Delineasi Zona Permeabel pada Reservoar Geotermal Sibayak Menggunakan Pemodelan 3-D Data Mise-A-La-Masse = Delineation of Permeable Zone on Sibayak Geothermal Reservoir Using Mise-A-La-Masse 3-D Data Modeling

Amallia Nadhiaratna, author

Abstrak

ABSTRAK
Lapangan geotermal Sibayak berada di Sumatera Utara dengan ketinggian antara 1400 sampai 2200 m dengan keberadaan tiga vulkano aktif. Potensi dari lapangan geotermal Sibayak mencapai 40 MWe, namun saat ini kapasitas yang dieksplorasi baru mencapai 12 MWe. Area pemboran yang produktif berasosiasi dengan zona reservoir memiliki ciri yaitu area dengan temperatur dan permeabilitas tinggi. Daerah dengan permeabilitas tinggi ini biasanya disebabkan oleh banyaknya rekahan-rekahan. Pengukuran resistivitas dengan metode mise-a-la-masse merupakan cara yang dapat digunakan untuk mengetahui zona rekahan dengan permeabilitas tinggi. Data pendukung juga diperlukan seperti data geologi, geokimia, dan data sumur. Pembuatan model menggunakan metode inversi smoothness constrained least squares. Nilai resistivitas rendah menunjukkan adanya rekahan-rekahan bawah permukaan. Hasil yang diperoleh menunjukkan tiga zona permeabel yaitu high permeability di bagian utara sumur SBY-4 atau sekitar Gunung Sibayak, moderate permeability dekat sumur SBY-3 dan SBY-4, dan low permeability di bagian selatan dekat kaldera. Rekomendasi potensi lokasi sumur pemboran produksi berada di daerah upflow yang bertemperatur tinggi dan permeabilitas tinggi, yaitu di sebelah utara sumur SBY-4.
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<i>ABSTRACT
Sibayak geothermal field located in Sumatera Utara with elevation around 1400 until 2200m and surround by three active volcanoes. The potential of the Sibayak geothermal field reaches 40 MWe, but currently the explored capacity has only reached 12 MWe. Productive drilling areas associated with reservoir zones are characterized by areas with high temperature and permeability. This area with high permeability is usually caused by many fractures. Resistivity measurement using the mise-a-la-masse method is a method that can be used to determine the zone of fracture with high permeability. Supporting data is also needed such as geological, geochemical and well data. Modeling uses the smoothness constrained least squares inversion method. Low resistivity values indicate the existence of subsurface fractures. The results obtained showed three permeable zones which is high permeability in the northern part of the SBY-4 well or around Mount Sibayak, moderate permeability near the SBY-3 and SBY-4 wells, and low permeability in the southern part near the caldera. The recommendation for the potential location of the production drilling well is in the high temperature and high permeability upflow area, which is to the north of the SBY-4 well.<i/>