DESCRIPTIVE MODEL OF VOLCANOGENIC Mn

By Randolph A. Koski

APPROXIMATE SYNONYM Volcanogenic-sedimentary (Roy, 1981)

DESCRIPTION Lenses and stratiform bodies of manganese oxide, carbonate, and silicate in volcanic-sedimentary sequences. Genesis related to volcanic (volcanogenic) processes.

GENERAL REFERENCE Roy (1981).

GEOLOGICAL ENVIRONMENT

Rock Types Chert, shale, graywacke, tuff, basalt; chert, jasper, basalt (ophiolite); basalt, andesite, rhyolite (island-arc); basalt, limestone; conglomerate, sandstone, tuff, gypsum.

Age Range Cambrian to Pliocene.

Depositional Environment Sea-floor hot spring, generally deep water; some shallow water marine; some may be enclosed basin.

Tectonic Setting(s) Oceanic ridge, marginal basin, island arc, young rifted basin; all can be considered eugeosynclinal.

Associated Deposit Types Kuroko massive sulfide deposits.

DEPOSIT DESCRIPTION

Mineralogy Rhodochrosite, Mn-calcite, braunite, hausmannite, bementite, neotocite, alleghenyite, spessartine, rhodonite, Mn-opal, manganite, pyrolusite, coronadite, cryptomelane, hollandite, todorokite, amorphous MnO_2.

Texture/Structure Fine-grained massive crystalline aggregates, botryoidal, colloform in bedded and lensoid masses.

Alteration Spilitic or greenschist-facies alteration of associated mafic lavas, silicification, hematitization.

Ore Controls Sufficient structure and porosity to permit subsea-floor hydrothermal circulation and sea-floor venting; redox boundary at seafloor-seawater interface around hot spring; supergene enrichment to upgrade Mn content.

Weathering Strong development of secondary Mn oxides (todorokite, birnessite, pyrolusite, amorphous MnO_2, at the surface and along fractures.

Geochemical Signature Although Mn is only moderately mobile and relatively abundant in most rocks, Mn minerals may incorporate many other trace elements such as Zn, Pb, Cu, and Ba.

Examples

Olympic Peninsula, USWA	(Park, 1942, 1946; Sorem and Gunn, 1967)
Franciscan type, USCA, USOR	(Taliaferro and Hudson, 1943; Crerar and others, 1982; Snyder 1978; Kuypers and Denyer, 1979)

GRADE AND TONNAGE MODEL OF VOLCANOGENIC Mn

By Dan L. Mosier

COMMENTS Tonnage is correlated with manganese grade ($r = -0.32$) and with phosphorus grade ($r = -0.94$, $n = 8$). See figs. 103-104.

DEPOSITS

Name	Country
Abuhemsin (Abiulya)	TRKY
Abundancia	TRKY
Akcakilise Topkirazlar	TRKY
Akoluuk	TRKY
Akseki Gokceovacik	TRKY
Antonio	CUBA
Augusto Luis and others	CUBA
Avispa	CUBA
Black Diablo	USNV
Blue Jay	USCA
Boston Group	CUBA
Briseida Group and others	CUBA
Buckeye	USCA
Bueycito	CUBA
Buritirama	BRZL
Cadiz	CUBA
Castillode Palanco	SPAN
Cavdarli-Komurluk	TRKY
Cayirli Koy	TRKY
Charco Redondo-Casualidad	CUBA
Crescent	USWA
Cubenas	CUBA
Cubuklu KOYU	TRKY
Cummings	USCA
Curiol-Playa Real-Pavones	CORI
Danisment	TRKY
Dassoumble	IVCO
Djebel Guettara	ALGR
Durnovskoe	URRS
El Cuervo	SPAN
Esperancita	CUBA
Estrella-Sopresa	CUBA
Fabian	USCA
Faucogney	FRNC
Foster Mountain	USCA
Glib en Nam	MRCO
Gloria-Elvira-Polaris	CUBA
Gocek Koyu	TRKY
Gran Piedra	CUBA
Guanaba Group	CUBA
Gunbasi (Akcakese)	TRKY
Hyatt No. 1	PANA
Idikel	MRCO
J07	NCAL
Jutinicu	CUBA
Komurluk Koyunun	TRKY
Korucular	TRKY
La Calanesa	SPAN
Ladd	USCA
Lagnokaha	UVOL
Lasbela	PKTN
La Unica	CUBA
Laverton-Mt. Lucky	AUWA
Liberty	USCA
Lucia (Generosa)	CUBA
Lucifer	MXCO
Magdalena	CUBA
Manacas Group	CUBA
Manuel	CUBA
Montenegro-Adriana	CUBA
Mrima	KNYA
Pirki	TRKY
Piskala	TRKY
Ponupo	CUBA
Ponupo de Manacal	CUBA
Pozo Prieto	CUBA
Progreso	CUBA
Quarzazate	MRCO
Quinto	CUBA
Raymond	NCAL
Rhiw	GRBR
Sabanilla	CUBA
Santa Rosa	CUBA
Sapalskoe	URRS
Sereno	BRZL
Sigua	CUBA
Soloviejo	SPAN
South Thomas	USCA
Taratana	CUBA
Taritipan	INDS
Thatcher Creek	USCA
Thomas	USCA
Tiere	UVOL
Tiouine	MRCO
Tokoro	JAPN
Topkirozlar	TRKY
Toscana (Cerchiara)	ITLY
Tutunculer	TRKY
Vane de Maganeso	CUBA
Welch	USCA
Woody Woody	AUWA
Yeya	CUBA

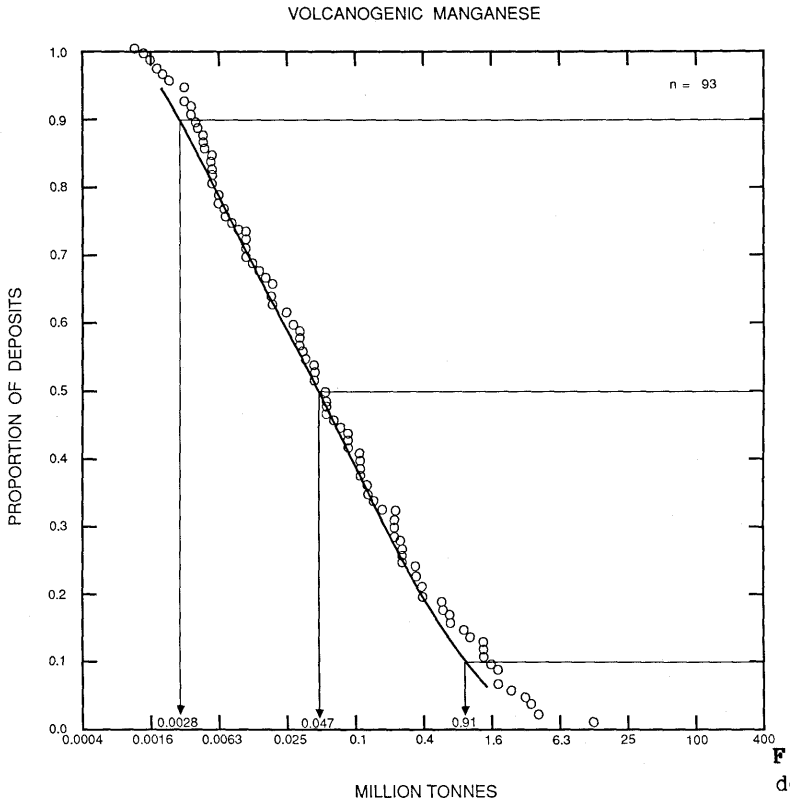

Figure 103. Tonnages of volcanogenic Mn deposits.

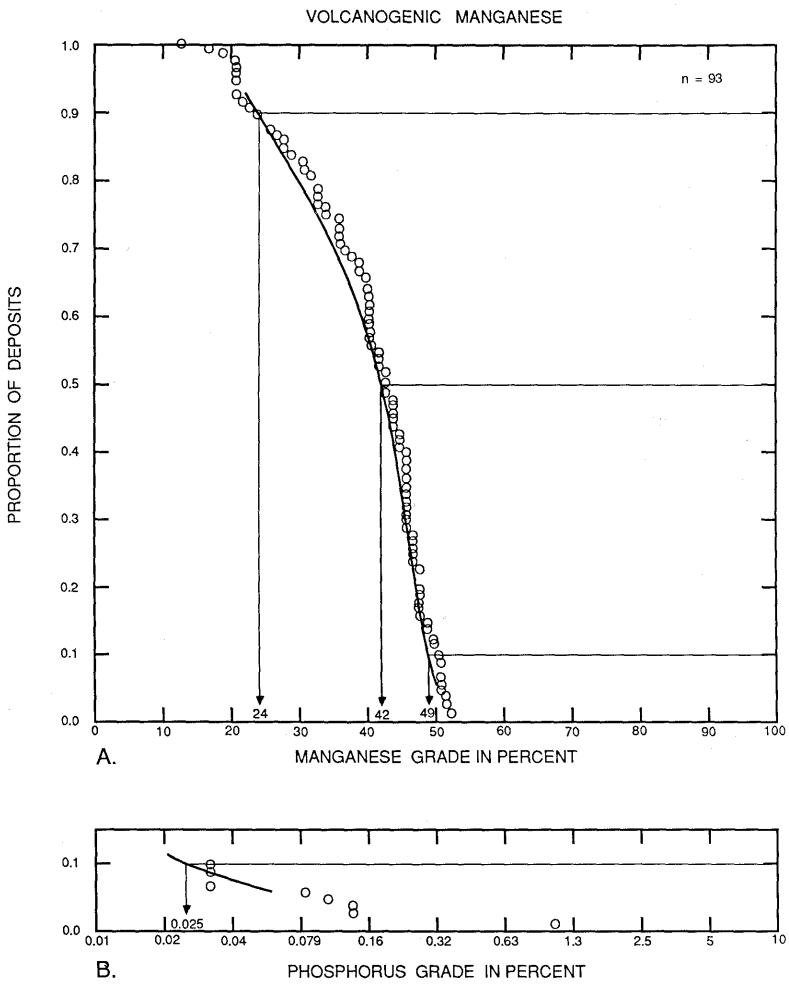

Figure 104. Metal grades of volcanogenic Mn deposits. A, Manganese. B, Phosphorus.