

Ground Water Quality Standard for 1,1-Dichloro-1-Fluoroethane

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CASRN# 1717-00-6

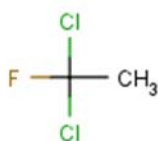
NJDEP

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 500 µg/L and PQL of 30 µg/L (ppb) for 1,1-dichloro-1-fluoroethane (HCFC141b). 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 500 µg/L.**

1,1-Dichloro-1-Fluoroethane

Molecular Formula: C₂H₃Cl₂F

Molecular Structure:



Background: 1,1-Dichloro-1-fluoroethane was developed as a substitute for CFC-11, a fully halogenated chlorofluorocarbon mainly for use as a blowing agent for polyurethane and polyisocyanurate insulating foams and as a solvent in electronic and other precision cleaning applications. It is no longer permitted to be used as a blowing agent. It is produced and used as a substitute for fully halogenated chlorofluorocarbons with comparable physical properties since it has less unfavorable environmental properties (ECETOC, 1994; OECD, 2001).

Reference Dose: Because no oral subchronic, chronic, developmental or reproductive studies are available for 1,1-dichloro-1-fluoroethane, the Reference Dose is based on systemic effects from an inhalation study. The endpoint used as the basis for the Reference Dose is the LOAEL (lowest observed adverse effect level) of 2000 ppm (9,700 mg/m³) for decreased body weight in the F₁ rat pups on days 14, 18, and 21 from a rat two-generation study (Rusch et al., 1995). The inhalation LOAEL can be converted to an oral LOAEL by multiplying by the default daily inhalation volume, 20 m³/day and body weight, 70 kg, and adjusting for the fact that exposure occurred for 6 hours per day, as follows:

$$\frac{9,700 \text{ mg/m}^3 \times 20 \text{ m}^3/\text{day} \times 6 \text{ hrs}/24 \text{ hrs}}{70 \text{ kg}} = 693 \text{ mg/kg/day}$$

Note that an uncertainty factor for less-than-lifetime exposure is not used for developmental endpoints which occur due to exposure during a short time period.

The Reference Dose is: $\frac{693 \text{ mg/kg/day}}{10,000} = 0.07 \text{ mg/kg/day}$

10,000= uncertainty factor

Therefore, the Reference Dose used as the basis of the ground water quality criterion for 1,1-Dichloro-1-Fluoroethane is 0.07 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 0.07 mg/kg/day as the Reference Dose (as explained above), and standard default assumptions:

$$\frac{0.07 \text{ mg/kg/day} \times 70 \text{ kg} \times 0.2}{2 \text{ L/day}} = 0.5 \text{ mg/L} = 500 \text{ } \mu\text{g/L}$$

Where:

0.07 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 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 analytical 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.

1,1-Dichloro-1-Fluoroethane appears as a listed parameter in [National Environmental Methods Index \(NEMI\)](#). The limit of detection in the method is specified as 6.4 ppb. As explained above, the PQL is established by multiplying the limit of detection by five, 6.4 ppb x 5 = 30 ppb." **Therefore, the Department has established a PQL of 30 ppb for 1,1-Dichloro-1-Fluoroethane.**

Conclusion: Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 500 $\mu\text{g/L}$ and a PQL of 30 $\mu\text{g/L}$ (ppb) for 1,1-Dichloro-1-Fluoroethane. *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 1,1-dichloro-1-fluoroethane is 500 $\mu\text{g/L}$.*

Technical Support Documents: *Interim Specific Groundwater Criterion Support Document 1,1-Dichloro-1-Fluoroethane (HCFC141b)*. Gloria Post, Ph.D., NJDEP, (April 17, 2012); *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for 1,1-Dichloro-1-Fluoroethane*, R. Lee Lippincott, Ph.D., NJDEP, May 1, 2014.

References:

ECETOC. 1994. *Joint Assessment of Commodity Chemicals No. 29. 1,1-Dichloro-1-fluoroethane (HCFC 141b). CAS No. 1717-00-6.* December 1994.

OECD. 2001. *Organisation for Economic Co-operation and Development. 1,1-Dichloro-1-Fluoroethane. CAS No. 1717-00-6. Screening Information Data Sets (SIDS) Initial Assessment Report for 12th SIDS Initial Assessment Meeting (SIAM).* United Nations Environment Programme (UNEP) Publications. <http://www.inchem.org/documents/sids/sids/1717006.pdf>

Rusch, G.M., Millischer, R.J., Rooij, C., Brooker, A.J., Hughes, E. and D. Coombs. 1995. *Inhalation teratology and two-generation reproduction studies with 1,1-dichloro-1-fluoroethane (HCFC-141b).* Food and Chemical Toxicology 33: 285-300.



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