

ABSTRAK

KARAKTERISTIK ALTERASI, MINERALISASI, DAN URAT KUARSA SERTA GENESA ENDAPAN EPITERMAL SULFIDASI RENDAH ZONA URAT X, PROSPEK *NORTH*, DAERAH GOSOWONG, MALUKU UTARA

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Penelitian ini dilakukan pada Pit Zona Urat X, Prospek *North*, Daerah Gosowong, Kabupaten Halmahera Utara, Provinsi Maluku Utara yang termasuk dalam wilayah izin usaha pertambangan PT Nusa Halmahera Minerals. Daerah penelitian terletak pada jalur magmatik *Halmahera Arc* yang dikenal memiliki potensi endapan mineral ekonomis, salah satunya emas. Penelitian ini bertujuan untuk mengidentifikasi kondisi geologi, karakteristik alterasi, mineralisasi, dan urat kuarsa, serta menginterpretasikan genesis endapan emas pada daerah penelitian. Metode penelitian dilakukan melalui integrasi data permukaan (*surface pit mapping*) dengan data bawah permukaan (*drillhole*) yang dikorelasikan untuk memperoleh hubungan vertikal dan lateral mineralisasi emas. Hasil penelitian menunjukkan bahwa stratigrafi daerah penelitian tersusun atas satuan konglomerat Gosowong dan lava andesit Gosowong berumur Pliosen Awal. Struktur geologi berkembang dalam bentuk kekar, sesar, dan urat dengan orientasi dominan barat-timur yang diinterpretasikan sebagai bagian dari sistem *strike slip* berarah NE-SW. Alterasi hidrotermal terbagi menjadi empat zona, yaitu zona silisik dengan himpunan mineral kuarsa ± kalsedon ± pirit, zona argilik illit dengan himpunan mineral illit ± smektit ± kaolinit ± kuarsa, zona argilik smektit dengan himpunan mineral smektit ± kaolinit ± klorit ± kuarsa, dan zona propilitik dengan himpunan mineral klorit ± epidot ± kuarsa ± karbonat. Mineralisasi dicirikan oleh kehadiran mineral sulfida berupa pirit, kalkopirit, galena, sfalerit, dan *native element* berupa *native gold* (Au), serta mineral oksida sebagai hasil proses oksidasi permukaan. Urat kuarsa dikelompokkan menjadi urat kode A, urat kode B, dan urat minor dengan tekstur bervariasi berupa *massive chalcedony*, *molds*, *crystalline*, *cryptocrystalline*, *comb*, *druzy*, *dogteeth*, *banded*, dan *cockade*, serta mode urat berupa *breccia* (*wall-clast* dan *vein-clast*), *stockwork*, dan *sheeted*. Nilai kadar Au tertinggi ditemukan pada urat kode B dengan kadar sekitar 5 ppm. Endapan emas daerah penelitian merupakan endapan epitermal sulfidasi rendah dengan zona mineralisasi yang bersifat fluktuatif akibat aktivitas fluida hidrotermal *multipulse*. Zona tersebut berada pada *Crystalline-Chalcedonic Superzone* atau *Main Base Metal Interval-Low Grade Precious Metal Interval* yang merepresentasikan bagian perifer sistem epitermal sulfidasi rendah.

Kata kunci: alterasi, epitermal, genesis, mineralisasi, urat

ABSTRACT

ALTERATION, MINERALIZATION, QUARTZ VEIN CHARACTERISTICS, AND GENESIS OF LOW SULFIDATION EPITHERMAL DEPOSIT IN VEIN ZONE X, NORTH PROSPECT, GOSOWONG AREA, NORTH MALUKU

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This study was conducted in Vein Zone X Pit, North Prospect, Gosowong Area, North Halmahera Regency, North Maluku Province, within the mining concession of PT Nusa Halmahera Minerals. The study area is located within the Halmahera Arc magmatic belt, which is well known for hosting economically significant mineral deposits, particularly gold mineralization. This study aims to characterize the geology, alteration, mineralization, and quartz veins, and to interpret the genesis of the gold deposit. The study was carried out through the integration of surface data (surface pit mapping) and subsurface data (drillhole), which were correlated to establish the vertical and lateral relationships of gold mineralization. The results indicate that the stratigraphy of the study area consists of the Gosowong Conglomerate and Gosowong Andesite Lava units of Early Pliocene age. Geological structures occur as joints, faults, and veins with a dominant east-west orientation, interpreted as part of the NE-SW strike slip system. Hydrothermal alteration is divided into four alteration zones: silicic alteration characterized by quartz $\pm$ chalcedony $\pm$ pyrite assemblages, illite argillic alteration characterized by illite $\pm$ smectite $\pm$ kaolinite $\pm$ quartz assemblages, smectite argillic alteration characterized by smectite $\pm$ kaolinite $\pm$ chlorite $\pm$ quartz assemblages, and propylitic alteration characterized by chlorite $\pm$ epidote $\pm$ quartz $\pm$ carbonate assemblages. Mineralization is characterized by the presence of sulfide minerals, including pyrite, chalcopyrite, galena, and sphalerite, as well as native gold and oxide minerals formed through oxidation processes. Quartz veins are classified into Vein Code A, Vein Code B, and minor veins, exhibiting a variety of textures including massive chalcedony, molds, crystalline, cryptocrystalline, comb, drizzly, dogteeth, banded, and cockade textures, with vein styles comprising breccia (wall-clast and vein-clast), stockwork, and sheeted veins. The highest Au grade occurs in Vein Code B, reaching ~5 ppm. The gold deposit in the study area is classified as a low-sulfidation epithermal deposit, with a fluctuating mineralization zone resulting from multipulse hydrothermal fluid activity. This zone is positioned within the Crystalline-Chalcedonic Superzone or the Main Base Metal Interval-Low Grade Precious Metal Interval, representing the peripheral part of a low-sulfidation epithermal system.

Keywords: alteration, epithermal, genesis, mineralization, vein.