

DESCRIPTIVE MODEL OF BESSHI MASSIVE SULFIDE

By Dennis P. Cox

APPROXIMATE SYNONYM Besshi type, Kieslager.

DESCRIPTION Thin, sheetlike bodies of massive to well-laminated pyrite, pyrrhotite, and chalcopyrite within thinly laminated elastic sediments and mafic tuffs.

GENERAL REFERENCES Klau and Large (1980), Fox (1984).

GEOLOGICAL ENVIRONMENT

Rock Types Clastic terrigenous sedimentary rocks and tholeiitic to andesitic tuff and breccia. Locally, black shale, oxide-facies iron formation, and red chert.

Textures Thinly laminated elastic rocks. All known examples are in strongly deformed metamorphic terrane. Rocks are quartzose and mafic schist.

Age Range Mainly Paleozoic and Mesozoic.

Depositional Environment Uncertain. Possibly deposition by submarine hot springs related to basaltic volcanism. Ores may be localized within permeable sediments and fractured volcanic rocks in anoxic marine basins.

Tectonic Setting(s) Uncertain. Possibly rifted basin in island arc or back arc. Possibly spreading ridge underlying terrigenous sediment at continental slope.

Associated Deposit Types None known.

DEPOSIT DESCRIPTION

Mineralogy Pyrite + pyrrhotite + chalcopyrite + sphalerite ± magnetite ± valleriite ± galena ± bornite ± tetrahedrite ± cobaltite ± cubanite ± stannite ± molybdenite. Quartz, carbonate, albite, white mica, chlorite, amphibole, and tourmaline,

Texture/Structure Fine-grained, massive to thinly laminated ore with colloform and framboidal pyrite. Breccia or stringer ore. Cross-cutting veins contain chalcopyrite, pyrite, calcite or galena, sphalerite, calcite.

Alteration Difficult to recognize because of metamorphism. Chloritization of adjacent rocks is noted in some deposits.

Ore Controls Uncertain. Deposits are thin, but laterally extensive and tend to cluster in an echelon pattern.

Weathering Gossan.

Geochemical Signature Cu, Zn, Co, Ag, Ni, Cr, Co/Ni >1.0, Au up to 4 ppm, Ag up to 60 ppm.

EXAMPLES

Besshi, JAPAN	(Kanehira and Tatsumi, 1970)
Motoyasu, JAPAN	(Yui, 1983)
Kieslager, ASTR	(Derkman and Klemm, 1977)
Raul, PERU	(Ripley and Ohmoto, 1977)

GRADE AND TONNAGE MODEL OF BESSHI MASSIVE SULFIDE

By Donald A. Singer

DATA REFERENCE Yamada and others (1980).

COMMENTS Only deposits from Japan containing more than 10,000 tonnes are included. See figs. 100-102.

DEPOSITS

<u>Name</u>	<u>Country</u>	<u>Name</u>	<u>Country</u>
Akinokawa (Onishi)	JAPN	Motoyasu	JAPN
Asakawa	JAPN	Nakayama	JAPN
Besshi	JAPN	Nanogawa	JAPN
Choja	JAPN	Naruyasu	JAPN
Chushiro	JAPN	Nii	JAPN
Ehime	JAPN	Nishinokawa	JAPN
Higashiyame	JAPN	Noji	JAPN
Hirabaya	JAPN	Nonowaki	JAPN
Hirota	JAPN	Okuki	JAPN
Hitachi	JAPN	Omine	JAPN
Imade & Ouchi	JAPN	Ryuo	JAPN
Imori	JAPN	Sazare	JAPN
Iyo	JAPN	Shiiba, Takaragi	JAPN
Izushi	JAPN	Shimokawa	JAPN
Kamegamori	JAPN	Shimokawa (Kouchi)	JAPN
Kanayama	JAPN	Shinga	JAPN
Kotsu	JAPN	Shirataki	JAPN
Kune	JAPN	Takaura	JAPN
Machimi	JAPN	Terano	JAPN
Makimine, Hibira	JAPN	Yanahara	JAPN
Minawa	JAPN	Yoshimoto	JAPN
Miyawa	JAPN	Yuryo	JAPN

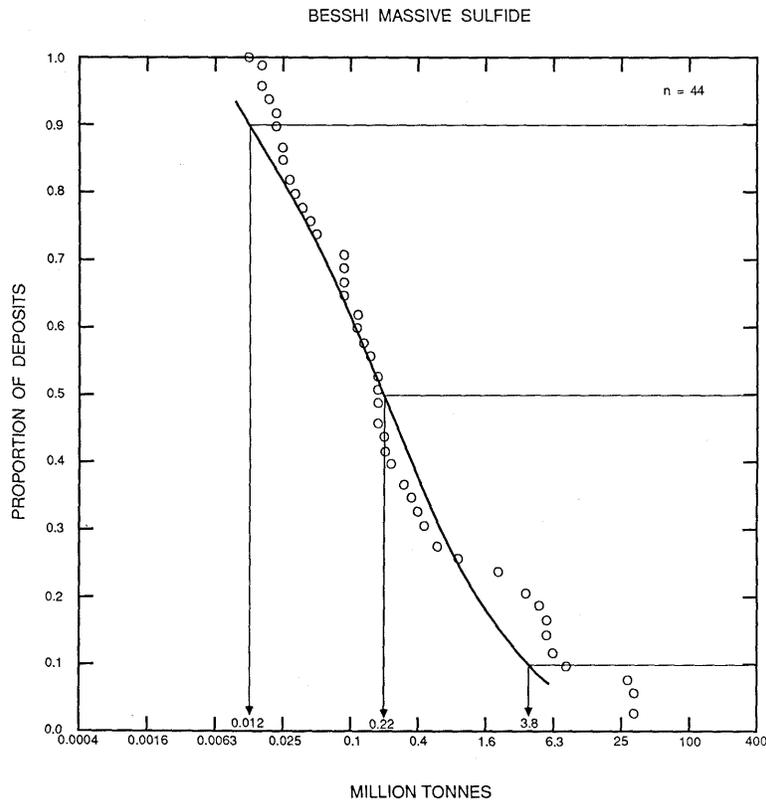


Figure 100. Tonnages of Besshi massive sulfide deposits.

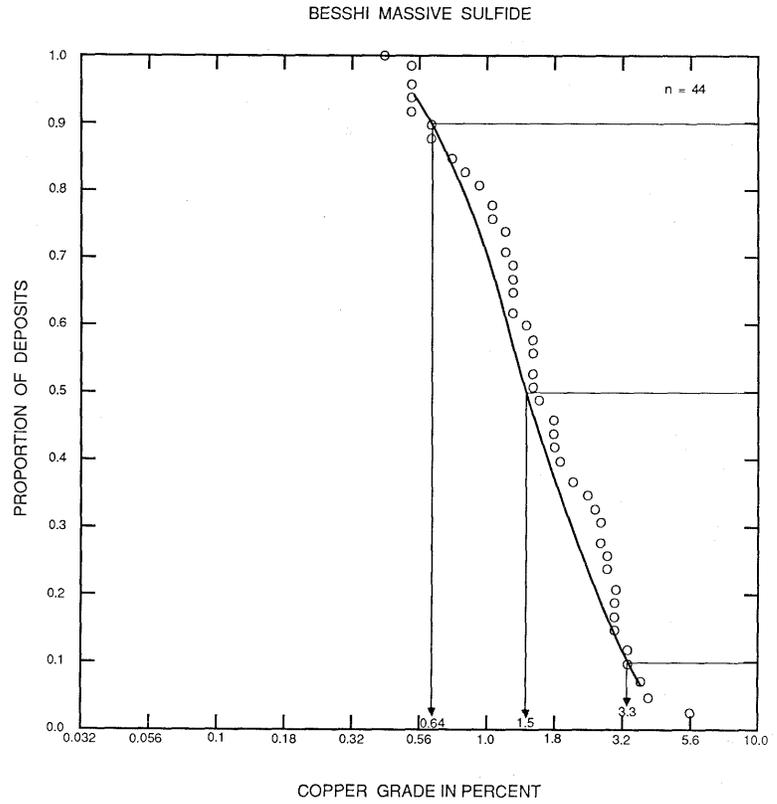


Figure 101. Copper grades of Besshi massive sulfide deposits.

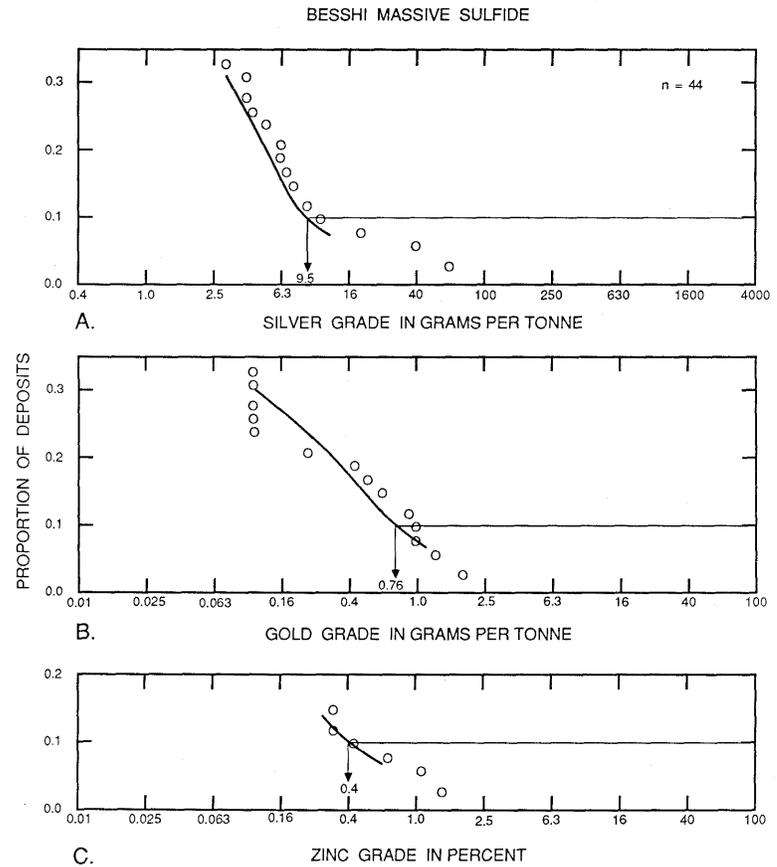


Figure 102. By-product grades of Besshi massive sulfide deposits. A, Silver. B, Gold. C, Zinc.