

SARI

GEOLOGI DAN STUDI KARAKTERISTIK SISTEM PANAS BUMI DAERAH SIMISUH KABUPATEN PASAMAN, SUMATERA BARAT

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Energi panas bumi berasal dan tersimpan dalam inti bumi yang tertransfer melalui perpindahan konveksi dan konduksi ke permukaan. Keterdapatannya menjadi indikasi potensi energi panas bumi. Penelitian bertujuan mengetahui karakteristik sistem panas bumi daerah penelitian meliputi sumber panas, reservoir, batuan penutup dan fluida panas bumi. Analisis karakteristik menggunakan metode geofisika dan geokimia dengan pendekatan pada data geologi. Daerah penelitian berada di daerah Simisuh, kabupaten Pasaman, provinsi Sumatera Barat. Kondisi geologi daerah penelitian terdiri dari 19 satuan batuan dengan kontrol struktur geologi yang intensif. Berdasarkan analisis geokimia, tipe air panas daerah penelitian berupa tipe sulfat. Semua manifestasi panas bumi berasal dari satu sistem reservoir dan berada pada zona *partial equilibrium*. Temperatur reservoir 145-165°C termasuk dalam sistem panas bumi temperatur menengah. Berdasarkan hasil inversi 3D data geomagnet nilai susceptibilitas tinggi (0.031-0.246 cgs) berpotensi menjadi sumber panas. Susceptibilitas sedang ((-0.026)- 0.031 cgs)) berpotensi menjadi batuan penutup. Susceptibilitas rendah (-0.026) – (-0.353) cgs berpotensi menjadi reservoir sedangkan berdasarkan model 3D data geolistrik nilai resistivitas rendah (0-25 Ohm-meter) berpotensi menjadi batuan penutup. Resistivitas sedang (25-75 Ohm-meter) berpotensi menjadi reservoir dan resistivitas tinggi (>75 Ohm meter) berpotensi menjadi sumber panas. Berdasarkan korelasi data geologi, geokimia dan geofisika sistem panas bumi daerah penelitian yaitu sumber panas yang berasal dari intrusi magma dan kubah lava. Batuan reservoir berupa batuan beku atau lava yang telah mengalami pensesaran sehingga memiliki permeabilitas sekunder dan berpotensi menjadi reservoir. Batuan penutup berupa alterasi batuan beku atau lava. Fluida manifestasi berasal dari air meteorik yang telah mengalami pengkayaan ¹⁸O, sebagai indikasi pembentukan mata air panas berhubungan dengan interaksi fluida dengan batuan.

Kata kunci: *Inversi, Panas Bumi, Resistivitas, Susceptibilitas,*

ABSTRACT

GEOLOGY AND STUDY CHARACTERISTICS OF GEOTHERMAL SYSTEM IN SIMISUH AREA PASAMAN REGENCY, WEST SUMATERA

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Geothermal energy is originated and stored in the earth's core which is transferred through convection and conduction to the surface. Manifestation is an indication of the potential for geothermal energy. The research aims to determine the characteristics of geothermal systems in the research area including heat sources, reservoirs, cap rock and geothermal fluids. Analysis of characteristics by using geophysical and geochemical methods with an approach to geological data. The research area is located in the Simisuh region, Pasaman regency, West Sumatra province. The geological condition of the research area consists of 19 rock units with intensive geological structure control. Based on geochemical analysis, the type of hot water in the research area is sulfate type. All of manifestation are derived from a reservoir system and in the partial equilibrium zone. Reservoir temperatures of 145-165 °C are included in the medium temperature geothermal system. Based on the 3D inversion results of geomagnetic data, high susceptibility (0.031-0.246 cgs) has the potential to be a heat source. Moderate susceptibility ((-0.026) - 0.031 cgs)) has the potential to be a rock cap. Low susceptibility (-0.026) - (-0.353) cgs has the potential to be a reservoir. Based on 3D geoelectric data the low resistivity value (0-25 Ohm-meters) has the potential to be a rock cap. Medium resistivity (25-75 Ohm meters) has the potential to be a reservoir and high resistivity (> 75 Ohm meters) has the potential to be a heat source. Based on the correlation of geological, geochemical and geophysical data of the geothermal system in the research area, the heat source comes from intrusion of magma and lava dome. Reservoir rocks in the form of igneous rocks or lava have experienced an enlargement so that it has secondary permeability and has the potential to become a reservoir. Cap rock in the form of igneous rock or lava alteration. Fluid manifestation originated from meteoric water which has undergone ¹⁸O enrichment, as an indication from formation of hot springs associated with fluid interactions and rocks.

Keywords: *Geothermal, Inversion, Resistivity, Susceptibility.*