

Fred Burr Creek Historic Tailings Characterization¹

Ed Spotts* and Caleb Lucy²

Abstract: Fred Burr Creek, a tributary of Flint Creek, is located near Philipsburg, Montana and is a primary contributor of mercury to the Clark Fork River. Historic silver milling operations at the Rumsey Mill in the upper Fred Burr Creek (FBC) watershed between 1889 and the early 1900's have resulted in mercury and metal contamination of water, stream sediments and soils by tailings, as documented in previous investigations. The characterization of impacted soils has been limited to the area in proximity to the mill site. A combination of natural and anthropogenic processes in the upper FBC floodplain have affected the distribution of materials in the floodplain. These actions, in conjunction with the low gradient, depositional nature of upper FBC, prompted an investigation of potential soil impacts downstream of the mill site. A field investigation was performed in July 2018 to evaluate the nature and extent of impacts to floodplain soils in the approximately 1.5 mile long portion of floodplain below the former Rumsey Mill site. A total of 147 samples from discrete intervals within 49 soil pits were collected and analyzed for mercury, arsenic, and lead using a portable X-Ray Fluorescence (XRF) unit optimized for mercury analysis. The presence of tailings/impacted soils was confirmed and appeared to be limited to the riparian corridor. Depths of tailings/impacted soils ranged between 0 and 25 inches below ground surface (BGS), with most impacts observed within the upper 12 inches of this interval. Concentrations dropped approximately two (2) orders of magnitude in underlying alluvial sands and silts and mean depth to groundwater was 42 inches BGS. Mercury, arsenic and lead concentrations (mg/kg) at 37 floodplain sample locations (117 samples) ranged between 1.4 and 318, 1.0 and 10,253, and 4.6 and 3,677, respectively. The wide range likely reflects the degree of fluvial mixing of tailings and background floodplain materials over time with lower concentrations representing samples of the relatively unimpacted underlying alluvial sands/silts. Median mercury, arsenic, and lead concentrations (mg/kg) were 22.7, 661, and 243, respectively. Thirty-two percent (32%) of floodplain samples had mercury concentrations of >100 mg/kg. Future work will focus on quantifying impacts to floodplain resources, evaluating risks to potential receptors, and developing remediation alternatives.³

Additional Key Words: historic mining, tailings, Fred Burr Creek, mercury, arsenic.

-
1. Oral paper presented at the 2019 National Meeting of the American Society of Mining and Reclamation, Big Sky, MT. Welcome Back to Montana, The Land of Reclamation Pioneers, June 3 - 7, 2019. Published by ASMR; 1305 Weathervane Dr., Champaign, IL 61821.
 2. Ed Spotts (* presenter), Senior Scientist and Project Manager, KC Harvey Environmental, 376 Gallatin Park Drive, Bozeman, Montana 59715.
 3. Work reported here was conducted near 46.28858N, -113.27524W.