

Measurements of radon concentration in geothermal fluids at Cerro Prieto are evaluated with respect to spatial and temporal variations in reservoir thermodynamic conditions and the rock — fluid mass ratio for radon emanation. Higher concentration of radon observed at wells with higher fluid enthalpy can be attributed to the higher steam fraction in the reservoir fluid. Regression analysis of radon concentration with specific volume of pore fluid shows a significant degree of correlation, resulting from the dependence of specific volume on both two-phase conditions and reservoir temperature. Temporal variations in radon concentration reflect changing phase conditions in the reservoir. Observations over a 2-year interval show significant changes in the producing zones. The constant low concentration along the western edge of the field indicates a fluid of low steam saturation. In the eastern area, radon concentrations have increased significantly suggesting an increase in the steam saturation in this part of the reservoir due to exploitation. Other areas, e.g. the southeast area, show decreased radon concentration indicating a decrease in steam saturation. Concurrent measurements of ammonia, a soluble component of the noncondensable gases, support the observations of partitioning of gas components, with wellhead concentration dependent on spatial variations in steam saturation over the field.