

Evaluation of Quality-Control Data Collected by the U.S. Geological Survey for Water-Quality Activities, Idaho National Laboratory, 1996-2001

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The U.S. Geological Survey, in cooperation with the U.S. Department of Energy, has monitored radiochemical and chemical wastes discharged to the eastern Snake River Plain aquifer at the Idaho National Laboratory (INL) since 1949. More than 200 quality control (QC) samples, consisting of replicates and blanks, were collected from 1996 through 2001 (data were previously evaluated from quality control samples collected through 1995) and measured for radionuclides, major ions, nutrients, trace metals, volatile organic compounds, and total organic carbon (TOC). These QC data were used to estimate the variability and bias of environmental data and to evaluate the USGS INL Project Office's quality assurance program. Variability was evaluated by calculating both the statistical equivalence (using the t-test and relative percent difference) and the relative standard deviation (RSD) of constituent concentrations from replicates. Positive bias in environmental samples from potential sample contamination was estimated from constituent concentrations measured in blank samples.

The percentage of statistically equivalent replicate concentrations exceeded 90 percent for all constituents except chromium, hexavalent chromium, and TOC, and the RSD's met data-quality objectives for variability for all constituents except hexavalent chromium and TOC. Trace concentrations of sodium, chloride, sulfate, nitrate plus nitrite, ammonia, hexavalent chromium, and toluene were detected in equipment and trip blank samples, but not in field blanks. Therefore, it does not appear that positive bias of these constituents affected environmental samples. Concentrations of hexavalent chromium were measured in one field and one equipment blank; these concentrations may have affected the quality of environmental data.