Socorro Island is the exposed part of a ~4000 m-high volcanic edifice rising from the oceanic floor to ~1000 m asl at the northern part of the Mathematician Ridge, Western Pacific. The volcano is active, with the most recent basaltic eruption in 1993. Moderate fumarolic activity and diffuse degassing are concentrated in the summit region of the volcano composed of a group of rhyolite domes. Low-temperature, boiling-point, fumaroles discharge gas with high H$_2$ (up to 20 mol% in dry gas) and CH$_4$ (up to 4 mol%). Both carbon and He isotopic ratios and abundances correspond to those in MORB fluids (delta$_{13}^{13}$C$_{CO_2} = -5\%$; delta$^{3}$He/4He = 7.6Ra, CO$_2$/3He = (2-3)$\times$10$^9$, where Ra is the atmospheric ratio $^{3}$He/4He of 1.4$\times$10$^{-6}$. Light hydrocarbons (CH$_4$, C$_2$H$_6$, C$_3$H$_8$ and C$_4$H$_{10}$) are characterized by a high C1/C2+ ratio of ~1000. Methane is enriched in $^{13}$C (delta$^{13}$C$_{CH_4}$ from -15 to -20$\%$) and $^2$H (delta$^2$H from -80 to -120$\%$) and hydrocarbons show an inverse isotopic trend in both delta$^{13}$C and delta$^2$H (ethane is isotopically lighter than methane). These isotopic and concentration features of light hydrocarbons are similar to those recently discovered in fluids from ultramafic-hosted spreading ridge vents and may be related to the serpentinization processes: H$_2$ generation and reduction of CO$_2$ to CH$_4$ within high-temperature zone of volcano-seawater hydrothermal system hosted in basaltic and ultramafic rocks beneath a volcano edifice. The thermodynamic analysis of this unusual composition of the Socorro fluids and the assessment of endmember compositions are complicated by the near-surface cooling, condensation and mixing with meteoric water.