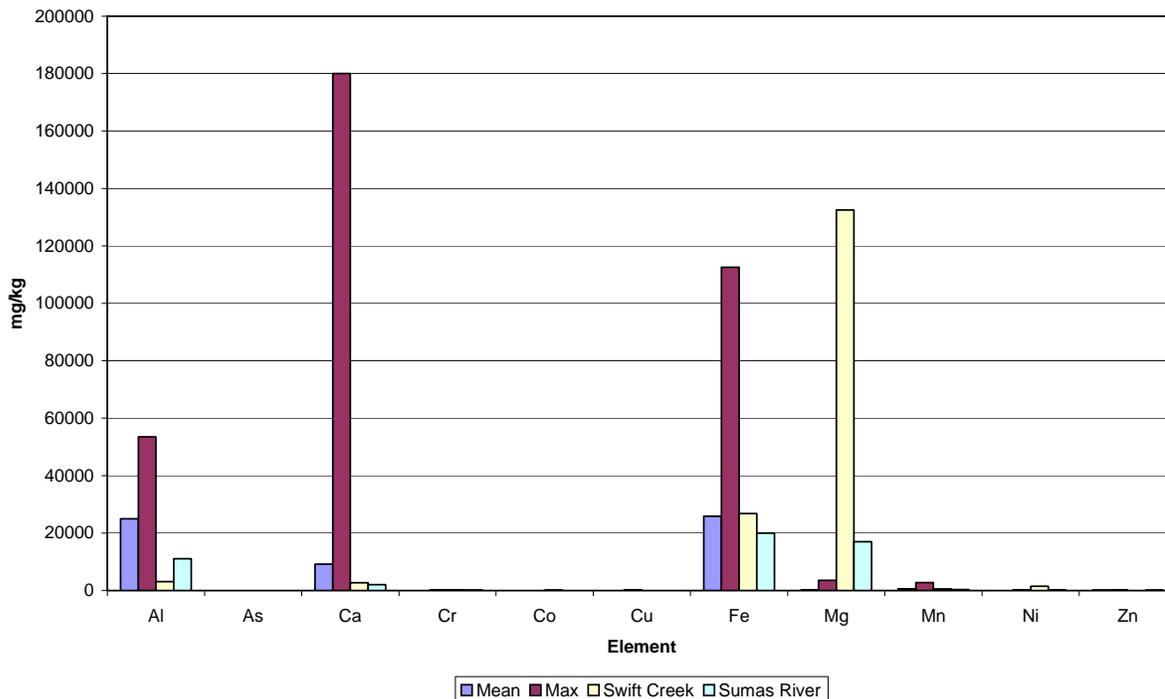


## Comparison of Natural Background Soil Metals Concentrations in Washington State versus Soil Metals Concentrations observed in Swift Creek

Four sediment samples were collected from the Swift Creek landslide, Swift Creek channel and a stockpile on April 29, 2004. In addition, two sediment samples were taken from the Sumas River, one downstream of the confluence with Swift Creek, and one upstream of the confluence. The sediments samples were sent off for a Total Analyte analysis at CCI Analytical Laboratories in Everett. Methods used to test the soil samples were EPA-6010 and EPA-7471 (for Hg). Method EPA-9045 was used to measure pH for the soil samples. A summary of the relative soil metals is shown in the table below. The mean and maximum soil metal levels were taken from “Natural Background Soil Metals Concentrations in Washington State” published by the Washington State Department of Ecology in October 1994.

**Comparison of WA Background Soil Metals Concentrations and Swift Creek Soil Metals Concentrations**



The two metals that substantially exceed the range of the soil metals sampled by the Department of Ecology are Magnesium and Nickel. Research into serpentinite soils revealed that serpentinite soils can be limiting to certain types of plants because of low macronutrient elements (Nitrogen, Calcium, and Potassium), especially with regard to a suitable Calcium/Magnesium ratio, basic soil pH, and other heavy metals that may inhibit or be toxic at certain levels to plants (Nickel). The ideal Calcium/Magnesium ratio for plant growth is around three. The ratio observed at Swift Creek is closer to 0.02, and is likely the most prominent factor explaining the lack of vegetation present in soils originating from the landslide. The average pH for the sediment samples was

approximately 9, and also could be a contributing factor for inhibiting plant growth. Levels of Nickel higher than the state background levels were also observed, and may also contribute to inhibiting plant growth. No citations of adverse health effects from high levels of naturally occurring Magnesium and Nickel were found in our literature search.

The soil originating from the slide seems stable over time when piled along side the creek. A soil pile deposited close to 30 years ago was sampled and the levels of metals and pH was within the range of metal concentrations and pH to the samples that were taken from the slide and the creek.

The Sumas River was found to have magnesium levels higher than state background levels and a pH of approximately 8, however, the Calcium/Magnesium ratio was close to 1 and the presence of Nickel was within the range of the state background levels. The vegetation upstream of the Swift Creek confluence is not noticeably void, sparse or exhibiting growth problems.