Ground Water Quality Standard for Acetonitrile

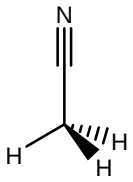
CASRN# 75-05-8

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 determined that insufficient information is available to develop a specific or interim specific ground water quality criterion for acetonitrile at this time. Since acetonitrile is a synthetic organic chemical not listed in Appendix Table 1, and is also classified by USEPA as a Group D chemical (No Evidence of Human Carcinogenicity), **the applicable constituent standard is the interim generic ground water quality criterion of 100 µg/L**. The basis for this criterion and PQL are discussed below.

Acetonitrile

Molecular Formula: C_2H_3N

Molecular Structure:



Background: Acetonitrile is used primarily as a solvent. The key studies for the risk assessment of acetonitrile include subchronic and chronic inhalation studies in rats and mice conducted by the National Toxicology Program in 1996.

Literature Search: The toxicity of acetonitrile was thoroughly reviewed in a Toxicological Review prepared for the USEPA IRIS database in 1999. A further Screening-Level Literature Review was conducted by USEPA in 2002 to determine whether additional relevant information had become available. The Department conducted another literature search and determined that no relevant studies have been published since the initial Toxicological Review was prepared in 1999.

Reference Dose: USEPA developed an inhalation reference concentration (RfC) for acetonitrile based on chronic and subchronic rat and mouse studies, and classified acetonitrile as a Group D chemical (No Evidence of Human Carcinogenicity) under the 1986 Guidelines for Carcinogen Risk Assessment. There are no oral studies appropriate for reference dose (RfD) development. Based on its review in 1999, USEPA withdrew an oral RfD that was previously developed by extrapolation from inhalation studies.

Derivation of Ground Water Quality Criterion: The Department has determined that insufficient information exists on oral toxicity data for acetonitrile to develop a

specific or interim specific health-based ground water quality criterion. The Ground Water Quality Standards at N.J.A.C 7:9C-1.7(c)6 establish that for synthetic organic chemicals (SOC) not listed in Appendix Table 1, the interim generic ground water quality criterion of 5 µg/L applies to SOCs defined as carcinogens at N.J.A.C. 7:9C-1.4 (generally, chemicals categorized by USEPA carcinogen risk assessment as Group A, B, or C), and the interim generic ground water quality criterion of 100 µg/L applies to SOCs defined as non-carcinogens at N.J.A.C. 7:9C-1.4 (generally, chemicals categorized by USEPA carcinogen risk assessment as D or E). The USEPA IRIS database classifies acetonitrile as a Group D chemical (No Evidence of Human Carcinogenicity); therefore, the interim generic ground water quality criterion of 100 µg/L applies to this constituent.

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.

Acetonitrile appears as a listed parameter in a published analytical method – "USEPA OSW 8033, Acetonitrile in Aqueous Matrices Using Gas Chromatography with Nitrogen-Phosphorus Detection". The limit of detection in the method is specified as 1.7 ppb. As explained above, a more conservative detection limit is established using a multiplier of five. 1.7 ppb x 5 = 8.5, which rounds to 9 ppb. Therefore, the Department has established a PQL of 9 ppb for acetonitrile.

Conclusion: Based on the information provided above (and cited below), the Department has determined that insufficient information is available to develop a specific or an interim specific ground water quality criterion for acetonitrile at this time; therefore, the applicable constituent standard is the interim generic ground water quality criterion of 100 µg/L for a non-carcinogen.

Technical Support Documents: *Interim Specific Ground Water Quality Criterion Recommendation Report for Acetonitrile*, Dr. Gloria Post, NJDEP, September 6, 2006; *Procedure for Describing Process for Development of Analytical Practical Quantitation Levels (PQLs) for Acetonitrile*, R. Lee Lippincott, Ph.D., NJDEP, December 6, 2005.

References:

NTP (1996). National Toxicology Program. NTP Technical Report on the Toxicology and Carcinogenesis Studies of Acetonitrile (CAS No. 75-05-8) in F344/N Rats and B6C3F1 Mice (inhalation studies). NTP TR 447. April 1996.

USEPA (1999). United States Environmental Protection Agency. Toxicological Review of Acetonitrile (CAS No. 75-05-8) in Support of Summary Information on the Integrated

Risk Information System (IRIS). January 1999.

USEPA (2005). United States Environmental Protection Agency. Guidelines for Carcinogen Risk Assessment. EPA1630/P-03/001F. March 2005.