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Determining of Tin Zone with Gravity Method in Tanjung Gunung Village, Indonesia

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Abstract— **Bangka Island is a potentially large area of both secondary and primary tin producers, indicated by exploration and exploitation that took place since Dutch colonialism. The need for primary tin exploration in Tanjung Gunung Village, Central Bangka Regency to optimize the acquisition of primary tin resources available by PT TIMAH Tbk. The data collection and processing method is done by measuring the gravity field every point with a lopping system, spacing 250 m and the number of points realized is 474 and using two types of gravity meter devices namely LaCoste & Romberg and Scintrex. The required data is in the form of geological data, rock samples, bouguer anomalies, which will be formed into an anomaly bouger map. Based on the results of research on primary tin mineralization obtained that the stratigraphic formation process is located on the Klabat Granite Formation (TRJkg) in the presence of many granite rock outcrops containing Sn as well as the results of residual bouguer anomalies obtained two interest zones which then made 2-dimensional modeling to find out underwater surface conditions of the study area. This is supported by geological data, actual data on the field and interpretation of the lithology section, so it is recommended to carry out further exploration using the geoelectric methods in the two interest zones to the north and south in the research area.**

Keywords—Tin, Geomagnetic, Interest area, Exploration

I. Introduction

Exploration activities are applied to determine the distribution area, quality, and quantity and method of extracting resources according to the stages and capabilities of the exploration method applied before mining the excavated material [3]. Given the uneven and non-renewable spread of primary tin mineralization [1], early exploration techniques are needed to interpret the conditions and initial potential of the research area with one gravity method that utilizes the variation of the earth's gravitational field from the difference in density of each rock below the earth's surface [4].

This research was carried out in the PT Timah Tbk Mining Business Permit (IUP) Region, Central Bangka Regency, precisely the Province of Bangka Belitung Islands

in Tanjung Gunung Village with a research area of 2,837.5 ha. If viewed from the geological map this area is dominated by formation stratigraphy consisting of the Granit Klabat Formation, Tanjung Genting Formation and Alluvium Deposition with interesting structures [2]. This makes this area considered potential for gravity research, especially with the actual conditions near the research location that were found in former community mining land which means it has proven to have tin spread and not infrequently the discovery of rock outcrops.

II. Methods

The research method used is descriptive qualitative in the form of direct observation and literature studies related to determining the primary area of tin tin distribution using the gravity method in Tanjung Gunung Village, Central Bangka Regency by knowing the location to which measurement data will be taken as initial research data and know the geology and morphology of the research area as well as the initial documentation of the research area.

The tools used in this study include: LaCoste & Romberg gravitymeter Type G772, G778, G758 and Scintrex CG5 gravitymeter, Magellan Promax 3 GPS, timepiece, geological map, stationery, computer devices with Microsoft Excel Software installation, Grav-Tc, DNR-GPS, and Oasis Montaj Software. Applying measurements using the closed lopping method that points to the base station called GFS3, spacing between points 250 m with the number of measurement points 474 points and repeating measurements at one point 3-5 times.

Gravitational acceleration (gravity) results of the reading of the tool are converted to mgal [5], then tidal correction and floating correction are carried out until the gravitational acceleration observation values are then reduced to theoretical gravitational acceleration values which include normal gravity correction, free air correction, Bouguer correction and field correction [6]. The results obtained after the reduction process are bouguer anomalies which will then be interpreted using Oasis Montaj Software to determine subsurface conditions for 2D modeling.

III. Results and discussion

Bouguer anomaly is obtained by interpreting bouguer anomalies that have been corrected and then interpreting the bouger anomaly as a gravity anomaly used to estimate

subsurface structures. The bouguer anomaly value obtained in this study ranged from +16.2 to +21.3 mgal shown in Fig. 1. Two empty areas in this research area were the permit area of PT MKM which had large granite outcrops and width for which interpretation is not carried out.

Then the bouguer anomaly map that has been obtained is interpreted regionally. This is to determine the extent of the influence of bouger anomalies by applying a lowpass filter with a wavelength of 10,000 and resulting in the value of the bouger anomaly range +16.9 to +20.9. The regional bouger anomalies obtained are shown in Fig. 2.
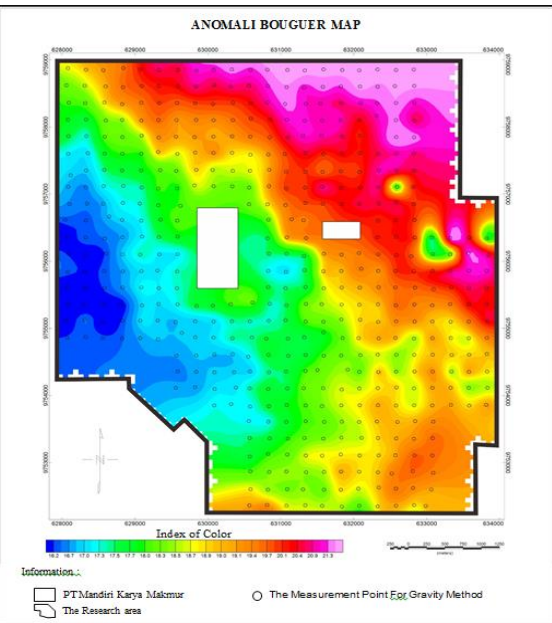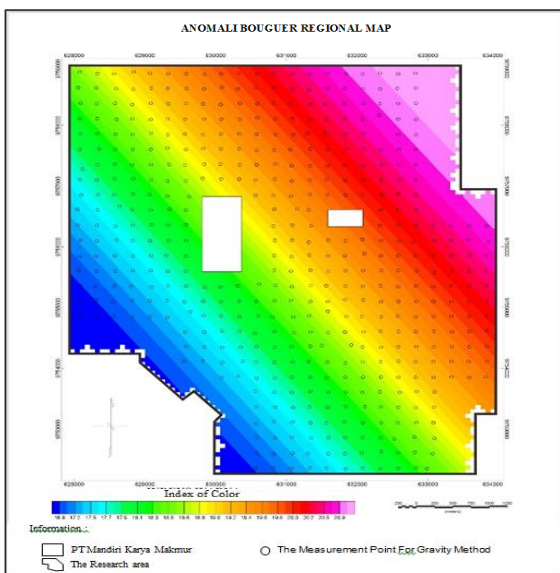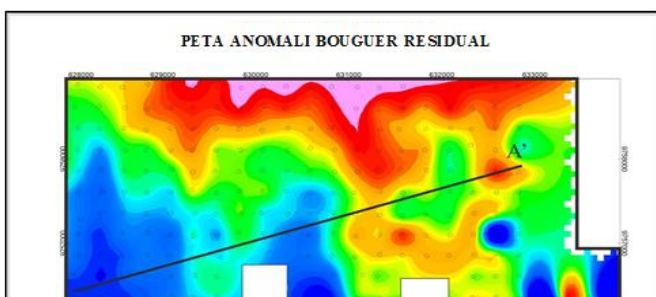

Fig.1. Anomaly bouguer map

Fig.2. Anomaly bouguer regional map

Zona A

Zona B

Fig .3. Anomaly bouguer residual map

From the results of reduction of bouguer anomalies and bouger anomalies of regional, bouger anomalies of residual were obtained (Fig. 3). Identification of interest zones which show primary tin obtained from residual bouger anomalies consists of interest zone is zone A (the north) and zone B (the south) in the research area.

Zone interest A consists of a part of the upper right corner bouger anomalies of residual map that has a Northeast direction to the Southwest, an anomaly that is interesting with a low anomaly zone surrounded by high anomalies ranging from 0.1 to 1.1 mgal around it which is displayed in green and has a value interval -1.3 to -0.8 mgal, then just below it there are low anomalies in blue with values ranging from -1.3 to -0.8 mgal which are also surrounded by high red anomalies with intervals of values 0.1 to 0.6 mgal.

The zone interest B corresponds at the bottom right of the Southeast to Northwest trending map with a high anomaly having a value of 1,1 mgal which is surrounded by quite anomalies of high value from -0.3 to 0.3 mgal which are identified as metasedimen rock, so that it can be assumed below the surface of the Tanjung Genting Formation (trt) the presence of granite intrusion in the form of veins which do not form a large zone as in Zone Interest A. The former community mining and tributary flow and the presence of kaolin above show signs of granite intrusion, and clearly seen the bouguer anomaly pattern on this map forms a fracture structure that separates between the same anomalies. With the presence of fault structures in the Zone of Interest B it can be assumed that primary tin mineralization can be assumed because the geological structure that occurs is a place of mineralization in hydrothermal processes and alterations with side rocks.

The subsurface geological cross section is obtained from interpreting the interest zone incision model on residual bouger anomaly maps which are thought to have tin content. The results of this interpretation can be analyzed as estimating the zone of primary tin mineralization.

Based on the lines in the A-A' section, there is an interesting appearance of anomalies, based on a significant decrease in the value of bouguer anomalies which indicates the presence of geological structures.
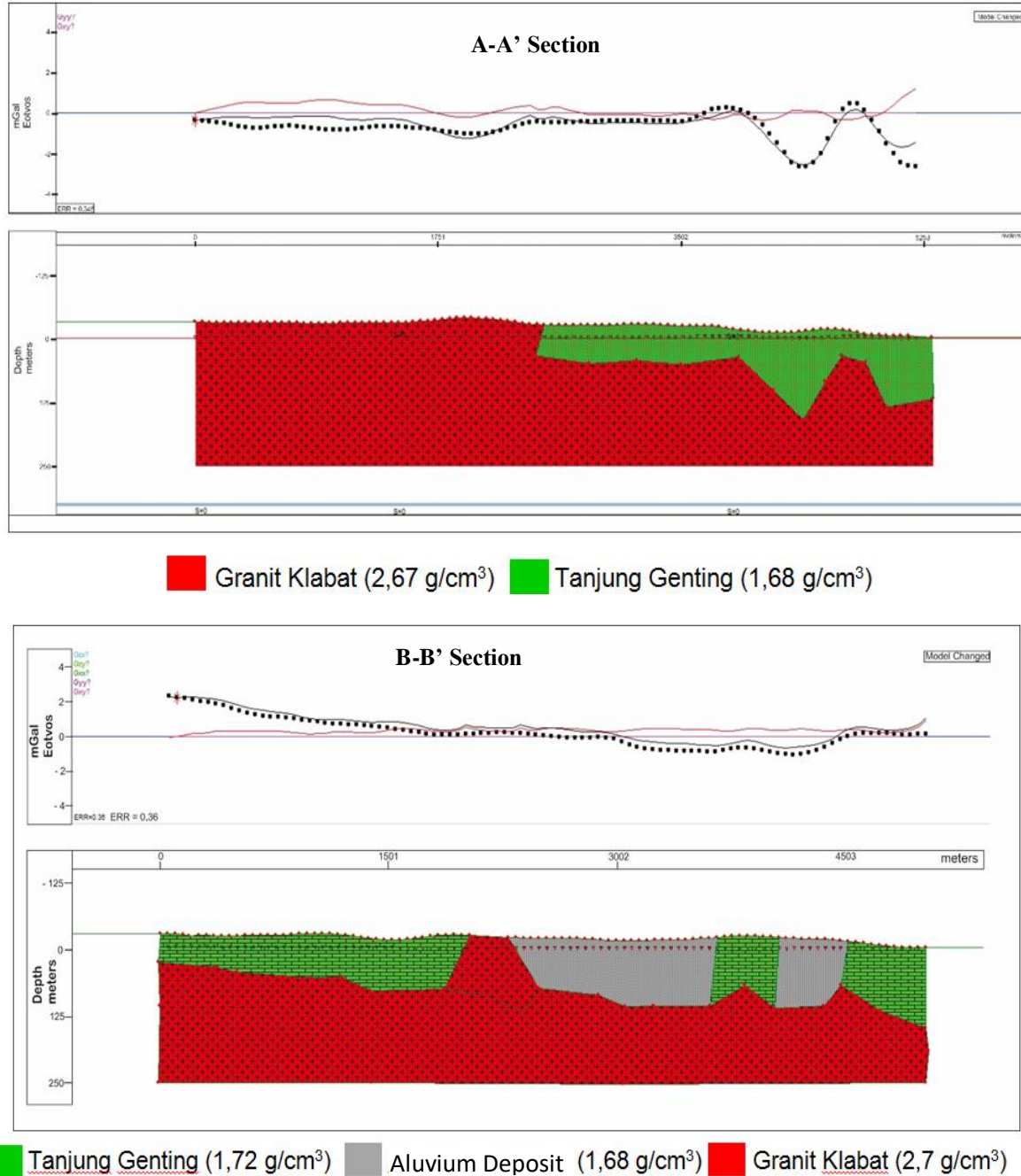

Fig. 4. The results of 2D residual anomaly modeling

An A-A' section is then analyzed using a geological map which results in a meeting between the Tanjung Genting and Granit Klabat Formations. The Tanjung Genting Formation is exposed at a distance of ± 2,150 m to ± 5,253 m, with a density of 1.68 g / cm³ at a depth of ± 20 m - ± 155 m, with the Klabat Granite Formation revealed at

the surface, which is then ± 100 - ± depth 250 below the Tanjung Genting Formation with a density of 2.67 g / cm³.

This incision is considered interesting because it is an area that has a low anomalous value surrounded by high bouguer anomalies. Identified to have primary tin, drain due to alteration by the intrusion residual liquid of granite rocks

in the Tanjung Genting Formation which enters the surrounding rock gap with geological structures. An the B-B' section has 3 rock formations consisting of Klabat Granite (TRJkg), Tanjung Genting (TRt), and Alluvium Deposits (Qa) with graphs that do not drastically change the value of bouguer anomalies with the incision line length of 5,253 m. the depth of 0 - 125 m is dominated by sedimentary rocks, namely the Tanjung Genting Formation with a density of 1.72 g / cm^3 and a density of 1.68 g / cm^3 alluvium deposits. this is depth of 0 m to 250 m with the Klabat Granite Formation (TRJkg), below which has a density of 2.7 g / cm^3. The structure is thought to be a rising fault which separates between anomalies which have the same high value.

IV. CONCLUSIONS

Based on the results of the study, it was concluded that the condition of the research location indicated by geological data stated that the study area was dominated by 3 large formations, namely the Granit Klabat Formation, Tanjung Genting, and alluvium deposits. The value of residual bouguer anomalies shows that there are several regions which are strongly suspected to be interest areas with granite intrusion zones in zone A and zone B.

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