

COLLECTION AND ANALYSIS OF SURFACE-WATER SAMPLES FOR DETERMINATION OF LOW-LEVEL MERCURY CONCENTRATIONS IN NEW JERSEY

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ABSTRACT

Prior to 2005, analytical methods were incapable of determining accurate mercury concentrations in surface waters in New Jersey because the concentrations of mercury in the ambient surface water were less than detection limits. The U.S. Geological Survey (USGS) Wisconsin Mercury Research Laboratory (WIML) has recently implemented U.S. Environmental Protection Agency Method 1631, allowing for the determination of various forms of mercury in the nanogram-per-liter range.

In 2005, using ultra-clean sample-collection techniques, the USGS in cooperation with the New Jersey Department of Environmental Protection (NJDEP) began a limited synoptic study to determine dissolved mercury concentrations in selected surface waters in the State. Results of sample analysis conducted by WIML show that the concentrations of dissolved mercury at all locations in the study area were less than the State's surface water criterion of 50 nanograms per liter. This study also investigated seasonal variations in dissolved-mercury concentrations at reference locations. Samples were collected to examine potential seasonal variation, but results were inconclusive and further investigation is warranted. Analysis of samples collected during base-flow and high-flow conditions at selected locations showed that the concentration of mercury increased as streamflow increased.

In 2007, a second study was initiated to evaluate seasonal fluctuations of total mercury and total methylmercury concentrations at reference stations and to compare results obtained using one-person and two-person sample-collection methods. Results to determine whether mercury concentrations are seasonal are forthcoming. In developing the one-person collection method, the two-person sample-collection method, as developed by USGS, was modified slightly to accommodate the ultra-low analytical capabilities of WIML. Results obtained using the one-person sample-collection method were comparable to those obtained using the more labor-intensive two-person sample-collection method. Therefore, the more efficient one-person sample-collection method can be used to save money without sacrificing accuracy and may be implemented into ambient monitoring programs.

KEYWORDS

Mercury, EPA method 1631, Methyl Mercury