

## **The August 2015 Gold King Mine Release in the Context of Previous Geologic and Water-Quality Studies**

*Katie Walton-Day*  
*Hydrologist, USGS, Lakewood, CO*

In the late 1990s through early 2000s the U.S. Geological Survey (USGS) completed a watershed study in the upper Animas River watershed that provides geologic, geochemical, geophysical and biological background to interpret (1) the effects of the 2015 accidental release of 3 million gallons of metal-rich sediment and water from the Gold King Mine located on the north fork of Cement Creek, and (2) the effects of the last 15 years of remediation. The watershed comprises the headwaters of the upper Animas River, Cement Creek, and Mineral Creek, which join near the town of Silverton, Colorado. Historical mining occurred from the 1870s through the early 1990s, and left a legacy of abandoned mines and mine waste that degrade water quality. However, this mining occurred in a watershed where extensive hydrothermal alteration of the original geologic units helped create the economic mineral deposits, but also created non-highly mineralized, pyrite-rich rock that produces acid-rock drainage when weathered. Water quality in Cement Creek and lower Mineral Creek were likely degraded from acid-rock drainage prior to mining. USGS studies helped identify remediation targets, but occurred when placement of bulkheads to remediate mine drainage in the American Tunnel was ongoing. A series of bulkheads installed beginning in 1996, altered groundwater flow patterns in the area, and groundwater discharge was rerouted to upgradient, abandoned mine tunnels. This change in the hydrologic regime underscores the need for re-evaluation of major sources of water-quality degradation in the upper parts of the watershed and re-evaluation and prioritization of remediation targets.