Site Description

Columbus Marsh

(updated 2010)

Geologic setting: Adapted from Kratt et al. (2009): Columbus Salt Marsh is bounded by the Candelaria Hills (NW), Monte Cristo Range (NE), Volcanic Hills (SW), and Emigrant Hills (SE). Columbus Marsh, like Rhodes and Teels marshes, sits within the Mina Deflection, a broad right-stepping transfer zone in the Walker Lane (Oldow et al., 1994). Right-lateral strain is accommodated by a series of ENE-striking left-lateral faults, a configuration that leads to extensional, "pull-apart" basins at all three playas. The associated faults in each playa show evidence of Quaternary displacement (Wesnousky, 2005).

Geothermal features:

Columbus playa: A joint research project between the Center for Geothermal Energy (Univ. Nevada Reno), the Desert Research Institute, and SpecTIR Corp. has applied airborne hyperspectral imagery and shallow 2-meter temperature probes to geothermal exploration in Columbus Marsh. This project identified two areas of anomalously high temperatures, one on the north side of the playa and one on the southwestern side. The southwestern anomaly, covering 4.1 x 1.7 km^2, is up-gradient from several sulfate and borate occurrences in the playa, as identified by hyperspectral imagery. The shape of this temperature anomaly is elongate in an east-northeast direction parallel to, and along trend with, nearby Quaternary faults.

A cold spring located within the southwestern anomaly yields anomalous geothermometer temperatures (115°C and 137°C, respectively, for the quartz and Mg-corrected Na-K-Ca geothermometers), suggesting a strong geothermal component to shallow playa groundwaters. [more water chemistry]

Rock Hill: At the northern end of Columbus Marsh playa, two warm wells have been sampled, one __C and one __. Their water chemistry predicts reservoir temperatures of __C. No water could be retrieved from a third, warmer well (__C), measured at __m depth by thermal probe.

Ormat has drilled several gradient holes 5 km north of the playa at Rock Hill.

Site Description

The Gap: The Gap is located at the southern boundary of Columbus Marsh, between Fish Lake Valley and Columbus Marsh. Three warm springs and one warm well have been measured, and of those sampled, geothermometer values are moderately high.

Gap Spring, an unnamed spring about 2.4 km northeast of Gap Spring…. At Gap Spring, a small spot of a few square meters at the spring outlet is slightly radioactive. Running water has the highest radioactivity, suggesting the water may contain radon (Garside, 1973).

Leasing information: The 2,560 acre Columbus Marsh Property is within the northwest-trending Walker Lane, which exhibits active dextral oblique-slip with approximately four to six millimeters per year. A survey of playas in the area by the Great Basin Center found evidence of borate crusts, which was interpreted as evidence for a hidden geothermal system. Fluids from nearby Columbus well 2/36 yielded a Na-K-Ca geothermometer reservoir estimate of 210°C. No known work completed recently on the property.

Kratt, C., Coolbaugh, M., Peppin, B., and Sladek, C., 2009, *Identification of a New Blind Geothermal System with Hyperspectral Remote Sensing and Shallow Temperature Measurements at Columbus Salt Marsh, Esmeralda County, Nevada* (PDF and PPT - **27 MB**), Geothermal Resources Council Transactions, v. 33, p. 481-485.