

Abstract

AWWARF
Project 2507

National Survey of MTBE, Other Ether Oxygenates, and Other VOCs in Community Drinking-Water Sources

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The large number of releases and persistence in ground water and surface water of the gasoline oxygenate methyl *tert*-butyl ether (MTBE) have, in part, resulted in the loss of several sources of drinking water in select cities in the United States. For these and other reasons, the American Water Works Association Research Foundation sponsored a national assessment of MTBE occurrence in sources of drinking water. During this assessment, completed by the Metropolitan Water District of Southern California (MWDSC) in cooperation with the U.S. Geological Survey and Oregon Graduate Institute, samples of untreated source water were collected from a total of 954 randomly selected community water systems (CWSs) located throughout the Nation. Of the 954 CWSs sampled, 579 were ground-water sources and 375 were surface-water sources. A total of 66 volatile organic compounds (VOCs) including MTBE were analyzed by the MWDSC using a minimum reporting level of 0.2 micrograms per liter ($\mu\text{g/L}$). Results indicated that 42 of the 66 VOCs analyzed were detected and approximately 25 percent of all source waters sampled were found to contain at least one VOC. However, few (8) CWSs had a detected VOC concentration greater than or equal to a maximum contaminant level or health advisory. Overall, ground-water and surface-water sources were found to have a similar frequency of detecting one or more of the 66 VOCs; however, many VOCs occurred more frequently in sources sampled from larger CWSs in comparison to smaller CWSs. Chloroform was the most frequently detected VOC with a detection frequency of 13 percent.

MTBE was the second most frequently detected VOC with a detection frequency of 8.7 percent. MTBE was found 5 times more frequently in areas using reformulated gasoline in comparison to other areas. Additionally, MTBE was found to occur more frequently in surface-water sources (14 percent) in comparison to ground-water sources (5 percent). Detected concentrations of MTBE generally were low with minimum, median, and maximum concentrations of 0.20 $\mu\text{g/L}$, 0.54 $\mu\text{g/L}$, 20 $\mu\text{g/L}$, respectively. Other ether oxygenates, including ethyl *tert*-butyl ether, diisopropyl ether, and *tert*-amyl methyl ether, were rarely detected (<0.25 percent) and were only detected in association with MTBE. MTBE typically did not co-occur with the gasoline hydrocarbons benzene, toluene, ethylbenzene, or xylenes.



UNITED STATES GEOLOGICAL SURVEY
NATIONAL WATER-QUALITY ASSESSMENT (NAWQA) PROGRAM



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