

Penentuan Model Konseptual Panas Bumi Berdasarkan Data Sumur dan Data Geofisika di Lapangan Panas Bumi "X" = Determination of Geothermal Conceptual Model Based on Well Data and Geophysics Data in Geothermal Field "X"

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Abstrak

Lapangan panas bumi "X" adalah lapangan yang sudah mengoperasikan Unit 1 khususnya di bagian tengah area, dan akan melaksanakan pengembangan untuk Unit lainnya di bagian Utara. Berbeda dengan kondisi di bagian tengah lapangan "X", di bagian Utara ini belum banyak data sumur yang tersedia meskipun manifestasi permukaan yang menunjukkan potensi panas bumi banyak ditemukan di sana. Dalam hal ini, analisa kondisi reservoir bawah permukaan bumi penting dilakukan untuk meningkatkan tingkat keberhasilan produksi dan mengurangi resiko pengeboran yang akan dilakukan di bagian Utara lapangan "X". Model konseptual panas bumi merupakan informasi yang menentukan kualitas maupun kuantitas reservoir serta berperan sebagai informasi untuk menentukan lokasi pemboran. Salah satu metode yang dapat digunakan untuk menentukan informasi tersebut melalui analisa data sumur. Namun pada bagian Utara lapangan "X", model tersebut sulit diidentifikasi karena data sumur belum banyak tersedia dan survei permukaan mempunyai ketidakpastian tinggi. Untuk mengurangi ketidakpastian tersebut, dilakukan analisa terhadap data survei permukaan dan data pengeboran di bagian tengah lapangan "X" agar dihasilkan model konseptual panas bumi untuk seluruh lapangan. Lebih lanjut, simulasi sumur pemboran dilakukan agar model tersebut ter validasi berdasarkan data produksi dan dapat digunakan dalam well targeting. Data yang digunakan meliputi data literatur sebagai referensi, data survei permukaan (kelurusan struktur, topografi, persebaran lateral batuan, data gravitasi, dan magnetotelluric) serta data pemboran sumur (mineral alterasi, litologi sumur, permeabilitas, dan temperatur di sumur). Metode yang akan dilakukan meliputi pengumpulan data, pemodelan struktur geologi, analisa litologi dan mineral alterasi serta pemrosesan data geofisika. Berikutnya, dilakukan perbandingan antara data sumur di bagian tengah lapangan "X" dengan resistivitas dan densitas sebagai dasar dalam pembuatan model konseptual. Kemudian dari model tersebut dilakukan proses wellbore simulation terhadap sumur uji coba. Pada tahap akhir, analisa hasil pemodelan dilakukan termasuk penentuan korelasi kualitatif data sumur terhadap model geofisika (gravitasi dan magnetotelluric). Hasil akhir yang diperoleh dari penelitian ini adalah model konseptual panas bumi lapangan "X" yang tervalidasi sebagai dasar dalam penentuan lokasi sumur pengeboran di bagian Utara lapangan "X". Meskipun penelitian ini dilakukan pada lapangan panas bumi yang berada pada tahap pengembangan dengan data yang cukup banyak, tetapi hasil penelitian ini juga diharapkan dapat memberikan manfaat untuk kepentingan tahap eksplorasi ketika data yang tersedia masih terbatas.

.....Geothermal Field "X" is a field that already operates Unit 1 especially in the central of study area and will carry out development for other units in the North part. In contrast to the conditions in the central part of Field "X", in the North part the available well data are limited, however surface manifestations that indicate geothermal potential are found there. In this case, the analysis of sub-surface reservoir condition is important to increase the success rate of production and reduce the drilling risk that will be conducted in the northern part of Field "X". Geothermal conceptual model is information that determine the quality and

quantity of reservoir which used as information to identify the drilling location. One of the methods that can be used to determine this information is through the analysis of well data. But in the northern part of Field “X”, these models are difficult to be identified because the well data is limited while the surface surveys have high uncertainty. To reduce the uncertainty, analysis of surface and drilling data in the central of Field “X” was done to generate geothermal conceptual models for entire field. Furthermore, wellbore simulation is done so that the model is validated based on production data and can be used in well targeting. The data used include literature data for reference, surface survey data (structural lineament, topography, lateral distribution of lithology, gravity and Magnetotelluric data) as well drilling data (alteration minerals, lithology, permeability and temperature in wells). The methods that will be carried out include data collection, modelling of geological structures, lithology and mineral analysis of alteration and processing of geophysical data. Next, a comparison were done between well data in the central of Field “X” with resistivity and density model as the basis for the creation of conceptual models. Then from the model is carried out wellbore simulation process for the selected well. In the final stage, the analysis of modelling results was conducted including determining the qualitative correlation between well data and geophysical model (gravity and magnetotelluric). The final results obtained from this study are the geothermal conceptual model of Field “X” that have been validated as the basis for determining the drilling location in the northern part of Field “X”. Although this research was conducted on geothermal fields that are at the development stage with a considerable amount of data, but the results of this study are also expected to provide benefits for the exploration stage when the available data is still limited.