

Monitoring Surface-Water-Quality in the Tongue River Watershed of Montana and Wyoming

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The U.S. Geological Survey, in cooperation with other Federal, State, Tribal, and local entities, has operated a surface-water-quality monitoring network in the Tongue River watershed of Montana and Wyoming since 2004. This network provides information for understanding the water quality and evaluating potential changes in water quality, particularly with regard to coal-bed methane (CBM) development. Water samples are collected regularly for laboratory analysis and continuous monitors are operated to measure specific conductance (SC) at seven mainstem and five tributary sites. Sodium adsorption ratio (SAR), which is of interest to irrigators, is estimated from continuous SC data for sites having statistically significant SC-SAR relations. Streamflow, SC, and estimated SAR data are disseminated in real-time on U.S. Geological Survey web pages.

Because SC-SAR relations can be affected by temporal variability in the composition of dissolved solids in the water, an onsite SAR analyzer is being developed and tested. This instrument analyzes samples and calibration standards using an ion-selective microelectrode for sodium and spectrophotometric methods for calcium and magnesium.

Results of monitoring for March–October 2004 provide an initial overview of water quality in the watershed. SC and SAR values in the Tongue River gradually increase downstream, with a larger increase near the mouth. SAR values generally were near or less than 1, except near the mouth where values ranged from about 2 to 4. All SC and SAR values were less than State of Montana irrigation-season standards.

Data collected thus far do not represent a broad range of hydrologic conditions. Long-term monitoring will be required for assessment of existing water quality and evaluation of changes in water quality associated with hydrologic conditions, climate variations, or CBM development and other land-use activities.