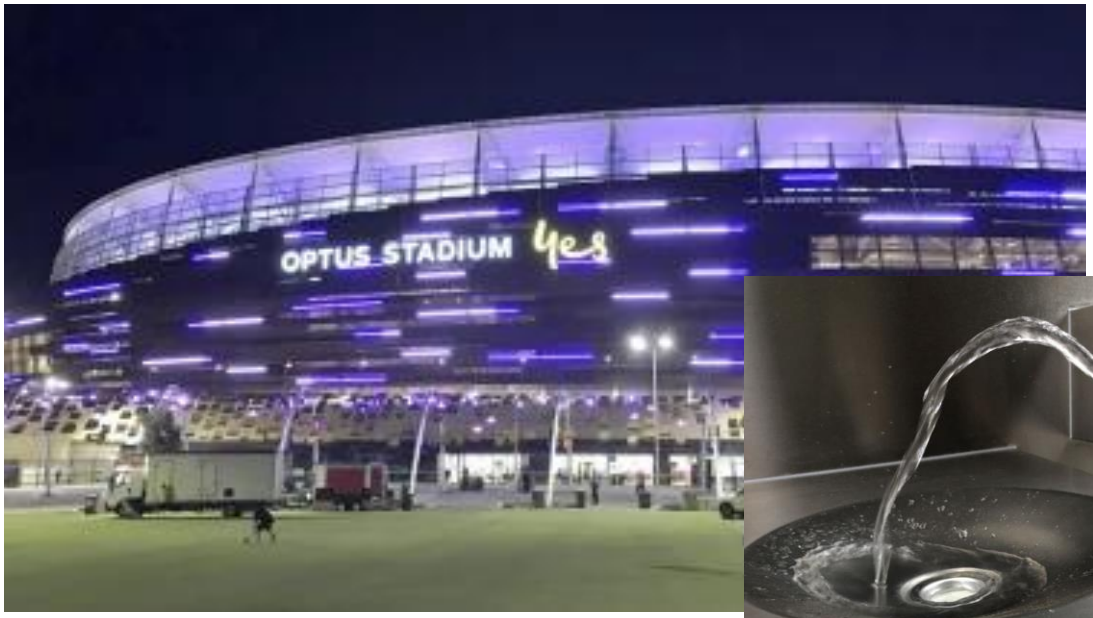
Vertical Taps

8. Lead Safe™ Taps for Schools & Child Care Facilities

Ezy-Drink ® Lead Safe™ Stainless Steel Drinking Bubblers

- The electronic piezo tap has a unique **hygiene rinse** feature which can be set to activate at regular 12, 24 or 48 hour/s intervals to remove any stagnant water
  - This will reduce the number of metals that may leach into the water from the plumbing system, and assist in minimising the growth of bacteria such as Legionella
- The electronic piezo tap requires **no manual pressure** to operate the taps
  - This makes it ideal for small children or people with hand impairments
- Taps include a unique rubber mouthguard which has been specially designed to **protect teeth** in the rough and tough environment of the schoolyard and playground.
- Unique rubber compound in the mouthguard offering high resistance to:
  - *fungal and bacterial attack*
  - *sunlight and environmental ageing*

8. Lead Safe™ Taps in Optus Stadium in Perth



Images of Galvin Engineering taps installed at the Optus Stadium

Thanks for listening and feel free to call

At Galvin Engineering, we are passionate about Water Solutions for a Healthier Environment, so give us a call to share your thoughts and ideas on this important issue. We also offer CPD courses on designs for mental health facilities and for schools.

Chris Galvin – 0413 620 794

Galvin Clear® LEAD SAFE™

Certified System ™ Quality ISO 9001 SAI GLOBAL

Certified System ™ Environment ISO 14001 SAI GLOBAL

A family owned Australian business ™