Bakreswar thermal spring system (Lat.23°52' N ; Long. 87°25' E ) in Birbhum District, West Bengal belong to a belt of thermal springs (35°C to 71°C) within a Precambrian craton in the Northeastern part of Peninsular India. Vertical Electrical Sounding investigation in and around Bakreswar reveal the presence of two to four prominent lithologic layers under prevailing hydrodynamic conditions. The bottom most layer is the compact basement crystalline having mostly high resistivity. Groundwater is mainly confined in intermediate weathered and fractured zones forming an unconfined aquifer. Lithology and groundwater conditions, as inferred from VES, as well as hydrological studies, are in agreement with the nearby borehole logs. VES results reveal few promising groundwater potential zones in the eastern part of the region. Wenner resistivity profiling, coupled with VES and geological studies, indicate the presence of a nearly N–S striking buried fault providing passage for hot water to emerge in the form of springs. Combined studies indicate that the thermal spring waters are mixture of hot ascending water and shallow nonthermal ground water of the area. From silica–enthalpy relationship, degree of mixing of deep seated thermal water component has been estimated to be around 27% with an inferred temperature of about 188°C. Water from the shallow aquifer is chemically of Na-HCO₃ type with near neutral pH and little F⁻ in marked contrast to thermal spring water which is Na mixed anion type with alkaline pH and characteristically enriched in F⁻. Convective geoheat discharge from Agnikund has been estimated to be about 1158 Kw-hr which is equivalent to heat liberated by burning 0.14 tonne of coal.