

## Studi Geologi dan Geokimia Untuk Eksplorasi Penentuan Potensi Mineralisasi Bijih Di Daerah "X", Sulawesi Utara = Geology and Geochemistry Study for Exploration Determination of Ore Mineralization Potential in "X" Area, North Sulawesi

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### Abstrak

Studi geologi dan geokimia tanah dilakukan untuk menentukan potensi dan prospek mineralisasi bijih di Daerah "X", Sulawesi Utara sebagai salah satu daerah yang berpotensi mengandung mineralisasi logam ekonomis. Penelitian dilakukan dengan mengintegrasikan data geologi dan data pemercontohan tanah (oil sampling) oleh PSDMBP yang masih perlu diolah secara geostatistik. Studi geologi dilakukan melalui integrasi terhadap data sekunder dari PSDMBP dengan analisis geomorfologi, kelurusan, dan petrografi untuk menentukan kondisi geomorfologi, litologi, struktur, zona alterasi, serta kelurusan urat kuarsa. Analisis geostatistik dilakukan dengan analisis univariat dan multivariat untuk menentukan persebaran anomali unsur dan asosiasi antar unsur. Hasil penelitian menunjukkan bahwa daerah penelitian memiliki satuan geomorfologi berupa satuan perbukitan tinggi vulkanik berlereng curam dan satuan perbukitan vulkanik berlereng agak curam-curam. Litologinya terdiri atas satuan dasit, satuan andesit, satuan tuff, dan satuan batupasir dengan struktur geologi berupa pola kelurusan dengan orientasi barat laut – tenggara. Zona alterasi pada daerah penelitian meliputi zona alterasi argilik (fasies kaolinit + kuarsa + ilit + ilit-smektit) dan zona alterasi propilitik (fasies klorit + illite-smektit + kalsit + epidot). Terdapat tiga jalur urat kuarsa berorientasi barat daya – timur) laut yang teridentifikasi pada daerah penelitian, yaitu Urat Kuarsa X (bagian tenggara), Urat Kuarsa Y (bagian barat), dan Urat Kuarsa Z (bagian barat laut). Hasil analisis statistik terhadap empat unsur yang dapat diteliti (Cu, Au, Sb, Hg) menunjukkan masing-masing nilai ambang sebesar 72.44 ppm, 16 ppb, 3.39 ppm, dan 551.72 ppb. Hasil analisis multivariat menunjukkan adanya satu asosiasi unsur pada daerah penelitian, yaitu Au-Sb-Hg. Persebaran anomali unsur logam bijih kemudian diketahui secara umum memiliki pengayaan disekitar urat kuarsa dan mengalami proses dispersi pada unsur Cu, Sb, dan Hg. Potensi mineralisasi bijih pada daerah penelitian berasal dari sistem endapan epitermal sulfidasi rendah dengan prospek mineralisasi sebagian besar berada pada ketiga jalur urat kuarsa dan bagian timur laut serta selatan daerah penelitian. Prospek bagian timur laut dan selatan diindikasikan sebagai kehadiran urat kuarsa di bawah permukaan yang tertutup oleh tanah dan tidak terpetakan.

.....Soil geology and geochemical studies were carried out to determine the potential and prospects for ore mineralization in "X" area, North Sulawesi as one of the areas with the potential for economic metal mineralization. The research was conducted by integrating geological and soil sampling data by PSDMBP which still needed to be processed geostatistically. Geological studies was conducted through integration of secondary data from PSDMBP with geomorphological, lineaments and petrographic analyzes to determine geomorphological conditions, lithology, structure, alteration zones, and alignment of quartz veins. Geostatistic analysis was carried out using univariate and multivariate analysis to determine the distribution of elemental anomalies and associations between elements. The results showed that the study area has geomorphological units of high volcanic hill units with steep slopes and volcanic hill units with rather steep slopes. The lithology consists of dacite, andesite, tuff, and sandstone with geological structure from

lineament analysis shows a northwest-southeast orientation. The alteration zones in the study area include argillic alteration zones (kaolinite + quartz + illite + illite-smectite facies) and propylitic alteration zones (chlorite + illite-smectite + calcite + epidote facies). There are three southwest-northeast oriented quartz veins identified in the study area, namely the X Quartz Vein (southeast), Y Quartz Vein (western part), and Z Quartz Vein (northwestern part). The results of the statistical analysis of the four elements that can be studied (Cu, Au, Sb, Hg) show that each threshold value is 72.44 ppm, 16 ppb, 3.39 ppm and 551.72 ppb. The results of the multivariate analysis showed that there were one elemental associations in the study area, namely Au-Sb-Hg. The distribution of anomalous metal ore elements is then known to generally have enrichment around quartz veins and undergo a dispersion process in Cu, Sb, and Hg elements. The potential for ore mineralization in the study area originates from a low sulfidation epithermal deposit system with the prospect of mineralization being mostly in the third lane of the quartz vein and the northeastern and southern parts of the study area. The prospects for the northeast and south are indicated by the presence of subsurface quartz veins that are covered by soil and are not mapped.