# Ground Water Quality Standard for 2-Methylnaphthalene

*CASRN# 91-57-6*

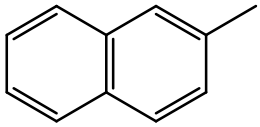
February 2008 NJDEP

**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 30 µg/L and PQL of 10 µg/L (ppb) for 2-methylnaphthalene. 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 30 µg/L**.

## 2-Methylnaphthalene

**Molecular Formula: $C_{11}H_{10}$**

**Molecular Structure:**



**Background:** 2-methylnaphthalene has been evaluated by the U.S. Environmental Protection Agency (USEPA), and a Reference Dose is available on the USEPA IRIS database. The Department has determined that the USEPA IRIS Reference Dose (RfD) is an appropriate basis for the ground water criterion. 2-methylnaphthalene was evaluated under the USEPA Guidelines for Carcinogen Risk Assessment (2005), and was given the descriptor of inadequate to assess human carcinogenic potential. Therefore, 2-methylnaphthalene is treated as a non-carcinogen in developing an interim specific ground water quality criterion.

**Reference Dose:** The IRIS Reference Dose (RfD) for 2-methylnaphthalene of 0.004 mg/kg/day was developed in 2003 (USEPA, 2003a, b) based on benchmark dose modeling of the incidence of pulmonary alveolar proteinosis in B6C3F1 mice fed 2-methylnaphthalene for 81 weeks (Murata et al., 1997). A benchmark response level of 5% extra risk ($BMD_{05}$) of the critical effect, pulmonary alveolar proteinosis, was selected for this assessment. The lower 95% confidence limit on the $BMD_{05}$ (i.e., $BMDL_{05}$) was 3.5 mg/kg-day.

A total uncertainty factor of 1000 was applied to the $BMDL_{05}$ of 3.5 mg/kg-day: 10 for extrapolation for interspecies differences, 10 for consideration of intraspecies variation,; and 10 for deficiencies in the database, including lack of adequate studies of oral developmental toxicity, reproductive toxicity, and neurotoxicity. Based on the uncertainty factor adjustment (shown below), the RfD is 0.004 mg/kg/day.

**Uncertainty factor (UF) adjustment:**

$UF_{interspecies\ variability} = 10$

$UF_{intraspecies\ variability} = 10$

$UF_{database\ deficiencies} = 10$

$UF = UF_{total} = 10 \times 10 \times 10 = 1000$

$RfD = NOAEL/UF = \frac{3.5 \text{ mg/kg/day}}{1000} = 0.0035$ mg/kg/day which rounds to 0.004 mg/kg/day

**RfD** = 0.004 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 0.004 mg/kg/day as the Reference Dose (as explained above), and standard default assumptions:

$\frac{0.004 \text{ mg/kg/day} \times 70 \text{ kg} \times 0.2}{2 \text{ L/day}} = 0.028$ which rounds to 0.03 mg/L or 30 μg/L

**Where:**
0.004 mg/kg/day = Reference Dose (RfD)
70 kg = assumed body weight of average person
0.2 = Relative Source Contribution from drinking water
2 L/day = 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).

2-methylnaphthalene appears as a listed parameter in a published method – "OSW USEPA 8270D, Semivolatile Organic Compounds by GC/MS". The limit of detection in the method is not specified. The estimated quantification level (EQL) published in the method is 10 ppb (see the National Environmental Methods Index (NEMI)).

**Conclusion:** Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 30 μg/L and a PQL of 10 μg/L (ppb) for 2-methylnaphthalene. Pursuant to N.J.A.C. 7:9C-1.9(c), since the criterion is higher than the PQL for this constituent, **the applicable constituent standard for 2-methylnaphthalene is 30 μg/L**.

**Technical Support Documents:** *Interim Specific Ground Water Quality Criterion Recommendation Report for 2-Methylnaphthalene*, Dr. Gloria Post, NJDEP, September 7, 2006; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for 2-Methylnaphthalene.* R. Lee Lippincott, Ph.D, NJDEP, May 11, 2006.

**References:**

Murata, Y; Denda, A; Maruyama, H; et al. (1997) Short communication. Chronic toxicity and carcinogenicity studies of 2-methylnaphthalene in B6C3F1 mice. Fundam Appl Toxicol 36:90-93 (cited in USEPA, 2003a, 2003b).

USEPA (2003a). U.S. Environmental Protection Agency. Integrated Risk Information System. 2-Methylnaphthalene(CASRN 91-57-6). Last modified, 12/22/2003. USEPA, Washington, DC.

USEPA (2003b). United States Environmental Protection Agency. Toxicological review of 2-methylnaphthalene in support of summary information on Integrated Risk Information System (IRIS). USEPA National Center for Environmental Assessment, Washington, DC; EPA 635/R 03/010.

USEPA (2005). United States Environmental Protection Agency. Guidelines for Carcinogen Risk Assessment. Risk Assessment Forum, USEPA, Washington, DC. EPA/630.P-03/001F, March 2005.