

WHAT IS A DETECTION?

In this report, 'detection' refers to a given compound being identified in a water sample. Until recently (2000), results of laboratory analyses by USGS were reported either as quantified above or below a Laboratory Reporting Level (LRL). Recent improvements in laboratory analytical techniques, however, enable the chemist to report an estimated concentration when a compound meets all identification criteria, but the concentration value is less than the LRL (Conner and others, 1998; Childress and others, 1999). In rare instances, a compound is reported at an estimated concentration above the standard LRL because of laboratory uncertainty about the actual concentration measured. These problems are usually related to the performance of the laboratory instruments or interference created by other compounds in the water sample.

Volatile Organic Compounds (VOCs)

VOCs were detected in water samples from 76 percent of the 29 wells, with as many as 13 different VOCs detected in a single sample. Thirty-six of 86 VOCs were detected (fig. 4). Many of these VOC detections were at estimated concentrations below the reporting level for these compounds (see box). The most frequently detected VOC, chloroform, was present in 69 percent of the samples. Potential sources of chloroform to ground water in urban areas include domestic use of solvents and cleaning agents, leakage from water mains, or lawn irrigation with chlorinated municipal drinking water (Grady, 1994). None of the water samples exceeded the Massachusetts Department of Environmental Protection (1990) recommended drinking-water guideline of 5 µg/L for chloroform. Methyl-*tert*-butyl ether (MTBE) was the second most frequently detected VOC and was present in 52 percent of the samples. Since the late 1970's, MTBE has been added to gasoline either seasonally or year round in many parts of the United States, including New England, to increase the combustibility of gasoline in automobiles, and thus to reduce carbon monoxide emissions in the air (U.S. Environmental Protection Agency, 1997). One water sample had an MTBE concentration of 267 µg/L, which exceeded the Massachusetts Department of Environmental Protection's (2000) recommended drinking-water guideline of 70 µg/L. Other samples had MTBE concentrations less than 10 µg/L, and in 48 percent of the samples no MTBE was detected.

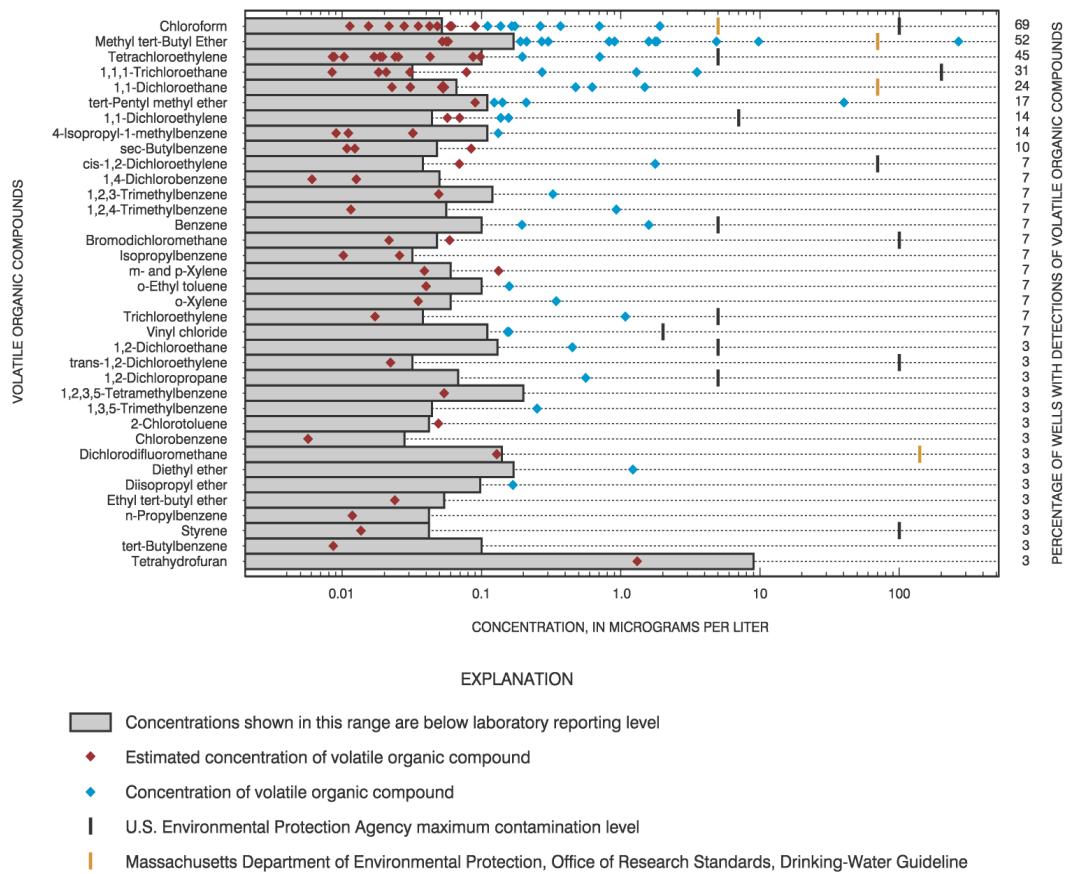


Figure 4. Concentrations of volatile organic compounds (VOCs) detected in the 29 water samples from shallow wells in the Boston metropolitan area and percentage of samples in which each VOC was detected.