HISTORIES OF GUIDELINE DEVELOPMENT FOR THE FOURTH EDITION

12. Chemical fact sheets

12.1 Chemical contaminants in drinking-water

Trihalomethanes (bromoform, bromodichloromethane, dibromochloromethane, chloroform)

History of guideline development

The 1958, 1963 and 1971 WHO *International Standards for Drinking-water* did not refer to THMs. In the first edition of the *Guidelines for Drinking-water Quality*, published in 1984, no guideline values for THMs other than chloroform were recommended after a detailed evaluation of the compounds. A health-based guideline value of 0.03 mg/l was established for chloroform only, as few data existed for the remaining THMs and, for most water supplies, chloroform was the most commonly encountered member of the group. It was noted that the guideline value for chloroform was obtained using a linear multistage extrapolation of data obtained from male rats, a mathematical model that involves considerable uncertainty. It was also mentioned that although the available toxicological data were useful in establishing a guideline value for chloroform only, the concentrations of the other THMs should also be minimized. Limits ranging from 0.025 to 0.25 mg/l, which represent a balance between the levels that can be achieved given certain circumstances and those that are desirable, had been set in several countries for the sum of bromoform, DBCM, BDCM and chloroform. In the second edition of the Guidelines, published in 1993, no guideline value was set for total THMs, but guideline values were established separately for all four THMs. Authorities wishing to establish a total THM standard to account for additive toxicity could use a fractionation approach in which the sum of the ratios of each of the four THMs to their respective guideline values was less than or equal to 1. The 1993 Guidelines established health-based guideline values of 0.1 mg/l for both bromoform and DBCM, and guideline values of 0.06 mg/l for BDCM and 0.2 mg/l for chloroform, associated with an upper-bound excess lifetime cancer risk of 10^{-5}, were derived. The guideline value of 0.2 mg/l for chloroform was retained in the addendum to the second edition of the Guidelines, published in 1998, but was developed on the basis of a TDI for threshold effects. These guideline values were brought forward to the third edition. In the first addendum to the third edition, published in 2006, the guideline value for chloroform was raised to 0.3 mg/l. In the second addendum to the third edition, published in 2008, it was cautioned that authorities wishing to use a guideline value for total THMs should not simply add up the guideline values for the individual compounds in order to arrive at a standard, because the four compounds are basically similar. These guidelines were brought forward to the fourth edition of the Guidelines, published in 2011, which noted that as BDCM was negative for carcinogenicity in a recent bioassay in which it was dosed in drinking-water, exceedances of the guideline value were not likely to result in an increased risk of cancer.