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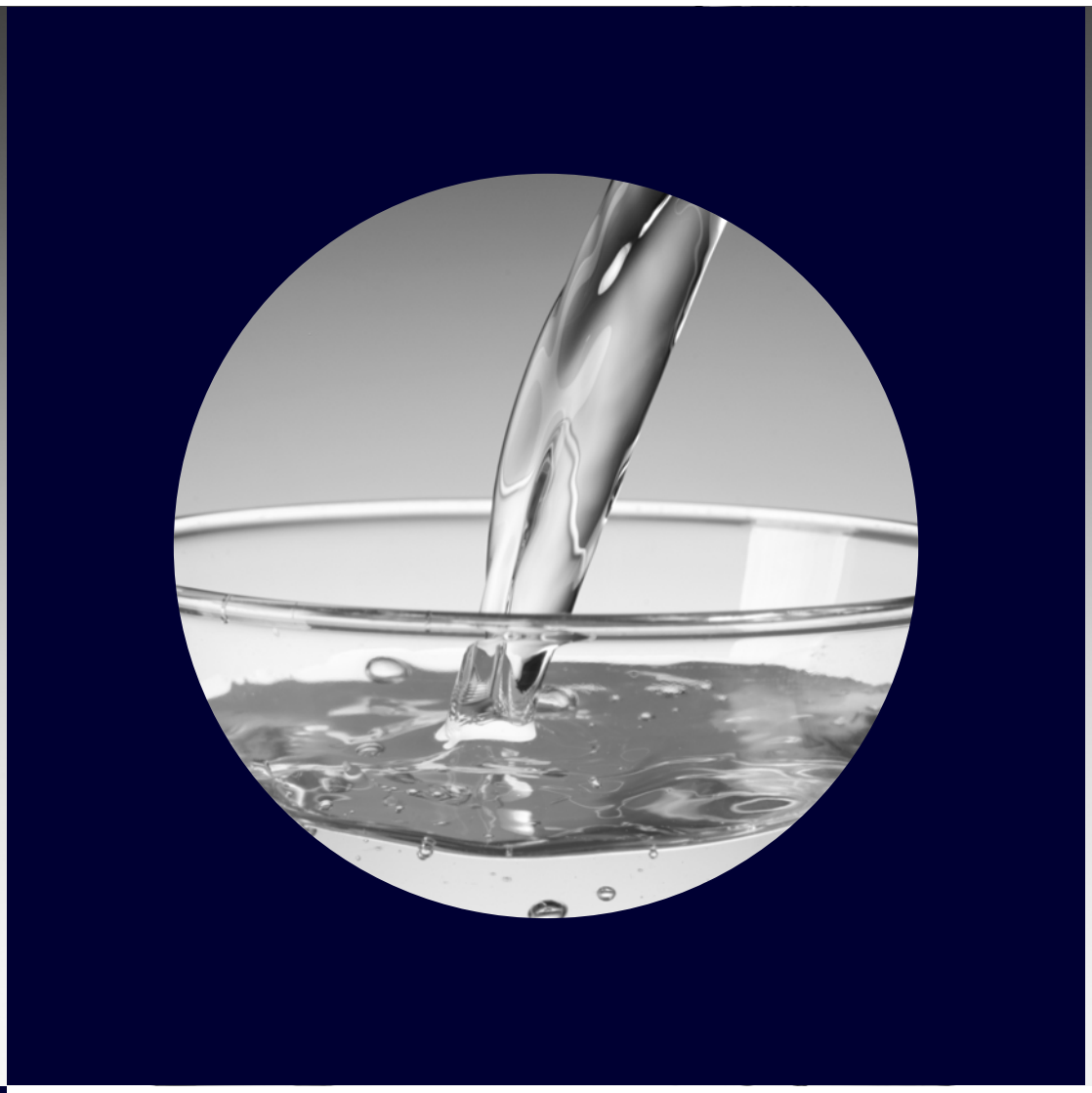
Australian Drinking Water Guidelines Administrative Report

Guidance on short-term exposure values



NHMRC

Administrative Report
Guidance on short-term exposure values

Contents

Summary

The National Health and Medical Research Council (NHMRC) in collaboration with the Water Quality Advisory Committee has developed *Guidance on Short-Term Exposure Values* (the Guidance). This advice aims to assist water regulators and suppliers in managing instances where temporary drinking water contamination occurs, such as during extreme weather events. The Guidance will be included in Chapter 9 of the *Australian Drinking Water Guidelines (2011)* (ADWG). This document summarises the advice development process.

Background

The ADWG are considered guidelines under section 7(1) of the *NHMRC Act 1992* (the Act). NHMRC maintains the ADWG through a rolling review process to ensure they provide an up to date evidence-based framework for the management of drinking water quality. The ADWG contain

factsheets and guideline values (aesthetic and health-based) for a number of chemicals that might be present in Australian drinking water supplies.

Health-based guideline values in the ADWG provide advice on the level of a substance in drinking water that is considered safe over a lifetime of consumption. Advice on short-term exceedances (such as during extreme weather events) had previously been identified as a gap in the ADWG.

In June 2017 NHMRC received a request from the Department of Health to develop guidance on short-term exposure values for several per- and polyfluoroalkyl substances (PFAS) in drinking water (PFOS, PFHxS, and PFOA).

At its 211th Session on 12-13 July 2017 NHMRC Council recommended that advice on short-term exposure values should be developed for all chemicals in general. This recommendation was supported by the Water Quality Advisory Committee and members of the Water Quality Expert Reference Panel, who agreed that providing short-term exposure methodologies for PFAS was inappropriate. This is because exceedances of the PFAS health-based guideline values are unlikely to be a one-off event but rather a long term issue due to the nature of the chemicals and their persistence in the environment.

Development of guidance

The Guidance was drafted by members of the Water Quality Advisory Committee Chemical Subgroup in collaboration with the Office of NHMRC (ONHMRC). The Guidance was based on the findings of a recent Water Research Australia (Water RA) project report that reviewed methodologies for deriving short-term exposure values (Leusch et al. 2020).

The Water Quality Advisory Committee reviewed the draft Guidance before seeking expert feedback from the Environmental Health Standing Committee (enHealth) Water Quality Expert Reference Panel. The draft Guidance was revised several times to address enHealth feedback (see **EnHealth consultation** and **Appendix A**).

NHMRC Council advised the CEO to release the draft Guidance for public consultation on 13 June 2019. The CEO agreed to this on 13 August 2019.

Public consultation on the draft Guidance was undertaken as per paragraph 13(d) of the *NHMRC Act 1992*. Public consultation was open from 27 August 2019 to 14 October 2019. Submissions were considered by the Water Quality Advisory Committee and the draft Guidance was revised by the Chemical Subgroup to address stakeholder feedback where appropriate (see **Appendix B**).

The revised Guidance was reviewed by the Water Quality Advisory Committee and the enHealth Water Quality Expert Reference Panel and revisions made where necessary (see **Appendix A**). NHMRC Council and CEO approval were sought to publish the finalised Guidance on the NHMRC website.

Key steps of the guidance development process are summarised in **Figure 1**. A timeline of the guideline development process including meetings where the project was discussed is provided in **Table 1**.

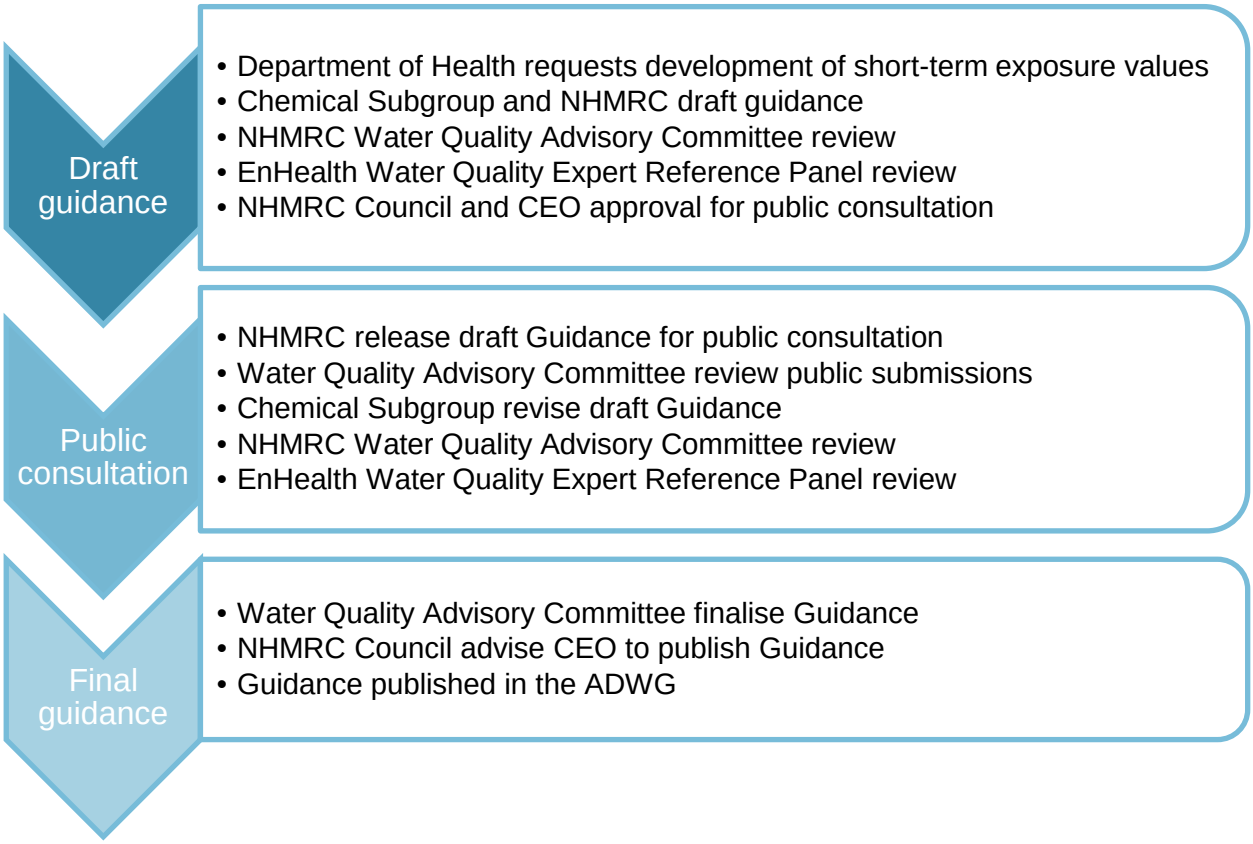


Figure 1: Overview of guideline development process

Table 1: Timeline of Short-Term Exposure Value guidance development	**Date**
Department of Health – requested development of STEV* advice for PFAS	June 2017
NHMRC Council – advised to develop general STEV guidance	12-13 July 2017
WQAC** meeting – discussed STEV methodologies	21 August 2017
Guidance drafted by NHMRC and Chemical Subgroup	September - November 2017
WQAC meeting – discussed draft Guidance	15 December 2017
WQAC meeting – discussed worked examples	9 February 2018
EnHealth WQERP*** review of first version of draft Guidance	February – March 2018
EnHealth WQERP meeting – discussed draft Guidance with NHMRC and Chair of WQAC	20 March 2018

WQAC meeting – reviewed and discussed enHealth feedback	3 April 2018
Chemical Subgroup meeting – provided responses to enHealth feedback based on WQAC discussion (see **Appendix A**)	29 May 2018
WQAC meeting – progress update	12 June 2018
Chemical Subgroup revise Guidance to address enHealth feedback	June – September 2018
WQAC meeting – reviewed and approved revised Guidance	5 November 2018
enHealth WQERP review of second version of draft Guidance	December 2018 – February 2019
WQAC meeting – reviewed and discussed enHealth feedback	March 2019
Chemical Subgroup meeting – reviewed enHealth and WQAC comments (see **Appendix A**)	29 April 2019
Chemical Subgroup revise Guidance to address enHealth feedback	March - May 2019
WQAC review revised Guidance (out of session)	May 2019
EnHealth WQERP review of public consultation draft Guidance (see **Appendix A**)	May 2019
WQAC meeting – approved draft Guidance for public consultation	5 June 2019
NHMRC Council (out of session) – advised to release draft Guidance for public consultation	13 June 2019
NHMRC CEO approval of public consultation	13 August 2019
Public consultation	27 August 2019 - 14 October 2019
WQAC meeting – reviewed public consultation comments and provided responses (see **Appendix B**)	25 November 2019
Chemical Subgroup revise Guidance	December 2019
WQAC review of revised Guidance (out of session)	December 2019 - January 2020
enHealth WQERP review of finalised Guidance (**see Appendix A**)	January 2020
WQAC approval of finalised Guidance (out of session)	February 2020
NHMRC Council – advised the CEO to publish Guidance	11-12 March 2020 (219th session)
NHMRC CEO approval to publish Guidance and Administrative Report	25 January 2021

* STEV - short-term exposure value
** WQAC - Water Quality Advisory Committee
*** WQERP - Water Quality Expert Reference Panel

EnHealth consultation

The enHealth Water Quality Expert Reference Panel provided expert feedback on several iterations of the draft Guidance. Panel membership includes jurisdictional representatives working in the field of drinking water quality and human health who can provide feedback on the feasibility and accuracy of NHMRC advice.

The Water Quality Advisory Committee agreed on a number of changes to the draft Guidance as a result of the feedback from enHealth. Further details on the issues raised by enHealth Water Quality Expert Reference Panel on the draft Guidance and how they were addressed is provided in **Appendix A**.

Key changes that were made on consecutive drafts of the Guidance include:

- the scope of the Guidance was changed to not specifically focus on emergency situations. This was to clarify that short-term exposure values are for one-off events and not applicable to recurrent exceedances.
- the original Guidance was intended to include different methodologies for calculating STEVs in different situations. It was agreed that the methodologies used to calculate STEVs required a level of technical detail that did not align with the rest of the ADWG. Decisions about the methodology to be used need to be made in consultation with the relevant drinking water regulator or health authority. The section on methodologies was subsequently removed.
- the draft Guidance originally included example calculations. These were removed after concerns were raised that this would encourage utilities to calculate short-term exposure values without consulting the relevant drinking water regulator or health authority.
- the draft Guidance was initially described as too general. A list of short-term exposure values for particular chemicals was then included in the draft Guidance but was removed after there was confusion about the inclusion of some chemicals and not others. It was agreed that the Guidance should be shortened and simplified with technical details such as published short-term exposure values cross-referenced to the available literature.
- the Guidance was originally written for inclusion in Chapter 6 of the ADWG but Chapter 9 *Overview of monitoring* was considered more appropriate.

Public consultation

On 5 June 2019 the Water Quality Advisory Committee agreed to recommend to NHMRC Council the draft Guidance be released public consultation.

NHMRC Council members considered the draft Guidance out of session in July 2019 and agreed to advise that the NHMRC CEO release the draft Guidance for public consultation. The CEO approved the release of the draft Guidance for public consultation on 13 August 2019.

Public consultation was held between 27 August 2019 and 14 October 2019. NHMRC worked with the Water Quality Advisory Committee to ensure due consideration was given to the issues raised during public consultation. A summary of this process, including the issues raised and how these were addressed to finalise the Guidance is provided in the public consultation summary report

provided at **Appendix B**. Full submissions are available at **Appendix C** where permission has been given to publish.

Contributors

The NHMRC Water Quality Advisory Committee oversaw the development of the Guidance. This work was undertaken over two terms of the committee from 2017 to 2020. Committee membership is outlined below.

2015-2018 Water Quality Advisory Committee

- Professor Frederic Leusch (Chair), Griffith University
- Dr Daniel Deere, Water Futures Pty Ltd
- Dr Stuart Khan, The University of New South Wales
- Professor Jochen Mueller, The University of Queensland
- Dr Joanne O'Toole, Monash University
- Associate Professor Susan Petterson, Griffith University and Water and Health Pty Ltd
- Dr Tahna Pettman, The University of Melbourne
- Professor Craig Simmons, Flinders University
- Ms Carolyn Stanford (Consumer Representative), Stanford Marketing
- Mr Tim Hoar (Observer), Department of Agriculture and Water Resources
- Dr Nick Fletcher (Observer), Food Standards Australia New Zealand.

2018-2021 Water Quality Advisory Committee

- Professor Fred Leusch (Chair), School of Environment and Science, Griffith University
- Ms Miranda Cumpston, Monash University and University of Newcastle
- Dr David Cunliffe, South Australian Department for Health and Wellbeing
- Mr Cameron Dalgleish, Tasmanian Department of Health
- Dr Dan Deere, Water Futures Pty Ltd
- Professor Cynthia Joll, Curtin Water Quality Research Centre, Curtin University
- Professor Stuart Khan, Water Research Centre, University of NSW
- Associate Professor Susan Petterson, Water & Health Pty Ltd / Griffith University
- Professor Craig Simmons, Australian Research Council / National Centre for Groundwater Research and Training, Flinders University
- Ms Carolyn Stanford (Consumer Rep), Stanford Marketing, Victoria
- Dr Katrina Wall, New South Wales Health Department

- Dr Nick Fletcher (Observer), Food Standards Australia New Zealand
- Ms Amy Lea (Observer), Department of Agriculture, Water and the Environment
- Mr Marcus Waters (Former member) (Observer), Department of Agriculture, Water and the Environment
- Mr Adam Lovell (Observer), Water Services Association of Australia.

Chemical Subgroup

Past and present Members of the Chemical Subgroup involved in drafting the guidance and subsequent revisions include:

- Professor Stuart Khan (University of NSW) – Chair of the Chemical Subgroup
- Professor Fred Leusch (Griffith University)
- Professor Cynthia Joll (University of Western Australia)
- Dr Nick Fletcher (Observer, Food Standards Australia New Zealand)
- Professor Jochen Mueller (University of Queensland).

NHMRC Project Team

Early work on the project was undertaken by the Environmental Health and CAMS section of the Research Translation branch. From 2018 onwards the project was managed by the Water Team in the Public Health section.

Declarations of Interest

A summary of the disclosed interests and expertise of the Chemical Subgroup who reviewed the evidence and led the development of the Guidance is available at **Appendix D**.

The declared interests of the broader membership of the current Water Quality Advisory Committee are available on the NHMRC website at https://www.nhmrc.gov.au/health-advice/water-quality-and-health/water-quality-advisory-committee-wqac.

It is noted that several members of the Water Quality Advisory Committee (Professor Leusch, Professor Khan, Dr Cunliffe and Dr Deere) are authors of a key publication that is cited in the guidance (Leusch et al. 2020). Members of the Water Quality Advisory Committee did not raise any concerns regarding these interests and no management approach was required.

Project Funding

This work was funded by the Department of Health and NHMRC.

References

Leusch FDL, Khan SJ, Deere D, Cunliffe D, Neale PA, Humpage A (2020). Deriving safe short-term chemical exposure values (STEV) for drinking water. *Regulatory Toxicology and Pharmacology*, 110:104545.

Appendix A – EnHealth feedback on draft Guidance

EnHealth Water Quality Expert Reference Panel feedback was provided on a number of iterations of the Guidance.

First version of draft Guidance

The following feedback was provided by members of enHealth in response to the first draft of the Guidance provided for review in February-March 2018.

#	EnHealth feedback	Action/ WQAC response
General Comments		
1	Reasons for not supporting the short-term exposure value (STEV) update are: • Short-term exposure is defined as 24 hours to a few days. For most chemicals, by the time analytical results are available, the community would already have been exposed for longer than the defined short term. • Even where a turnaround of under 24 hours is available for a chemical analysis, it may not be possible to predict the duration of the exposure, so it may not be possible to know if the 24 hour, 7 day, or lifetime exposure guideline would apply. • The draft document mentions "balance of risks between supplying water containing a contaminant and not supplying water in such emergencies". Not supplying water is rarely, if ever, an option. Switching to an alternative supply if one is available could be considered in a contamination event. If not, continued supply with a "Do not Drink" warning and supply of bottled water is the more usual response.	Not accepted. The guidance is based on the WHO approach. The STEVs can be used both prospectively and retrospectively as a long term management strategy. A table of calculated STEVs from the Water RA report (Table 2) will be included in the document with specific times. Include an example of balancing pathogen risk after an emergency (e.g. storm) with increased levels of DBPs from additional chlorine treatment will be included.
2	Issues with Chapter 6 in general and suggested that the next iteration of the ADWG may need an update on data inputs used for calculating values (such as average body weight).	Accepted. Include guidance in Chapter 9 of the Australian Drinking Water Guidelines.

Introduction		
3	New Section proposed – this section might be better placed in Section 9.9 of the ADWG: Incident and emergency response monitoring?	Accepted. Guidance will be in new sections 9.9.1 (approaches to water contamination problems and emergencies) and 9.12 (STEVs)
4	Request for clarity around the types of chemicals that are in scope of this guidance. Does this include toxins or organic material derived substances that naturally occur? The focus also appears to be on pollution of source water, and not changes within a drinking water system – such as formation of disinfection by-products. Clarifying this would be useful.	Accepted. Includes physical and chemical contaminants regardless of it being naturally occurring. This is clarified later in the document. Includes algal toxins and DBPs. Use table 2 from Water RA report to illustrate. Amend to contaminant rather than pollutant.
5	Questioned use of the word “problematic” to describe providing guidance for managing incidences. Health risks can be assessed and managed, although remediation may present a challenge. Australian health authorities and water utilities have experience in managing a range of natural and ‘industrial’ contamination incidents.	Accepted. Reword sentence and change problematic to complex and polluted to contaminated
6	The inference here should be about the magnitude and duration of the exposure and the difference between acute and chronic exposures.	Accepted. Reword sentence to include duration and frequency. Advice reflects both acute and chronic exposure.
7	The ADWG appears to use the term ‘health-related’ more so than ‘health-based’. Consistent terminology would assist readers.	Accepted. Use health-related.
8	The language in the paragraph is complicated and could be simplified (e.g. for the first sentence, ‘The duration of adverse health effects would depend on the contaminant’).	Accepted. Reword sentence.
9	Assessment of the duration of exposure to increased contaminant (this may be from the last know water quality sample result) and needs to extend to the expected (or estimated) time that the issue can be resolved.	Accepted. Add dot point on time of exposure.
10	A number of other considerations could be listed consistent with advice provided in later chapters of the ADWG document. i.e. immediate response plan & risk communication & future analysis. i.e. See Chapter 3 Might need a reword to point to the incident and emergency protocol of section 3.6.2	Accepted. Amend to cross-reference with Chapter 3 of the ADWG where appropriate.

11	What does NHMRC recommend as an appropriate response? NHMRC should consider a brief section on possible responses, which may include: No warning to consumers, if health risk assessment confirms water is safe to consume (in short term or longer term). A 'do not drink' warning, and advice on an alternative safe water supply. A 'do not use' warning, and advice on an alternative safe water supply.	Accepted. Check if already covered in Chapter 9 of the ADWG. Describe appropriate action using a decision tree.
Water Safety Plan		
12	Is this a reference to the WHO Water Safety Plan? The term WSP is not used elsewhere in the ADWG. For consistency, this reference should be to the Framework for the Management of Drinking Water Quality, rather than a WSP. This is the first mention of a 'water safety plan' in ADWG. Is this proposing that water utilities draft a new, stand-alone document? Clarification required.	Accepted. Refer to the *Framework for the Management of Drinking Water Quality* and drinking water management plans.
13	Most of this section covers sections already covered in other Chapters i.e 3 & 9 & 10 and should point readers to sections for further detail.	Accepted. Amend text to cross-reference where appropriate.
14	*Trigger for action* Perhaps the triggers and responses could be divided into two categories: 1. Detection of a chemical characteristic in drinking water (above the health guideline value). 2. Detection of chemical risks in raw water (e.g. a spill) that has not necessarily affected treated drinking water.	Accepted. Amend text on t*he detection of unexpected substance in the water* to reflect treated and raw water as noted in comment.
15	This is from routine, investigatory, project based or ad-hoc sampling programs.	Accepted. Amend text to reflect that detection of unexpected substance in the water is from routine, investigatory, project based or ad-hoc sampling programs
16	Is this a reference to chlorine demand or other water treatment requirements? Can NHMRC provide examples of sudden changes?	Accepted. Add guidance on increase in turbidity and increasing chlorination. Additional guidance related to filtration and UV treatments.

17	This is an important point that extends beyond chemical 'incidents'. Is this already addressed as part of the Framework (3.6 Management of Incidents)? If not, would it be more efficient to reference 3.6 rather than duplicating text here?	Accepted. Communication is addressed in section 3.6. Amend to cross reference section 3.6.
18	This needs to include more than households, but also food processors and sensitive end users – like health care facilities.	Accepted. Need to define range of consumers. Include in brackets (including food processors, health care facilities and other sensitive end users). This section has been deleted and section 3.6 cross referenced instead.
19	Local health authority protocols for issuing of public notices should be followed and may include multi government agencies or government emergency response authorities.	Accepted. Text to be amended.
20	The concentration of the substance and duration of exposure.	Accepted. Add text on concentration of substance and duration of exposure.
Short-term exposure values for use in intermittent incidences		
21	Would the term 'acute' be preferred to 'short-term'? Perhaps 'short-term' is plain English.	Accepted. Amend to 'acute.'
22	Mention of 'emergencies' in this introduction would assist context of the section.	Noted. Place STEV guidance in Australian Drinking Water Guidelines (ADWG) Chapter 9 Overview of monitoring to follow section 9.9 Incident and emergency response monitoring.
23	Consider using the UKWIR 24hr and 7 Day SNARL values for emergency situations.	Accepted. Outline guidance including United Kingdom Water Industry Research, United States Environmental Protection Agency, World Health Organization's *Guidelines for Drinking Water Quality* - Chapter 8 and Suggested No Adverse Response Level.
24	What short-term effects are of concern? Or is this a protective measure based on uncertainty?	Not accepted. Unclear on meaning of comment. The short-term effects would depend on the specific chemical.

25	It should be stated that short-term exceedances for some specific substances may result in increased likelihood of adverse health effects (such as for carcinogens, fluoride etc).	Accepted.
26	Where a water sampling program result identifies an exceedance, the duration of this – i.e. the last time the water was known to be within guidelines – may be a long time (annual, quarterly, monthly, weekly, sampling frequency). There are little instantaneous or immediate analytical processes (maybe apart from fluoride) For those substances with acute guideline values, they should be highlighted in Table 10.6 and any further development of STEVs is not appropriate (i.e. Copper, Fluoride, lead, etc)	Not accepted, as does not apply as beyond the 30 day event trigger. Accepted, redrafted guidance will only relate to specific chemicals and toxins. STEVs will not be developed for copper, fluoride and lead.
27	Guidance on when percentage contributions are reasonable to differ from 10% is needed. This provides greater uncertainty in the calculations.	Noted. Remove sentence. Refer to the *Australian Guidelines for Water Recycling*.
Methodologies to calculate a STEV		
The WQAC Chemical Subgroup agreed not to provide methodologies for calculating STEVs. Instead the table of calculated STEVs available in the Water RA report *Derivation of safe short-term chemical exposure trigger values (STETv) for use in emergency situations* will be included under a new section 9.12. **Based on this decision the following comments are no longer relevant to the redraft.**		
28	Could NHMRC provide a worked example(s) in this section?	Noted. Methodologies removed.
29	ARfD values are only applicable to pesticides.	Noted. Methodologies removed.
30	This approach may be the right one, but in the context of this chapter, is not useful as the period of exposures are “a few days.”	Noted. Methodologies removed.
31	Chronic toxicity will be looking for different health effect/end points compared to acute toxicity studies(lethal doses or irritation).	Noted. Methodologies removed.
32	The terminology and exposure period is changing “a few days” to <28 days. What happens if the period is 10 days? For example.	Noted. Methodologies removed.

33	Does NHMRC see a difference between the terms 'acute' and 'short-term'? Why are both used?	Noted. Methodologies removed.
34	*Guideline values for acute and short-term exposures provide a basis for deciding when water can continue to be supplied without serious risk to consumers in an emergency situation.* The section introduction would benefit from context such as this.	Noted. Methodologies removed.
35	STEV may be useful to inform or trigger an action for occasional exceedances but should not replace a States guidance on what actions to take in an emergency situation – see next comment STEVs are most useful for understanding the risk of occasional exceedances above the ADWG during routine operations and for post-incident assessment.	Noted. Methodologies removed.
36	The primary issue with this section is that it presents a number of exposure periods, a number of methods and defers to expert literature review, which together does not provide certainty or rapid determination of public health risks in the event of an emergency.	Noted. Methodologies removed.
37	Water supply is also used for firefighting and industrial processes which whilst not a concern of a drinking water consumer, is the reality of water supply systems.	Noted. Methodologies removed.
38	Not supplying water' is the most extreme response option. Section 6.3.4 should expand on all response options and the rationale for each.	Noted. Methodologies removed.
39	Strong suggestion that inclusion of this section in ADWG includes a revision of Table 10.6 to include: health (lifetime), health (7 days) health (14 days) health (28 days) values or similar, including a reference the specific method used for their determination. This would need the above optional methods to be numbered for reference.	Noted. Methodologies removed.

Second version of draft Guidance

The following feedback was provided by enHealth members in response to the second version of the draft Guidance provided for review in December 2018 – February 2019.

#	EnHealth feedback	Action/WQAC response
1	• Concerns about the misuse of STEVs to justify exceedances in the absence of incidents/emergencies. • It should be made unambiguously clear that day-to-day performance should be governed by the established HBGVs. • Need to make the text in the draft that deals with this more prominent e.g. by including it in unequivocal terms in the opening paragraph.	Not accepted. Section is clear on usage. Further edits made to strengthen message.
2	Could the availability of multiple methods for calculating STEVs cause confusion? Three ***suggestions*** • focus of STEVs could be on chemical overdosing arising from use of treatment chemicals e.g. fluoride, aluminium, chlorine • Exclusions should be considered. Allowing STEVs that are 100 x HBGVs may not always be appropriate: o Lead should be specifically excluded based on latest advice that there is no safe concentration. o Disinfection by-products should also be excluded as a rationale for allowing occasional exceedances based on not compromising microbial quality is already included in the ADWG. o The two rationales for exceedances should not be conflated • determining STEVs for appropriate chemicals with health-based values to remove ambiguity about the method applied (i.e. in a similar approach to Table 4.4 in the AGWR module on drinking water augmentation)	Not accepted. Section is clear on using STEVs with acute effects. Further edits made to clarify this point, including the need to consult with health regulators and toxicologists when deriving STEV for acute risks. Table of STEVs removed.
3	Do we need to provide supporting information for application of a 50% attribution for 7-day exposures? (noted in the draft that the UKWIR document on SNARLs is not in the public domain)	Noted. Guidance has been edited to remove technical detail.

4	***Suggestions related to the Water RA Project on Extreme events*** The Chapter briefly cites the project on Extreme Events as a source for the methodologies for calculating STEVs. STEVs only apply for short events (1d-7d) and will not be useful for the longer duration of impacts associated with some extreme events…..	Not accepted. Guidance does not specify STEV use for extreme events
5	STEVs should be framed as a mechanism for dealing only with short-term emergencies and incidents (i.e. spills etc). While these may occur during extreme events this type of event should not be the driver for inclusion of STEVs in the ADWG. Draft guidance does not reference extreme events but it could be useful to include text on when STEVs could be useful (including specific time limited incidents/spills that might arise during extreme events).	Accepted. Guidance simplified to clarify this point.
6	Require further justification for applying STEVs to extreme events lasting weeks or months and questions whether the proposed inclusion of STEVs was an appropriate response to the range of concerns raised at the extreme events hypothetical workshops. It was suggested that the proposed inclusion could circumvent the process of developing responses to these concerns.	Noted. Addressed above.
	Other general comments	
7	Need to include justification for inclusion of STEVs in the ADWG	Noted. Table of STEVs removed.
8	Definitions should be provided of relevant contamination events and incidents to provide boundaries for application of STEVs	Noted. Guidance edited to clarify.
9	Consideration should be given to laboratory capacity with particular reference to turn-around times	Noted. No changes made.
10	There is a lack of evidence that pesticide concentrations exceed untreatable concentrations in floodwaters	Noted. No changes made.
11	The 2015 USEPA 10 day drinking water health advisories for microcystins (1.6 ug/L) and cylindrospermopsin (3ug/L) for adults are much lower than the proposed STEVs	Noted. Table of STEVs removed.
12	Need to provide further justification for removing the 10x uncertainty factor for microcystin	Noted. Table of STEVs removed.
13	The numbers of significant figures should be consistent with those used in the original guideline value	Noted. Table of STEVs removed.
14	There is inconsistent use of the terms 7day exceedances and 7day exposures	Accepted. Corrected throughout.

Public consultation draft Guidance

The following feedback was provided by the enHealth Water Quality Expert Reference Panel in response to the public consultation draft Guidance provided for review in May 2019.

Jurisdictional feedback mostly supported the release of the draft Guidance for public consultation. The following key issues were raised for consideration by the Water Quality Advisory Committee when next revising the draft Guidance:

#	EnHealth feedback	Action/WQAC Response
1	Include text that conveys "the development and use of STEVs should be discussed with the relevant health regulator"; or words to that effect.	Accepted. Text has been revised to convey this.
2	Further consideration is required on the need and validity of this guidance. It is not clear how the guidance will be implemented with potential adverse outcomes i.e. misuse by water suppliers justifying short-term exceedances. Chemical parameters with acute toxicity remain in the table (i.e. algal toxins). This is inconsistent with the advice in the guidance (Attachment B) that STEVs should not apply to chemicals with acute toxicity. STEVs do not consider the whole population exposed – this is inconsistent with the WHO guidelines which include the body weights for a child and infants. Nor is this approach consistent with the USEPA. If we take an example for Glyphosate: ADWG – 1 mg/L, STEV proposed method = 105 mg/L – this is too high for a child. Taking into consideration the body weight of a child as 10 kg the value would be 30 mg/L, and for a bottle fed infant = 20 mg/L. Comments on methods: Method 2.1 – scientific rationale needs to be provided on why it is appropriate from a toxicological perspective to derive acute exposure values extrapolated from applying a factor of 10 to chronic exposure values. How have acute toxicity data to determine NOAELs, TDI or ADIs been considered Suggest independent review by human toxicologist of the methods proposed and their relevance to the relevant toxicological end-points for the whole population.	Noted. These comments have been addressed following feedback from an earlier version of the Guidance. The Guidance has been simplified to address these concerns and to put the emphasis on consulting with the relevant authority or health regulator when calculating STEVs. The table of STEV values has been removed. Reference is made to a publication containing methodologies if they are required.

	UKWIR SNARLs are suggested no adverse response levels and are not considered standards. The SNARL is based on the concentration of a substance in water that is considered to represent no significant risk to human health over a short period. The SNARL terminology is more meaningful in the context of assessing an imminent risk to health.	
3	There could be benefit in NHMRC indicating within the Australian Drinking Water Guidelines (ADWG): (1) which Acute Reference Dose (ARfD) value would be used for STEV derivation where different values have been published by the Australian Pesticides and Veterinary Medicines Authority (APVMA) and FAO-WHO Meeting of Pesticide Residues (JMPR) for a chemical; and (2) whether interim STEVs will also be adopted like interim (chronic) guideline 8`values when an ADWG value is not available for a chemical.	Noted. This level of detail has been removed from the Guidance – these decisions can be made in consultation in the relevant drinking water authority or health regulator. More technical detail is available in the references provided.
4	The current text requires revision before being released for public consultation. Conceptually STEVs are supported for responding to emergencies on condition (as below). STEVs are consistent with the: • WHO Guidelines for Drinking-water Quality Section 8.7.5 Health-based values for use in emergencies; • the development of SNARLs by UKWIR • the development of short-term health advisories by USEPA STEVs are a potentially useful tool but should be utilised carefully in responding to drinking water contamination incidents and emergencies. These may arise during extreme events but this should not be the driver for STEVs. Guidance on extreme events need to be reviewed before STEVs can be used. Condition for STEV use: • it should be made unambiguously clear that day to day performance is governed by the established health-based guideline values. STEVs should not be used to excuse poor performance by a drinking water supplier. STEVs should only be used in specific and defined circumstances associated with contamination events and incidents. STEVs should only be applied when approved/agreed by the relevant regulator. • a definition of contamination incidents and emergencies needs to be included to provide clear boundaries on application of STEVs	Noted. The draft Guidance has been substantially revised to address similar comments.

	• duration should be limited to the defined time frames (currently 1d or 7d) and never be applied indefinitely or repeatedly (the latter is noted in the guidance) • exclusions from STEVs should be considered (e.g. lead?). Providing a STEV that is 10-100 times the health-based guideline value may not always be appropriate. Given the relatively finite list of chemical guideline values consideration should be given to identifying agreed STEVs where deemed appropriate (in some cases these could be grouped e.g. pesticides with ARfDs). This would remove ambiguity. Disinfection by-products should not be included as STEVs. The rationale for allowing occasional exceedances of guideline values for DBPs is based on not compromising microbiological quality. This is a sound but different justification and the two rationales should not be conflated. If considered useful a separate section could be added to the ADWG on DBPs to provide further supporting text to the repeated statements in the ADWG that "action to reduce DBPs (insert target chemical) is encouraged but must not compromise disinfection as non-disinfected water poses significantly greater risk than the DBP"	

Final Guidance

EnHealth Water Quality Expert Reference Panel members provided the following comments on the final Guidance in January 2020.

#	EnHealth feedback	Action/WQAC response
1	The document could be distilled further by eliminating repetition and rephrasing. In particular the last three paragraphs which reiterate the information already provided in the first two paragraphs	Not accepted. The advice is already substantially shortened.
2	Throughout document: introduction of the acronyms STEV and ARfD are not helpful; these terms should be spelt out throughout this short section.	Noted. ARfD is referred to throughout the ADWG – kept for consistency. STEV spelt out in full.
3	Consistency needed for "short term" versus "short-term" and "health based" versus "health-based",	Accepted.
4	Para 1: *specific cohorts* –suggest simply to 'exposed population'	Accepted.

5	Para 2: Change in wording of 'on the basis of' to 'based on'	Accepted.
6	Para 2: reference to AVPMA: The advice is to base short-term exposure values on acute reference doses, and points the reader to the APVMA as the source of theses dose values in Australia. However, the APVMA only maintain acute reference doses for pesticides (and vet medicines). It would be more useful to readers if this was made clear. For example, change the existing sentence to say "In Australia, acute reference dose values for pesticides are provided by the Australian Pesticides and Veterinary Medicines Authority." It would also be useful to suggest sources of acute reference doses for other materials, or to suggest that health authorities seek advice from toxicologists in determining short-term exposure values for incidents.	Accepted. Minor edits made regarding sourcing of ARfDs.
7	Para 2: last sentence: Should be stated differently– I think what they mean is that for acutely toxic chemicals the ADWG value is already based on the acute health endpoint and requires no further adjustment.	Noted. Minor edits made that health-based guideline values should be used.
8	Para 3: first sentence: A STEV would be primarily used to assess an exposure that has already occurred hence its usefulness for communicating risk	Noted.
9	Para 3: first sentence: this has already been stated in opening para	Noted.
10	Para 3: last sentence: This is an important use for a STEV	Noted.
11	Para 4: first sentence: *So self-evidently true no need to say this, unless it is considered that somebody somewhere believes that STEV's might void the principle.*	Noted.
12	Para 4: first sentence: Should be stated differently – I think what they mean is that the STEV should not be used in isolation to the ADWG as a measure of water quality.	Noted. Minor edits made to clarify.
13	Para 4: second sentence: STEV assist in determining whether there is an imminent threat to public health and recognise that *not* supplying water poses significant risks to public health (e.g. loss of water for sanitation and fire-fighting, a shift to less safe alternative water sources or poor adherence to avoidance advisories)" addresses two very different ideas. The sentence would benefit from being split into two, for example: "Short term exposure values assist in determining whether there is an imminent threat to public health. They also are an acknowledgement that *not*	Accepted. Minor edits made.

	supplying water poses significant risks to public health (e.g. loss of water for sanitation and fire-fighting or a shift to less safe alternative water sources ~~or poor adherence to avoidance advisories~~)."	
14	Para 4: second sentence – reference to sanitation and fire-fighting: *STEV's do no such thing. Really, who is going to depressurise a public water supply system such that it risks loss of water for sanitation and fire-fighting anyway, merely on the basis of a chemical exceedance? Is there any evidence this has plausibly happened in an Australian context?*	Noted. No changes made.
15	Para 4: second sentence – reference to sanitation and fire-fighting: Over reaction to a STEV – and probably what is meant is that a STEV assists in risk communicating the real rather than received risks.	Noted. No changes made.
16	Para 4: last sentence: *Already stated*	Noted.
17	Para 5: This may not be the case and it may be possible to have multiple exceedances and still not pose an unacceptable risk to public health. In any case the doc doesn't explain why it's critical that it's a 'once off'	Not accepted. The Guidance is written to encourage engagement with the relevant authority to make these decisions after a one-off event.
18	Para 5: first sentence: *The document does not explain why it is "critical" that STEV's are valid once per year, but not twice or three times.*	Not accepted. As above.
19	Para 5: last sentence: *Already stated*	Noted.

Appendix B – Public Consultation Summary Report

Background:

The *Australian Drinking Water Guidelines* 2011 (ADWG) have been developed by the National Health and Medical Research Council (NHMRC) and are designed to provide an authoritative reference to the Australian community and the water supply industry on what defines safe, good quality drinking water, how it can be achieved and how it can be assured. The ADWG undergo rolling revision to ensure they represent the latest and best scientific evidence on good quality drinking water.

The ADWG contains factsheets and health-based guideline values for a number of chemicals that might be present in drinking water. The health-based guideline value for each chemical is the concentration that, based on present knowledge, does not result in any significant risk to the health of the consumer over a lifetime of consumption and is consistent with water of good quality.

In certain circumstances the guideline value of some chemicals in a water supply may be exceeded for a short period of time without any appreciable risks to public health. This is an important consideration for local health authorities when, for example, deciding whether or not to shut down a town water supply after a flood. There is currently no advice on these exposure scenarios in the ADWG.

At the request of the Australian Government Department of Health, NHMRC developed draft *Guidance on Short-Term Exposure Values* (the Guidance) to include in Chapter 9 of the ADWG. This aims to assist water regulators and suppliers to manage instances where drinking water contamination occurs, such as during extreme weather events.

NHMRC sought public comment on the draft Guidance for inclusion in the ADWG between Wednesday 21 August 2019 and Monday 7 October 2019. Stakeholders were invited under paragraph 13(d) of the *NHMRC Act 1992* to make submissions to NHMRC about the draft amendments. The aim of this public consultation was to seek stakeholder feedback on the draft Guidance, including the proposed approach for deriving or applying short-term exposure values.

Consultation Questions

The questions asked at public consultation were:

1. Do you have any comments on the overall approach to deriving or applying short-term exposure values in drinking water?
2. Do you foresee any major difficulties in the implementation/ application of this proposed guidance? If so, what are they and how could they be resolved?
3. Do you have any general comments on the draft guidance?

Submissions

NHMRC received six public consultation submissions from the following industry, government agencies and independent sources:

- Central Highlands Water
- Individual post-graduate student
- Water NSW
- Water Services Association of Australia
- Orana Water Utilities Alliance
- Department of Health WA

Full submissions are available in **Appendix C** where permission has been given to do so.

Water Quality Advisory Committee consideration and final amendments to the Guidance on Short-Term Exposure Values

The public consultation submissions raised a number of issues that were all given due regard and taken under careful consideration by the Water Quality Advisory Committee. Key issues and responses including amendments to the Guidance by the Committee are summarised in the table below. Other minor edits such as text clarifications have been actioned accordingly.

Note that comments on issues unrelated to the public consultation were not considered as part of this process.

Summary of key issues

#	Key issue	Response
1	The description of Short-Term Exposure Values in the draft text is too generic, and, where it is specific, it is focused on pesticides data as a model for all short-term excursions. The draft Guidance is not clear on what chemicals would be covered by Short-Term Exposure Values, how they should be developed and what the values should be. It is inappropriate for the Guidelines to not provide advice as to what chemicals fit into this category.	Noted and not accepted. The ADWG provides broad guidance for regulators - this advice is not meant to cover specific circumstances and earlier examples have been removed upon request of the enHealth Water Quality Expert Reference Panel. The Guidance is, however, referring to Haber et al. (2016) and Leusch et al. (2020), which provide more concrete examples.
2	The draft Guidance does not provide enough advice on how to assess the significance of short-term excursions above the health-based guideline values for chemicals. The focus should be on providing advice about how to assess toxicological risks from short-term excursions above the health-based guideline values, in a variety of plausible settings, rather than setting an alternate set of short-term exposure values, and doing so in a way that does not simply reiterate advice already elsewhere in the Guidelines.	Not accepted. Level of detail out of scope of ADWG – a wide range of chemicals in different settings which would be too prescriptive. Seek expert advice if unsure or there is a need to understand toxicological implications of short-term exposures.

3	In response to an update to the Australian Drinking Water Guidelines, water utilities will be required to review and update their response protocols to incorporate Short-Term Exposure Values. As a result, the timeline and costs associated with implementation should be considered in making the update.	Noted. Implementation is out of scope of the ADWG. In addition, the document merely points out the availability of the short-term exposure value approach, it does not require utilities to use them.
4	Clarification of terms such as “short-term”, “allocation factor”	Noted. Details have been added to clarify terms or make it more consistent with rest of ADWG.
5	Whilst the draft text does not specify, the implication is that short-term values are to be based on or calculated from population data as nothing to the contrary is indicated within the text. Short-term values should be focussed on the cohort specifically exposed under the circumstances of the excursion (e.g. children and low body weight individuals and actual exposure profiles).	Noted. This is already covered in guidance and references. Leusch et al. (2020), referred to in the text, provides more detail on cohorts.
6	Advice should be provided on how to deal with circumstances where there is inadequate data (NOAEL, LOAEL) to evaluate a short-term/acute exposure health effect.	Not accepted. This level of detail is out of scope of this generic guidance, Haber et al. (2016) and Leusch et al. (2020) referred to in the text provide more details.
7	The section should include further guidance on the methodology applied by WHO. If a water utility is undergoing a challenge in meeting a chemical health-based guideline value, immediate clear guidance for evaluating risk should be provided rather than a document cascade back to source guidance documents.	Note accepted. This level of detail is provided elsewhere so is not included the guidance – this approach is consistent with the rest of the ADWG. Water utilities should also consult their local drinking water regulator/health authority in these situations.
8	The importance of involving a regulator or health authority on short-term chemical excursions warrants a ‘must’ instead of a ‘should’.	Accepted. Changes made to text.
9	Discussion of health-based guideline values and chronic exposure - while correct it does not add value to reiterate it here.	Not accepted. This short section adds context.
10	Discussion of using STEV for risk communication - this para does not add any value. There are considerably more matters to consider as “tools for risk communication” in the event of an exceedance than a STEV, recommend deletion.	Accepted. Sentence has been rephrased to be clearer.

Appendix C – Public Consultation Submissions

The following public consultation submissions are reported in full without alteration where permission has been given to do so.

Public Consultation Questions

1. Do you have any comments on the overall approach to deriving or applying short-term exposure values in drinking water?
2. Do you foresee any major difficulties in the implementation/ application of this proposed guidance? If so, what are they and how could they be resolved?
3. Do you have any general comments on the draft guidance?

#	Organisation	Q	Comments Received
1	Central Highlands Water	1	The reference to STEVs in the ADWG will be useful to guide regulators and industry on the potential health implications of 'short term' exceedances in parameters guideline values that have been determined on long term/lifetime exposure criteria. For example, elevations in disinfection by-product concentrations in the immediate period after significant rain events (elevated organics in raw water) or during temporary free chlorine conversions to control nitrification in chloraminated water supplies. In Victoria, water suppliers are required to submit a Section 22 notification under the Safe Drinking Water Act 2003 if the supplied water is considered unsafe. The use of STEVs will allow a judgement to be made under these circumstances as to the potential health effects.
		2	No - though the practical use of ARfD's and allocation factors for some ADWG users may be challenging, based on the specific parameter in question and the appropriateness of the calculation/assumptions.
		3	Suggest worked examples are provided for a few key parameters - eg. THMs, microcystin, a pesticide, a metal, etc This would be vey beneficial to ADWG users. See similar to Pg13 and 14 of the Water RA project report - 'Protecting Drinking Water Quality from Extreme Weather Events'.
2	Individual post-graduate student	1	Yes a comment on overall approach to deriving or applying short term exposure values in drinking water are in contrary healthy.
		2	As i do forsee major difficulties in the implementation / application of this propsed guidance, yes they are implementing and are self resolving radically sound sence of hearing.
		3	No.

3	WaterNSW	1	The alignment of the proposed section with the WHO Guidelines for Drinking Water Quality (2011, 2017) provides a supportable basis for the approach.
		2	Given the potential severity of a STEV excursion, perhaps a flow chart may allow a more rapid response to this kind of scenario.
		3	The proposed application of short term exposure values (STEV's) to ADWG may be a useful tool for managing drinking water risk. A current limitation of ADWG relates to guidance on risk assessment for short term water quality excursions, this document assists in informing this gap. An expansion of the section should however include further guidance on the methodology applied by WHO for development of a ARfD and subsequent evolution into a STEV. If a water utility is undergoing a challenge in meeting a chemical HBGV, immediate clear guidance for evaluating risk should be provided rather than a document cascade back to source guidance documents.
4	Water Services Association of Australia	1	WSAA supports the National Health and Medical Research Council (NHMRC) including guidance on Short Term Exposure Values in the Australian Drinking Water Guidelines. In our view the draft Guidance is of limited assistance on its own, as it requires individual water utilities and/or health regulators to identify and develop Short Term Exposure Values. The draft Guidance is not clear on what chemicals would be covered by Short Term Exposure Values, how they should be developed and what the values should be. The Guidance would be more useful to water utilities by including examples of Short Term Exposure Values. For example, the values provided in the Water Research Australia document 'Protecting drinking water quality from extreme weather events' (document can be accessed from https://www.waterra.com.au/project-details/158, see p13). By providing examples or a reference to the Water Research Australia document, the NHMRC would provide context to water utilities and regulators to enable development of relevant values.
		2	In response to an update to the Australian Drinking Water Guidelines, water utilities will be required to review and update their response protocols to incorporate Short Term Exposure Values. As a result, the timeline and costs associated with implementation should be considered in making the update.
		3	The Water Services Association of Australia (WSAA) consulted our members in providing this feedback. WSAA members will continue to work with the relevant health regulators to implement the Australian Drinking Water Guidelines and provide safe secure drinking water to their customers.

5	Orana Water Utilities Alliance	1	There is concern among Orana Water Utilities Alliance (OWUA) members that any short term changes have the potential to turn in to long term changes - setting a precedence and eroding the existing standards. Each Local Water Utility has a commitment in their Drinking Water Management Systems to meet the Australia Drinking Water Guidelines.
		2	Not answered
		3	Not answered
6	Department of Health Western Australia	1	The Department of Health (WA) generally supports the concept of including in the Guidelines advice on how to assess the significance of short-term excursions above the health-based guideline values for chemicals. The proposed draft text does not, in our view, achieve that outcome. The focus should be on providing advice about how to assess toxicological risks from short-term excursions above the health-based guideline values, in a variety of plausible settings, rather than setting an alternate set of short-term exposure values, and doing so in a way that does not simply reiterate advice already elsewhere in the Guidelines.
		2	The principal problem with the draft text is that it is too generic, and, where it is specific, it is focussed on pesticides data as a model for all short-term excursions. It is recommended that the following issues be resolved before final publication: • The focus on pesticides does not appear to account for the need for advice on short-term excursions relating to metals, disinfection by-products, fire retardants, hydrocarbons, carcinogens, nitrates and cyanotoxins, especially those that require consideration of half-life and elimination pathways. • Advice should be provided for accidental overdoses of chemicals added at the water treatment plant by a water supplier e.g. accidental overdose of aluminium based chemicals, fluoride, chlorine, other flocculants, oxidants or water softening chemicals. • Clarification of what time frames are meant by “short-term”, be it 24 hours, 7 days, 28 days or some other time period. The UKWIR SNARL process or USEPA Health Advisories process may be useful here. • Advice for chemicals that may be acutely problematic in plausible short term scenarios (e.g. lead, nitrates, aluminium) should be considered, either here or in the relevant chemical fact sheet. • Whilst the draft text does not specify, the implication is that short term values are to be based on or calculated from population data as nothing to the contrary is indicated within the text. Short term values should be focussed on the cohort specifically exposed under the circumstances of the excursion (e.g. children and low body weight individuals and actual exposure profiles).

			• Advice should be provided on how to deal with circumstances where there is inadequate data (NOAEL, LOAEL) to evaluate a short-term/acute exposure health effect.
		3	Comments on the specific text are as follows, in red, in the form of recommended redrafts or deletions (to be read in conjunction with our responses to questions 1 and 2, which require more detail to be added): ~~**Guidance on Short Term Exposure Values**~~ **Guidance on investigating short-term exceedances of health based guideline values** (to be included in *the Australian Drinking Water Guidelines, Chapter 9)* **9.12 Assessing the significance of short-term exceedances of the health based guideline value** Most of the chemical Health Based Guideline Values (HBGV) listed in Chapter 10 (Table 10.6) are based on the amount of a chemical in drinking water that a person can consume on a daily basis over a lifetime without any appreciable risk to health—these therefore generally relate to chronic exposure. Most HBGV are conservative and include safety factors. *(While correct it does not add value to reiterate it here. It should be noted that Chapter 9.12 discusses guideline values which are not introduced until Chapter 10. Suggest deletion.)* ~~In most cases a small (e.g. <10x above HBGV) and brief (<1 week) exceedance of a chemical HBGV is unlikely to result in an increased risk to health or indicate that the water is unsuitable for consumption.~~ *(The language here is too speculative, recommend deletion*) The amount and period for which any guideline value can be exceeded without affecting public health depends upon the specific contaminant involved and sensitivity of specific cohorts. Consideration should therefore be given to any potential effects of acute exposure on a chemical-by-chemical basis. Identification of toxicological risks from short-term exposure ~~values (STEVs)~~ must ~~should only~~ be undertaken in consultation with the relevant drinking water regulator or health authority. *(The importance of involving a regulator or health authority on short term chemical excursions warrants a 'must' instead of a 'should').* The World Health Organization (WHO) has provided guidance on the derivation of short-term exposure values in the 2017 edition of the WHO *Guidelines for Drinking Water Quality.* The WHO recommended that short-term exposure values be based on acute reference doses (ARfD) and that the allocation factor applied to drinking water may be adjusted to 100% for a short period of time. *(Suggest clarifying what 'allocation factor' means, as it is a term used only once in the entire Guidelines, deeply buried in the fact sheet for trichloroacetaldehyde.* *In the fact sheet for formaldehyde, the text reads differently, viz "… based on a 20% allocation of total daily intake to drinking water", which may or may not be an allocation factor. The Guidelines always uses terminology like 'proportion' or 'proportionality factor' when considering total daily intake attributable to the consumption of water, so introducing new terminology about a similar*

			concept needs to be justified. The basis for numerically adjusting an 'allocation factor' to 100% must also be explained. Suggest redraft for clarity.) An ARfD is defined as the amount of a chemical that can be ingested over a period of 24 hours or less without appreciable health risk to the consumer on the basis of all known facts at the time of the evaluation (Solecki *et al* 2005). In Australia, ARfD values are provided by the Australian Pesticides and Veterinary Medicines Authority (APVMA 2019), while the FAOWHO Joint Meeting on Pesticide Residues (JMPR) provides an international perspective. *(This appears to only relate to pesticides, thus limiting the applicability of the advice in this para. Suggest redraft to expand scope.)* ~~It is important to keep in mind that some chemicals do pose an acute health risk and that deriving a short-term exposure value for such chemicals is not appropriate.~~ *(This statement is correct however, it is inappropriate for the Guidelines to state this and to not provide advice to water system operators as to what chemicals fit into this category. Recommend deletion and redrafting to provide specific advice relevant to plausible Australian scenarios.)* ~~Short-term exposure values can be useful to assess the risk posed by small and brief exceedances of the HBGV, providing a basis for deciding when water can continue to be supplied to consumers without adverse health risk. They can also be a useful tool for risk communication when a HBGV exceedance has been identified.~~ *(This para does not add any value. There are considerably more matters to consider as "tools for risk communication" in the event of an exceedance than a STEV, recommend deletion.)* ~~Identification of a STEV does not void the need to reduce chemical exposure, but assists in determining whether there is an imminent threat to public health and recognises that not supplying water poses significant risks to public health. Any exceedance of HBGV should be investigated and the relevant drinking water regulator or health authority should always be involved in the response to an exceedance.~~ *(While correct, this para does not add any value and the information is already stated elsewhere in the Guidelines. It is also not clear how identification of a STEV … "recognises that not supplying water poses significant risks to public health". Recommend redraft to clarify.)* ~~It is critical to understand that STEV are only applicable to "once off" exceedances (i.e., no more than one event in any 12-month period). STEV are not appropriate for intermittent and recurrent events, which should be investigated in consultation with the relevant drinking water regulator or health regulator.~~ *(If what is proposed is only for one off circumstances, then the Guidelines should explain why, and should also talk about what to do in recurrent circumstances. It is also of concern that if adopted this advice may be used by water providers to excuse exceedance events. Recommend redraft to clarify or delete.)*

Appendix D – Declarations of Interest of Chemical Subgroup

Name/Position	Declaration of Interest
Professor Stuart Khan **(Chair of Chemical Subgroup)** Water Research Centre, The University of New South Wales	**Relevant Expertise**: • Trace Chemical Contaminants in Water; Risk Assessment and Risk Management; Environmental Engineer **Declared interests:** • Lectures at the University of New South Wales on water and wastewater quality and analysis. • Committee/Advisory member of: WHO – Water Quality and Technical Advisory Group 2015 – present; Water Quality Research Australia – Project Quality Review Team 2012 – present; U.S. WateReuse – Technical Advisory Committee 2015 – 2017; Gold Coast Commonwealth Games Independent Expert Panel – Water Quality and Monitoring Programme 2016 - present • Past Committee/Advisory member of: U.S. WateReuse Foundation – Project Advisory Committee 2010 – 2014; Australian Water Recycling Centre of Excellence – Project Advisory Committee 2011 – 2014; CSIRO and NSW Environmental Trust – Project Advisory Committee 2010 – 2013; South East Queensland Urban Water Security Research Alliance – Project Advisory Committee – Purified Recycled Water Project 2008 – 2012 • Journal Editorships: Associate Editor – Environmental Science – Water Research and Technology; Journal of Water Supply – Research Technology • Publication of numerous journal articles, reports and book chapters; also presentations at international and national conferences, seminars and workshops • Recipient of research grants from government and non-government agencies – including Australian Research Council and Water Research Australia • Member of: Australian Water Association; International Water Association; Engineers Australia • Consultant: undertook work for members of the Australian Water Industry

Professor Frederic Leusch (Chair of Water Quality Advisory Committee) School of Environment and Science, Griffith University	**Relevant Expertise**: • Environmental Toxicology; Chemical pollutants in the environment; Endocrine disruption; Bioanalytical tools in water quality assessment; Chemical risk assessment and guideline development **Declared interests**: • Deputy Head (Research), School of Environment and Science • Associate Editor (Toxicology) for Environmental Science and Technology (2020-present) • Associate Editor (environmental toxicology) for Chemosphere 2014 – 2018 • Appointments: Health and Environmental Sciences Institute –Animal Alternatives for EDC Testing Workgroup 2014 – present; Project Review Team – Water Research Australia 2012 – present; Board Member – SETAC 2015 – present • Published numerous research papers, conference publications, reports and book chapters • Presentations at international and national conferences, seminars and workshops • Has provided expert advice to Californian and Australian water utilities on recycled water quality and micropollutants of emerging concern. • Conference organisation: Chair – SETAC Australasia Conference 2012; Co-Chair: Micro Pool & Ecohazard 2011; Organising Committee: EmCon & WiOW 2016 – Emerging Contaminants and Micropollutants in the Environment; SETAC AP 2014; SETAC Australasia 2013; Discussion Leader – Disinfection By-Products Gordon Research Conference 2015 • Committees: Chair of Steering Committee – Bioanalytical Risk Assessment Validation and Experimentation – Australian Water Recycling of Excellence 2015 – present; NHMRC's Fluoride Reference Group 2014 – 2017; European Commission Seventh Framework Programme – Demonstration of Promising Technologies to Address Emerging Pollutants in Water and Waste Water 2014 – 2015; Water Research Foundation – Screening Endocrine Activity of Disinfection By-Products 2010 – 2014 • Member of: Australasian College of Toxicology and Risk Assessment; International Water Association; Society of Environmental Toxicology and Chemistry • Recipient of national and international grants to conduct research on water quality (including ARC Linkage grants including Water Quality Research Australia).

Professor Cynthia Joll Deputy Director Curtin Water Quality Research Centre, Curtin University	**Relevant expertise**: • Analytical chemist with a focus on disinfection by-products, both in terms of formation, detection and analysis of the chemicals. **Declared interests:** • Since 2006 – Deputy Director, Curtin Water Quality Research Centre, Curtin University. The Curtin Water Quality Research Centre is a Strategic Research Alliance with the Water Corporation of WA. Curtin University is also a research member of Water Research Australia • Chief Investigator on a current ARC Linkage project on nitrogen compounds in wastewater treatment. Chief Investigator on past ARC Linkage projects on disinfection by-products in drinking water systems with partner organisations Water Corporation of WA and Water Research Australia. Future applications to ARC for research support. • Publications of numerous journal articles, book chapters and reports
Dr Nick Fletcher (Observer) Food Standards Australia New Zealand	**Relevant expertise:** • Toxicology and risk assessment **Declared interests:** • Manager Risk Assessment Chemical Safety and Nutrition, Food Standards Australia New Zealand • Senior Associate (Toxicology) Coffey Environments 2012-2013
Professor Jochen Mueller **(former Member)** National Research Centre for Environmental Toxicology, The University of Queensland Adjunct Professor, Griffith University	**Relevant expertise:** • Environmental Chemistry and Toxicology; human bio-monitoring and molecular bio-markers **Declared interests:** • The University of Queensland – National Research Centre for Environmental Toxicology • Adjunct Professor, Griffith University – School of Atmospheric Science • ARC Future Fellowship until 2016 • Committee memberships: Chair – 32nd dioxin Symposium 2012 • Member of: Queensland Alliance for Environmental Health Science • Editorial boards: Chemosphere; Environmental Science and Pollution Research; Emerging Contaminants • Publications of numerous journals, book chapters and reports; also presentations at international and national conferences, seminars and workshops