

INTISARI

Lapangan panas bumi "KS" terletak di dalam kompleks kaldera di Pulau Jawa. Sistem panas bumi di lapangan panas bumi "KS" memiliki tipe vulkanogenik, karena berasosiasi dengan gunung api yang terbentuk akibat aktivitas vulkanik berumur Pleistosen-Holosen. Sistem panas bumi jenis ini sangat rentan adanya influks fluida magmatik dan cenderung menghasilkan fluida dengan pH asam. Daerah penelitian tidak dijumpai manifestasi permukaan atau air termal sehingga sangat berisiko untuk dilakukan eksplorasi, pengeboran, dan menghasilkan uap panas bumi karena masalah korosi yang tinggi dan bahaya vulkanik. Adanya studi alterasi hidrotermal bawah permukaan dapat mengetahui komposisi fluida dari mineral alterasi yang terbentuk pada sumur pemboran "X". Penelitian ini bertujuan untuk mengetahui zona alterasi sumur pemboran "X" dan mengetahui karakteristik fluida hidrotermal pada lapangan panas bumi "KS" berdasarkan kehadiran mineral alterasi hidrotermal. Metode penelitian berupa pengamatan petrografi primer sampel *cutting* sebanyak 23 sampel yang mewakili kedalaman serta data sekunder berupa 10 deskripsi petrografi dan 3 sampel data XRD dari PT MCG. Berdasarkan integrasi data primer dan sekunder, didapatkan asosiasi mineral alterasi hidrotermal yang kemudian dijadikan dasar penamaan zona alterasi. Zona alterasi hidrotermal pada sumur pemboran "X" terbagi menjadi empat yaitu zona alterasi smektit (96 – 536 mKU), zona alterasi transisi (545 – 617 mKU), zona alterasi ilit (629 – 1103 mKU), dan zona alterasi biotit (1220 – 2159 mKU). Lapangan panas bumi "KS" memiliki karakteristik fluida hidrotermal dengan pH netral pada saat mineral-mineral alterasi tersebut terbentuk dan memiliki kisaran suhu fluida 120 – 310 °C. Kisaran suhu fluida hidrotermal pada zona smektit adalah 120 – 200 °C, zona alterasi transisi 180 – 200 °C, zona alterasi ilit 220 – 310 °C, dan zona alterasi biotit memiliki kisaran suhu fluida 280 – 300 °C. Sistem panas bumi lapangan "KS" diperkirakan memiliki reservoir dengan sistem dominasi air yang berisi air alkali klorida. Hal tersebut dapat diketahui dari hadirnya mineral kalk-silikat seperti epidot, aktinolit, wairakit, dan prehnit pada zona reservoir sumur pemboran "X".

Kata kunci: *alterasi hidrotermal, fluida hidrotermal, lapangan panas bumi "KS", sumur pemboran "X", zona alterasi hidrotermal*

ABSTRAK

The "KS" geothermal field is located within the caldera complex in Java Island. The geothermal system in the "KS" geothermal field has a volcanogenic type, because it is associated with volcanoes formed due to Pleistocene-Holocene volcanic activity. This type of geothermal system is very susceptible to magmatic fluid influx and tends to produce fluid with an acidic pH. There are no surface manifestations or thermal water in the research area, so it is very risky to explore, drill, and produce geothermal steam due to high corrosion problems and volcanic hazards. By studying subsurface hydrothermal alteration, we can find out the fluid composition of the alteration minerals formed in the "X" drilling well. This research aims to determine the alteration zone of the "X" drilling well and determine the characteristics of the hydrothermal fluid in the "KS" geothermal field based on the presence of hydrothermal alteration minerals. The research method consisted of primary petrographic observations of 23 cutting samples representing depth as well as secondary data in the form of 10 petrographic descriptions and 3 samples of XRD data from PT MCG. Based on the integration of primary and secondary data, a hydrothermal alteration mineral association was obtained which was then used as the basis for naming the alteration zone. The hydrothermal alteration zone in the "X" drilling well is divided into four, there are smectite alteration zone (96 – 536 mMD), transition alteration zone (545 – 617 mMD), illite alteration zone (629 – 1103 mMD), and biotite alteration zone (1220 – 2159 mMD). The "KS" geothermal field has the characteristics of a hydrothermal fluid with a neutral pH when the minerals were formed and a fluid temperature range of 120 – 310 °C. The hydrothermal fluid temperature range in the smectite zone is 120 – 200 °C, transition alteration zone is 180 – 200 °C, illite alteration zone is 220 – 310 °C, and biotite alteration zone has a fluid temperature range of 280 – 300 °C. The "KS" field geothermal system was previously thought to have a reservoir with a water-dominated system containing alkali chloride water. This can be seen from the presence of calc-silicate minerals such as epidote, actinolite, wairakite, and prehnite in the reservoir zone of the "X" drilling well.

Keywords: *hydrothermal alteration, hydrothermal fluid, "KS" geothermal field, "X" drilling well, hydrothermal alteration zone*