

Memorandum

To: DEQ Water Quality Staff

From: Water Quality Permitting and Program Development; updated by Aliana Britson

Date: 7/22/2024

Subject: Implementation Instructions for the Water Quality Criterion Hexachlorocyclo-hexane-Technical (CAS #: 608-73-1)

This memo clarifies how Hexachlorocyclo-hexane-Technical (synonyms: Technical-HCH or Technical BHC) concentrations in effluent and surface water are measured to determine compliance with water quality criteria.

Criteria summary

Oregon water quality standards (OAR 340-041-8033) include human health criteria for Hexachlorocyclo-hexane-Technical and separate human health criteria for the isomers BHC alpha, BHC beta, and BHC gamma (Lindane) (Table 40). There are also aquatic life criteria for BHC gamma (Table 30 and Endnote A).

Table 1: Water Quality Criteria

Chemical	Human Health Criteria		Aquatic Life Criteria (Freshwater)		Aquatic Life Criteria (Saltwater)	
	Water + Org (µg/L)	Org Only (µg/L)	Acute (µg/L)	Chronic (µg/L)	Acute (µg/L)	Chronic (µg/L)
Hexachlorocyclo-hexane-Technical	0.0014	0.0015	---	---	---	---
BHC Alpha	0.00045	0.00049	---	---	---	---
BHC Beta	0.0016	0.0017	---	---	---	---
BHC Gamma (Lindane)	0.17	0.18	0.95	0.08 ^A	0.16 ^A	---

^A This criterion is based on EPA recommendations issued in 1980 that were derived using guidelines that differed from EPA's 1985 Guidelines which update minimum data requirements and derivation procedures. The CMC may not be exceeded at any time and the CCC may not be exceeded based on a 24-hour average. The CMC may be applied using a one hour averaging period not to be exceeded more than once every three years, if the CMC values given in Table 30 are divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

Technical-grade BHC was historically used as an insecticide. It is not a separate BHC isomer, but rather a mixture of BHC isomers, consisting of approximately 60–70% alpha (α), 5–12% beta (β), 10–15% gamma (γ), 6–10% delta (δ), and 3–4% epsilon (ε) forms of BHC¹. The gamma isomer is the main insecticidal component to the technical mixture.

¹ Kutz et al. 1991 and ATSDR. [Toxics Substances Portal](#). Hexachlorocyclohexane (HCH).



Key issues

40 CFR 122, Appendix D requires certain industrial facilities to monitor their effluent for “*alpha-BHC*”, “*beta-BHC*”, “*gamma-BHC*” and “*delta-BHC*” as part of the priority pollutant scan. Note that there is not an explicit state water quality criterion for delta-BHC.

Although 40 CFR 122, Appendix J does not explicitly require domestic facilities to monitor for these pollutants, domestic major facilities are required to monitor for all pollutants for which there are state standards (40 CFR 122.21(j)(4)(iv)).

Analytical methods exist for the individual isomers, but there are no analytical methods specifically for Technical BHC.

Recommended analytical method

Separate analyses for BHC alpha, BHC beta, and BHC gamma should be done to compare results against individual numeric criteria. Because there are no analytical methods specifically for Technical BHC, separate analyses for the four major isomers (alpha, beta, delta, and gamma) must be completed and then each result added together and compared to the most stringent applicable criterion for Technical BHC.

Implementation in NPDES permits

For NPDES permits where Technical BHC is identified as a pollutant of concern, monitoring for all four isomers, alpha, beta, delta, and gamma, will be required. To compare effluent values to the Technical BHC criteria, the analytical results for all four isomers will be added together. For example, if the permittee reported 0.01 ug/L for alpha, 0.01 ug/L for beta, 0.02 ug/L for delta, and 0.01 ug/L for gamma, the final sum of 0.05 ug/L (0.01 ug/L + 0.01 ug/L + 0.02 ug/L + 0.01 ug/L) would be used for comparison to the Technical BHC criteria or any permit limits. It should be noted that BHC gamma (Lindane) was also produced and used separately from the production and use of Technical BHC. Therefore, if the permittee is able to prove that any exceedance of the Technical BHC criteria is due to the past use of Lindane, and not due to Technical BHC, then the Technical BHC criteria will be evaluated using only the alpha, beta, and delta isomers.

As stated in Note A of OAR 340-041-8033, the freshwater chronic and saltwater acute aquatic life criteria for gamma-BHC were based on EPA recommendations issued in 1980. To ensure consistent evaluation with other criteria, the acute (CMC) aquatic life criteria for gamma-BHC will be applied using a one hour averaging period not to be exceeded more than once every three years. Therefore, the CMC value will be divided by 2 as stated in Note A and a value of 0.08 ug/L will be used as the saltwater acute aquatic life criteria to which effluent concentrations are compared.

Water Quality Permitting
700 NE Multnomah Street, Suite 600, Portland, OR 97232
503-229-5263, Toll-free in Oregon: 800-452-4011

DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.



Conclusion

In summary, there is no analytical method for Technical BHC. Instead, the four major isomers (alpha, beta, delta, and gamma) must be separately analyzed and then added together to compare to the Technical BHC criteria.

Non-discrimination statement

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities. Visit DEQ's [Civil Rights and Environmental Justice page](#).

Translation or other formats

[Español](#) | [한국어](#) | [繁體中文](#) | [Русский](#) | [Tiếng Việt](#) | [العربية](#)
800-452-4011 | TTY: 711 | deqinfo@deq.oregon.gov

Water Quality Permitting
700 NE Multnomah Street, Suite 600, Portland, OR 97232
503-229-5263, Toll-free in Oregon: 800-452-4011

DEQ's mission is to be a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.