Australian Government
Department of Climate Change, Energy, the Environment and Water

Australian & New Zealand
GUIDELINES FOR FRESH & MARINE WATER QUALITY

Response to public submissions on draft default guideline values for nickel in marine water

May 2026

Draft default guideline values (DGVs) for nickel in marine water were published on the Water Quality Guidelines website for a 3-month public consultation period. During this period, comments for the draft DGVs for nickel in marine water were received via public submission.

Responses to comments and any associated edits to the draft DGV technical brief are outlined in this report, de-identified for public record. In accordance with the formal post public comment DGVs approval process, the responses and revisions have been approved by the jurisdictional technical and policy oversight groups, and noted by the National Water Reform Committee.

The default guideline values for nickel in marine water are now published as final. For additional information on the publication process, please refer to the pathway for toxicant default guideline value publication.

The Water Quality Guidelines Improvement Program thanks all submissions for their valuable contribution to the development of default guideline values for the protection of aquatic ecosystems.

Attachment A

Response to public submissions on draft default guideline values

Toxicant: Nickel in marine water

Public comment	Response	Action taken
Submission 1		
1. A skewed distribution of species and taxonomic groups, which is biased toward sensitive groups such as crustaceans and echinoderms (Refer to detailed submission). *Submitter's recommendation:* • A distribution of taxa should be selected to be more representative of Australian and New Zealand marine ecosystems and re-run in a new DGV generation process. This is due to the most sensitive taxa (Crustaceans and Echinoderms) being over-represented. This more taxonomically balanced dataset can be developed via excluding 'non-preferred' data as highlighted above or via including other data considered not suitable (which is unable to be determined due to the lack of a non-included data appendix as detailed previously). In addition, the species *Mysidopsis intii*, *Mysidopsis bahia* and *Excirolana armata* were included in the DGV generation despite these species being uncommon in Australian/New Zealand waters. The inclusion of these species thus also needs some justification given that if they were excluded the dataset would still be classified as 'highly reliable'	The DGV derivation method (Warne et al. 2018) has no provision to adjust datasets to reflect general taxonomic representation of Australian and New Zealand aquatic ecosystems. Moreover, doing so would require: (i) sound knowledge of actual taxonomic representation and confidence that this was applicable across all marine ecosystems in Australia and NZ; and (ii) an overall reduction in the dataset to create a specific taxonomic representation – this reduction in sample size for the species sensitivity distribution would potentially counter any benefit gained from adjusting the taxonomic representation. Regarding the treatment of non-preferred data, see response to comment 4, below. The toxicity value for *Excirolana marina* was excluded because it was a chronic EC50 (see details in previous paragraph). However, the values for *Mysidopsis intii* and *Mysidopsis bahia* were retained as per the policy for ANZG. Warne et al. (2018) states: 'There are few geographical restrictions to the use of toxicity data for deriving DGVs. Data for Australian, New Zealand and overseas species are considered relevant and can be used provided they meet the quality criteria'.	No action taken. See Action taken for comment 4, re non-preferred data.

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2. Disproportionate (40%) number of tropical species which are not found in the bulk of Australian and New Zealand marine environments (Refer to detailed submission). *Submitter's recommendation:* • Further consideration needs to be given to the potential to generate both temperate and tropical marine Ni DGVs (i.e. two sets of DGVs) given the suitability of both datasets and the potential improvements this approach could have across Australian and New Zealand marine environments.	A sound argument is provided by Gissi et al. (2020) for combining tropical and temperate data, and this is included in the DGVs technical brief. There was no sound basis upon which to go against the conclusions of Gissi et al. (2020). See: Gissi F, Wang Z, Batley GE, Leung KMY, Schlekat CE, Garman ER & Stauber JL. 2020. Deriving a chronic guideline value for nickel in tropical and temperate marine waters. *Environmental Toxicology and Chemistry*, 39:2540–2551.	No action taken.
3. The lack of an Appendix document highlighting chronic ecotoxicology studies deemed unsuitable (excluded) for use in the DGV derivation (Refer to detailed submission). *Submitter's recommendation:* • An appendix (for transparency and clarification) be provided outlining the data deemed unsuitable for use in the DGV generation to increase the transparency of the DGV generation process.	All chronic toxicity data were quality assessed, with none scoring <50% (i.e. all were deemed acceptable quality). However, further screening identified inappropriate data for reasons including (but not necessarily limited to): • Salinity of test waters too low • EC10s could not be calculated • Cases where an available NOEC was deemed to be more appropriate than an available EC10 • Left censored values (i.e. < values) • Chronic low/median effect data that would need to be converted to negligible effect data An appendix of excluded chronic toxicity data is not a requirement for ANZG technical briefs (although it is acknowledged that at least one DGV technical brief has included such information). Studies/data that were not included in the nickel marine derivation can be identified via the data quality and data entry spreadsheets, while there is also discussion in Section 4.1 of the technical brief on specific	The data quality assessment and data entry spreadsheets have been tidied up and clear notes added where necessary. Technical brief updated. Section 4.1 of the technical brief has been re-written to be more explicit about certain data selection decisions.

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During a high-level literature search, MBS identified at least one study (Asadpour et al., 2013) that appears to be of similar quality to some of the 'non-preferred' data included in the DGV derivation	data selection decisions (e.g. selection of NOECs over EC10s, the censored data, converted chronic data). The paper by Asadpour et al. (2013) looked only at acute effects of nickel on shrimp species; therefore, it was not even considered for the derivation as there were ample chronic toxicity data.	
4. Seemingly arbitrary inclusion and exclusion of 'non-preferred' ecotoxicological data (i.e. No Observed Effect Concentration - NOEC and converted- NOEC) despite the dataset being classified as being of high reliability in the absence of 'non-preferred' ecotoxicological data (Refer to detailed submission). *Submitter's recommendation:* • All relevant but 'non-preferred' NOEC and converted NOEC data should either all be included or all excluded for consistency noting that the dataset is considered of high reliability when all NOEC and converted NOEC data is excluded. • Remove any data from testing not conducted within the range of typical marine salinity (25 to 36 ppt (parts per thousand)) and pH (6.5 to 8.0) as specified by DCCEEW (2023) in the technical brief for the draft copper DGV.	The use of 'non-preferred' NOEC data and also low/median effect data (i.e. MATC, LOEC, EC50) was re-assessed. Based on this assessment: • low/median effect data that would need to be converted to negligible effect data were not included in the final dataset due to the higher uncertainty associated with the need to apply default conversion factors, and the fact that their inclusion had negligible effect on the DGVs. • Two left censored NOEC values (i.e. < values) were excluded due to their high uncertainty. • The remaining chronic NOEC data (and an EC20 value) were included in the final dataset. There is no evidence that salinities in the range 25 to 35 ppt affect Ni speciation and toxicity, for nickel concentrations in the "µg/L" range (e.g. Bryant et al. 1985). Differences are seen at much lower salinities.	Technical brief updated. An Appendix (Appendix B) was added that provides the details and justification for the key data selection decisions. Section 4.1 was also updated accordingly. The SSD and DGVs were updated based on the revised final dataset.

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	Warne et al. (2018) state that data for salinities ≥25‰ are acceptable in marine datasets. No toxicant data were used for values outside this range. The origin of the pH 6.5-8 for the draft copper technical brief is unclear. ANZECC/ARMCANZ (2000) lists 7.0-8.5 for estuaries and 8.0-8.4 for marine waters, so the higher pH values seen are acceptable.	
5. The conduction of modality and taxa-specific sensitivity assessments that does not account for the inherent variability between individual datapoints (studies) of the same species (Refer to detailed submission). The most prominent example of this was for the diatom *Skeletonema costatum* and the polychaete *Hydroides elegans* which both contained significant variability across individual experimental samples as outlined below in Table 6. *Submitter's recommendation:* • An assessment of modality and taxa-specific sensitivity should encompass the variability in nickel responses across studies on the same species as well as between different species and taxa.	The rules for data selection are clear (Warne et al. 2018). The tests for modality are designed to look at the derived SSD and determine if there is an indication of bimodality. These have been shown to work well. Where this occurs, the effects are very clear. The modality and sensitivity assessments are not designed to address the inherent variability between data points for the same species. For toxicity values from the same species, endpoint and test duration, we use the geometric mean of those values to deal with the inherent variability. This is an accepted way to get data that is representative of a single species (see Warne et al. (2018) for the hierarchy of selecting the toxicity data that represents a single species). Moreover, there is no reason to suspect that the mechanisms of toxicity of nickel might differ leading to a bimodal response. It is noted that a comprehensive assessment of modality of the copper marine dataset was undertaken based on a similar public comment, which concluded that it did not change the outcome.	No action taken
6. Difficulties measuring low level nickel in marine waters (Refer to detailed submission).	Notably, the three commercial laboratory LoRs reported by the submitter (0.5 μg/L , 1 μg/L and 1 μg/L) are all lower than the	Technical brief updated. A paragraph related to sampling and analysis was added to Section 4.3.

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Submitter's recommendation: • Further discussion also needs to be given to measurement of the 99% DGV as it is below the PQL of most laboratories including what methods should be used to measure it such as passive sampling devices. More accurate measurement of these extremely low levels will avoid false positives exceeding the 99% DGV and resource wastage to run the resultant investigations triggered by laboratory analysis variability.	draft 99% species protection DGV of 1.4 µg/L. Moreover, some laboratories can obtain lower detection limits using ultratrace methods, which could be used if nickel concentrations of <1 µg/L in seawater needed to be detected; however, this should not be required for the purposes of comparing marine water nickel concentrations to the DGVs.	
Submission 2		
1. This updated guideline value is statistically defensible in its derivation and the underlying quality of the science is determined to be highly reliable. Nonetheless, it represents over a 12-fold decrease which may initially, on a practical level, present challenges in site assessments and DGV exceedances. The available implementation guidance and practices should be thoroughly prepared to handle an increased quantity of nickel exceedances during the initial timeframe these values are enacted.	The ANZG website provides guidance on how toxicant DGVs should be applied, but it also acknowledges that the DGVs are not mandatory and that it is up to local jurisdictions to determine if and how they will be implemented. Relevant jurisdictions were aware of the lower DGVs well before publication, and they will implement any necessary measures as part of the DGV publication and implementation process.	No changes to the DGVs technical brief.

References

ANZECC/ARMCANZ (2000) *Australian and New Zealand guidelines for fresh and marine water quality*. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand.

Asadpour YA, Nejatkhah M, Baniamam M. (2013). Evaluating the bioaccumulation of nickel and vanadium and their effects on the growth of *Artemia urmiana* and *A. franciscana, Iranian Journal of Fisheries Sciences,* 12, 183-192.

Bryant V, Newbery DM, McLusky DS, Campbell R. (1985). Effect of temperature and salinity on the toxicity of nickel and zinc to two estuarine invertebrates (*Corophium volutator*, *Macoma balthica*). *Marine Ecology Progress Series*, 24, 139–153.

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Warne MStJ, Batley GE, van Dam RA, Chapman JC, Fox DR, Hickey CW, Stauber JL (2018) *Revised method for deriving Australian and New Zealand water quality guideline values for toxicants – update of 2015 version*, Australian and New Zealand governments and Australian state and territory governments.