



DASAR-DASAR EKSPLORASI SUMBER DAYA MINERAL

Geoinformatika-3

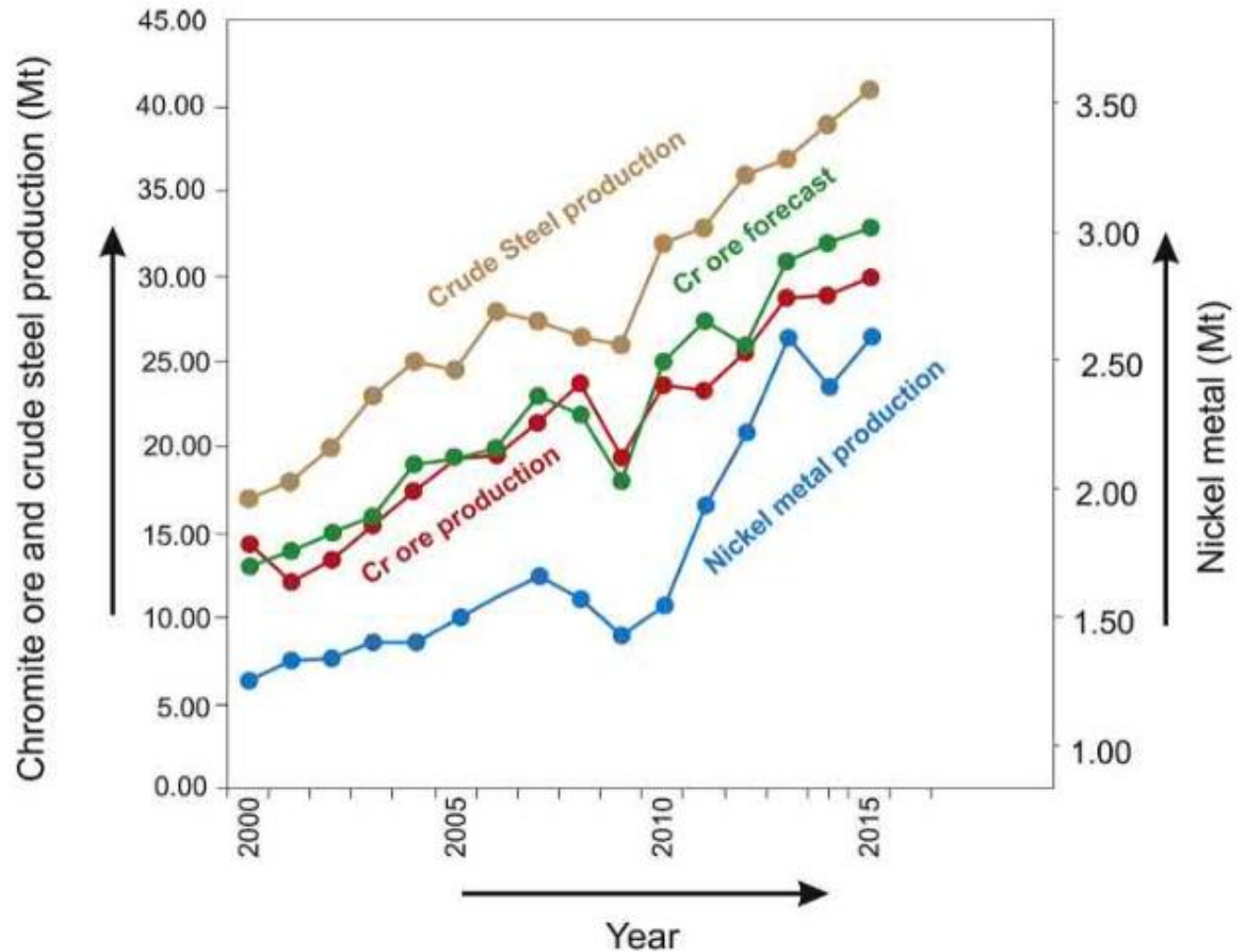
MINERAL DAN METAL

- Mineral dan metal → sangat penting untuk kemajuan peradaban,
- *Big milestone* → *copper age* dan *bronze age*
- Alat dan perkakas untuk berburu dan meramu → mempertahankan diri → berperang → *territorial conquest*

MINERAL DAN METAL

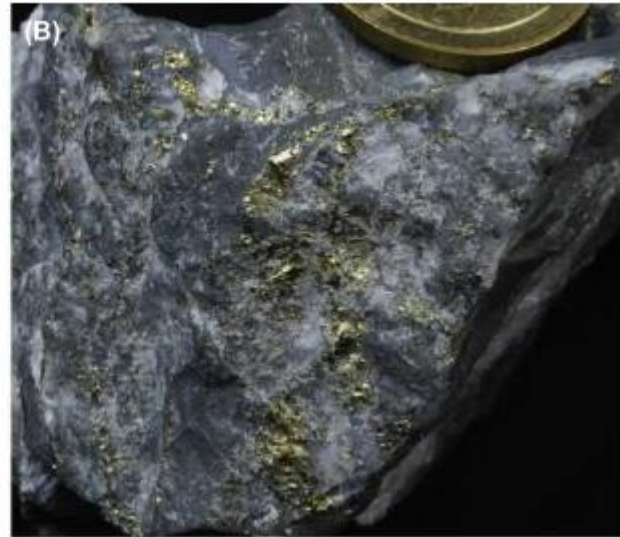
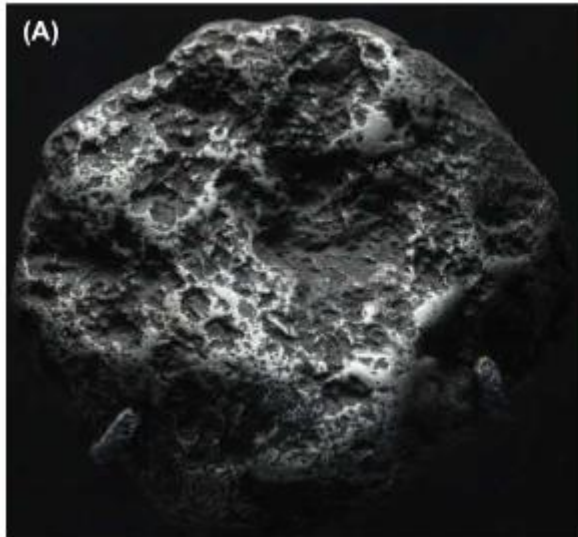
- Jumlahnya sangat sedikit dibandingkan volume permukaan bumi,
- *Near-surface deposits* sudah semakin menipis → beralih ke *concealed deposits*,
- Eksplorasi → kegiatan untuk menemukan *concealed deposits*.

MINERAL DAN METAL



Haldar, S. (2018)

MINERAL DAN METAL



MINERAL DAN METAL

TABLE 1.1 Classification of Mineral Deposits by Usage

| Type | Minerals |
|----------------|--|
| Metallic | Native Pt, Au, Ag, Cu, chalcopryrite, sphalerite, galena, hematite, magnetite, pyrite, pyrrhotite, bauxite |
| Noble | Gold, silver, platinum, palladium |
| Industrial | Quartz, garnet, phosphate, asbestos, barite |
| Gemstones | Amethyst, aquamarine, diamond, emerald, garnet, opal, ruby, sapphire, topaz, zircon |
| Rock | Granite, marble, limestone, salt |
| Bulk/aggregate | Sand, gravel, mud, clay |
| Mineral fuel | Coal, crude oil, gas |
| Strategic | Uraninite, pitchblende, thorianite, wolframite |
| Life essential | Natural water |
| Rare earth | Lanthanum (La), cerium (Ce), neodymium (Nd), promethium (Pm) |
| Ocean | Polymetallic nodules, coral, common salt, potassium |

MINERAL DAN METAL

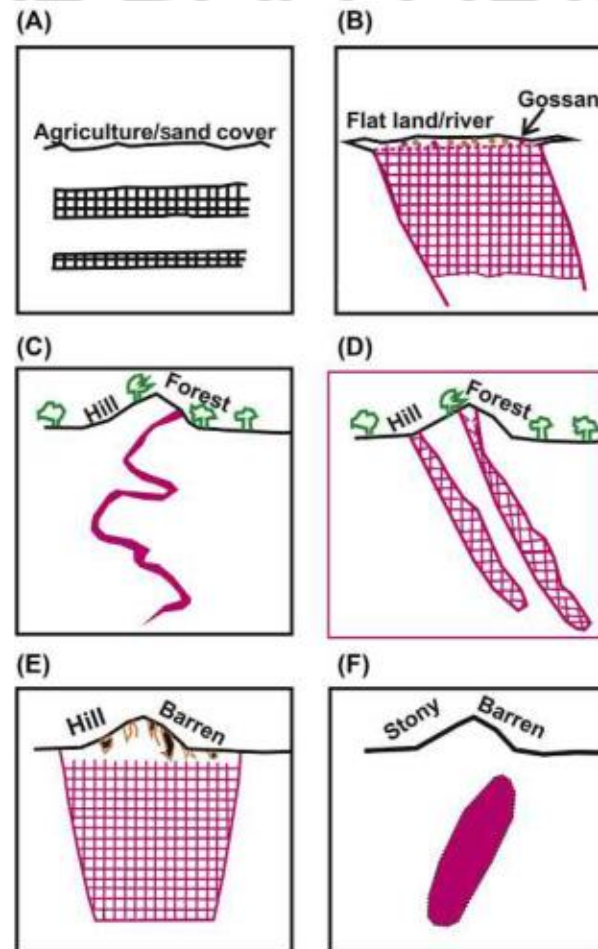


FIGURE 1.3 Mineral deposits with schematic shape and style: (A) subhorizontal lignite body under agriculture/sand cover at Barsingsar, (B) massive Zn-Pb-Ag orebody exposed to the surface at Rampura-Agucha, (C) intricately folded Pb-Cu deposit at Agnigundala, (D) en echelon Zn-Pb lenses under hilly terrain at Zawar, (E) unique gossans signature of sulfide deposit at Rajpura-Dariba, (F) concealed sulfide deposit under stony barren quartzite at Sindesar-Khurd, India.

EKSPLORASI

- Eksplorasi secara umum merupakan kegiatan untuk mencari keberadaan sumber daya alam mineral yang ditinjau dari segi :
 - genesa,
 - bentuk geometri,
 - parameter-parameter eksplorasi / eksploitasi,
 - maupun berbagai parameter fisik lainnya yang berkaitan dengan penanggulangan masalah lingkungan.

EKSPLORASI

- Tingkat ekonomis SDA berdasar :
 - Tataanan geologi,
 - Jumlah cadangan,
 - Faktor kesulitan eksplorasi, eksploitasi, ekstraksi,
 - Keadaan sosial politik.

EKSPLORASI - *Discovery*

- Ditemukan, langsung bisa ditambang (menguntungkan) dan digunakan → *reserves* (atau *ore reserves*).
- Ditemukan, diketahui berpotensi, tapi tidak bisa langsung ditambang atau dianggap tidak menguntungkan → *resources*.

EKSPLORASI - *Discovery*

- *Greenfield discovery* → area baru,
- *Brownfield discovery* → di sekitar area penambangan lama.

TAHAP-TAHAP EKSPLORASI

- *Reconnaissance (recon, G4)*
 - *Large area prospecting (G4/G3)*
 - *Prospecting (G3)*
 - *General exploration (G2)*
 - *Detailed exploration (G1)*
-
- *United Nations Framework Classification for Resources (UNFC)*

Reconnaissance (G4)

- Identifikasi lokasi potensial dalam skala regional,
- Survei literatur, pengambilan data-data geofisik,
- *Remote sensing, airborne and ground geophysical survey,*
- Ada kemungkinan dilakukan *survey/scouting drilling.*

TABLE 1.2 Work Program During Reconnaissance License (G4) by Years

| Year | Proposed Work Program |
|--------|---|
| Year 1 | <ol style="list-style-type: none">1. Regional geological check, mapping, and rock chip sampling2. Acquisition and interpretation of available airborne geophysical data from previous surveys3. Identification of prospective geological packages/structures4. Regional geochemical surveys: soil/stream sediment sampling as required5. Regional airborne geophysics and ground magnetic and electromagnetic traverses as required |
| Year 2 | <ol style="list-style-type: none">1. Integration and interpretation of geological, geophysical, and geochemical data to identify anomalies/targets (could be geological, geochemical, and geophysical)2. First pass follow-up of anomalies/targets by detailed mapping, infill soil/rock chip sampling, and ground geophysics3. Prioritization of anomalies/targets for drill testing4. Scout drilling of interesting targets |
| Year 3 | <ol style="list-style-type: none">1. Second pass follow-up and target definition2. Reverse circulation/diamond core drilling3. Down-hole geophysics and drilling, if required4. Reports/recommendations5. Prospecting license application if encouraging results obtained |

Large Area Prospecting (G4/G3)

- Kelanjutan *recon* dan persiapan sebelum *prospecting*,
- *Detailed geological mapping, rock chip and soil samplings, close-spaced ground geophysics, diamond core drilling, and resource estimation of inferred.*
- Data cuaca, informasi infrastruktur, informasi logistik (termasuk fasilitas kesehatan), AMDAL.

Prospecting (G3)

- Proses sistematis untuk mencari daerah tambang dari daerah potensial yang didapat saat proses sebelumnya,
- *Mapping on a 1:50.000-1:25.000 scale, linking maps with a UTM, lithology, structure & surface signature, analysis of history of mining, if it exists, ground geophysics, geochemical orientation survey, sampling of rock/soil/debris of background and anomaly area, pitting and trenching, diamond drilling at a 100-1000 m section at one level depending on mineral type, core sampling, petrographic and mineragraphic studies, borehole geophysical logging, and baseline environment.*
- Menghasilkan nilai *inferred resources* dan *probable reserves*.

General exploration (G2)

- Pembentukan batasan yang jelas antara area yang akan ditambang dengan yang tidak/belum akan ditambang.
- *Methods include mapping on a 1:25.000-1:5000, or larger scale for narrowing down the drill interval along the strike(100-400 m) and depth (50-100 m), detailed sampling and analysis of primary and secondary commodities, value-added trace and deleterious penalty elements, ~10% check sampling, borehole geophysical survey, bulk sampling for laboratory,*

Detailed exploration (GI)

- Sebelum kegiatan penambangan dilakukan,
- *Three-dimensional delineation to outline firm contacts of the orebody, rock quality designation (RQD) for mine stability, and planning and preparation of samples for pilot plant metallurgical test work. The works envisaged are mapping at 1:5000-1:1000 scales, close space diamond drilling (100 x 50, 50 x 50 m), borehole geophysics, a trial pit in case of surface mining, and subsurface entry with mine development at one or more levels in case of underground mining.*

Jenis Eksplorasi Lain

- *Ongoing Exploration* → eksplorasi yang dijalankan saat proses eksploitasi berlangsung.
- Di area sekitar penambangan tetap dilakukan *diamond drilling*, *soil sampling*, dan *pitting-trenching*.