

ABSTRAK

ANALISIS DATA GEOMAGNETIK, TDIP (*TIME DOMAIN INDUCED POLARIZATION*) DAN GEOLOGI DALAM MEMBANGUN MODEL KONSEPTUAL SISTEM ENDAPAN EPITERMAL SULFIDASI RENDAH DI WILAYAH PROSPEK CIBALIUNG, BANTEN

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Busur Sunda-Banda merupakan jalur metalogenik di Indonesia. Pada busur ini, terdapat mineralisasi logam yang berkaitan dengan aktifitas sub-vulkanik Miosen hingga Pliosen dalam batuan andesitik terubah berumur Miosen, seperti ditemui di Bukit Barisan, Pegunungan Selatan Jawa dan menerus sampai ke Nusa Tenggara Timur. Pada Pegunungan Selatan Jawa banyak terjadi mineralisasi tipe endapan epitermal. Tipe endapan epitermal yang hadir salah satunya adalah endapan epitermal sulfidasi rendah (LSE) Au-Ag yang terdapat di salah satu IUP Eksplorasi PT. Aneka Tambang daerah Cibaliung, Banten.

Penggunaan integrasi metode geofisika dan geologi diperlukan dalam membangun konseptual model suatu endapan mineral. Zona mineralisasi sulfida dapat diidentifikasi berdasarkan distribusi nilai kemagnetan (metode geomagnetik) dengan analisis pola struktur yang berkembang sebagai kontrol mineralisasi serta berdasarkan distribusi resistivitas dan chargeabilitas dari metode TDIP untuk mengetahui litologi bawah permukaan, keberadaan mineralisasi dari asosiasi batuan alterasinya. Integrasi kedua metode geofisika tersebut diperkuat dengan data geologi permukaan yaitu data litologi, alterasi, struktur, geokimia soil dan data pemboran eksplorasi daerah telitian.

Penelitian dilakukan di area seluas 3 x 2 km² untuk metode geomagnetik, sedangkan data lain difokuskan pada setengah area penelitian bagian utara karena dianggap lebih menarik. Penggunaan metode geomagnetik sebanyak 20 lintasan dan TDIP sebanyak 10 lintasan. Pada analisis olahan data geomagnetik dengan filter *Reduce to the Pole* menunjukkan anomali rendah yang di sebelah utara area penelitian, dimana respon rendah tersebut menunjukkan adanya zona lemah berupa zona mineralisasi. Selanjutnya data diproses lebih lanjut dengan filter *Tilt Derivative* yang menunjukkan adanya pola-pola struktur mayor berarah NW-SE dan beberapa struktur minor berarah SW-NE dan W-E. Struktur tersebut terkonfirmasi dengan adanya data geologi permukaan yaitu struktur berupa *buried mineralized fault* dan *mineralized fault* berarah NW-SE juga terdapat struktur berupa *post mineral fault* berarah SW-NE dan N-S. Dengan hasil tersebut diperlihatkan area yang lebih prospek di sebelah timur area penelitian. Analisis olahan data TDIP berupa resistivitas menunjukkan adanya litologi andesite tuff sebagai baruan teralterasi dengan alterasi dominan yaitu alterasi chloritic (chl±qz±cb±ep-py) memiliki nilai resistivitas tinggi berkisar antara 66.3 – 239.6 Ohm meter, alterasi *smectite* (sm±chl±qz±cb-py) dan alterasi *illite* (il-ka-py±qz+sm) dengan nilai resistivitas 24.9 – 66.3 Ohm meter, serta alterasi *advance argillic* (qz-dk-ka±al±pf) dengan nilai resistivitas 3.53 – 24.9 Ohm meter. Zona alterasi lempungan dan mineralisasi sulfida ditunjukkan pada kedalaman mulai 50 meter hingga 200 meter di bawah permukaan dengan nilai chargeabilitas 75 – 600 msec. Sedangkan untuk *fling fracture vein* sebagai zona *base metal* ditemukan pada respon resistivitas tinggi dan pada chargeabilitas sedang karena mengandung sedikit mineral sulfida. Zona tersebut mengikuti pola struktur yang dilihat dari peta geomagnetik, struktur maupun *plan map* atau peta kedalaman resistivitas. Pada integrasi hasil analisis tersebut terbukti dengan adanya data analisa geokimia soil berupa Hg, Sb, As, Zn, Pb, Cu, Ag, dan

Au yang menunjukkan prospek lebih tinggi di area sebelah timur. Unsur Ag dan Au menjadi kunci utama adanya prospek endapan epitermal sulfidasi rendah, ditunjukkan sebaran yang cukup tinggi di sebelah timur pada area zona mineralisasi dan struktur. Kadar Ag yang tersebar memiliki nilai 0.05 – 111 ppm dan kadar Au memiliki nilai 1.88 – 17 ppb. Pada data pemboran ditemukan alterasi silisik di titik pemboran RD.01 pada kedalaman 310– 340 meter. Sedangkan kandungan Au dan Ag yang cukup tinggi pada titik pemboran RD.02 hingga lebih dari 0.01375 ppm Au dan lebih dari 3.3 ppm Ag.

Kata Kunci: Low Sulfidation Epithermal, Geomagnetik, Resistivitas, Chargeabilitas, Zona Mineralisasi.

ABSTRACT

ANALYSIS OF GEOMAGNETIC DATA, TDIP (TIME DOMAIN INDUCED POLARIZATION) AND GEOLOGY TO BUILD CONCEPTUAL MODEL OF LOW SULFIDATION EPITHERMAL DEPOSIT SYSTEM IN THE PROSPECT AREA OF CIBALIUNG, BANTEN

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Metallogenic of Sunda Banda Magmatic Arc in Indonesia consist of variably metal mineralization related with Miocene-Pliocene sub-volcanic activity on the Miocene altered andesitic rock, that has been found at Bukit Barisan, Southern Java Mountain, and continuously existed at Nusa Tenggara Timur. At Southern Java Mountain occur a lot of epithermal deposit mineralization. One of them from the type of epithermal deposit is Low Sulfidation Epithermal (LSE) Au-Ag which is contained in one of the Exploration IUP of PT. Aneka Tambang Cibaliung, Banten.

The use of integration from geophysical method and geological data are needed to build conceptual model of a mineral deposit. Sulfide mineralization zone can have identified based on magnetic field distribution value of geomagnetic method with analyse an existing structural pattern as mineralization control also based on resistivity and chargeability distribution from Time Domain Induced Polarization (TDIP) method to know subsurface lithology and the presence of mineralization from the alteration rock associations. Integration from two of geophysical methods strengthened with geological surface data that is lithology, alteration, structures, soil geochemistry and exploration drillhole data from the research area.

The research was conducted in an area of 3 x 2 km² for the geomagnetic method, while other data are focused on the northern half of the research area as they are considered more interesting. Geomagnetic method consists of 20 lines and TDIP consist of 10 lines. The analyse of processing geomagnetic data with Reduce to the Pole filter shown low anomaly at the north side of research area, its shown mineralization zones. After that, the data process by Tilt Derivative filter which shown major structural patterns from NW to SE and minor structural pattern from SW to NE and West to East. The structures confirmed by surface geological data that are buried mineralized fault and mineralized fault from NW to SE also consist post mineral fault from SW to NE and from N to S. With these results, it is shown a more prospective area to the east of the research area. Analysis of processed TDIP data of resistivity value shown andesite tuff lithology as altered rock with dominant alterations that are chloritic alteration (chl±qz±cb±ep-py) has a high resistivity value ranging from 66.3 to 239.6 Ohm meter, smectite alteration (sm±chl±qz±cb-py) and illite alteration (il-ka-py±qz+sm) has a resistivity value ranging from 24.9 to 66.3 Ohm meter, also advance argillic alteration (qz-dk-ka±al±pf) has a resistivity value ranging from 3.53 to 24.9 Ohm meter. The clay alteration zone and sulfide mineralization is shown at the starting depth from 50 meter to 200 meter in the subsurface which has a chargeability value from 75 to 600 msec. Whereas for the filling fracture vein as a base metal zone it was found in a high resistivity response and at a moderate chargeability because it contained minor sulfide minerals. That zone following the structural patterns seen from geomagnetic map, geological structure also resistivity plan map. In the integration, the results of the analysis were proven by the existence of geochemical soil analysis data in the form of Hg, Sb, As, Zn, Pb, Cu, Ag, and Au which

shown more highly prospect at east sides of research area. Ag and Au elements are the main key of Low Sulfidation Epithermal deposit, shown a fairly high distribution in the east of mineralized zone and structure area. The scattered Ag content has a value is about 0.05 - 111 ppm and the Au content has a value is about 1.88 - 17 ppb. The drilling data shows silicification alteration at the RD.01 drilling point at a depth is about 310– 340 meters. While the Au and Ag content were quite high at the drilling point RD.02 to more than 0.01375 ppm Au and more than 3.3 ppm Ag.

Keywords: *Low Sulfidation Epithermal, Geomagnetic Field, Resistivity, Chargeability, Mineralization Zone.*