GEOTHERMAL EXPLORATION IN PAI, MAEHONGSON, THAILAND

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ABSTRACT

The study conducted at Muang Rae hot spring, Pai district, Maehongson province at the north of Thailand, to estimate potential of hot springs in depth. The investigation are collecting previous study, water and gas sampling and analysis to calculate reservoir temperature, geological and geophysical survey by resistivity and magneto-telluric method to consider depth and setting of reservoir in this area. Finally approve all study by drilling at depth 1,000 m., beside with measurement of temperature, flow rate, lithologic description and chemical analysis.

By chemical analysis and using formula of Fournier and Rowe (1966) found that reservoir temperature is between 143 - 150 ºC. Comparing temperature by Geochemist workbence program could predict temperature at 132 ºC. Geology is characterized by the association of plutonic rock widespreadly covered through out the area , mostly of stressed granite and some of quartz vein and biotite-granite in pegmatite vein. Hot spring rises to surface by faults and fractures with 60-70º west dip along Huay Kokkway river. From resistivity and magneto-telluric inversion model show the shallow reservoir at depth less than 100 m. at vicinity of hot spring which have very low resistivity value < 30 ohm-m. Below shallow reservoir also shown low resistivity area but little shift towards southwest at depth between 200-600 m.

Result core sample drilling found the upper stressed granite to equigranular biotite granite within the interval 583-635 m. very fractured zone at 690-705 m. and veining with hydrothermal alteration from 630 m. down to the bottom. According to temperature log, temperature increases downward to 600 m. where a high temperature of 91.5 ºC is constant to 700 and then the hole gradually cools with depth to 860 m. where the temperature is 89 ºC. Below 860 m. the temperature increases to a bottom-hole with temperature of 92. That indicates a downward flow of water from a zone at about 600 m., possibly exiting into a lower zone of fracture rock. At bottom of well with unaffected by flow (860 – 1,005 m.) indicates a geothermal gradient of 30 ºC/km., showing water at 2 km. depth should be 123 ºC, close to the predicted temperature. There is no flow water under pressure in hole. Water pumped from this well was 89 ºC, at a rate of 4.7 l/s. Chemical analysis of hot water from well test has very high silica (SiO_2), 231-238 mg/l., which estimated to reservoir temperature about 190-192 ºC (in case no stream loss).

Keywords: Geothermal exploration, Pai Maehongson, Muang Rae, hot spring