Ground Water Quality Standard for
1,1,1-Trifluoroethane

October 2015

CASRN# 420-46-2

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 5000 µg/L and PQL of 60 µg/L (ppb) for 1,1,1-trifluoroethane. 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 5000 µg/L**.

1,1,1- Trifluoroethane; R-143a

Molecular Formula:

$C_2H_3F_3$

Molecular Structure:

Background: 1,1,1-Trifluoroethane is mainly used in stationary air conditioning systems and commercial refrigeration (OECD, 2010).

Reference Dose: The NOAEL (no observed adverse effect level) of 40,000 ppm from the subchronic rat inhalation study (Brock et al., 1996) is selected as the basis for the Reference Dose. The inhalation NOAEL can be converted to an oral NOAEL by multiplying by the default daily inhalation volume, 20 m^3/day and body weight, 70 kg, and adjusting for the fact that exposure occurred for 5 of 7 days per week, 6 of 24 hours per day, as follows:

40,000 ppm = 137,000 mg/m^3

$$\frac{137{,}000\ mg/m^3 \times 20\ m^3/day \times 6\ hrs/24\ hrs \times 5/7\ days\ per\ week}{70\ kg} = 7000\ mg/kg/day$$

The total uncertainty factor is 10,000
RfD = 7,000 mg/kg/day/10,000 = 0.7 mg/kg/day.

Therefore, the Reference Dose used as the basis of the ground water quality criterion for 1,1,1-trifluoroethane is 0.7 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 0.7 mg/kg/day as the Reference Dose (as explained above), and standard default assumptions:

$$\frac{0.7\ mg/kg/day \times 70\ kg \times 0.2}{2\ L/day} = 5\ mg/L = \mathbf{5000\ \mu g/L}$$

Where:
0.7 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 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 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.

1,1,1-Trifluoroethane appears as a listed parameter in National Environmental Methods Index (NEMI). The limit of detection in the method is specified as 11 ppb. As explained above, a more conservative detection limit is established using a multiplier of five. 11 ppb x 5 = 60 ppb. Therefore, the Department has established a PQL of 60 ppb for 1,1,1-trifluoroethane .

Conclusion: Based on the information provided above (and cited below), the Department has established an interim specific ground water quality criterion of 5000 µg/L and a PQL of 60 µg/L (ppb) for 1,1,1-trifluoroethane. *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 1,1,1-trifluoroethane is 5000 µg/L** .

Technical Support Documents: *Interim Specific Ground Water Quality Criterion Recommendation Report for 1,1,1-Trifluoroethane*, Gloria Post, Ph.D., DABT, NJDEP, April 22, 2012; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for 1,1,1-Trifluoroethane,* R. Lee Lippincott, Ph.D., NJDEP, May 1, 2014.

References:

Brock, W.J., Trochimowicz, H.J., Millischer, R.J., Farr, C., and Rusch, G.M. 1996. Acute, subchronic, and developmental toxicity and genotoxicity of 1,1,1-trifluoroethane (HFC- 143a). Fd Chem. Toxic. 31:200-209.

OECD. 2010. Organization for Economic Co-operation and Development. *1,1,1-Trifluoroethane. CAS No. 420-46-2. Screening information data sets (sids) initial assessment report for 30th SIDS Initial Assessment Meeting (SIAM)*. http://webnet.oecd.org.