ABSTRACT

TITLE:	Analysis of Mercury Bonding and Concentration in Soils from the Missionary Ridge Burn Area, Near Durango, CO
AUTHOR(S):	Angst, Anya
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ABSTRACT: Mercury in the environment is detrimental to human and ecological health. In 2006, four years after the Missionary Ridge Fire, the EPA issued a fish consumption advisory for Vallecito Reservoir. This study aims to determine how forest fire impacts mercury mobility in soils affecting the nearby watershed. The study site is located near Vallecito Reservoir in La Plata County, Colorado. During this study, 48 soil samples were collected from within the Missionary Ridge fire perimeter and tested for mercury concentration. The samples were from unburned, low intensity, and high intensity burned sites. They also included two vegetation types: mixed Conifer, and Pine. Four unburned samples were chosen for a mercury adsorption experiment. Half of each sample was burned at 400C for 20 minutes. Mercury was then added at concentrations from10 -9 M to 10 -4 M and modeled using isotherms and distribution coefficients to represent both strong and weak mercury bonding sites. In the samples analyzed in this study, mercury concentrations in unburned soils were the highest, containing an average of 48.6 ng/g. Soils sampled in the high intensity burned areas had the lowest mercury concentrations (13.7 ng/g). The mercury adsorption experiment demonstrated that mercury had a greater affinity to burned soils than unburned soils especially at lower concentrations. The dissolved organic matter was greater in the unburned sites (11.6-23.8 mg C/L) than it was in the burned sites (6.7-12.3 mg C/L). Previous studies of mercury/soil interactions are consistent with the observed higher concentrations in unburned, organic-rich soils (Biswas et al., 2006). Volatilization of mercury into the atmosphere is consistent with the lower concentrations observed in burned soils that also lost most of their organic component. The lab analyses of the effects of burning soils are problematic and are still under investigation. The Missionary Ridge fire decreased the amount of mercury in soil, possibly via atmospheric emission, consequently decreasing the amount available in runoff to pollute the reservoir. If the lab analyses prove correct, then mercury bonds to burned soil better than it does to unburned soil. Both of these results suggest that the Missionary Ridge Fire decreased the influx of mercury into the reservoir from runoff. Other sources of mercury contamination in the reservoir need to be examined.