

Jaboi Geothermal Field Boundary, Nanggroe Aceh Darussalam, Based on Geology and Geophysics Exploration Data

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ABSTRACT

Jaboi geothermal area is located at the most Western part of Indonesia at Weh island, Nanggroe Aceh Darussalam. The Weh island is located at the most northern part of Great Sumatra fault system which has NW-SE trend elongated from Weh island until Semangko bay about 1650 km within Sumatra island.

The heat source in the southern part is inferred from Leumo Matte partial melting magma about 1800 m in depth, which indicated by gravity survey. However, the geothermal surface manifestation is not clearly appeared at the northeastern part. Geoelectrical survey carried out in the southern part give good information of shallow geothermal reservoir about 500 m depth. Furthermore, based on geochemical data the reservoir temperature is above 225 °C, which categorize as high temperature geothermal area. Therefore, Jaboi geothermal area is promising geothermal field to be develop for electric power plant in the near future, since the area is high enthalpy geothermal area with shallow depth reservoir.

1. INTRODUCTION

The exploration at Jaboi geothermal area is starting since 1972 for the reconnaissance and between 1983-1984 for the surface manifestation and application of geoelectrical survey.

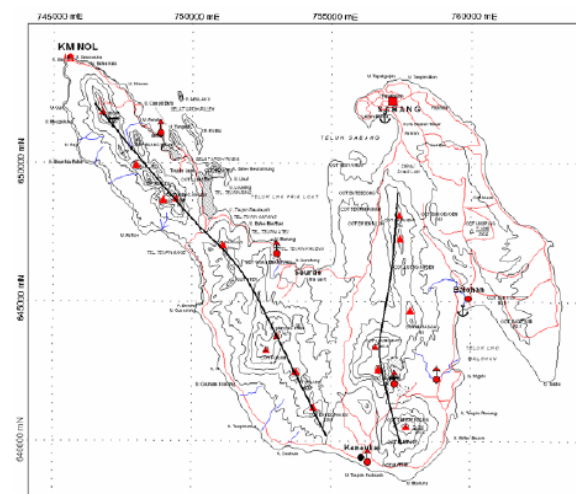


Figure 1: Location of study area, showing volcanic lineament and hotspring within Weh Island

The activity is follow up with some additional geological data acquisition in 2000. However, the intensive data for

both geological and geophysical data such as: geochemical, geomagnetic, gravity, head on resistivity and geoelectrical mapping are carried between 2005-2006. On the other hand two shallow drilling temperature survey at the end 2006 is ended the detailed geophysical exploration activity. Jaboi geothermal area is located at the most Western part of Indonesia at Weh island, Nanggroe Aceh Darussalam. **Figure 1** is showing NW-SE and NNE-SSE volcanic and hotspring lineament,

2. GEOPHYSICAL SURVEY

The geomagnetic survey result indicated low susceptibility areas, which related with surface manifestation of hotsprings Jaboi, Leseum, Batetamon, LhoPria Laot, Seurei and Pasi Jaboi (Ario mustang et.al, 2006). The highest magnetic susceptibility is fresh andesitic breccias, whereas weathered lava is lower. The lowest magnetic susceptibility is related with an altered rock due to the high temperature demagnetized rock.

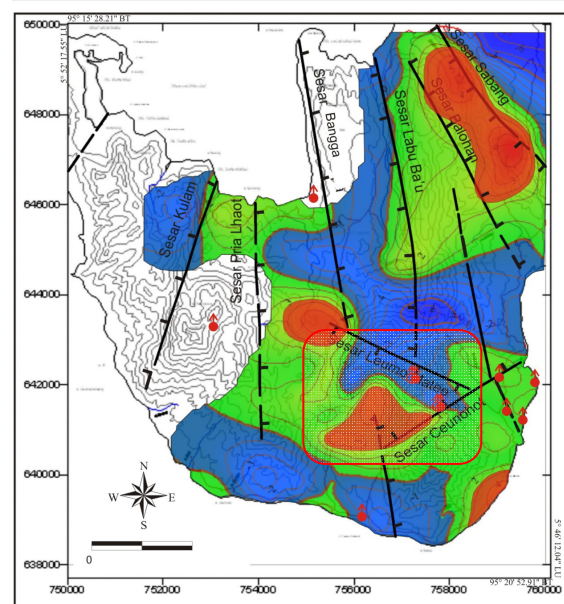


Figure 2: Residual gravity data showing interpreted by red color for the heat source of highest density values

The 220 point gravity survey (Edi Suhanto et.al, 2006) is combine with geomagnetic data to determined the heat source. **Figure 2** showing residual gravity anomaly of shallower structure anomaly, rectangle is localized interested geothermal prospect.

The resistivity survey consist of head on measurement to validated faulted surface geological (Sri widodo and Edi

Suhanto, 2006) and geoelectrical mapping (Edi Suhanto and Kasbani, 2007). **Figure 3**, showing the low resistivity area which coincident with rectangle of interest area based on geomagnetic and gravity survey results.

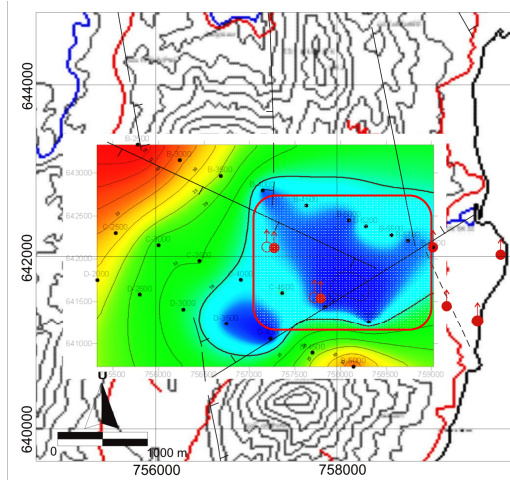


Figure 3: The low resistivity area indicated geoelectrical survey, interpreted as argillaceous caprock

3. GEOTHERMAL PROSPECT AREA

The geothermal conceptual model (**Figure 3**) is developed by compilation geological and geophysical data (Akbar, 2009). The boundary of geothermal field based on geological and geophysical data is followed up by shallow drilling temperature survey (Arif Munandar et.al., 2007).

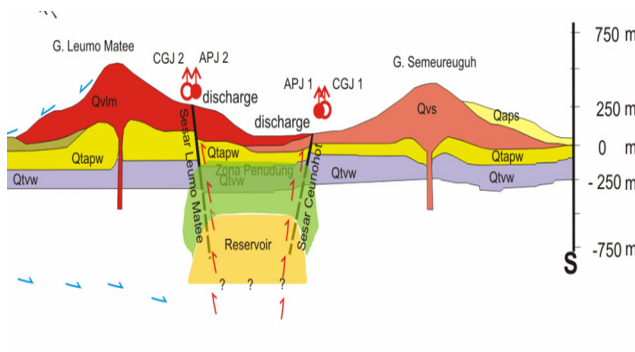


Figure 3: The NW-SE conceptual geological model constructed by combination with geophysical data

Figure 4, showing the shallow drilling temperature of JBO-1 and JBO-2, which reaching total depth of 238 m and 250 m, respectively. The shallow drilling result confirmed the weak-strong alteration intensity of argillic type.

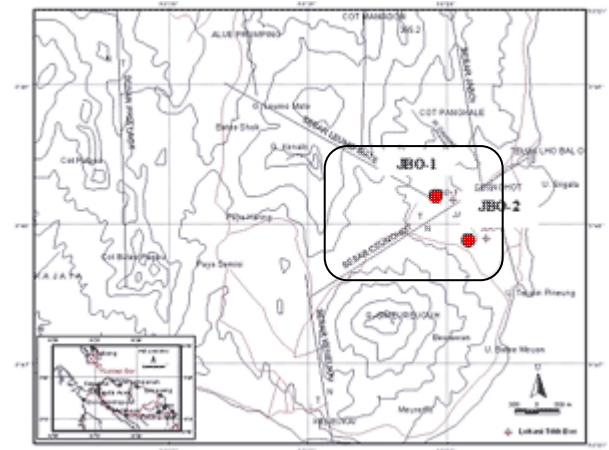


Figure 4: The location JBO-1 and JBO-2 of temperature survey of shallow drilling

CONCLUDING REMARKS

The exploration stages from the preliminary reconnaissance geological and geophysical survey can be accelerated the geothermal power plant development and reducing a risk of the steam supply. The geothermal electrical power plant will contributing for the future economic growth of NAD areas.

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