

## **Tracing the History of Contamination in Silver Bow Creek “Creek in a Beaker”**

**Items needed:** 2-liter glass beaker or other large, clear vessel; stirring rod; multi-meter or similar water quality meter; clean water; gravel and sand; “dirt”; a measuring cup; tailings; fertilizer; ammonia; Cu, Fe, Nitrate-nitrite and ammonia test strips; 5-gallon bucket for waste.

**Safety:** Make sure you wear safety glasses and nitrile gloves for this experiment, as ammonia, fertilizer and tailings are hazardous substances. Disposal: Dispose of beaker contents in a five gallon bucket. Dilute the contents with clean water to the bucket’s full volume and pour down a drain. Take the left over tailings and dispose of them in an unreclaimed portion of the Silver Bow Creek flood plain.

1. Start with a 2-liter glass beaker, or a large clear vessel. Fill the bottom couple inches with clean sand, rock and/or gravel. Pour in cold, clean water, either from the tap or a bottled source. This represents Silver Bow Creek (at this time unnamed) prior to white man’s discovery of gold in the 1860s. Take a temperature reading, pH and SC. The only human use of the stream was by Indians seasonally for hunting and fishing.
2. With the discovery of gold on Silver Bow Creek in 1864, the stream changed drastically. For the next five years, 1,000 miners tenaciously worked placer claims on the creek until all the easy-to-find gold was gone. Silver Bow was a ghost town by 1870 and all the action was on the Butte Hill. To show the impacts of placer mining, add in a few cups of dirt and swirl the water in the beaker. Take the same readings as before. This would generally show the impacts on the stream from the intense placer mining: stream bed disruption, diversion of flows, and though not exhibited in this step, addition of crude tailings and mercury.
3. By the 1870s, underground mining in Butte was in full swing. By the end of the 19<sup>th</sup> century there were dozens of smelters, concentrators and precipitation plants located on or near the banks of Silver Bow Creek, most of which depended upon the stream’s flows to carry away its wastes. The City of Butte also routed its raw sewage into the Silver Bow Creek, by now nothing more than an industrial sewer. In 1908 the largest flood on record hit the Upper Clark Fork, carrying millions of yards of contaminated tailings and wastes downstream, impacting the entire Clark Fork Basin. Add a cup or so of tailings and swirl the water in the beaker. Take the same readings, plus a copper and iron reading to show the impact of heavy metals to the stream.
4. Cleanup has begun on the Upper Clark Fork and Silver Bow Creek; however, Butte-Silver Bow still loads the stream with toxic nutrients from its sewage treatment plant. Add in some green food coloring to represent algae, and a cup of fertilizer dissolved in hot water and a small bit of ammonia. Take the same readings, plus a nitrate-nitrite and ammonia strip to show the nutrient impacts to the stream.