



Water Quality and Sediment in the San Juan River and Lake Powell Watersheds

BACKGROUND

As a result of efforts to evaluate conditions in the Gold King Mine (GKM) an uncontrolled release of metal-laden mine water began on August 5, 2015. The blow-out discharged to Cement Creek, a tributary of the Animas River. An estimated 3 million gallons of contaminated water was released. Models have predicted that this metal contaminated water traveled downstream to the San Juan River (SJR) and the ultimate fate of released metals likely resides in the sediments of Lake Powell in southeastern Utah.

PURPOSE/OBJECTIVES

The purpose of this report is to evaluate the historical and response-related water and sediment quality to assess metal concentrations and loads from the GKM spill and historic mining activities and their potential impact on beneficial uses (i.e., drinking water, recreation, aquatic life, agriculture) in the SJR. Specifically, the goals of this report are to:

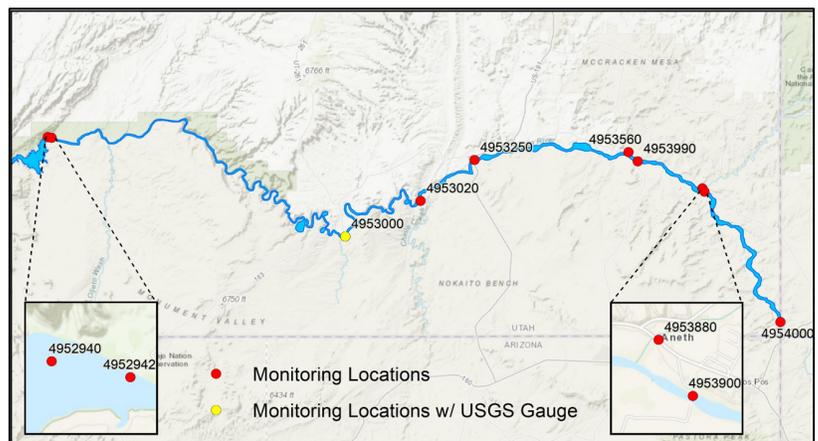
1. Review and quantify water column, particulate, and sediment metal concentrations in the SJR
2. Compare water quality and sediment data to standards known to be protective of beneficial uses
3. Identify the fate and transport of materials downstream
4. Quantify contributions from mining and non-mining sources of metals

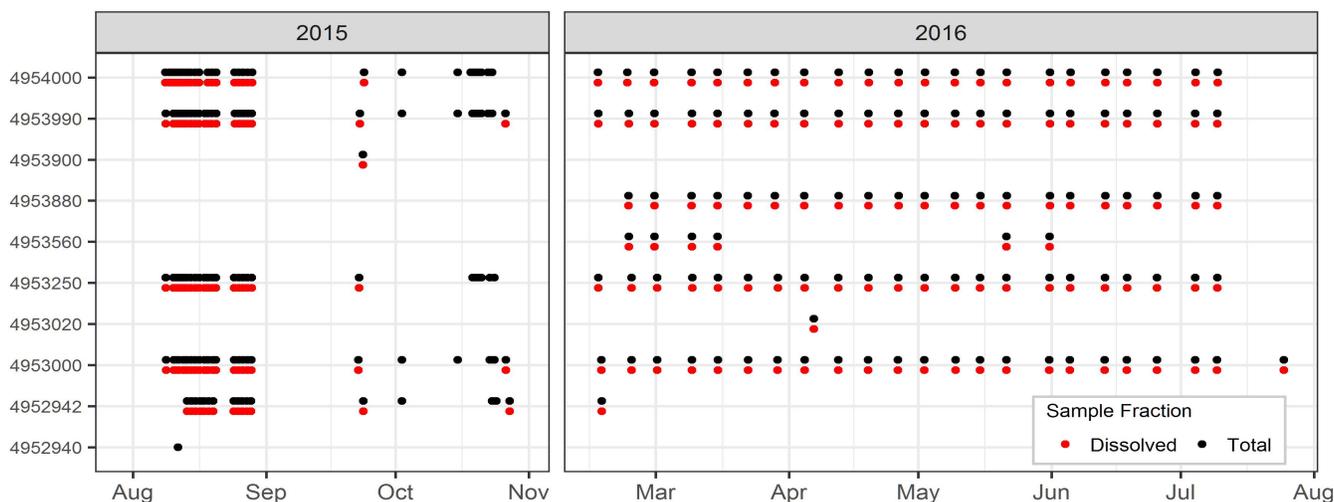


DATA COLLECTION/ANALYSIS

Water quality and sediment sampling occurred at several locations in the SJR (see map below) during two phases of sampling – post spill: Phase 1) August to October of 2015 and Phase 2) February to July of 2016. To provide context, spill-related results were also compared to historical data collected along the Animas River, the SJR, and their tributaries. A few methodological highlights include:

- All water quality and sediment data were screened against human health and aquatic life standards
- Sediment traps were deployed by USGS in the San Juan River arm of Lake Powell in 2015 to evaluate the metals loading and sediment quality as it enters Lake Powell
- Sediment cores collected in Lake Powell in 2010 by USGS were analyzed for historic comparison





KEY FINDINGS

The table below presents a summary of exceedances of both water quality and sediment standards during both phases of monitoring in the SJR as well as exceedances of health-based and aquatic life sediment screening values that occurred in the sediment cores and sediment traps. A few key highlights include:

- The majority of exceedances of water quality criteria occurred during the Phase 1 sampling efforts.
- The exception was the exceedance of the aluminum criteria for the aquatic life use where exceedances occurred during both Phase 1 and Phase 2.
- SJR sediment samples did not exceed the health-based value in either Phase 1 or Phase 2
- Sediment cores collected in 2010 showed exceedances of the health-based sediment screening value primarily for aluminum. The cores also exceeded the aquatic life sediment value for multiple parameters including chromium, copper, iron, lead, manganese, nickel, and zinc.
- Sediment traps exceeded both the health-based sediment screening values for aluminum, arsenic, manganese, and thallium and the aquatic life screening values for arsenic, cadmium, chromium, copper, iron, lead, manganese, nickel, selenium, silver, and zinc.

Beneficial Use	Aug to Oct, 2015	Feb to Jul, 2016	Sediment Cores, 2010	Sediment Traps, 2015 to present
IC Domestic Water	1 (Pb)	0	-	-
3B Aquatic Life	16 (Cd, Cu, Fe, Hg, Pb, Zn) 149 (Al)	10 (Hg) 126 (Al)	-	-
4 Agriculture	6 (Al, Fe, Mn) 2 (TDS)	1 (Mo) 24 (TDS)	-	-
Recreational Water Quality Screening	0	0	-	-
Health-Based Sediment Screening	0	0	100 (Al)	26 (Al), 3 (As), 4 (Mn), 2 (Tl)
Aquatic Life Sediment Screening	1 (Mn)	5 (Se)	45 (Cr), 20 (Cu), 98 (Fe), 3 (Pb), 81 (Mn), 13 (Ni), 5 (Zn)	6 (As), 1 (Cd), 24 (Cr), 5 (Cu), 26 (Fe), 6 (Pb), 27 (Mn), 20 (Ni), 9 (Zn)

NEXT STEPS

1. UDEQ, in collaboration with USGS, will begin a three-year sediment coring study in Lake Powell to better understand historic and current sediment deposition and try to differentiate between mining and non-mining sources of metals.
2. Several other studies are currently underway to better understanding the San Juan River watershed, including: 1) human health and ecological risk assessments, 2) water quality sampling in Lake Powell, and 3) monitoring of suspended sediment as a proxy for metal concentration and loads.
3. UDEQ worked with other states, tribes, and EPA to finalize a long term monitoring plan for the entire San Juan River watershed. Sampling began in fall of 2018.
4. The full report can be accessed at <https://deq.utah.gov/water-quality/analysis-of-water-quality-and-sediments>