

DESCRIPTIVE MODEL OF VOLCANIC-HOSTED MAGNETITE

By Dennis P. Cox

APPROXIMATE SYNONYM Porphyrite iron, Kiruna iron.

DESCRIPTION Massive concordant and discordant magnetite ore bodies in intermediate to alkalic volcanic rocks with actinolite or diopside alteration.

GEOLOGICAL ENVIRONMENT

Rock Types Andesitic to trachytic flows and subvolcanic intrusions, also at Kiruna, quartz porphyry, syenite porphyry, monzonite, and diorite.

Textures Porphyroaphanitic to fine- to medium-grained equigranular. Flows may be amygdaloidal.

Age Range Mesozoic to Holocene in circum-Pacific area. In Sweden and Missouri, 1,300-1,500 my.

Depositional Environment Continental volcanic rocks and elastic sediments intruded by subvolcanic intermediate plutons.

Tectonic Setting(s) Continental margin, subduction-related volcanic terrane. Especially with high-K volcanic rocks, possibly related to waning stages of volcanism.

Associated Deposit Types Sedimentary Fe in associated elastic rocks, apatite-magnetite deposits, hematite in quartz-sericite alteration, possible disseminated Au.

DEPOSIT DESCRIPTION

Mineralogy Magnetite + apatite. Rarely pyrite, chalcopyrite, chalcocite, and covellite. Ti is in sphene.

Texture/Structure Fine, granoblastic, skarn type textures.

Alteration Actinolite or diopside, andradite, biotite, quartz, albite, andesine, K-feldspar, sodic scapolite, epidote; carbonates, and locally, tourmaline, sphene, chlorite, barite, fluorite, kaolin, or sericite.

Ore Controls Magnetite in massive replacement, breccia filling and stockwork veins. Orebodies may be stratabound, concordant to intrusive contacts or in cross-cutting veins. Possibly related to cupolas of deeper plutons.

Geochemical and Geophysical Signature Fe, P, V, and minor Ba, F, Bi, Cu, Co; strong magnetic anomalies.

EXAMPLES

| | |
|--------------------------------------|--|
| Kirunavaara, Sweden | (Frietsch 1982, 1978) |
| El Romeral, Chile | (Bookstrom, 1977) |
| Middle-Lower Yangtze Valley, CINA | (Research Group of Porphyrite Iron Ore, 1977) |

GRADE AND TONNAGE MODEL OF VOLCANIC-HOSTED MAGNETITE

By Dan L. Mosier

COMMENTS Only deposits with abundant apatite are included. See figs. 131-133.

DEPOSITS

| <u>Name</u> | <u>Country</u> | <u>Name</u> | <u>Country</u> |
|-------------|----------------|------------------|----------------|
| Arnold Hill | USNY | Cerro de Mercado | MXCO |
| Benson | USNY | Chador-Malu | IRAN |

| | | | |
|-------------------|------|----------------------|------|
| Chahegaz | IRAN | Los Vasitos | MXCO |
| Choghart | IRAN | Luossauaara | SWDN |
| Ekstromberg | SWDN | Malmberget | SWDN |
| El Algarrobo | CILE | Minarets | USCA |
| El Dorado | CILE | Mineville-Port Henry | USNY |
| El Encino | MXCO | Modarelli | USNV |
| EL Romeral | CILE | Nakerivaara | SWDN |
| Grangesberg | SWDN | Northern Anomaly | IRAN |
| Gruvberget | SWDN | Painirova | SWDN |
| Guadalupe & Solis | MXCO | Pea Ridge | USMO |
| Hercules | MXCO | Ringwood | USNJ |
| Idkerberget | SWDN | Saghand | IRAN |
| Infiernillo | CILE | Savage River | AUTS |
| Joinville | BRZL | Se Chakhum | IRAN |
| Kiirunavaara | SWDN | Sterling Lake | USNY |
| La Grulla | MXCO | Tjarrojakka | SWDN |
| La Perla-La Negra | MXCO | Unnamed | MXCO |
| Leveaniemi | SWDN | | |

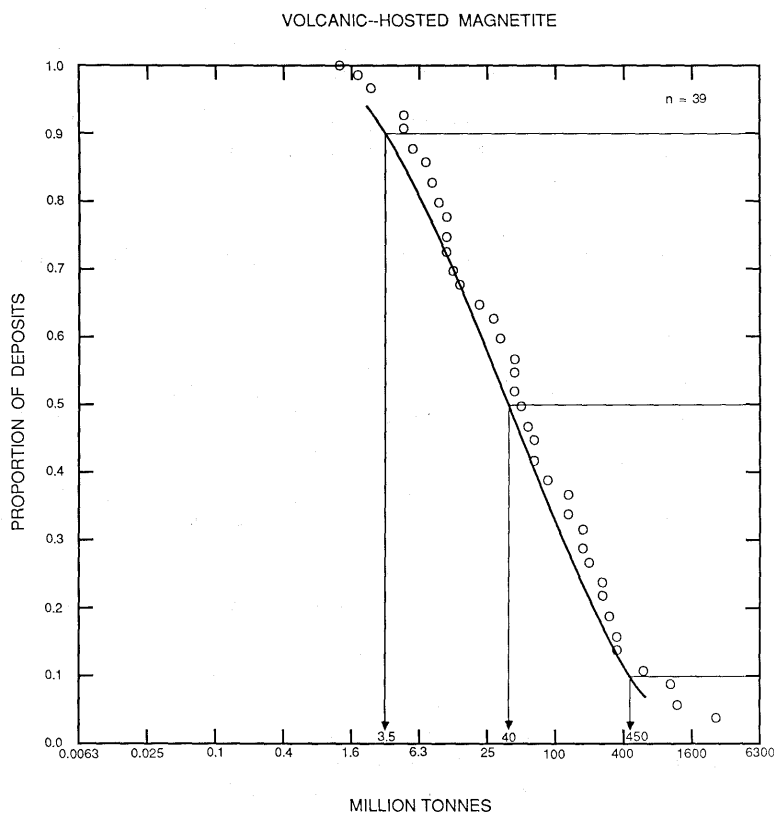


Figure 131. Tonnages of volcanic-hosted magnetite deposits.

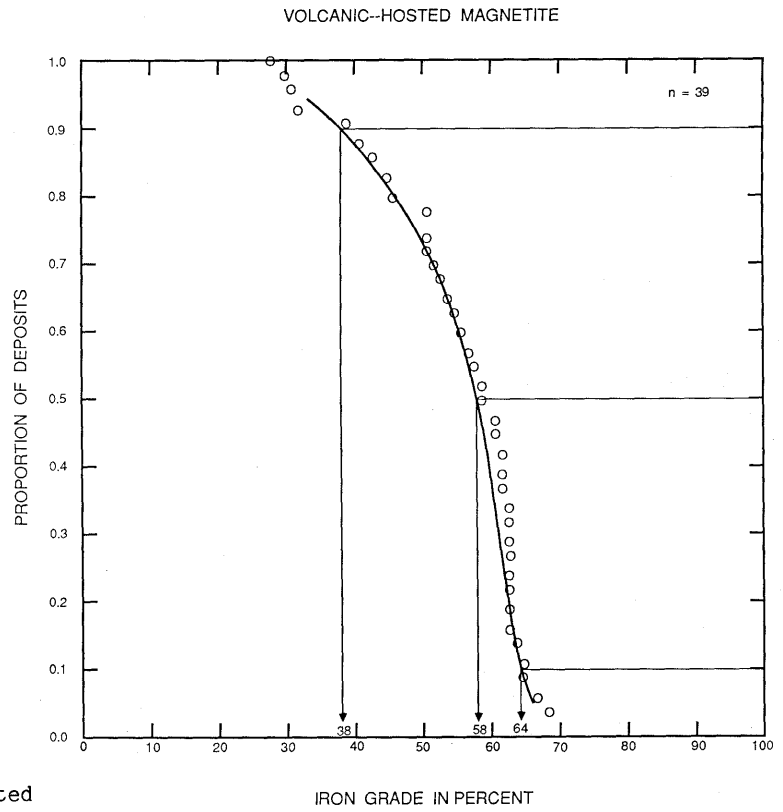


Figure 132. Iron grades of volcanic-hosted magnetite deposits.

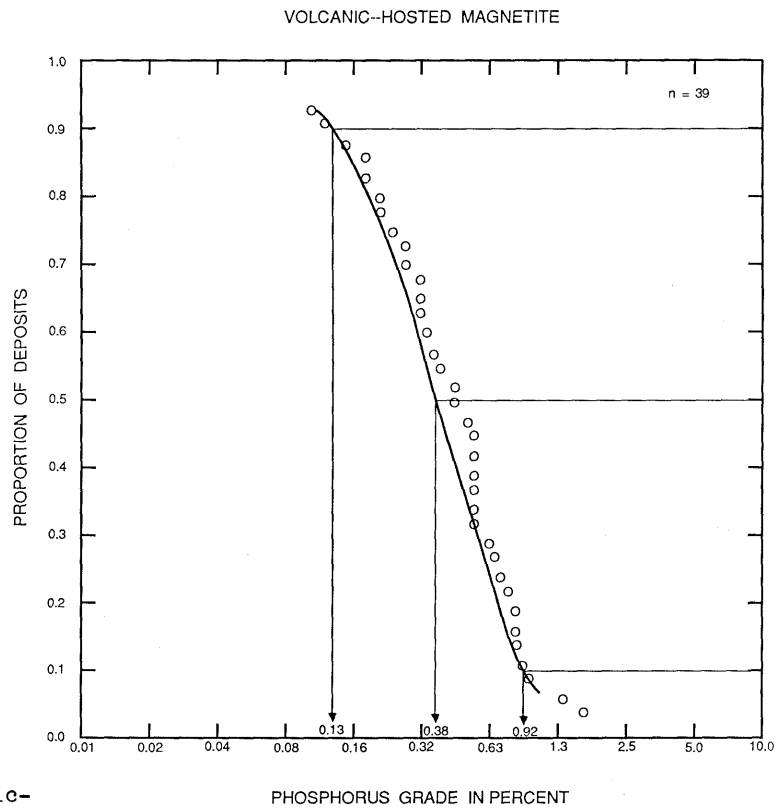


Figure 133. Phosphorus grades of volcanic-hosted magnetite deposits.