

Temporal Geochemical Variations In Volatile Emissions From Mount St. Helens, USA, 1980-1994

¹SHEVENELL, LISA and ²GOFF, FRASER. ¹Nevada Bureau of Mines and Geology, University of Nevada, MS 178, Reno, NV 89557-0088, USA, lisaas@unr.edu; ²Earth and Environmental Sciences Division, MS D462, Los Alamos National Laboratory, Los Alamos, NM, 87545, USA.

Samples were collected from 95 to 560°C fumaroles on the degassing dacite dome at Mount St. Helens between 1986 and 1994 to obtain a temporal record of changes in magmatic volatile constituents. Based on the δD and $\delta^{18}O$ contents of the fumarole condensates, all fumaroles sampled after 1980 discharge a mixture of magmatic and meteoric fluids. By 1994, the apparent end-member exsolved magmatic water δD content had been depleted by ≈ 7 per mil relative to the original 1980 composition indicating that an appreciable amount of the water had yet to degas from the melt. However, Cl and F contents in the samples collected in 1994 were only 0.47% and 3.8%, respectively, of the concentrations measured in fumarole condensates representative of degassed end-member magmatic water in 1980. Based on δD modeling, approximately 63% of shallow Mount St. Helens magma had yet to degas by 1994 indicating that most Cl was emitted to the shallower levels very early in the degassing history. By 1994, any emitted Cl was not reaching the shallower levels of the volcano. Because metals can be transported as Cl complexes, this change in behavior could have implications for the timing and location of metal transport and deposition.