HYDROCHEMISTRY OF SULPHUR AND ALAMO CREEK, VALLES CALDERA: EFFECT OF GEOTHERMAL SYSTEMS ON SURFACE WATER QUALITY OF THE JEMEZ RIVER.

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The Valles caldera in northern New Mexico is a large, Quaternary silicic volcanic complex (1.25 Ma to 40 ka) containing a liquid-dominated geothermal system. Sulphur Springs and Alamo Canyon in the southwestern part of the caldera contain acidic geothermal features. In this study, we examine the hydrochemistry of the acid-sulfate waters and examine their influence on the surface waters draining the Valles caldera.

We sampled waters of Alamo, Sulphur, San Antonio and Jemez rivers during two campaigns in summer, 2015. To obtain pH, temperature and other initial parameters a field probe was placed in streams. After those are recorded two water samples are collected; one for bicarbonate concentrations and another for anion and cation concentrations. With over 23 samples collected, measurements vary across a wide range: pH ranges from 2.5 (Sulphur Creek) to 7.1 (Jemez River above Soda Dam), temperatures from 10 C° (Alamo Creek) to 22 C° (above Soda Dam), and total dissolved solids concentrations from 30 (Alamo Creek) to 688 (Sulphur Creek) ppm. The acidic geothermal contributions have a major effect on the water quality in streams and shallow groundwater systems; especially pH, T, sulfate and solute content in the upper stream reaches of Alamo and Sulphur creeks. The water quality improves as dilute, circum-neutral waters from Redondo and the East Fork Jemez enter the stream system.

Using solute concentrations (including sulfate, chloride and bicarbonate) we are able to quantify the mass loading of geothermal constituents to the stream system, and predict the consequences of changes to future snowpack and runoff on water quality in the Jemez river system.

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Water Quality, Geothermal, Hydrochemistry, Valles Caldera, Jemez River

pp. 65

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