

Thermal and chemical characteristics of hot water springs in the northern part of the Limpopo Province, South Africa

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Abstract

In many countries thermal springs are utilised for a variety of purposes, such as the generation of power, direct space heating, industrial processes, aquaculture and many more. The optimal use of a thermal spring is largely dependent upon its physical and chemical characteristics. This article focuses on the thermal and chemical features of 8 thermal springs located in the northern part of the Limpopo Province, South Africa. Field data and water samples were collected from Evangelina, Tshipise, Sagole, Môreson, Siloam, Mphephu, Minwamadi and Die Eiland for analysis of physical and chemical parameters. The temperatures at source vary from 30°C to 67.5°C. The springs are associated with faults and impermeable dykes and are assumed to be of meteoric origin. The mineral composition of the thermal waters reflects the geological formations found at the depth of origin. None of the spring waters are fit for human consumption since they contain unacceptably high levels of bromide ions. Six springs do not conform to domestic water quality guidelines with respect to fluoride levels. Unacceptably high values of mercury were detected at Môreson and Die Eiland. Spring water at Evangelina is contaminated with selenium and arsenic. It is important to keep such limitations in mind when determining the ultimate use of the thermal springs.

Keywords: thermal springs, South Africa, macro and micro-elements, geological controls