The Safe Water Pub Test

Communicating Water Safety

Water Research AUSTRALIA

The Safe Water Pub Test
Communicating Water Safety

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Marty Hancock

The ABC of SafeWater

From Toxicology/Epidemology Risk, QMRA to HBT to LRV to CCP to PPM, a comprehensive process to ensure Safe Water but how does this translate for the customer? Options for informing consumers about water quality without the need for a science degree.

The Safe Water Pub Test
Communicating Water Safety

Stuart Khan

Various jurisdictions around the world have effectively defined safe drinking water by the way they present and implement guidelines, standards and regulation. The approach used in the ADWG is an important departure from what came before 2003/4, by the fundamental importance of the risk management frameworks. Thus ‘safe drinking water’ is no longer defined simply by the quality of water. Instead, the concept of ‘safe’ takes into account the potential for future incidents and accidents. This is an important risk management philosophy, but it is equally important that it is well understood and managed.

The Safe Water Pub Test
Communicating Water Safety

Kevin Hardy

Effectively communicating the safety of purified recycled water remains a persistent international challenge. Communities and individuals engage with water in dynamic, complex, and often fragmented ways. This talk will examine California's dialogue around drinking water safety through a case study of the Orange County Groundwater Replenishment System and its approach to defining "safe" water. Participants will also be invited to reflect on their own challenges in defining drinking water safety through the lens of three academic frameworks for assessing social legitimacy and its foundational element: trust. Together, we will consider how social legitimacy can reshape best practices for communication across the entire project life cycle in potable reuse.

The Safe Water Pub Test
Communicating Water Safety

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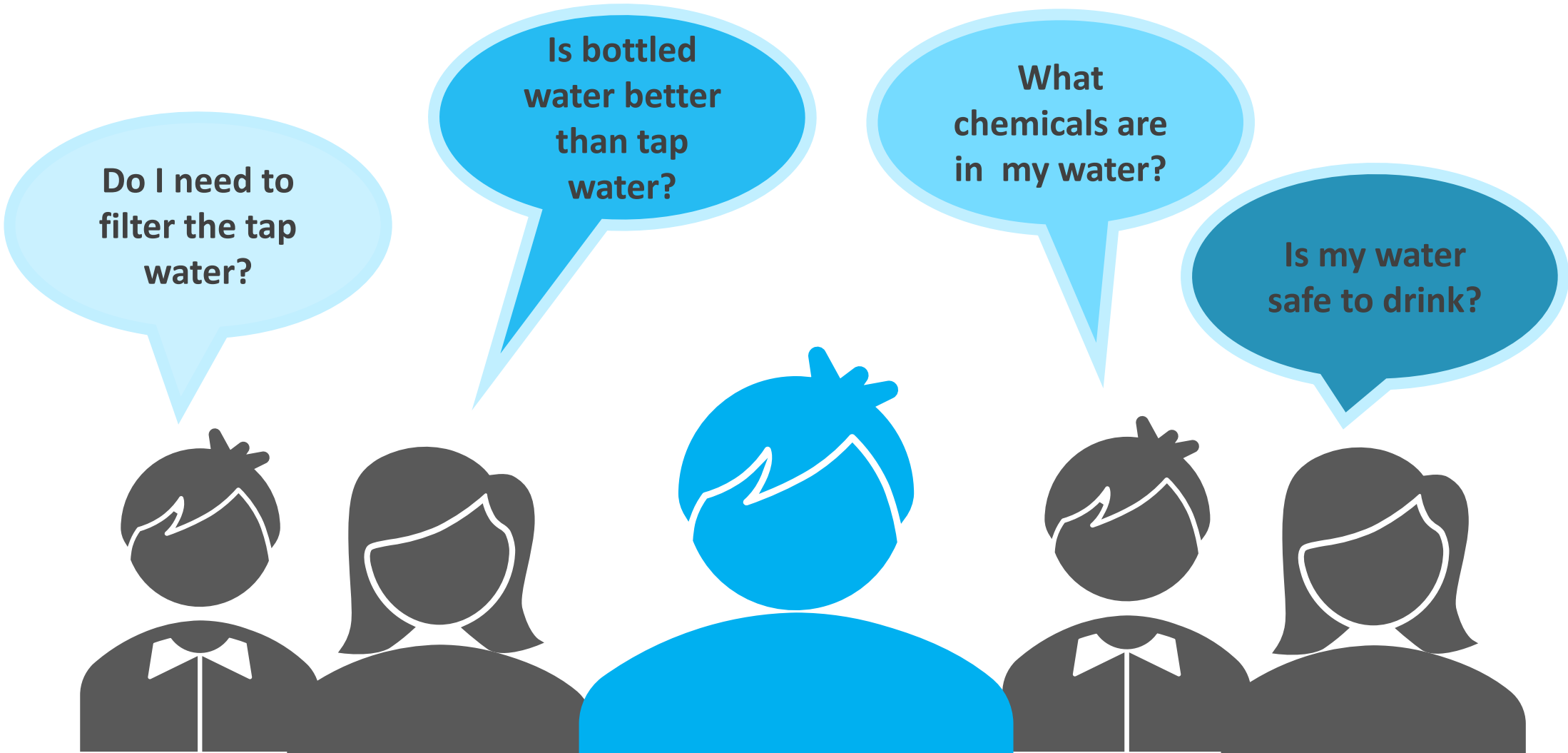
Danielle Francis

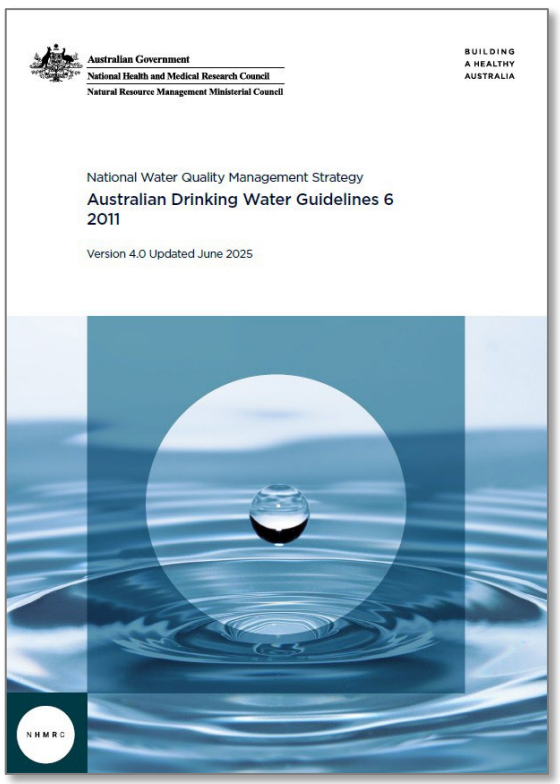
Exploring what safe water means from a customer lens and drawing on research learnings from local and international studies. Should we communicate safe water in terms of its outcome, its composition, source and treatment, or the thresholds it has to meet, or all of these aspects? Some international experts have studied perceptions of risk and stigma, and this has formed a basis for education programs on purified recycled water.

The Safe Water Pub Test

Communicating Water Safety



Communicating Drinking Water Safety
It’s Not Optional

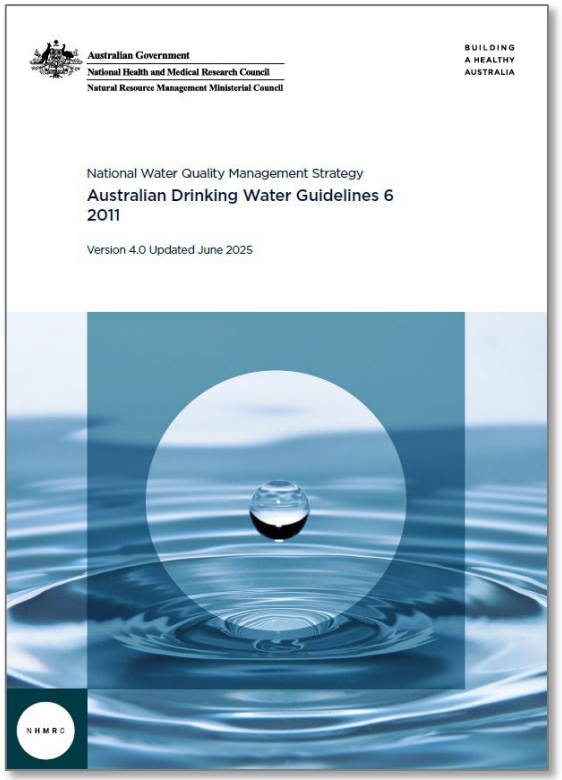


1.4 Community consultation

The Guidelines are intended to provide consumers with safe and aesthetically pleasing water, and ultimately it is consumers who will be the final judges of water quality. It is vitally important that consumers are viewed as active partners in making decisions about drinking water quality and the levels of service to be adopted. Community expectations and willingness to pay must be considered. It is the responsibility of drinking water suppliers to keep the community fully informed about water quality, existing problems and needs for improvement.

Consumers also need to be informed about their responsibilities in relation to domestic plumbing and of any possible issues associated with the interaction of mains water with this plumbing.

Communicating Drinking Water Safety
It's Not Optional



Chapter 1 Introduction

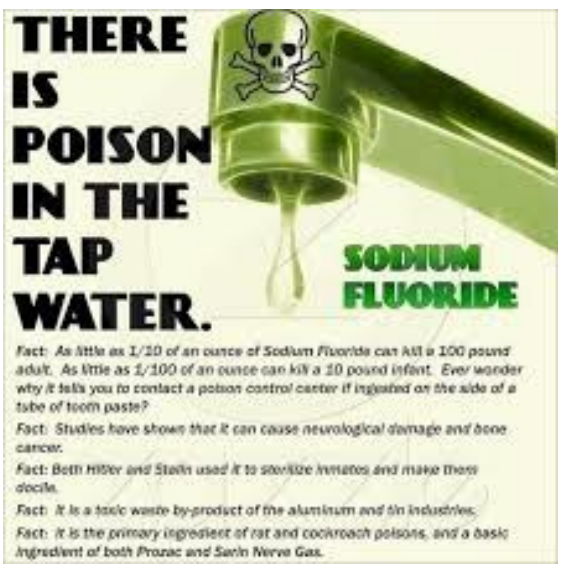
Safe drinking water, as defined by the WHO is Drinking Water Quality that does not represent any significant risk to health from short term and lifetime consumption.

Word search

Safe/safe water/safe drinking water **139 occurrences**

Google Research

Google Scholar



ChatGPT

"Safe water" refers to water that is free from harmful contaminants and is safe for drinking, cooking, bathing, and other everyday uses. Here’s a breakdown of what makes water "safe":

Customer Concerns

The Pub Test

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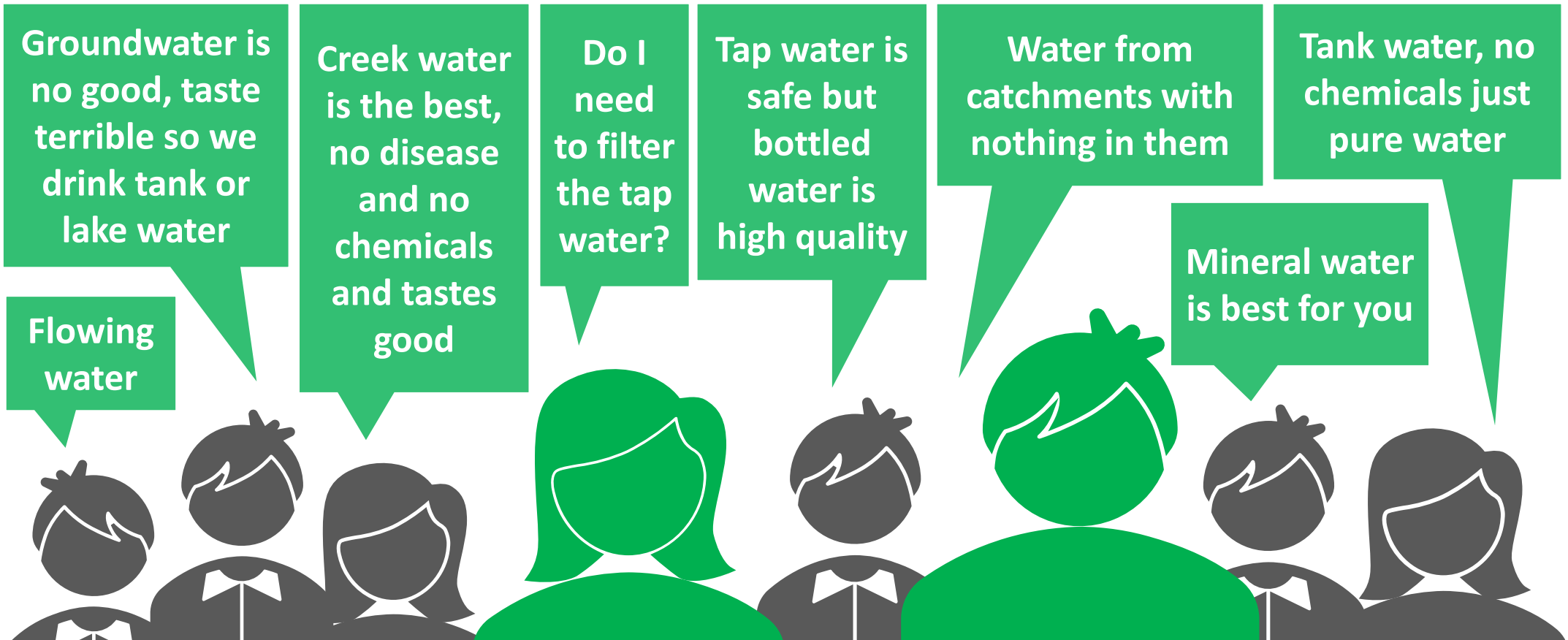
Source



What is Safe Water?

Treatment/Chemicals

I only drink water that has been through the kitchen filter

Only bottled water is safe

No harmful chemicals but with the natural minerals

Water that doesn't have forever chemicals

Tap water is OK for a shower but must be filtered or boiled to drink

We only drink ground water that has been treated with UV

Water that has been tested thoroughly

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Aesthetics

What is Safe Water?

Health

Putting Safe Water to the Pub Test

ADWG Pathogens → HBT 1µDALY → Water Supply QMRA → Treatment LRV → CCP → Monitor

Putting Safe Water to the Pub Test

ADWG Chemicals → HBT → NOEL PPM → Catchment → Treatment CCP → Monitor

Star Rating Systems

ENERGY RATING

aged care Star Ratings

5 HEALTH STAR RATING

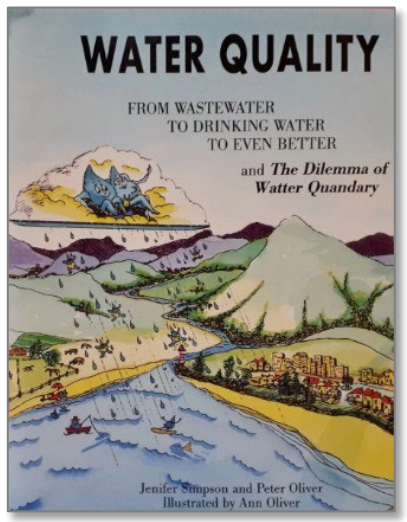
MICHELIN

ANCAP SAFETY TESTED 2023

Star Rating Systems

Jenifer Simpson (2006)

6 Star Rating system to describe the quality of water as it becomes progressively cleaner through a PRW scheme.



No Star Wastewater

★☆☆☆☆☆ Effluent screened

★★☆☆☆☆ Effluent Bio-dregadable material reduced, disinfected

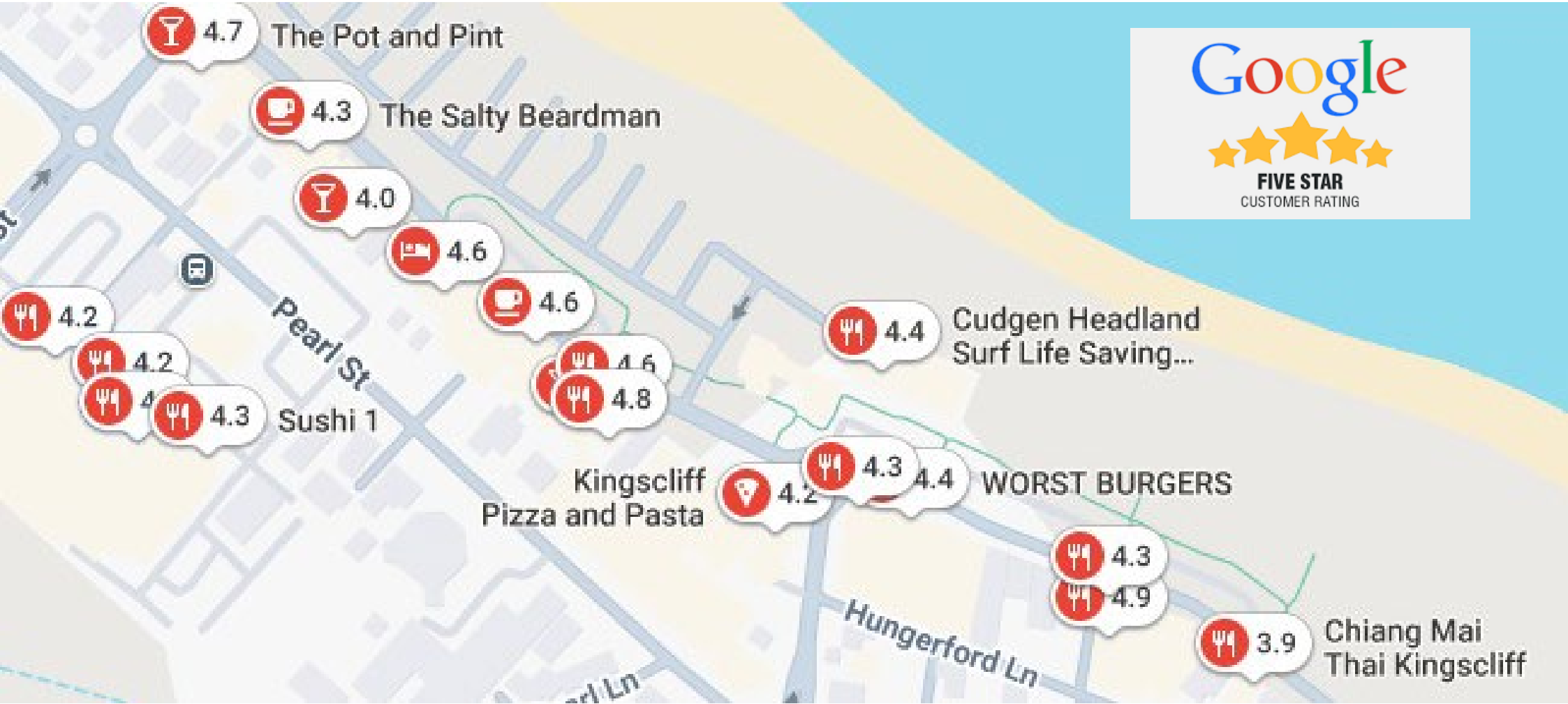
★★★☆☆☆ Effluent Nutrient removal

★★★★☆☆ Reclaimed water park/crop irrigation,Environmental release

★★★★★☆ Drinking Water, treated to ADWG

★★★★★★ Purer than drinking water, advanced treatment so it is as pure as water can be suitable for kidney dialysis, special industrial processes

Google Satisfaction Ratings



Communicating Water Safety

Test results vs ADWG

Water quality results: 1 July 2024 to 30 June 2025

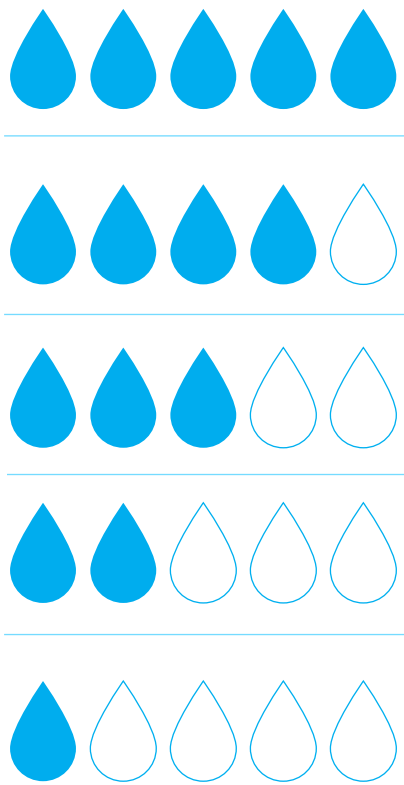
Measure		ADWG guidelines		Water supply system		
Parameter	Units	Health	Aesthetic	Tweed	Uki	Tyalgum
Physical characteristics *						
True colour	HU	N/a	15	1	1	2
Turbidity	NTU	N/a	5	0.2	0.1	0.1
Hardness	mg CaCO3/L	N/a	200	57	31.5	36
Alkalinity	mg CaCO3/L	N/a	N/a	61	41	48
Total dissolved solids	mg/L	N/a	600	109.5	94.5	78.5
pH	pH units	N/a	6.5 – 8.5	7.2	7.8	7.2
Disinfectants **						
Free chlorine	mg/L	5	N/a	0.77	0.84	1.09
Disinfection by-products **						
Trihalomethanes	mg/L	0.25	N/a	0.078	0.066	0.049
Chemical characteristics **						
Aluminium	mg/L	N/a	0.2	0.02	0.02	0.01
Antimony	mg/L	0.003	N/a	<0.001	<0.001	<0.001
Arsenic	mg/L	0.01	N/a	0	<0.001	<0.001
Cadmium	mg/L	0.002	N/a	<0.001	<0.001	<0.001
Calcium	mg/L	N/a	N/a	18	8.5	7.8
Chloride	mg/L	N/a	250	20	22	12
Chromium IV	mg/L	0.05	N/a	<0.001	<0.001	<0.001
Copper	mg/L	2	1	0.01	0	0.03
Fluoride	mg/L	1.5	N/a	0.93	0.06	0.07
Iron	mg/L	N/a	0.3	0.01	0.02	0.01
Magnesium	mg/L	N/a	N/a	4	3.15	4
Manganese	mg/L	0.1	0.05	0	0.01	<0.001
Nickel	mg/L	0.02	N/a	0	<0.001	<0.001
Lead	mg/L	0.005	N/a	0	<0.001	0
Sodium	mg/L	N/a	180	13	17.5	12
Sulfate	mg/L	N/a	250	2.9	2.85	1.5
Zinc	mg/L	N/a	3	0.01	0.01	0.01
Microbiological **						
E. coli	cfu/100mL	0	N/a	<1	<1	<1

Communicating Water Safety
Safety Continuum

Water safety continuum (Walker 2016) works on a graduated traffic light colour scale. The greater the shortfall between the estimated risk associated with the water supply and the 1 µDALY target, the more urgent and significant the action required to move the supply towards the benchmark value.

Figure 5.2 Water safety continuum for drinking water supplies

Safe Water Rating



Excellent

Very Good

Good

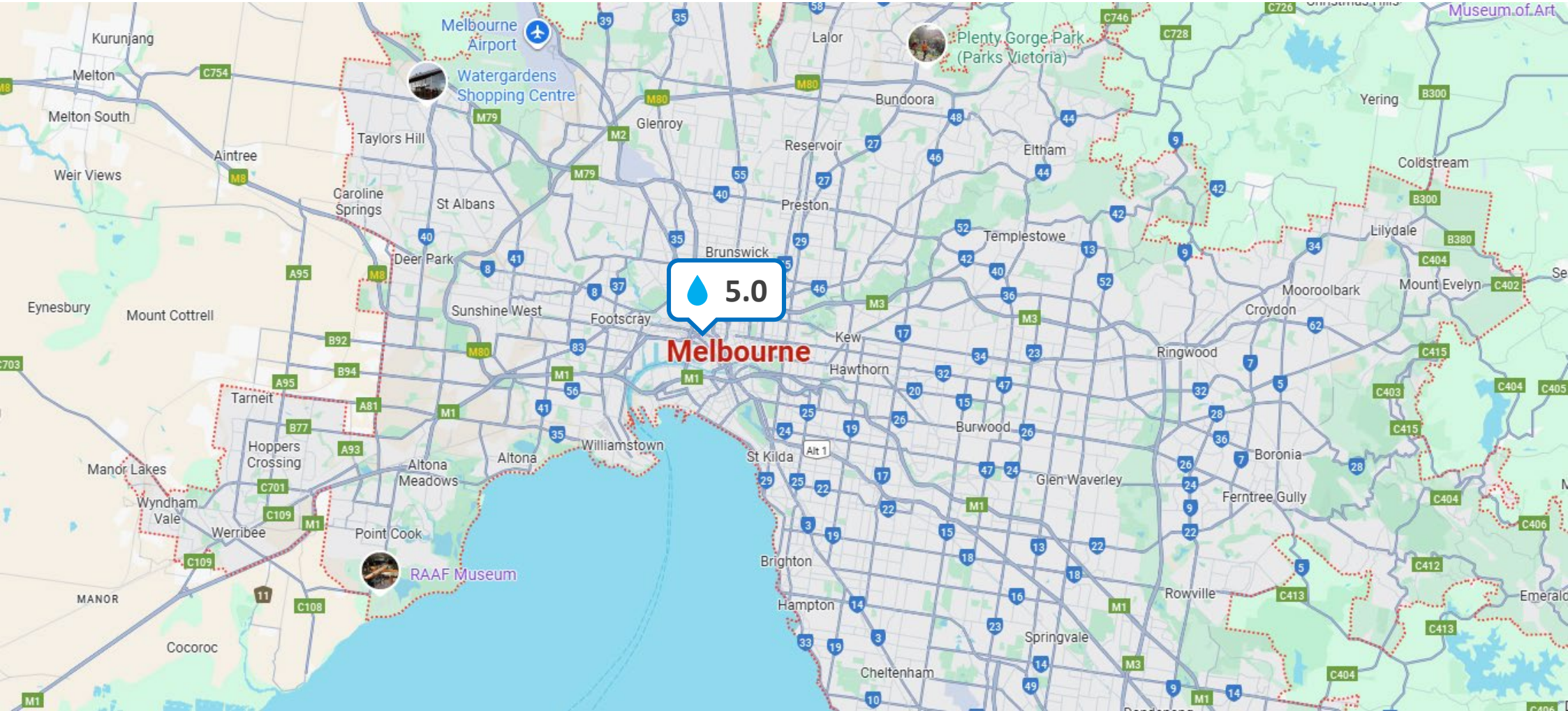
Poor

Not suitable for drinking

Calculation factors

- Compliance with water quality health limits
- Compliance with water quality aesthetic limits
- Compliance with HBT – DALYS
- Compliance with the ADWG Framework
- Compliance with regulations
- Customer satisfaction

Google Satisfaction Rating



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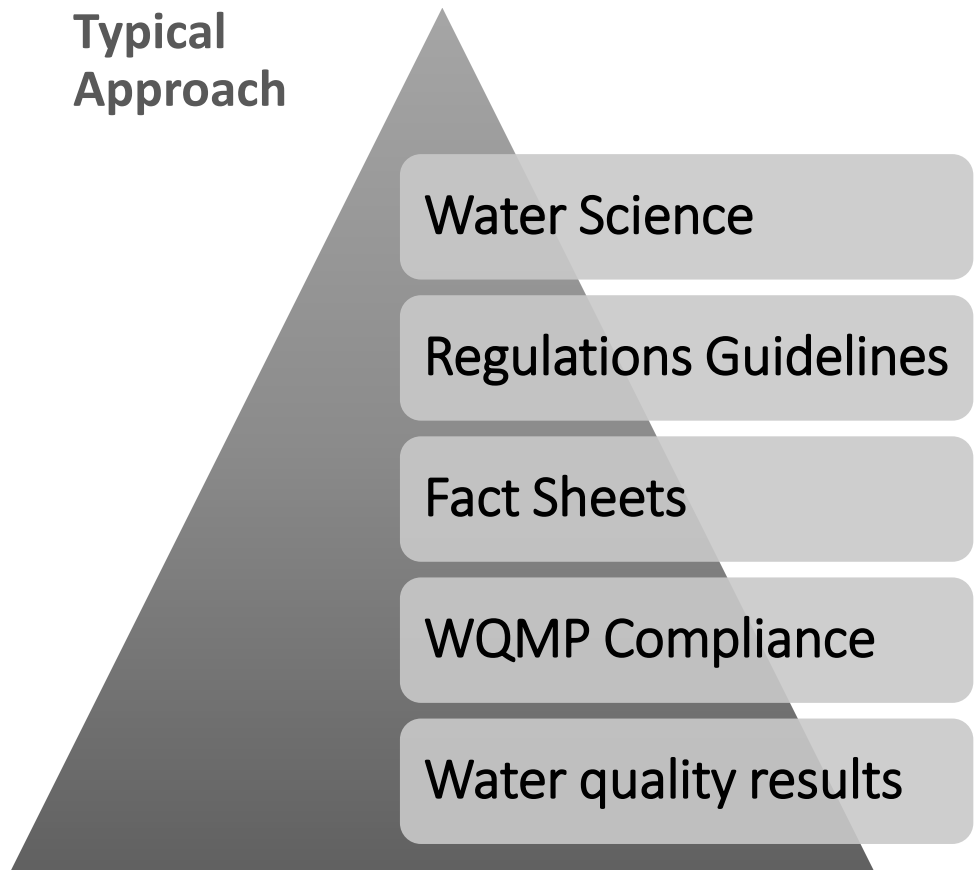
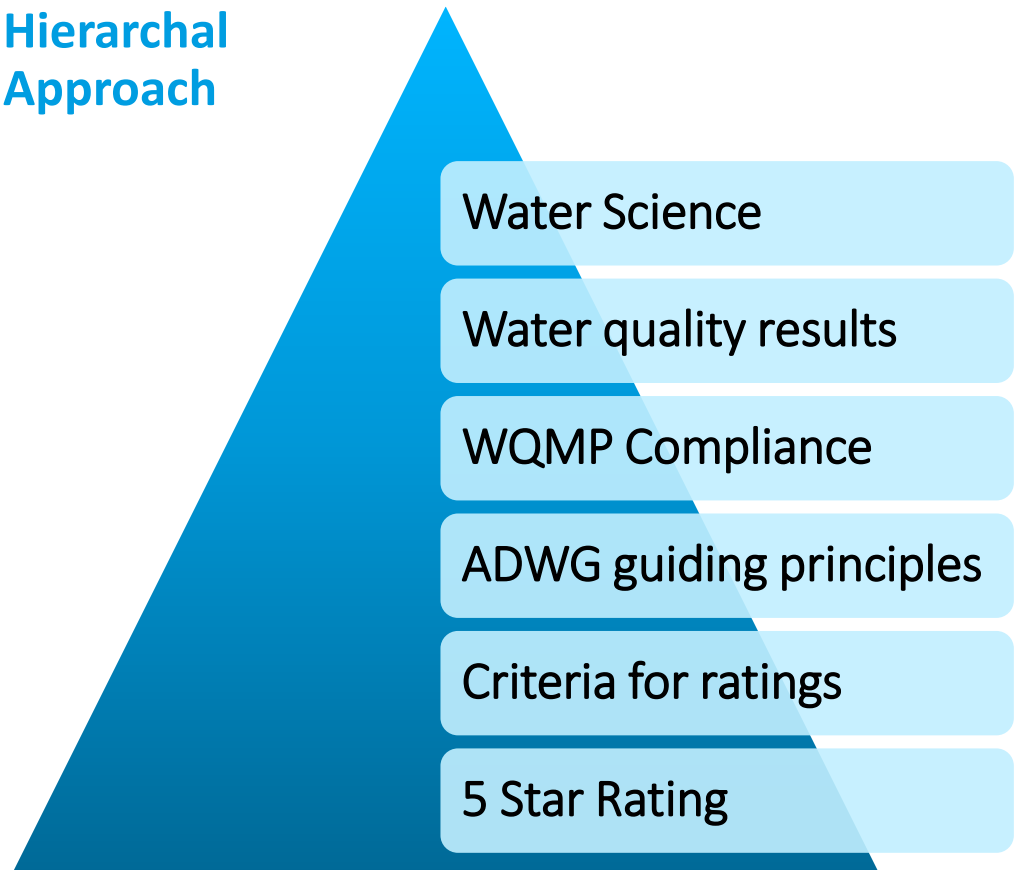
Typical Approach



Hierarchal Approach



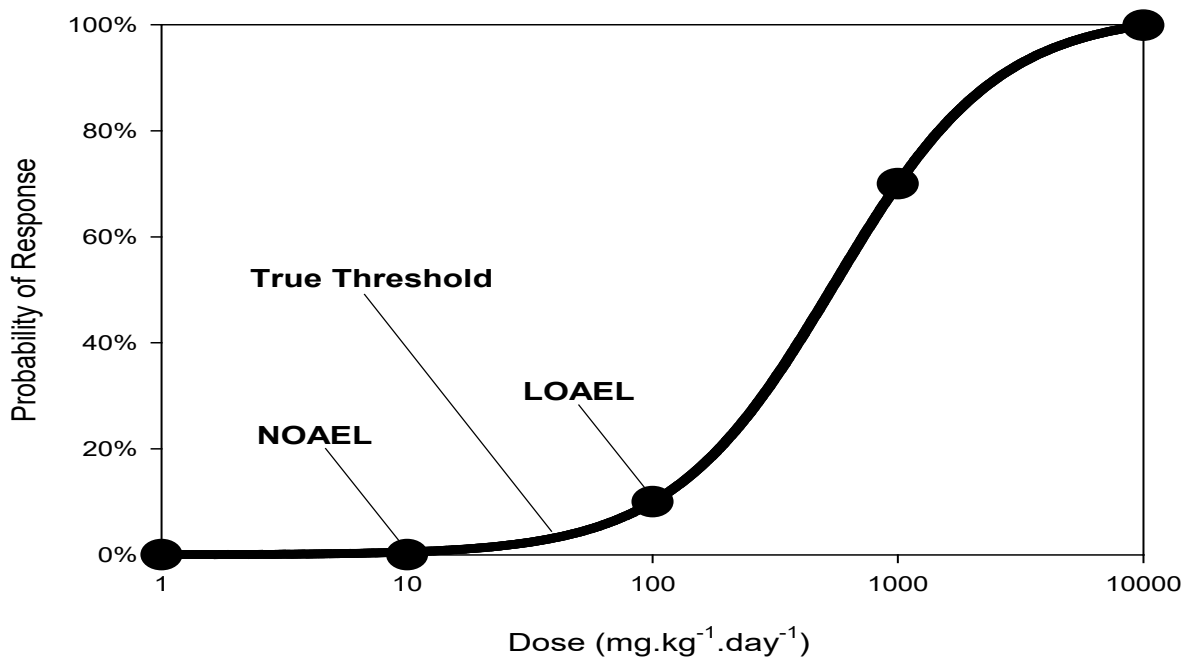
What is Safe Drinking Water anyway?

THE UNIVERSITY OF SYDNEY

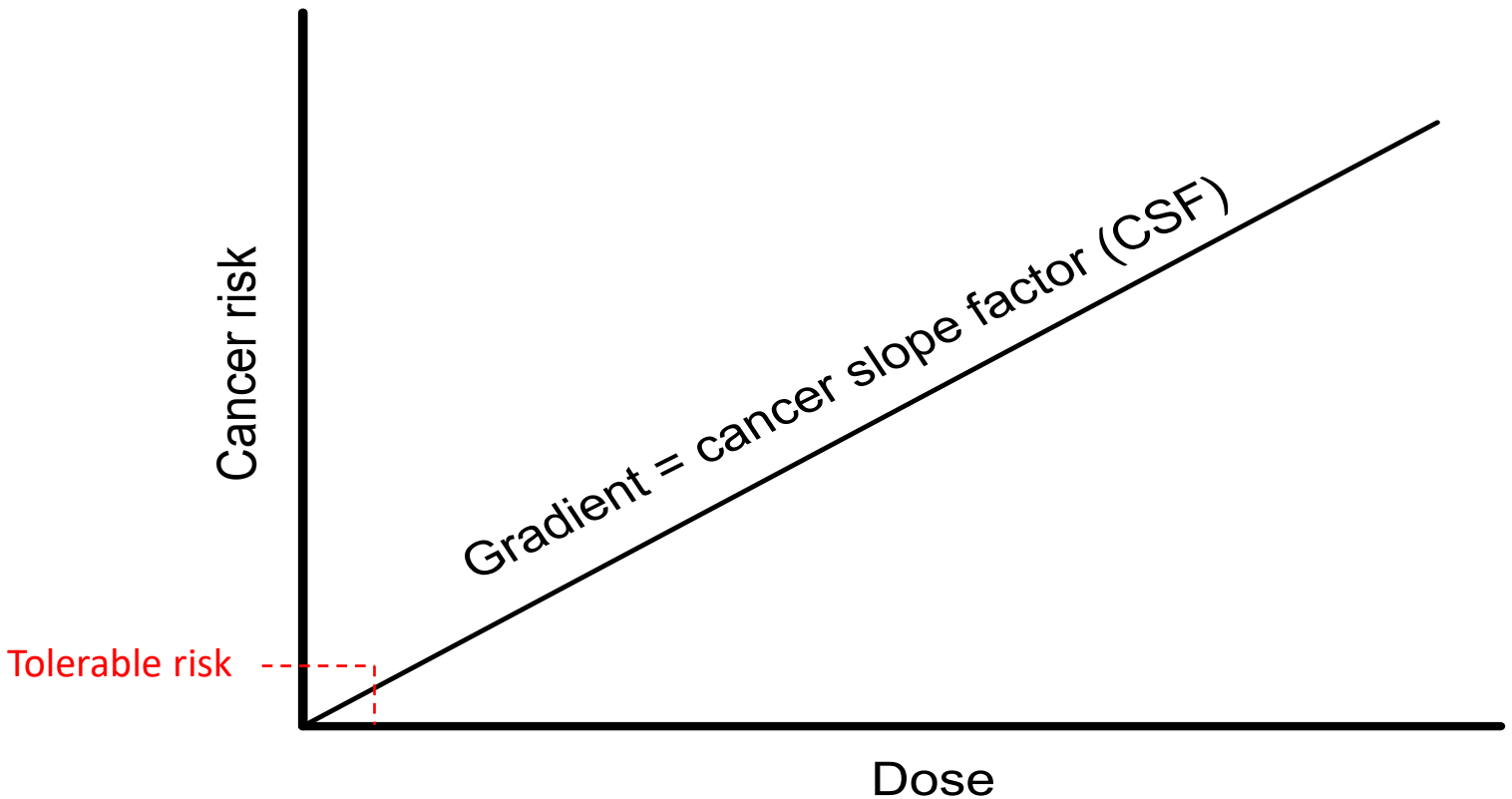
Stuart Khan

Professor and Head of School, Civil Engineering

$$\text{Safe Drinking Water Concentration (mg/L)} = \frac{\text{POD (NOAEL or LOAEL)} \times \text{BW} \times \text{PF}}{\text{IR} \times \text{UF}}$$



“No safe level….”?

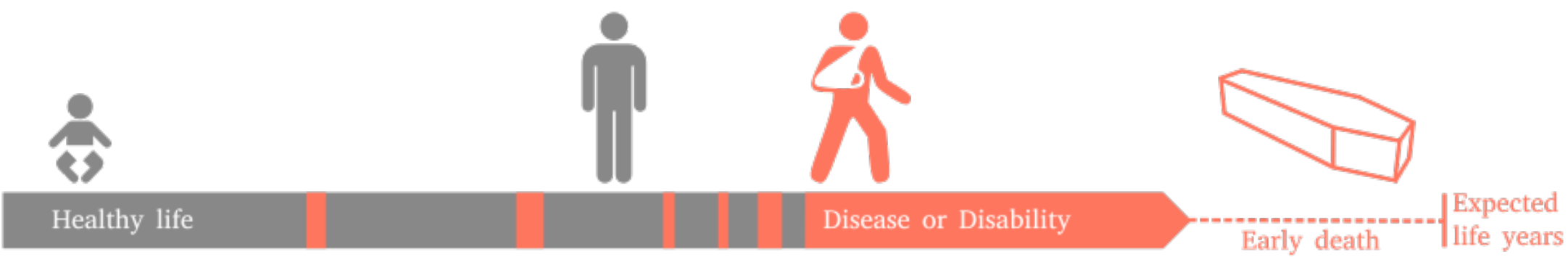


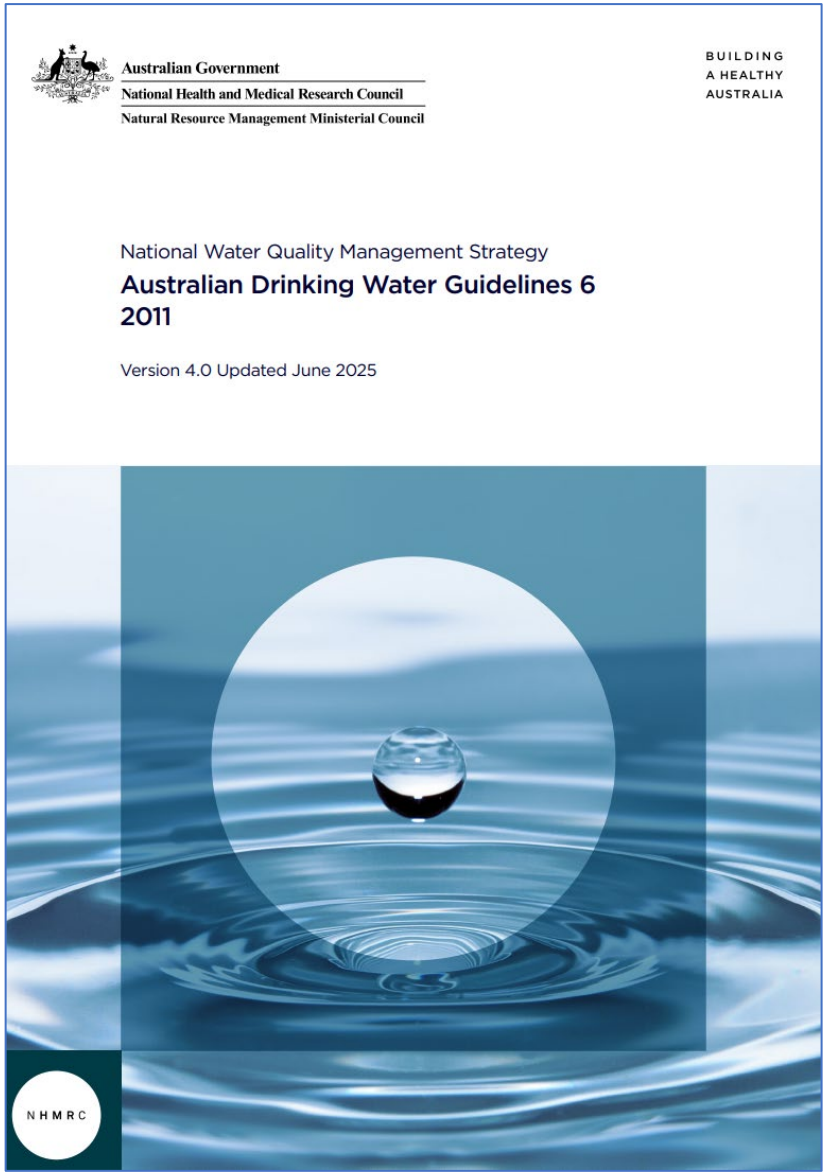
DALY

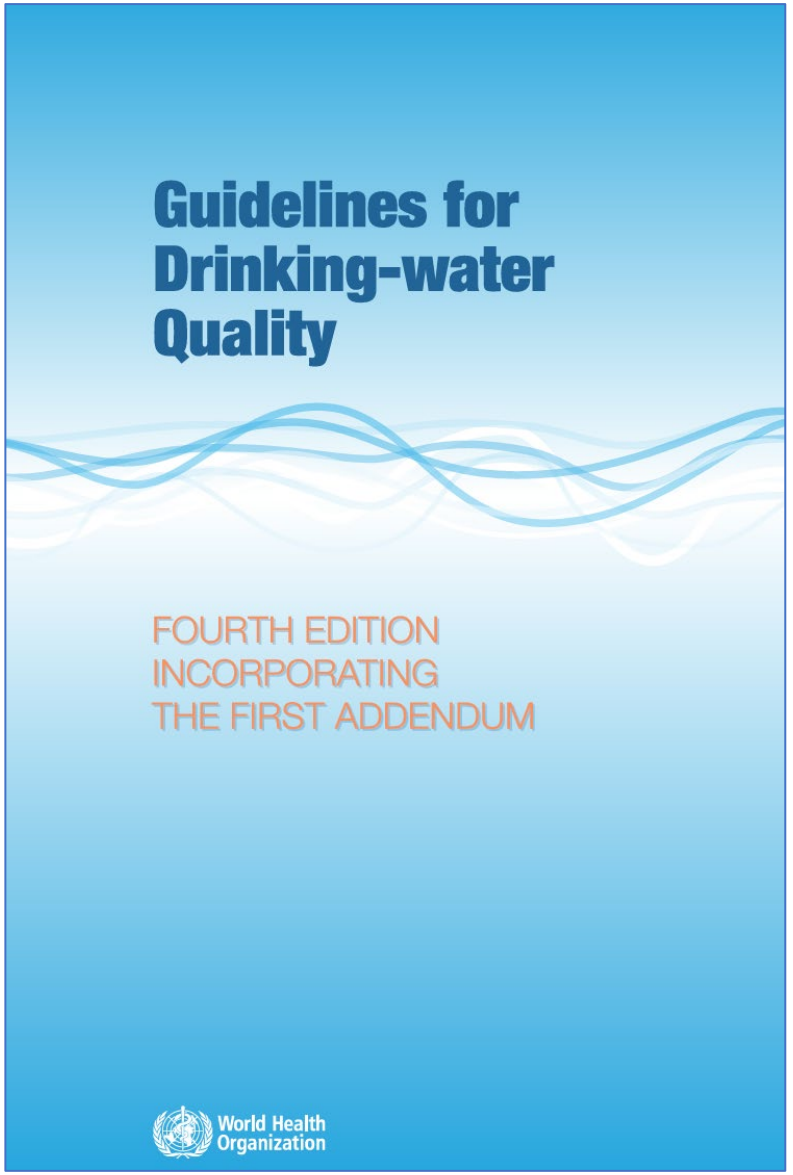
Disability Adjusted Life Year is a measure of overall disease burden, expressed as the cumulative number of years lost due to ill-health, disability or early death

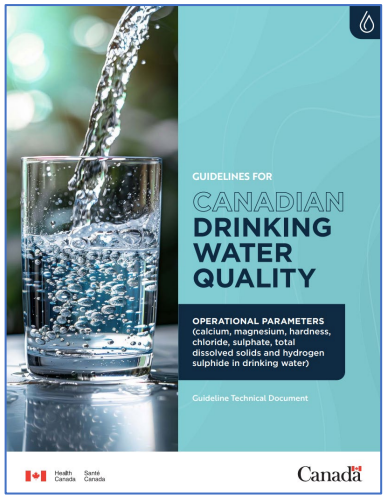
= YLD
Years Lived with Disability

\+ YLL
Years of Life Lost

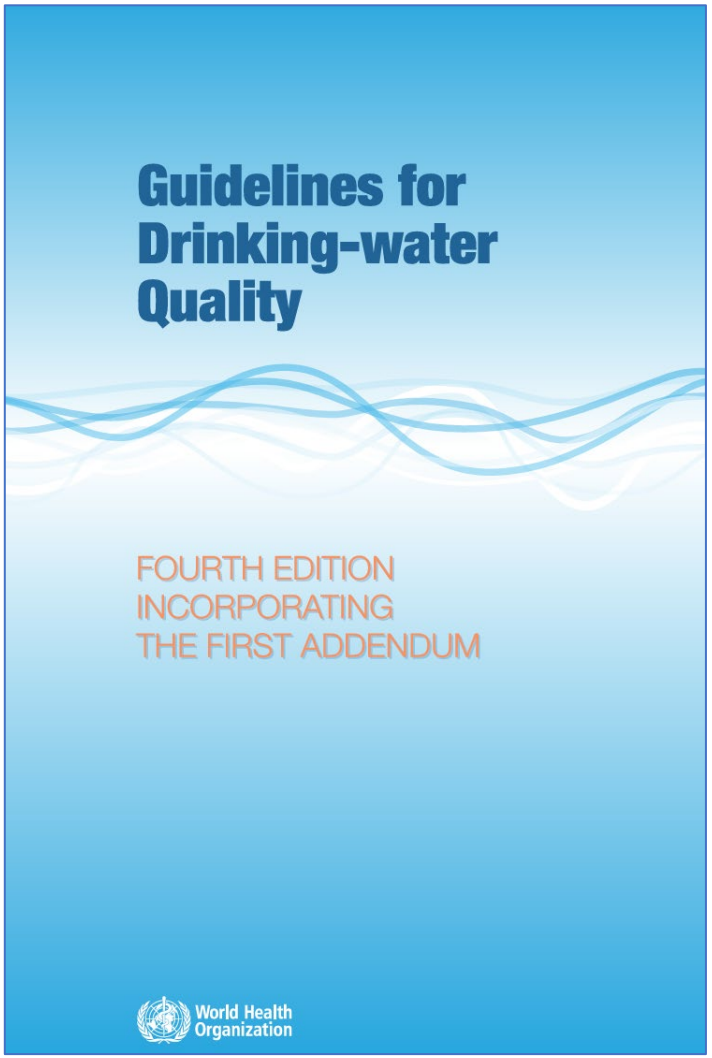



Australian Government
National Health and Medical Research Council
Natural Resource Management Ministerial Council
BUILDING A HEALTHY AUSTRALIA
National Water Quality Management Strategy
Australian Drinking Water Guidelines 6 2011
Version 4.0 Updated June 2025
NHMRC


Guidelines for Drinking-water Quality
FOURTH EDITION
INCORPORATING
THE FIRST ADDENDUM
World Health Organization


GUIDELINES FOR
CANADIAN DRINKING WATER QUALITY
OPERATIONAL PARAMETERS (calcium, magnesium, hardness, chloride, sulphate, total dissolved solids and hydrogen sulphide in drinking water)
Guideline Technical Document
Health Canada
Santé Canada
Canada


EPA United States Environmental Protection Agency
Environmental Topics
Laws & Regulations
Report a Violation
Safe Drinking Water Act (SDWA)
1
2
3

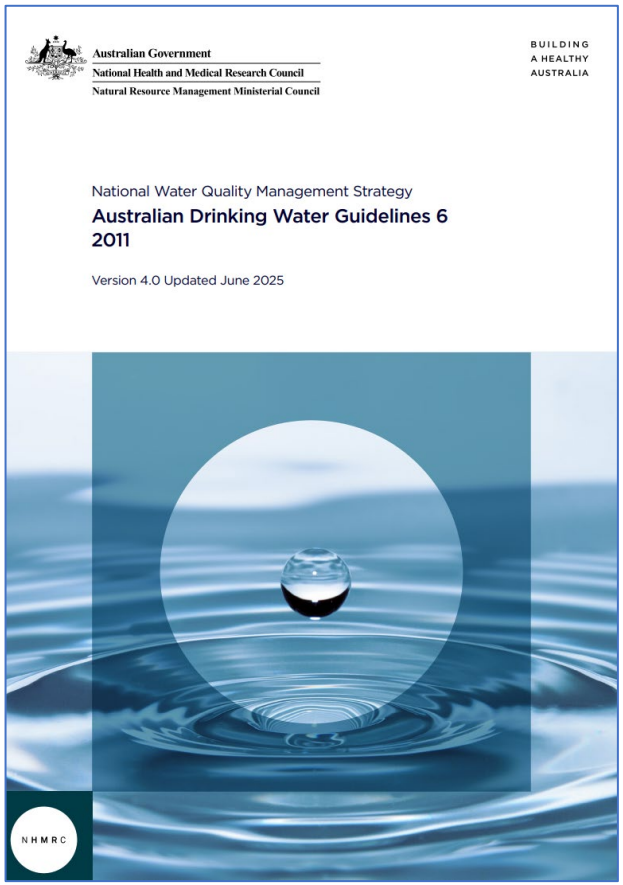


‘Safe drinking-water, as defined by the Guidelines does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages’.

Chapter 1 Introduction

Safe drinking water is essential to sustain life. Safe drinking water, as defined by the World Health Organization (WHO) Guidelines for Drinking Water Quality, does not represent any significant risk to health from short term and lifetime consumption (WHO 2022). Therefore, every effort needs to be taken to ensure that drinking water suppliers provide consumers with water that is safe to use.

The *Australian Drinking Water Guidelines* (the Guidelines) are intended to provide a framework for good management of drinking water supplies that, if implemented, will assure safety at point of use. The Guidelines have been developed after consideration of the best available scientific evidence. They are designed to provide an authoritative reference on what defines safe, good quality water, how it can be achieved and how it can be assured. They are concerned both with safety from a health point of view and with aesthetic quality.



pathogens. Combined with protection of water sources from human and livestock waste, disinfection can ensure safe drinking water. In the absence of complete protection of source

The multiple barrier approach is universally recognised as the foundation for ensuring safe drinking water. No single barrier is effective against all conceivable sources of contamination,

From among the preventive measures, critical control points should be identified for those hazards that represent a significant risk and require elimination or reduction to assure supply of safe drinking water.

The *Framework for Drinking Water Quality Management* (the Framework), outlined in Chapters 2-4, is based on a preventive strategy that encompasses total system management from catchment to consumer to assure safe drinking water.

operational monitoring in the source/catchment, through the treatment process, and in the distribution system, to ensure that processes and activities are functioning optimally to achieve safe drinking water;

Verification of drinking water quality provides an important link back to the operation of the water supply system and additional assurance that the preventive measures and treatment barriers in the water supply system have worked, and are working, to supply safe drinking water.

‘Monitoring programs that focus primarily on the quality of treated drinking water do not effectively guarantee the supply of safe drinking water’.

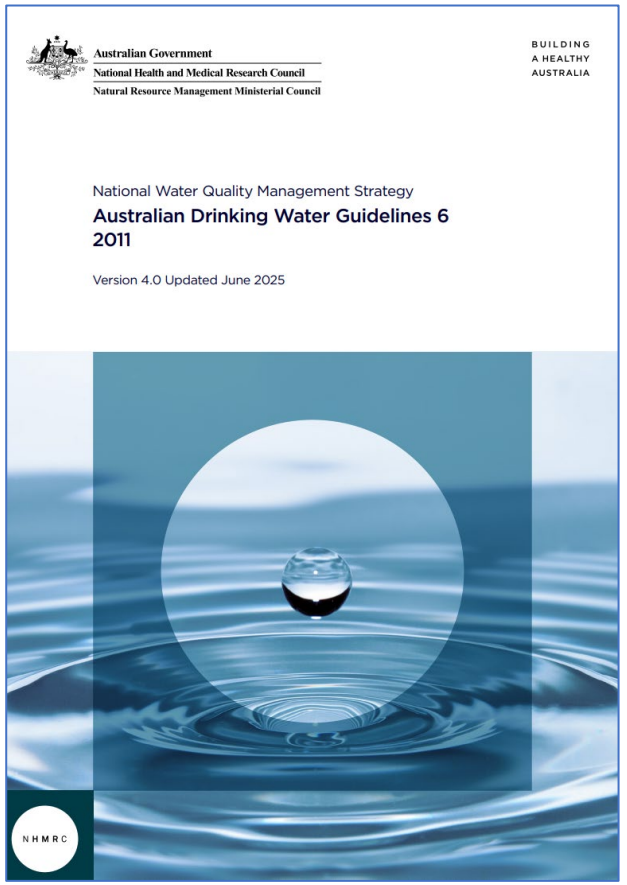
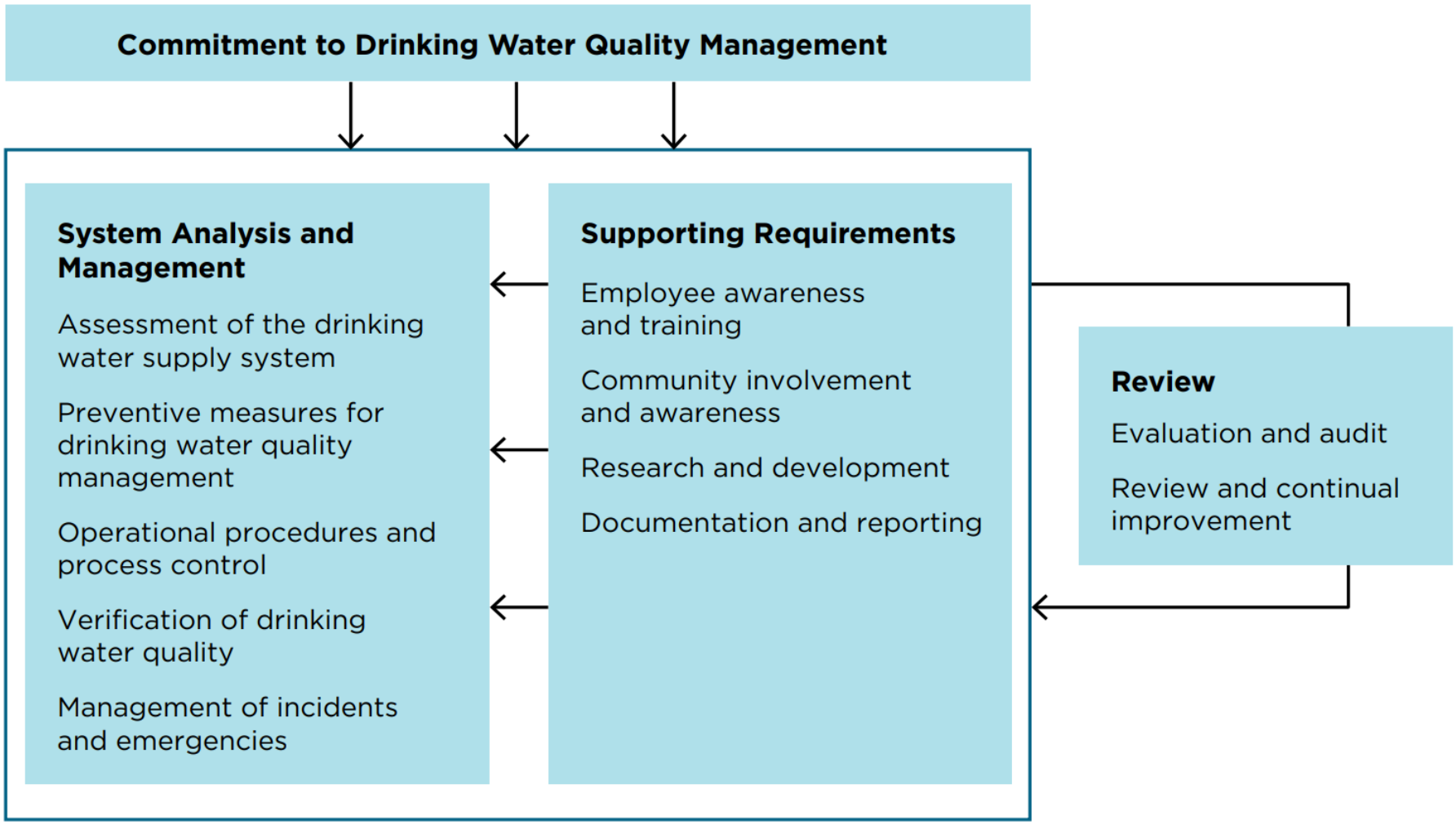
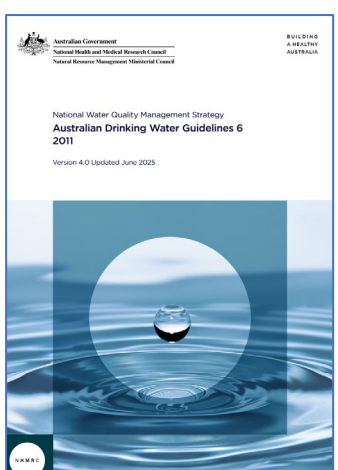


Figure 2.1 Framework for management of drinking water quality





Dam in Blue Mountains closed after elevated levels of PFAS chemicals detected

WaterNSW says closure a 'precautionary measure' and water supplied from filtration plant to local communities is safe and meets guidelines

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- Get our breaking news email, free app or daily news podcast

Medlow Dam in the Blue Mountains has been closed by WaterNSW after tests detected elevated levels of PFAS chemicals. Photograph: WaterNSW

August 2024

Sydney Water failed to properly test before declaring 'no known Pfas hotspots' in catchments, inquiry finds

More attention needs to be given to rapidly evolving issue of contamination of waterways with 'forever chemicals', committee's chair says

- Follow our Australia news live blog for latest updates
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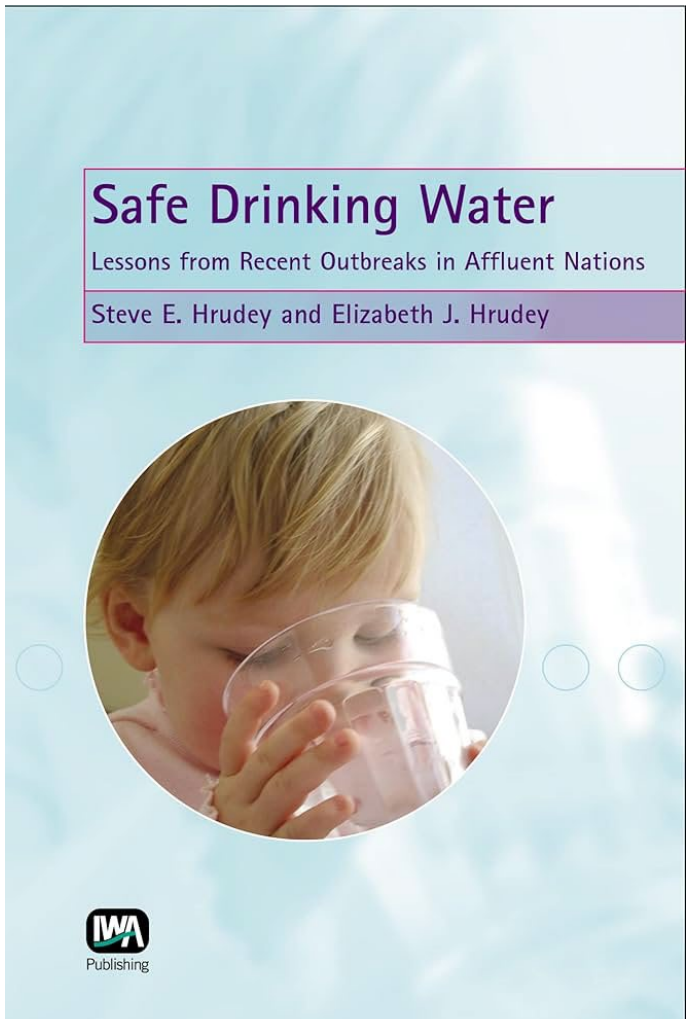
Medlow Dam in the Blue Mountains, where testing found elevated levels of some types of Pfas in untreated water. Photograph: WaterNSW

September 2025


Safe Drinking Water
Lessons from Recent Outbreaks in Affluent Nations
Steve E. Hrudey and Elizabeth J. Hrudey
IWA
Publishing


CAUTION
ACCIDENT
WAITING TO
HAPPEN

Authorised Version No. 015

Safe Drinking Water Act 2003

No. 46 of 2003

Authorised Version incorporating amendments as at
31 December 2019

The Parliament of Victoria enacts as follows:

Part 1—Preliminary matters

1 Purpose and outline

(1) The purpose of this Act is to make provision for the supply of safe drinking water.

(2) In outline this Act—

(a) requires water suppliers and water storage managers to prepare and implement plans to manage risks in relation to drinking water and some types of non-potable water; and

(b) provides for the auditing of those plans by approved auditors; and

(c) requires water suppliers to ensure that the drinking water they supply meets quality standards specified by the regulations; and

(d) requires water suppliers to disclose to the public information concerning the quality of drinking water; and

(e) provides for the variation, after community consultation, of water quality standards that relate only to aesthetic factors; and

7 Water suppliers must prepare, implement and review risk management plans

(1) A water supplier must—

(a) prepare a risk management plan in relation to its supply of drinking water and regulated water to the public; and

(b) implement the plan and comply with any requirements set out in the plan; and

(c) keep the plan under continuous review with a view to updating and improving it; and

(d) revise any aspect of the plan that is found, on review, to need revision.

Chart of the day: is this the most severe drought in history?

By Catherine Hanrahan | Story Lab | Droughts

Mon 6 Aug 2018

In 2018, autumn rainfall was the lowest since the 1902 Federation drought. *(ABC News: Jordan Hayne)*

Australia's 'black summer' bushfires showed the impact of human-wrought change

Tim Flannery

Burning embers cover the ground as firefighters battle against bushfires around the town of Nowra, New South Wales on December 31, 2019. Photograph: Saeed Khan/AFP via Getty Images

Sydney is flooded, again, as climate crisis becomes new normal for Australia's most populous state

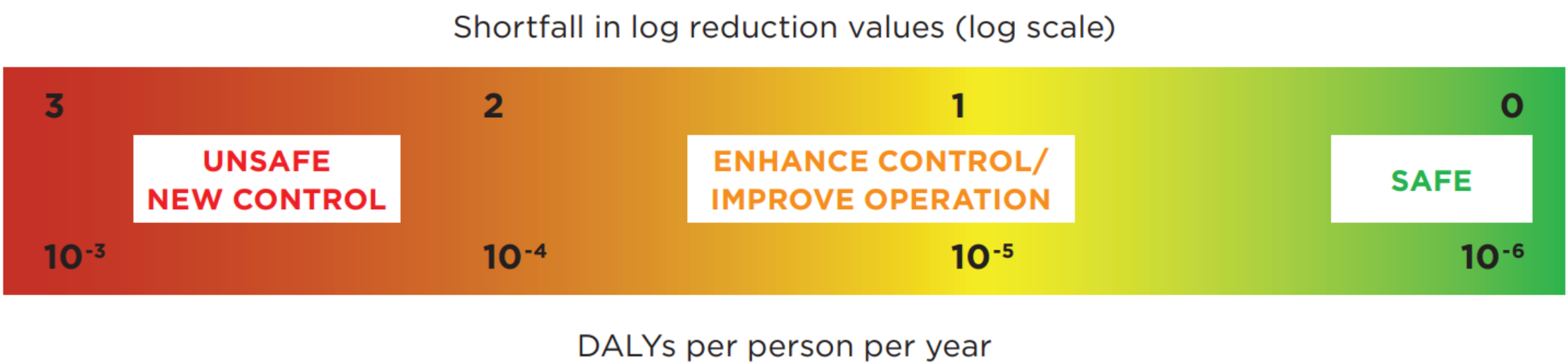
By Hilary Whiteman, CNN

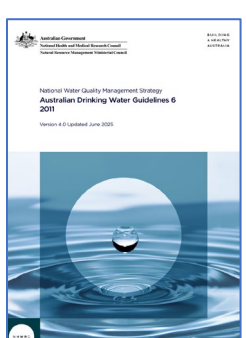
6 minute read · Updated 11:50 PM EDT, Mon July 4, 2022

2017 2018 2019 2020 2021 2022

Water safety continuum

Figure 5.2 Water safety continuum for drinking water supplies





Clean Water Pub Test: What *is* Clean Water

[redacted]

[redacted]

[redacted]

[redacted]

Kevin Hardy

Oklahoma

San Diego

Dinner Parties

New Water

National Water Research Institute

FOUNDED 1991

THE IRVINE FAMILY

CONDUCT AND DISSEMINATE THE FOUNDATIONAL RESEARCH TO SUPPORT PRW

AUSTRALIAN WATER RECYCLING CENTERS OF EXCELLENCE

Thesis

Whatever consumers say.

Communication builds community.

Opinions, consensus and credibility.

This is a journey, not a destination.

Whatever consumers say

- Rather unsatisfactory answer
- Eliminate the noise
- Start with data
- Providence flies with the committed

Communication builds communities

REVOLTING GRANDMAS

CITIZENS AGAINST RECYCLED EFFLUENT (CARE)

THE LANGUAGE OF ENGINEERS AND LAWYERS

THE LANGUAGE OF UNDERSTANDING

VOICES, TRADITIONS AND HUMAN RELATIONSHIPS

Opinions, consensus and credibility

- All opinions matter, some more
- Employees are crucial asset
- Trust
- Social Legitimacy

This is a journey – Hartley et al

Core Challenge	Key Elements	Strategies for Success	Theory of Project Failure	Insights
Public opposition is driven by trust deficits in utilities, regulators, and government in general.	Trust: in technology? Trust: in regulatory environment? Trust: in institutions?	Biuld Institutional trust through: • Independent review panels. • Open disclosure of risks and results. • Committed, long-term, disciplined engagement	Institutions tend to overpromise, hide information, fail to demonstrate competence or project related objectivity.	Cross-nationally, trust consistently explains acceptance variance more than demographic or knowledge variables.

This is a journey – Sedlak's et al and Social Legitimacy

Core Challenge	Key Elements	Strategies for Success	Why Projects Fail	
Narrow 'public acceptance' focus is inadequate. PRW projects demand a comprehensive legitimacy portfolios.	Pragmatic: clear benefits to end users. Moral: • Public health • Procedural fairness • Trustworthy leadership Cognitive: taken for granted	Portfolio including all 3 elements Pragmatic: Build a trusted brand Moral: GWRS NDMA disclosure and resolve Cognitive: GWRS expanded 2x; worlds largest PRW project	Too much focus on treatment technologies, presumptive needs; and PR campaigns vs. socially legitimate consensus building.	PRW aligned with environmental values; but in Northern CA, framing growth as a benefit triggered resistance.

Key Takeaways

1. Consumers are us and our families.
2. Build, maintain and improve relationships.
3. Disciplined, proactive response = credibility
4. We did that is irrelevant.

Let’s Collaborate!

Kevin M. Hardy

khardy@nwri-usa.org

WATER SERVICES
ASSOCIATION OF AUSTRALIA

Safe Water Pub Test

Next Water Conference
22 October 2025

Who is WSAA

- Water Services Association of Australia - Peak body for urban water industry
- Our members are the water utilities across Australia (and some NZ) – 25+ million customers
- Innovation, networking, research, advocacy
- National voice for water industry core issues

Marty's question

What wording makes people feel most confident about the safety of water:

- **Source of water**
- **Quality level/outcome**

(eg Guidelines)

- **Treatment process**

I asked ChatGPT for 2 normal people

Emma

21, lives in Perth, studying graphic design, Swiftie, loves Instagram & TikTok, going to Bali with friends soon. Knows if she gets sick, ‘it’s probably the water’

Raj

53, grew up in Mumbai, accounts clerk, loves baseball, reads Wall Street Journal & X, 4 grandkids, drives a Golf

- **Many customers don’t think about water much.**
- **What are they seeing and hearing?**
- **How should we communicate with them?**

I asked our researcher

He said:

It’s all about source

I asked our researcher

He said:

It’s all about source of water

I asked our researcher

He said:

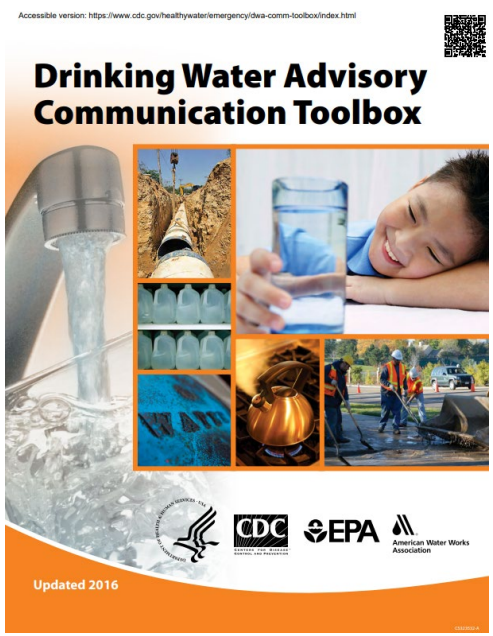
message

It’s all about source of ~~water~~

Global guidance – what & how

Centres for Disease Control (US)

- Clear & direct language
- Eg ‘Your tap water is safe to drink’ better than technical terms
- Avoid jargon
- Work with trusted spokespeople



Minnesota Dept of Health:

Bite – one line ‘your water is safe to drink’

Snack – outline context

Meal – detailed technical information

Body of risk communications literature:

- Plain language
- Avoid zero-risk claims
- Be specific about certainty & uncertain aspects
- Lead with empathy then facts – reduces defensiveness
- Show controls AND outcomes
- Be first, right and consistent

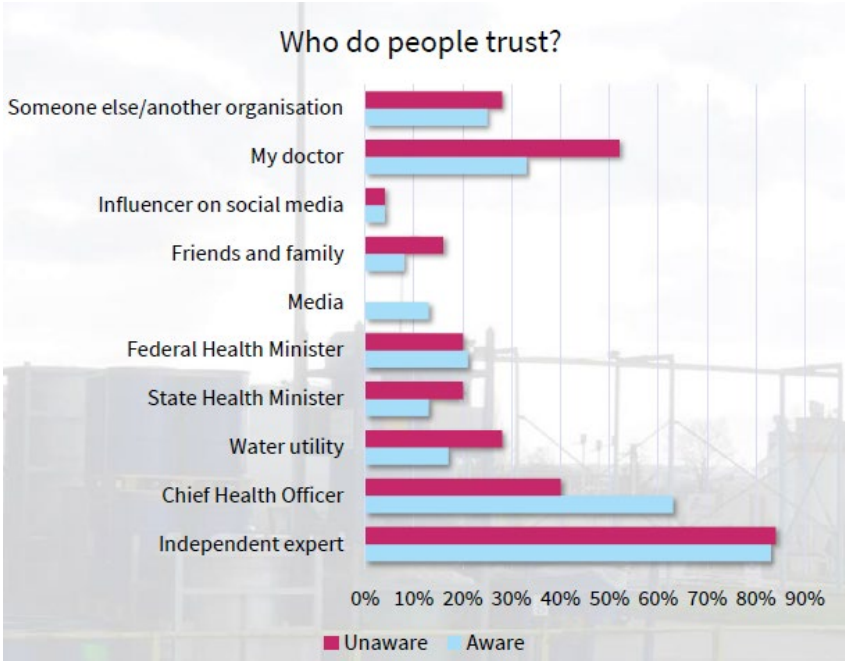
PFAS research

Questions:

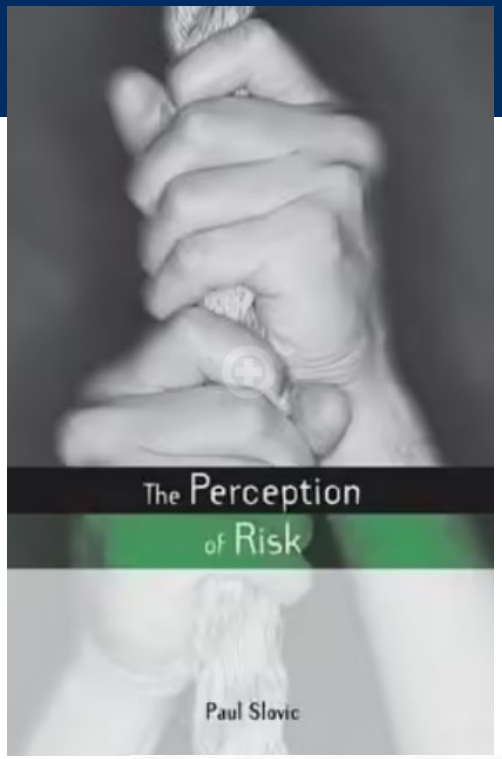
1. Is it safe
2. Who's testing & how
3. Why our limits different to USA

Liked simplicity:

- We can detect small amounts of PFAS
- 'Risk based testing'
- 'Guidelines indicate contaminant concentrations'
- Reference experts & medical professionals
- 'Let the experts talk on this topic'



What can we learn from PRW?



Paul Slovic – US Professor of Psychology

'Affect heuristic':

- Mental shortcut – people make judgments based on their gut reaction, not rational reasoning
- *Feels good* – we see it as low risk, beneficial
- *Feels bad* – vice versa

Stigma – once 'yuk factor' triggered, difficult to overcome

Inoculation theory[1] – 'expose them to 'weak attack' in advance, builds cognitive strength later'

E.g.: Proactive education on PRW enables rational judgment later, if a sensational headline appears

[1] William J Maguire (1960s)

A good example - ‘Toilet to tap’

- San Diego’s 1st PRW effort (late 90s) failed
- ‘Toilet to tap’ damaged perceptions
- 2nd time round, they proactively debunked it
- PRW ultimately proceeding

We’re looking at rebranding: from “Toilet to Tap” to “Showers to Flowers,” said Los Angeles Mayor Eric Garcetti

Looking for a beer made from actual human piss? Urine luck.

by Charley Cameron, 01/31/15

San Diego web FAQ:

Is this program “toilet to tap”?

“Toilet to tap” is not an accurate description of the water purification process. Water goes through numerous treatment steps and is subject to strict testing requirements before it would ever return to drinking water taps. In California, all forms of water are highly regulated and monitored to ensure safety. Since there is no new water on Earth, all water goes through a natural cycle and is essentially recycled water before it is treated and tested and then returned to homes and businesses as drinking water.

What are Raj & Emma hearing

Words customers use on social media to describe tap water

1. Cloudy /
2. Is it s
3. Bro
4. C
5. T
6.
7. C f l
8. Filter / bottle / boil
9. **Itchy skin / headaches / dead fish**

Distrust
Poor hygiene
Unnaturalness
Intervention

Words we use most to communicate safe water

1. Saf fe k
2. Hig clas
3. Meet Drinki ian nes
4. Reliable
5. Clean / clea
6. Treated / disinfe tration, chlorine, UV)
7. Monitored / tested
8. Compliant / meets requirements / regulated
9. Catchment / source to tap, multi-barrier
10. Public health protection

Trust
Quality
Diligence
Robustness

Which are we prioritising?

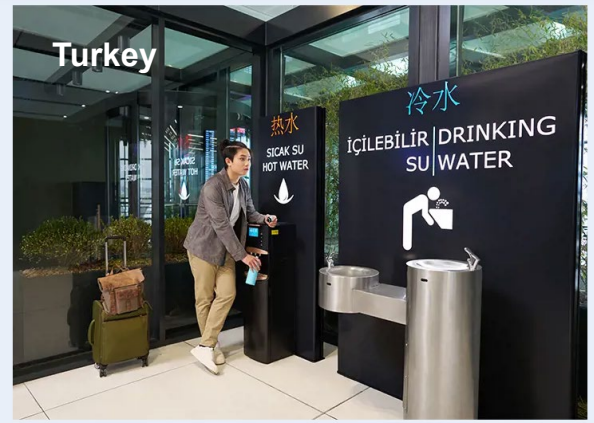
1. **Safe / safe to drink**
2. **Clean / clear**
3. **High quality / world class**
4. **Reliable**
5. **Meets / complies Australian Drinking Water Guidelines**
6. **Compliant / meets requirements / regulated**
7. **Public health protection**
8. **Treated / disinfected** (filtration, chlorine, UV)
9. **Monitored / tested**
10. **Catchment / source to tap, multi-barrier**

- Source types often named (dams, rivers etc)
- “Protected catchments” most common quality-related descriptor
- ‘Pristine’ sometimes appears

Airports

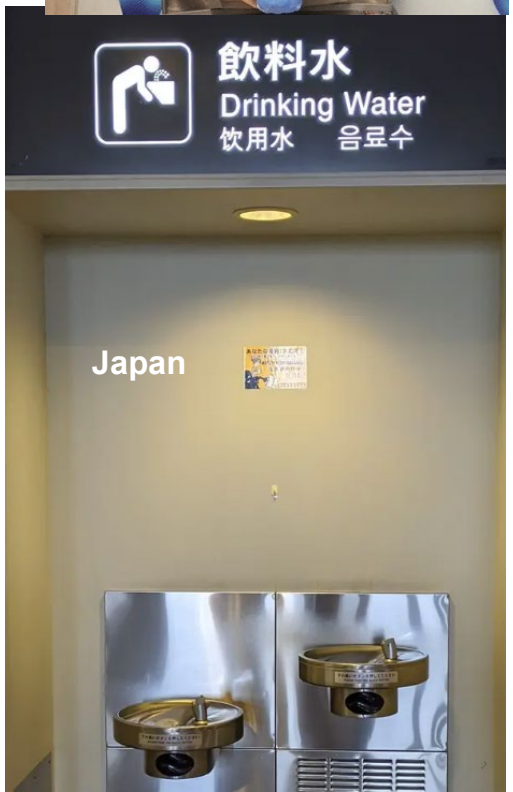
UK ????

Singapore



Complimentary Water Dispenser

Complimentary water dispensers are available at 23 different locations throughout the terminal. Passengers can access hot or cold water using the complimentary water dispensers available at our airport.



Visual cue + single word - End use

Conclusions

WHAT

- **‘Safe’ is a magic word – clear and binary**
- **Keep it simple, but have detailed technical information available**
- **Be a trusted source / refer to trusted sources**
- **Communicate to different groups (including CALD)**

Thank you

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collaborate innovate impact