

SARI
STUDI GEOLOGI DAN GEOKIMIA FLUIDA PADA LAPANGAN PANAS
BUMI LUMUT BALAI, SUMATERA SELATAN

Oleh:

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Penelitian tugas akhir ini dilakukan di Wilayah Kerja Panas Bumi Lumut Balai, Kabupaten Muara Enim, Provinsi Sumatera Selatan. Geomorfologi daerah penelitian berupa Satuan Lereng Gunungapi (V3), Satuan Kaki Lereng Fluvial Gunungapi Atas (V6), serta Satuan Dataran & Kaki Lereng Fluvial Gunungapi Atas (V8). Stratigrafi daerah penelitian dengan urutan tertua hingga termuda yaitu Satuan Andesit Lumut Balai, Satuan Breksi Andesit Lumut Balai, Satuan Breksi Tuff Lumut Balai, dan Satuan Andesit Basaltik Lumut Balai. Arah utama dari kelurusan yang berkembang sesuai dengan pola struktu geologi utama pada peta geologi regional, dominan berarah Barat laut-Tenggara seperti arah Sesar Sumatera. Karakteristik fluida pada daerah penelitian terbagi menjadi tipe air dan tipe gas. Tipe air manifestasi berdasarkan diagram Cl-SO₄-HCO₃ berupa mature waters dan steam heated waters. Kesenjangan manifestasi air berdasarkan diagram terner Na-K-Mg berupa *immature waters*, *partial equilibration*, dan *full equilibrium*. Berdasarkan rasio Cl/B didapatkan hasil seluruh manifestasi berasal dari satu reservoir yang sama. Dari geotermometer Na-K didapatkan temperatur manifestasi air 252-261 °C. Kemudian untuk manifestasi gas, penentuan tipe gas berdasarkan diagram terner H₂-H₂S-5CH₄ berupa *gas from neutral pH brine*. Berdasarkan diagram terner N₂-CO₂-Ar manifestasi gas berasal air meteorik yang terpanaskan terus menerus dibuktikan dengan kehadiran argon yang tinggi. Temperatur gas berdasarkan geotermometer CAR-HAR berkisar 180-250 °C, sampel terplot di posisi bawah diagram yang menandakan reservoir berupa *liquid dominated*. Kedua sampel baik air maupun gas menunjukkan bahwa bagian utara daerah penelitian berupa *zona outflow* dan bagian selatan daerah penelitian menunjukkan *zona upflow*.

Kata Kunci: Lumut Balai, Panas Bumi, Geotermometer, Geoindikator.

ABSTRACT
**GEOLOGICAL AND GEOKYMICAL STUDY OF FLUID IN THE LUMUT
BALAI GEOTHERMAL FIELD, SOUTH SUMATERA**

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This final project research was conducted in the Lumut Balai Geothermal Working Area, Muara Enim Regency, South Sumatra Province. The geomorphology of the research area consists of the Volcano Slope Unit (V3), the Upper Volcano Fluvial Slope Foot Unit (V6), and the Upper Volcano Fluvial Slope & Plains & Foot Unit (V8). The stratigraphy of the research are the Lumut Balai Andesite Unit, the Lumut Balai Andesite Breccia Unit, the Lumut Balai Tuff Breccia Unit, and the Lumut Balai Basaltic Andesite Unit. The main direction of the lineament that develops is in accordance with the main geological structure pattern on the regional geological map, dominantly trending northwest-southeast like the direction of the Sumatran Fault. Fluid characteristics in the research area are divided into water type and gas type. The types of manifestation water based on the Cl-SO₄-HCO₃ diagram are mature waters and steam heated waters. The balance of water manifestations is based on the Na-K-Mg ternary diagram in the form of immature waters, partial equilibration, and full equilibrium. Based on the Cl/B ratio, it was found that all manifestations came from the same reservoir. From the Na-K geothermometer, the water manifestation temperature was 252-261 °C. Then for gas manifestation, determine the gas type based on the H₂-H₂S-5CH₄ ternary diagram in the form of gas from neutral pH brine. Based on the N₂-CO₂-Ar ternary diagram, the manifestation of gas from continuously heated meteoric water is proven by the high presence of argon. The gas temperature based on the CAR-HAR ranges from 180-250 °C, the reservoir is liquid dominated. The two samples, both water and gas, show that the northern part of the research area is an outflow zone and the southern part of the research area shows an upflow zone.

Keywords: Lumut Balai, Geothermal, Geothermometer, Geoindicator.