Ground Water Quality Standard for o-, m-, and p-Cresol

CASRN# **95-48-7, 108-39-4, 106-44-5**

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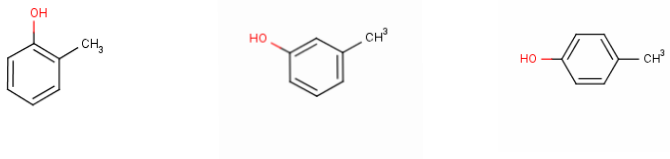
Summary of Decision: In accordance with the New Jersey Ground Water Quality Standards rules at N.J.A.C. 7:9C-1.7, the Department of Environmental Protection (Department) has developed an interim specific ground water quality criterion of 50 µg/L and PQL of 0.1 µg/L (ppb) for o-, m-, and p-Cresol. The basis for this criterion and PQL are discussed below. Pursuant to N.J.A.C. 7:9C-1.9(c), **the applicable constituent standard is 50 µg/L**.

o-, m-, and p-Cresol

Molecular Formula:

C_7H_8O

Molecular Structure:



Background: The cresols comprise a group of three closely related isomers, o-, m- and p-cresol. As environmental contaminants they are most commonly found as a mixture with varying proportions of these three isomers. Cresols are used as solvents, disinfectants, and as intermediates in chemical manufacture, including pharmaceuticals, dyes, epoxides, pesticides, paints and textiles and as an additive to phenol-formaldehyde resins. The Groundwater Quality Criterion is intended to apply to generic mixtures of cresol isomers.

Reference Dose: The RfD is based on decreased hematocrit in mice. The point of departure (POD) for that endpoint was divided by uncertainty factors (UFs) including a UF of 10 to address suggestive evidence of carcinogenic potential (USEPA, 2005, NTP 2008).

POD/ UF= 21.9 mg/kg/day/ (10 x 10 x 3) = 0.073 mg/kg/day.

RfD = 0.073 mg/kg/day/10 = 7.3×10^{-3} mg/kg/day.

Derivation of Ground Water Quality Criterion: The ground water quality criterion was derived pursuant to the formula established at N.J.A.C. 7:9C-1.7(c)4, using 7.3×10^{-3}mg/kg/day as the Reference Dose (as explained above), and standard default assumptions:

$$\frac{7.3 \times 10^{-3}\text{mg/kg/day} \times 70\text{ kg} \times 0.2}{2\text{ L/day}} = 5.1 \times 10^{2}\text{ mg/L} = 51.1\text{ µg/L or 50ug/L rounded to one significant figure}$$

Where:
$7.3x10^{-3}$mg/kg/day = derived RfD
70 kg = assumed weight of an adult human
0.2 = assumed relative source contribution
2 L/day = assumed daily volume of water consumed.

Derivation of PQL: The method detection limit (MDL) and the practical quantitation level (PQL) are performance measures used to estimate the limits of performance of analytical chemistry methods for measuring contaminants. The MDL is defined as "the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analytic concentration is greater than zero" (40 CFR Part 136 Appendix B). USEPA recommends that the MDL be multiplied by a factor of five or 10 to account for the variability and uncertainty that can occur at the MDL. The Department uses a value of five as the median upper boundary of the inter-laboratory MDL distribution from the New Jersey certified laboratory community and multiplies the MDL by five to derive the PQL. Establishing the PQL at a level that is five times the MDL provides a reliable quantitation level that most laboratories can be expected to meet during day-to-day operations.

O, m, p-Cresols appear as a listed parameter in National Environmental Methods Index (NEMI). The limit of detection in the method is specified as 0.026 ppb. As explained above, the PQL is established by multiplying the limit of detection by five, 0.026 ppb x 5 = 0.1 ppb (rounded to one significant figure). **Therefore, the Department has established a PQL of 0.1 ppb for o-, m-, and p-Cresol.**

Conclusion: Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 51.1 µg/L and a PQL of 0.1 µg/L (ppb) for o, m, p-Cresol. *Since the ground water quality criterion is higher than the PQL for this constituent*, pursuant to N.J.A.C. 7:9C-1.9(c), **the applicable constituent standard for o-, m-, and p-Cresol is 50 µg/L .**

Technical Support Documents: *Interim Specific Ground Water Quality Criterion Recommendation Report for o, m, p-Cresol, Alan H. Stern, Ph.D., D.A.B.T.*, NJDEP, February 25, 2010; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for o, m, p-Cresol*, R. Lee Lippincott, Ph.D., NJDEP, March 13, 2014.

References: NTP (National Toxicology Program) (2008). NTP Technical Report on the Toxicology and Carcinogenesis Studies of Cresols in Male F344/N Rats and Female B6C3F1 Mice (Feed Studies), NTP TR 550. National Institutes of Health, Public Health Service, U.S. Department of Health and Human Services.

USEPA (2005). Guidelines for Carcinogen Risk Assessment. Accessed at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=116283, 7/7/10.