

Ground Water Quality Standard

1,4-Dioxane

CASRN# 123-91-1

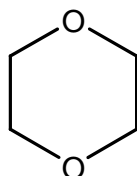
Summary of Decision: In accordance with the New Jersey Ground Water Quality Standards rules at N.J.A.C. 7:9C-1.7, the Department of Environmental Protection (Department) has developed an interim specific ground water quality criterion of 3 µg/L and PQL of 10 µg/L for 1,4-dioxane. The basis for this criterion and PQL are discussed below. Pursuant to N.J.A.C. 7:9C-1.9(c), **the applicable constituent standard is 10 µg/L.**

1,4-Dioxane

1, 4-Diethylene dioxide

Molecular Formula: C₄H₈O₂

Molecular Structure:



Background: 1,4-dioxane has been evaluated by the U.S. Environmental Protection Agency (USEPA), which classified this constituent as a Group B2 Probable Human Carcinogen. The cancer assessment for 1,4-dioxane provided in the [USEPA IRIS database](#) was developed in 1988 (USEPA, 2004). A cancer slope factor of 0.011 (mg/kg/day)⁻¹ was derived for this constituent based on the increased incidence of squamous cell carcinomas of the nasal turbinates in male Osborne-Mendel rats in a chronic drinking water study (NCI, 1978). For chemicals classified as Group B2, the cancer slope factor is used to develop a ground water quality criterion at the 10⁻⁶ risk level.

Derivation of Ground Water Quality Criterion: The ground water quality criterion was derived pursuant to the formula established in the [New Jersey Ground Water Quality Standards rules](#) at N.J.A.C. 7:9C-1.7(c)4, using 0.011 (mg/kg/day)⁻¹ as the cancer slope factor (as explained above) and standard default assumptions:

$$\frac{(10^{-6} / 0.011 \text{ (mg/kg/day)}^{-1}) \times 70 \text{ kg}}{2 \text{ L/day}} = 0.0032 \text{ mg/L or } 3.2 \text{ ug/L}$$

Where:

10⁻⁶ = Risk Level

0.011 (mg/kg/day)⁻¹ = Cancer Slope Factor

70 kg = assumed body weight of average person

2 L/day = assumed daily drinking water intake

Derivation of PQL: 1,4-Dioxane appears as a listed parameter in a published analytical method - "USEPA 1624, Volatile Organic Compounds by GC/MS". The limit of

detection in the method is not specified. The Minimum Reporting Level (ML), which is a quantitation level, is 10 ppb.

Conclusion: Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 3 µg/L and a PQL of 10 µg/L for 1,4-dioxane. Pursuant to N.J.A.C. 7:9C-1.9(c), since the PQL is higher than the criterion, the applicable constituent standard for 1,4-dioxane is 10 µg/L.

Technical Support Documents: *Interim Specific Ground Water Quality Criterion Recommendation Report for 1,4-Dioxane*, Dr. Gloria Post, NJDEP, September 11, 2006; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for 1,4-Dioxane*, R. Lee Lippincott, Ph.D., NJDEP, September 18, 2005.

References:

NCI (1978). National Cancer Institute. Bioassay of 1,4-Dioxane for Possible Carcinogenicity, CAS No. 123-91-1. NCI

Carcinogenesis Tech. Rep. Ser. No. 80. DHEW Publication No. (NIH) PB-285-711.

USEPA (2004). United States Environmental Protection Agency. Integrated Risk Information System.). 1,4-Dioxane (CASRN 123-91-1). Last updated 2/9/2004.