

Washington Stormwater Center

Comments in the attached file titled "Comment on ALC for 6PPD-Q WSU WSC.pdf"

April 23, 2024

Comments on aquatic life criterion proposed for 6PPD-quinone

- *1-h exposure duration.* The acute criterion is to prevent risk of mortality from a 1-h exposure. In support of a 1-h exposure duration as relevant, research conducted at WSU PREC showed that juvenile coho salmon (*O. kisutch*) exposed to 25% roadway runoff experienced some mortality after as little as a 1-h exposure. This data is currently unpublished but will be incorporated into an upcoming publication and can be provided upon request.
- *New LC50 to include in derivation.* The criterion calculations should include the new LC50 by Liao et al. (2024) for *O. mykiss* (0.9 µg/L), with the caveat detailed below about concentration basis.
- *Initial vs time-weighted concentrations.* Concentrations of 6PPD-quinone experienced early during an exposure are more important to causing mortality than concentrations experienced later during an exposure. This was shown by Chow et al. (2019) for coho exposed to roadway runoff, whereby fish transferred to clean water midway through a 24-h exposure died at the same timing and rate as fish that remained in the exposure water. Many of the studies used to develop the criterion reported significant decreases in exposure concentration (47-97%) across 24 hours. Several of those studies based the LC50 determination on time weighted average concentrations (TWA), which would produce a falsely low estimate of the LC50. Due to the importance of earlier concentrations, initial concentrations should be used to determine LC50s. The LC50 value of 0.51 µg/L reported for *S. leucomaenis* (Hiki et al. 2022) in Table 55 is based on the TWA and should be replaced by the value of 0.80 µg/L which Hiki et al. reported as based on initial concentrations. The estimated LC50 based on initial concentrations should be requested from Liao et al. (2024). It is unclear whether values from Di et al. (2022) and Brinkmann et al. (2022) are also based on TWA, which should be verified with the study authors and corrected to initial concentration basis.
- *24-h vs 96-h durations.* Given that the exposure window for the criterion is assumed to be 1 hour, LC50 values based on a 24-h exposure duration are more relevant than LC50 values based on a 96-h exposure. The *O. mykiss* value from Brinkmann et al. (1.0 µg/L) currently included in the criterion derivation in Table 55 is from a 96-h exposure. The 24-h criterion reported by Brinkmann et al. was 1.96 µg/L. The 24-h value should be used.

Values reported by Di et al. are also from 96-h exposures and 24-h values should be requested and used in the derivation.

- Concentrations reported by Varshney et al. (2022) for the acute lethality determination on zebrafish (*Danio rerio*) are nominal and no measurements were made to confirm exposure concentrations. This LC50 should probably not be included in the analysis.

Bibliography

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Sincerely,

A handwritten signature in black ink that reads "JK McIntyre". The letters are cursive and fluidly connected.

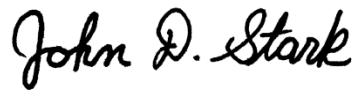
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A handwritten signature in black ink that reads "John D. Stark". The letters are cursive and fluidly connected.

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