World Academy of Science, Engineering and Technology
International Journal of Energy and Environmental Engineering
Vol:11, No:08, 2017

Hg Anomalies and Soil Temperature Distribution to Delineate Upflow and Outflow Zone in Bittuang Geothermal Prospect Area, south Sulawesi, Indonesia

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Abstract : Bittuang geothermal prospect area located at Tana Toraja district, South Sulawesi. The geothermal system of the area related to Karua Volcano eruption product. This area has surface manifestation such as fumarole, hot springs, sinter silica and mineral alteration. Those prove that there are hydrothermal activities in the subsurface. However, the project and development of the area have not implemented yet. One of the important elements in geothermal exploration is to determine upflow and outflow zone. This information very useful to identify the target for geothermal wells and development which it is a risky task. The methods used in this research were Mercury (Hg) anomalies in soil, soil and manifestation temperature distribution and fault fracture density from 93 km² research area. Hg anomalies performed to determine the distribution of hydrothermal alteration. Soil and manifestation temperature distribution were conducted to estimate heat distribution. Fault fracture density (FFD) useful to determine fracture intensity and trend from surface observation. Those deliver Hg anomaly map, soil and manifestation temperature map that combined overlayed to fault fracture density map and geological map. Then, the conceptual model made from north – south, and east – west cross section to delineate upflow and outflow zone in this area. The result shows that upflow zone located in northern – northeastern of the research area with the increase of elevation and decrease of Hg anomalies and soil temperature. The outflow zone located in southern - southeastern of the research area which characterized by chloride, chloride - bicarbonate geothermal fluid type, higher soil temperature, and Hg anomalies. The range of soil temperature distribution from 16 – 19 °C in upflow and 19 – 26.5 °C in the outflow. The range of Hg from 0 – 200 ppb in upflow and 200 – 520 ppb in the outflow. Structural control of the area show northwest – southeast trend. The boundary between upflow and outflow zone in 1550 – 1650 m elevation. This research delivers the conceptual model with innovative methods that useful to identify a target for geothermal wells, project, and development in Bittuang geothermal prospect area.

Keywords : Bittuang geothermal prospect area, Hg anomalies, soil temperature, upflow and outflow zone
Conference Title : ICGES 2017 : International Conference on Geothermal Energy and Systems
Conference Location : Copenhagen, Denmark
Conference Dates : August 17-18, 2017

Open Science Index, Energy and Environmental Engineering Vol:11, No:08, 2017 publications.waset.org/abstracts/72738/pdf