

**STUDI GEOLOGI, ALTERASI, DAN MINERALISASI
TIMAH PRIMER DI DESA TANJUNG GUNUNG
DAN BATU BELUBANG, KECAMATAN PANGKALAN BARU,
KABUPATEN BANGKA TENGAH, PROVINSI BANGKA-BELITUNG**

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Sari

Studi mengenai timah primer ini berada di salah satu lokasi Izin Usaha Penambangan (IUP) milik PT Timah (Persero) Tbk. yang secara administratif terletak di wilayah Pangkalan Baru, Bangka Tengah. Maksud dari penelitian ini adalah untuk mengetahui kontrol geologi terhadap mineralisasi, tipe dan mineralogi alterasi hidrotermal, tipe dan karakteristik mineralisasi, karakteristik fluida hidrotermal, serta model genetik dari sistem alterasi-mineralisasi di daerah penelitian. Metode penelitian yang digunakan antara lain: pemetaan (geologi dan alterasi hidrotermal) serta analisis laboratorium (petrografi, mineragrafi, XRD, ICP-AES/MS, XRF, serta inklusi fluida).

Hasil penelitian menunjukkan jika pembawa mineralisasi (*source rock*) adalah granitoid yang mengalami kristalisasi-fraksinasi terkuat (granitoid termuda) di lokasi penelitian. Tubuh granitoid ini belum diketahui bentuknya dan hanya tersingkap sebagai fragmen-fragmen batuan di dalam mineral lempung alterasi hidrotermal dari zona alterasi argilik. Satuan syenogranit maupun meta-batupasir halus hanya berperan sebagai *host rock*. Struktur geologi yang utamanya berperan sebagai struktur *syn-mineralisation* adalah sesar geser dekstral berarah Barat Laut-Tenggara. Namun struktur yang lebih tua (milonit) juga berkontribusi sebagai jalan masuk magma ke permukaan maupun sebagai zona-zona deposisi fluida hidrotermal di fase awal. Alterasi hidrotermal dikelompokkan menjadi 3, yaitu: silisifikasi (kuarsa+mika+turmalin+kalsedon+kristobalit), serisitisasi (mika+kuarsa+turmalin+ilit+zunyt), serta argilik (ilit+kaolin+smektit+pirofilit+mika+turmalin+kuarsa). Mineralisasi timah hadir dalam 4 wujud, yaitu: greisen, urat kuarsa-turmalin, urat kuarsa/mika-kuarsa, serta argilik. Mineralisasi utama berupa greisen memiliki kadar Sn mencapai 13.150 ppm dengan dominasi bijih berupa kasiterit. Akan tetapi, mineralisasi tipe ini keberadaan tubuhnya belum diketahui karena berasal dari granitoid termuda yang berperan sebagai *source rock*. Mineralisasi urat kuarsa-turmalin berwujud *tension veins* maupun *flat-dip veins* berarah Barat Laut-Tenggara memiliki kadar Sn mencapai 3.426 ppm dengan bijih yang melimpah berupa arsenopirit, pirit, kasiterit, dan sfalerit. Mineralisasi urat kuarsa/mika-kuarsa berwujud *tension vein* berarah Timur Laut-Barat Daya memiliki kadar Sn mencapai 310 ppm dengan bijih utama berupa kasiterit dan sfalerit. Mineralisasi pada zona alterasi argilik memiliki kadar Sn mencapai 510 ppm dengan bijih dominan berupa kasiterit. Fluida hidrotermal merupakan campuran fluida magmatik dan meteorik. Temperatur mineralisasi berkisar 130-460 °C, sementara salinitas fluida hidrotermal berkisar 1,6-17,3 wt. % NaCl *equivalent*. Greisen dan urat menunjukkan perbedaan kedalaman pembentukan yang signifikan. Greisen terbentuk lebih dahulu di kedalaman 7,8-18,1 km dari *paleosurface*, sedangkan urat terbentuk setelahnya di kedalaman 2,6-15,8 km dari *paleosurface*. Model alterasi-mineralisasi timah di lokasi penelitian mengikuti tipe endapan pada sistem greisenisasi: batuan dinding alumino-silikat, *boron-rich*, serta terbuka.

Kata kunci: timah primer, Bangka Tengah, greisen, urat, argilik.

**STUDY ON GEOLOGY, ALTERATION, AND MINERALISATION OF
PRIMARY TIN AT TANJUNG GUNUNG AND BATU BELUBANG AREA,
PANGKALAN BARU DISTRICT, CENTRAL BANGKA REGION,
BANGKA-BELITUNG PROVINCE**

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Abstract

The study of primary tin is located in one of PT Timah (Persero) Tbk. concession areas in Central Bangka region, Bangka-Belitung province. The aims of this research are to determine: geological control of mineralisation process, type and mineralogy of hydrothermal alteration, type and characteristic of mineralisation, hydrothermal fluid characteristic, as well as genetic model of hydrothermal alteration-mineralisation in research area. Following methods are used in this research: mapping (geological and hydrothermal alteration) also laboratorium analysis (petrography, ore microscopy, XRD, ICP-AES/MS, XRF, and fluid inclusion).

The results of this research indicate that mineralisation is carried out by the most fractionated (youngest) granitoid in research area. This granitoid body is still concealed and has been exposed merely in the form of rock fragments inside hydrothermal clay mineral in argillic alteration zone. On the other hand, both syenogranite and meta-fine sandstone unit only act as host rocks for the mineralisation events. Dextral strike-slip faults with North West-South East orientation have a role as syn-mineralisation geological structures. Mylonites, the oldest geological structures, in North West-South East orientation also play as the opening systems for: the emplacement of granitic magmas and the initial stages of hydrothermal fluid deposition. Hydrothermal alteration is grouped into 3 zones, they are: silicification (quartz+mica+tourmaline+chalcedon+cristobalite), sericitisation (mica+quartz+tourmaline+illite+zunyite), and argillic (illite+kaoline+smectite+pyrophyllite+mica+tourmaline+quartz). Tin mineralisation is present in 4 styles, they are: greisen, quartz-tourmaline veins, quartz/mica-quartz veins, and argillic. The main mineralisation style is greisen which grade up to 13,150 ppm Sn with cassiterite as its dominant ore. However, the body of this mineralisation style is still unknown because it is originated from the youngest concealed granitoid which also act as the source rock. Mineralisation in quartz-tourmaline veins present as tension veins as well as flat-dip veins with North West-South East orientation. This mineralisation is grade up to 3,426 ppm Sn with arsenopyrite, pyrite, cassiterite, and sphalerite present as its abundant ores. Mineralisation in quartz/mica-quartz veins presents as tension veins with North East-South West orientation. This mineralisation is grade up to 310 ppm Sn with cassiterite and sphalerite present as its main ores. Mineralisation in argillic alteration zone grade up to 510 ppm Sn with dominant ore is cassiterite. Hydrothermal fluid is characterised by mixing of magmatic by meteoric fluids. Mineralisation temperature of the deposit is range from 130-460 °C and salinity of the hydrothermal fluid is range from 1.6-17.3 wt. % NaCl equivalent. Greisen and veins show a significant formation depth difference. Greisen is formed earlier (7.8-18.1 km from paleosurface), while vein system is formed later (2.6-15.8 km from paleosurface). Primary tin alteration-mineralisation in research area follows the greisenisation type deposit in alumino-silicate wall rock, boron-rich, and associated with the open system.

Keywords: primary tin, Central Bangka, greisen, veins, argillic.