

Ground Water Quality Standard for Diphenyl Ether

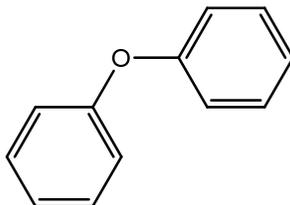
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CASRN# 101-84-8

NJDEP

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 100 µg/L and PQL of 10 µg/L (ppb) for diphenyl ether. 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 100 µg/L.**

Diphenyl Ether
Molecular Formula: C₁₂H₁₀O
Molecular Structure:



Background: Diphenyl ether is used in the manufacture of high-temperature lubricants and surfactants, as a fragrance, particularly in soap and detergents, as a heat-transfer medium in resins for laminated electrical insulation, as a dye carrier in the production of polyesters, and as a chemical intermediate for such reactions as halogenation, acylation, and alkylation.

Based on a thorough review by the Health Council of the Netherlands (2005), a rat dietary subchronic study conducted by ITT Research Institute (ITTRI, 1990), and a rat gavage developmental toxicity study conducted by Bio/dynamics (1987) on Therminol VP-1 heat transfer fluid (a mixture of diphenyl ether and biphenyl), there is no evidence that diphenyl ether is mutagenic and no chronic studies have been conducted on it. It is therefore treated as a non-carcinogen for risk assessment purposes.

Reference Dose: In the rat dietary subchronic study (ITTRI, 1990), the No Observed Adverse Effect Level (NOAEL) was 15 mg/kg/day, as effects on body weight occurred at higher doses in females. An uncertainty factor of 1000, appropriate for a NOAEL from a subchronic study, was applied to this NOAEL to derive a Reference Dose of 0.015 mg/kg/day. This includes an uncertainty factor of 10 for interspecies extrapolation, an uncertainty factor of 10 for intraspecies extrapolation, and an uncertainty factor of 10 for less-than-lifetime duration of the subchronic study.

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 0.015 mg/kg/day as the Reference Dose (as explained above), and standard default assumptions:

$$\frac{0.015 \text{ mg/kg/day} \times 70 \text{ kg} \times 0.2}{2 \text{ L/day}} = 0.105 \text{ mg/L (rounds to 0.1 mg/L)} = \mathbf{100 \mu\text{g/L}}$$

Where:

0.02 mg/kg/day = the derived RfD

70 kg = the assumed weight of an adult human

0.2 = the assumed relative source contribution

2 L/day = the assumed daily drinking water intake

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 analytic 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 analyte 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.

Diphenyl ether appears as a listed parameter in a published analytical method – "USEPA 1625, Semivolatiles - Base/Neutrals, Acid Extractable, GC/MS" (see [National Environmental Methods Index \(NEMI\)](#)). The limit of detection in the method is not specified. The Minimum Reporting Level (ML), which is a quantitation level, is 10 ppb. Therefore, the Department has established a PQL of 10 ppb for diphenyl ether.

Conclusion: Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 100 µg/L and a PQL of 10 µg/L (ppb) for diphenyl ether. 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 diphenyl ether is 100 µg/L .**

Technical Support Documents: *Interim Specific Ground Water Quality Criterion Recommendation Report for Diphenyl Ether*, Dr. Gloria Post, NJDEP, June 11, 2007; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for Diphenyl*, R. Lee Lippincott, Ph.D., NJDEP, September 7, 2007.

References:

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