Evolusi fluida reservoir pada sistem temperatur tinggi lapangan panasbumi wayang windu = Reservoir fluid evolution in high temperature system wayang windu geothermal field

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Abstrak

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Lapangan panasbumi Wayang Windu (WW) merupakan bagian dari busur gunungapi Kuarter Jawa Barat, terdiri dari komplek gunungapi dan dome Malabar, Bedil, Wayang, dan Windu yang berkontribusi pada pembentukan sistem panasbumi. Tipe fluida terdiri dari dua-fasa di area Selatan dan kecenderungan dominasi uap di Utara dengan kisaran temperatur reservoir 240 hingga 300 0C. Segmentasi secara hidrologi dibuat berdasarkan karakterisasi tekanan reservoir dari 40 di Utara hingga 80 bar di Selatan pada kondisi awal. Setelah melewati masa produksi lebih dari 13 tahun, telah terjadi perubahan di reservoir yang terlihat baik pada parameter fisik maupun kimia. Kegiatan monitoring geokimia dan microravity telah diterapkan di WW untuk mencatat setiap perubahan di reservoir dan sebagai mitigasi masalah yang timbul selama eksploitasi ataupun untuk pengenbangan selanjutnya. Respon kimiawi akibat produksi digambarkan dalam perubahan area isokontur dari semua parameter kimia yang terlihat jelas perubahannya di area Utara. Proses di reservoir seperti kondensasi teridentifikasi melalui kenaikan CO2/H2S sebagai respon dari penurunan H2S, serta efek dilusi minor teridentifikasi melalui penurunan klorida. Indikasi kehadiran brine dibawah zona dominasi uap di Utara dicirikan oleh kenaikan boron, klorida, dan silika. Secara singkat, evolusi fluida yang terjadi di WW akibat proses produksi yaitu terjadinya warm recharge atau brine carryover di sumur kering atau zona dominasi uap di Utara, serta perubahan fasa fluida dari dua-fasa menjadi dominasi liquid pada zona dua-fasa di Selatan. Evolusi fisik selama proses produksi juga diamati dengan baik melalui pengukuran perubahan gravity sebagai akibat dari perubahan saturasi liquid pada batuan hasil dari ekstraksi fluida dari reservoir. Integrasi data evolusi fluida di WW selama produksi dan aktivitas monitoring berkelanjutan telah memberikan manfaat terhadap strategi sustainabilitas produksi dan strategi pengembangan.
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ABSTRACT
Wayang Windu (WW) geothermal field is part of Quaternary volcanic arc located in Western of Java Island. It consists of volcanic complex and domes of Malabar, Bedil, Wayang, and Windu which contribute to geothermal system formation. Fluid phase were dominantly of two-phase fluid in the Southern area and likelihood of vapor dominated in the Northern area with temperature ranges

of 240 up to 3000C. Hydrological segmentation characterized by pressure ranging from 40 to 85 bar at the North to southern part respectively at initial condition. More than 13 year production, has led the reservoir to change and respond to physical and chemical parameter. Geochemistry and microgravity monitoring has been applied to record reservoir changes and mitigate problems during exploitation or future development. Chemical respond related to production impact decribed by change in isocontour area of all chemistry parameter seen in northern part of the field. Reservoir processes such as condensation identified by increasing CO2//H2S followed by decreased H2S, and minor dilution effect in WW identified by decreased choride. Indication of brine existance beneath the steam cap area in Northern wells, identified by increased boron, chloride, and silica in some of dry steam wells. Fluid evolution due to production in WW summarize as the process of warm recharge or brine carryover in dry steam wells, and changing from two-phase fluid into liquid dominated is one of the evolution happened in two-phase area in Southern area. Physical evolution during production also monitored by well defined gravity change measurement as the rock density change due to fluid extraction from reservoir. Data integration of the fluid evolution in WW during production and continuous monitoring activity give benefit to production sustainability strategy and future development area.;Wayang Windu (WW) geothermal field is part of Quaternary volcanic arc
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