State of Oregon
DEQ Department of Environmental Quality

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 DDT,-4,4' (CAS #: 50-29- 3) Water Quality Criteria

This memo clarifies how DDT,-4,4' concentrations in effluent and surface water are measured to determine compliance with water quality criteria.

Criteria summary

Oregon water quality standards include numeric criteria for DDT,-4,4' to protect human health and aquatic life. There are additional human health criteria for its metabolites - DDD,-4,4' and DDE,-4,4' (See table below).

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)
DDD,-4,4'	0.000031	0.000031	---	---	---	---
DDE,-4,4'	0.000022	0.000022	---	---	---	---
DDT,-4,4'	0.000022	0.000022	1.1 [A,G]	0.001 [A,G]	0.13 [A,G]	0.001 [A,G]

[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.

[G] *This criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value).*

Key issues

The footnote associated with the aquatic life criteria indicates that "this criterion applies to DDT and its metabolites (i.e. the total concentration of DDT and its metabolites should not exceed this value)." However, it does not specifically denote which metabolites to include. The EPA 1980 reference document[1] states in Table 1 that DDT refers to technical DDT, which is usually composed of DDT-4,4', DDT-2,4', DDD-4,4', DDD-2,4', DDE-4,4', and DDE-2,4' in descending

[1] EPA. Ambient Water Quality Criteria for DDT. EPA 440/5-80-038. October 1980.

quantities. Table 1 further lists the metabolites of DDT as DDE, DDD, DDMU, DDMS, DDNU, DDOH, and DDA. However, there are only 40 CFR 136 approved methods for DDT-4,4', DDD-4,4', and DDE-4,4'. While some of the 40 CFR 136 approved methods also include the 2,4' variants many of the metabolites do not have established methods, which would require permittees to ask labs to develop in-house methods to measure all metabolites. It is estimated that approximately 15% of technical DDT is made up of the 2,4' variants. Because there are no established methods for the other metabolites (DDMU, DDMS, DDNU, DDOH, and DDA) and the total percentage of these metabolites are unknown, these metabolites are considered to be *de minimis* and therefore do not need to be included.

The criteria developed for human health does not have a footnote referencing "metabolites." For evaluation of the human health criteria, samples are analyzed for DDD,-4,4', DDE,-4,4', and DDT,-4,4' and then compared to the applicable criteria.

The human health criteria are four orders of magnitude lower than the aquatic life criteria. Therefore, the human health criteria will be exceeded before DDT concentrations reach magnitudes that could exceed aquatic life criteria. Because of this, in cases where both the human health and aquatic life criteria apply there is only a need to evaluate the human health criteria based on DDT-4,4' DDE-4,4' and DDD-4'4. If there is not an exceedance in any one of these three criteria, then there is a guarantee that the aquatic life criteria have been met. Since the 2,-4 isomers of DDT, DDE, and DDD only encompass approximately 15% of the total of DDT metabolites, the lack of monitoring for these compounds would not impact the aquatic life analysis should the human health criteria already be met. Currently, both the human health and aquatic life criteria apply in nearly all waters of the state. For the rare cases where only aquatic life criteria apply or in situations where a permit limit based on aquatic life is included in a permit, DEQ will require separate analyses for DDD,-4,4', DDE,-4,4', and DDT,-4,4' to be completed and then add the results together. The final sum will then be increased by 15% to account for the 2,4' isomers of DDT, DDE, and DDD and compared to the aquatic life criterion or permit limit for DDT,-4,4'.

Implementation instructions for NPDES permits

For human health criteria, the samples must be analyzed for DDD,-4,4', DDE,-4,4', and DDT,-4,4' and each result compared to the applicable criteria (when determining reasonable potential and calculating effluent limits) or permit limit (for compliance monitoring).

For aquatic life criteria, it shall be assumed that the criteria are met if the human health criteria are not exceeded. For situations where the human health criteria do not apply, effluent and ambient samples must be analyzed for DDD,-4,4', DDE,-4,4', and DDT,-4,4'. The results of the three analyses will be summed together, increased by 15% and compared to the applicable aquatic life criteria (when determining reasonable potential and calculating effluent limits) or permit limit (for compliance monitoring) for DDT,-4,4'. For example, if a permittee reported a value of 0.001 ug/L for DDD,-4,4', 0.002 ug/L DDE,-4,4', and 0.003 ug/L for DDT,-4,4', the sum

of those values increased by 15% (0.001 ug/L + 0.002 ug/L + 0.003 ug/L = 0.006 ug/L+0.006* 0.15 = 0.0024 ug/L), would be the value compared to the applicable aquatic life criteria or permit limit.

Monitoring for DDD,-4,4', DDE,-4,4', and DDT,-4,4' will be required in NPDES permits when DDT-4,4' is a pollutant of concern.

As stated in Endnote A of OAR 340-041-8033, the freshwater chronic and saltwater acute aquatic life criteria for DDT,-4,4' were based on EPA recommendations issued in 1980. To ensure consistent evaluation with other criteria, the acute (CMC) aquatic life criteria will be applied using a one hour averaging period not to be exceeded more than once every three years. Therefore, as stated in footnote A the CMC value will be divided by 2 and the value of 0.55 ug/L will be used as the freshwater acute aquatic life criteria and the value of 0.065 ug/L will be used as the saltwater acute aquatic life criteria to which effluent concentrations are compared.

Conclusion

To evaluate reasonable potential for the aquatic life criteria it is self-evident that if the human health criteria are met then the aquatic life criteria are also met. To evaluate effluent limits related to the aquatic life criteria for DDT,-4,4', sum together the results for DDD,-4,4', DDE,-4,4', and DDT,-4,4' and increase by 15%. Results for the DDT human health criteria are directly compared to the applicable criteria for DDD,-4,4', DDE,-4,4', and DDT,-4,4'. Only monitoring for the 4,4' variants of DDT will be required to be monitored in NPDES permits.

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