DESCRIPTIVE MODEL OF CREEDE EPITHERMAL VEINS

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APPROXIMATE SYNONYM Epithermal gold (quartz-adularia) alkali-chloride-type, polymetallic veins (see fig. 106).

DESCRIPTION Galena, sphalerite, chalcopyrite, sulfosalts, + tellurides + gold in quartz-carbonate veins hosted by felsic to intermediate volcanics. Older miogeosynclinal evaporites or rocks with trapped seawater are associated with these deposits.

GENERAL REFERENCES Buchanan (1980), Boyle (1979).

GEOLOGICAL ENVIRONMENT

Rock Types Host rocks are andesite, dacite, quartz latite, rhyodacite, rhyolite, and associated sedimentary rocks. Mineralization related to talc-alkaline or bimodal volcanism.

Textures Porphyritic.

Age Range Mainly Tertiary (most are 29-4 m.y.).

Depositional Environment Bimodal and talc-alkaline volcanism. Deposits related to sources of saline fluids in prevolcanic basement such as evaporates or rocks with entrapped seawater.

Tectonic Setting(s) Through-going fractures systems; major normal faults, fractures related to doming, ring fracture zones, joints associated with calderas. Underlying or nearby older rocks of continental shelf with evaporite basins, or island arcs that are rapidly uplifted.

Associated Deposit Types Placer gold, epithermal quartz alunite Au, polymetallic replacement.

DEPOSIT DESCRIPTION

Mineralogy Galena + sphalerite + chalcopyrite + copper sulfosalts + silver sulfosalts ± gold ± tellurides ± bornite ± arsenopyrite. Gangue minerals are quartz + chlorite ± calcite + pyrite + rhodochrosite + barite ± fluorite ± siderite ± ankerite ± sericite ± adularia ± kaolinite. Specularite and alunite may be present.

Texture/Structure Banded veins, open space filling, lamellar quartz, stockworks, colloform textures.

Alteration Top to bottom: quartz ± kaolinite + montmorillonite ± zeolites ± barite ± calcite; quartz + illite; quartz + adularia ± illite; quartz + chlorite; presence of adularia is variable.

Ore Controls Through-going or anastomosing fracture systems. High-grade shoots where vein changes strike or dip and at intersections of veins. Hanging-wall fractures are particularly favorable.

Weathering Bleached country rock, goethite, jarosite, alunite--supergene processes often important factor in increasing grade of deposit.

Geochemical Signature Higher in system Au + As + Sb + Hg; Au + Ag + Pb + Zn + Cu; Ag + Pb + Zn, Cu + Pb + Zn. Base metals generally higher grade in deposits with silver. W + Bi may be present.

EXAMPLES

Creede, USCO	(Steven and Eaton, 1975; Barton and others, 1977)
Pachuca, MXCO	(Geyne and others, 1963)
Toyoha, JAPN	(Yajima and Ohta, 1979)

GRADE AND TONNAGE MODEL OF CREEDE EPITHERMAL VEINS

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COMMENTS Gold grade is correlated with zinc grade (r = -0.52, n = 22).See figs. 107-112.

DEPOSITS

Name	Country	Name	Country
Animas	USCO	Nogal	USNM
Bonanza	USCO	Oe	JAPN
Casapalca	PERU	Ogane	JAPN
Chavin	PERU	Ophir	USCO
Coco Mina	NCGA	Pachuca-Real del Monte	MXCO
Colqui	PERU	Red Mountain	USCO
Creede	USCO	Rio Pallanga	PERU
El Tigre	MXCO	Sai	JAPN
Eureka	USCO	Sneffels	USCO
Hosokura	JAPN	Telluride	USCO
Kata	PERU	Toyoha	JAPN
Lake City	USCO	Uruachic	MXC0
Los Mantiales	AGTN	Yatani	JAPN
Madrigal	PERU		

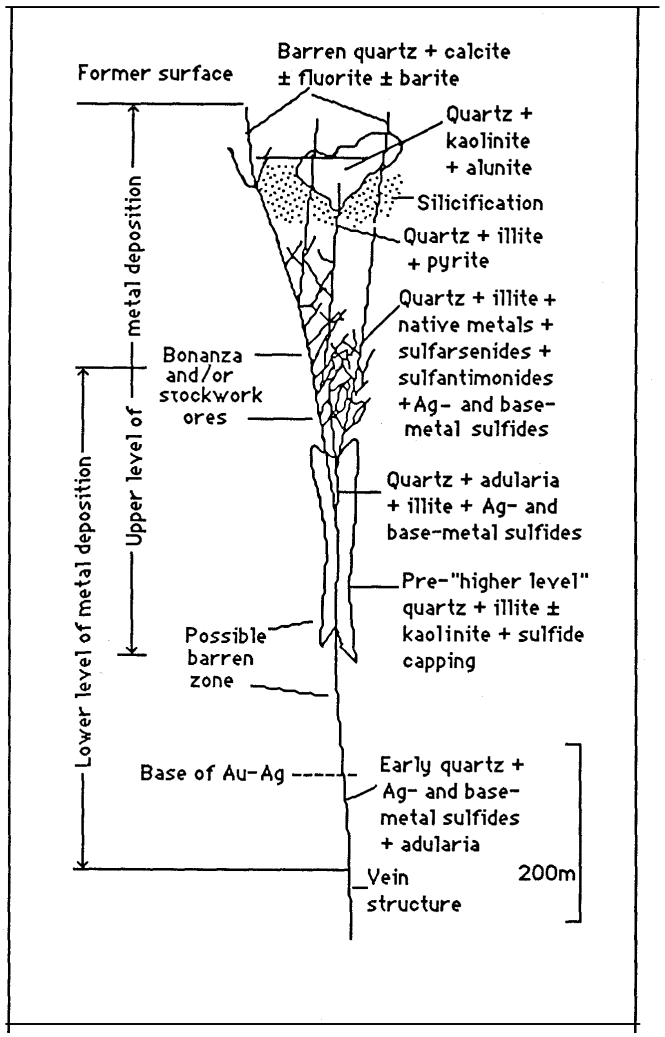

Figure 106. Cartoon cross section of typical Creede type epithermal vein deposit.

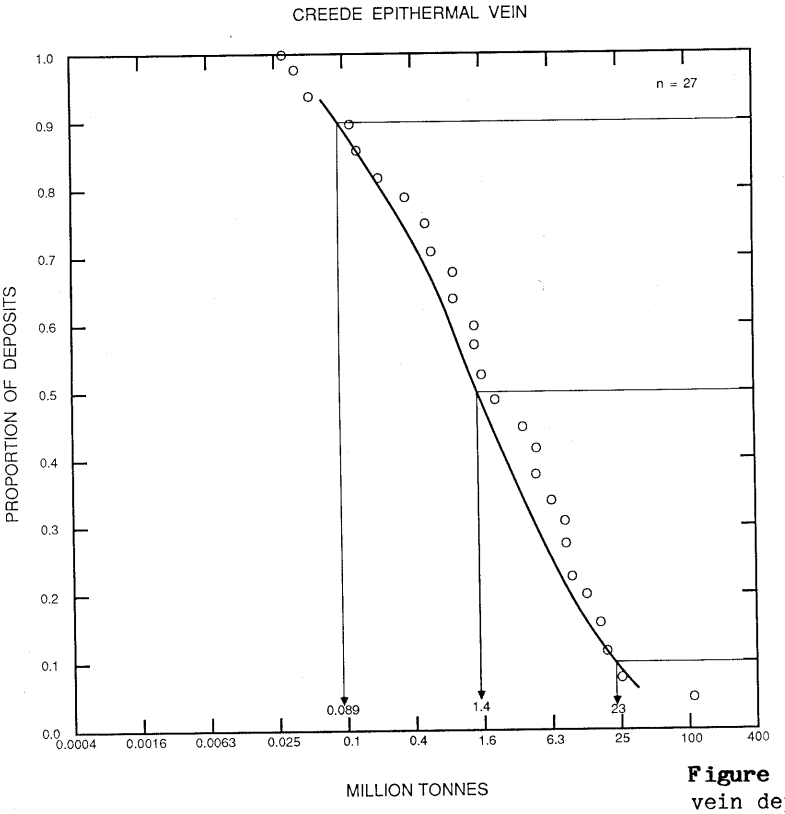

Figure 107. Tonnages of Creede epithermal vein deposits.

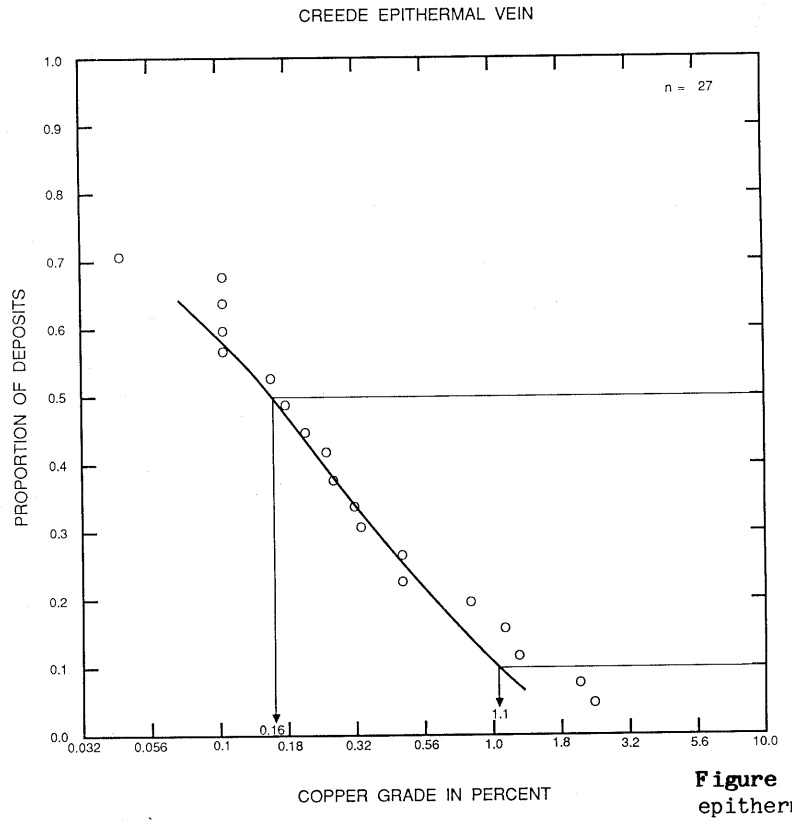

Figure 108. Copper grades of Creede epithermal vein deposits.

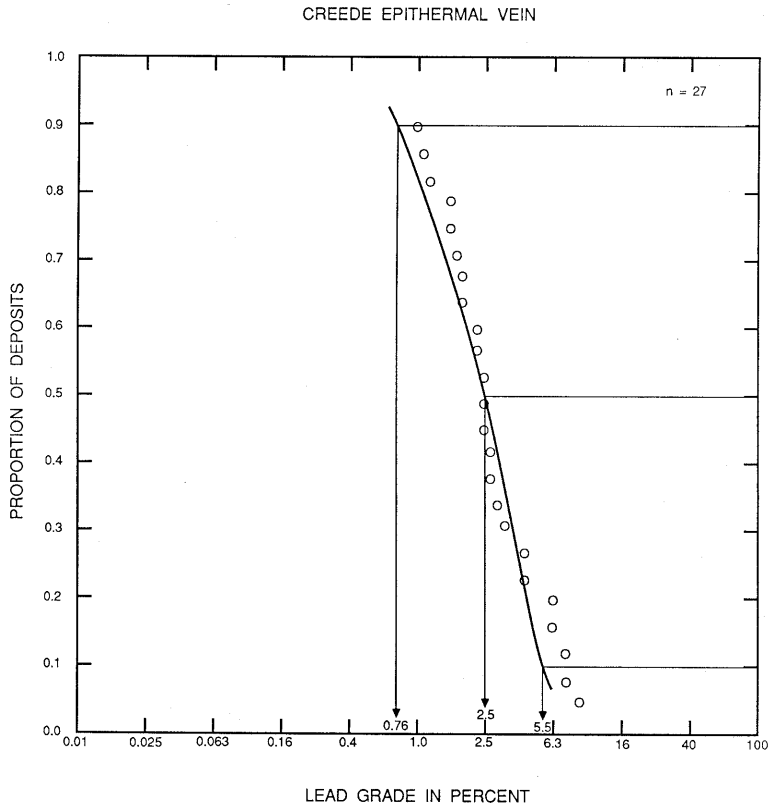

Figure 109. Lead grades of Creede epithermal vein deposits.

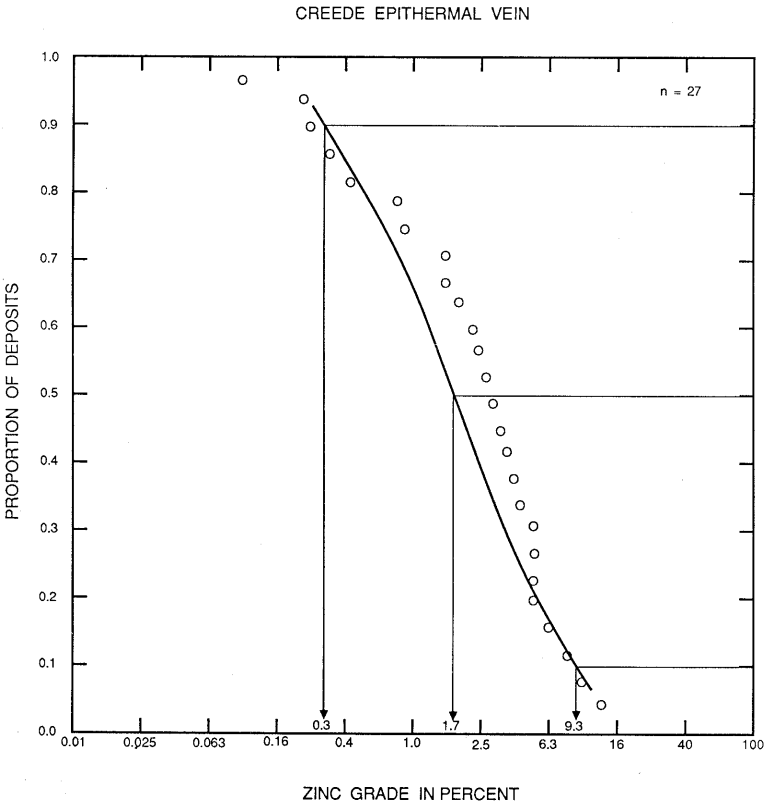

Figure 110. Zinc grades of Creede epithermal vein deposits.

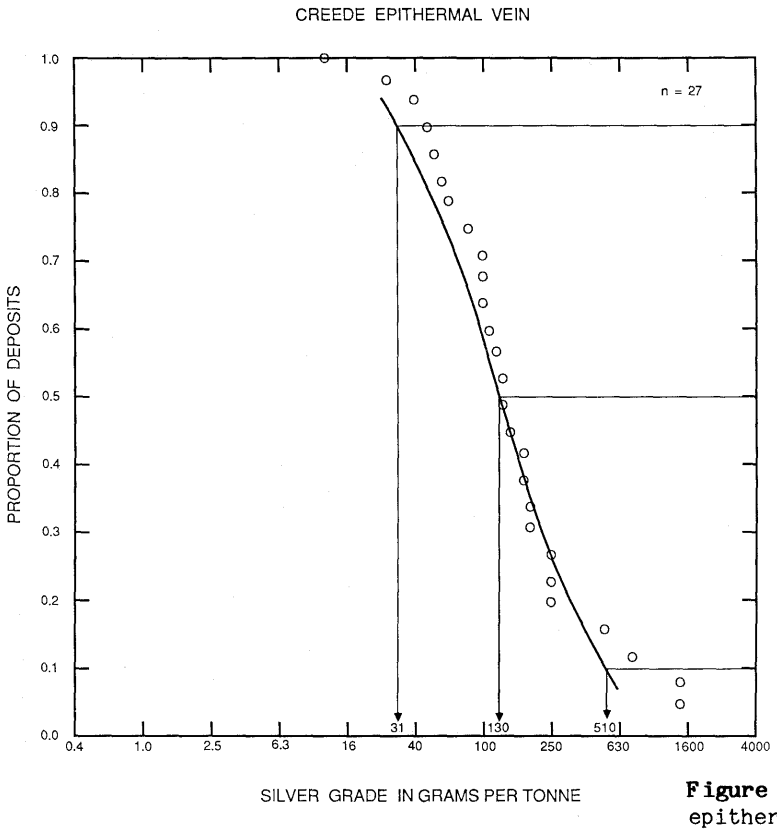

Figure 111. Silver grades of Creede epithermal vein deposits.

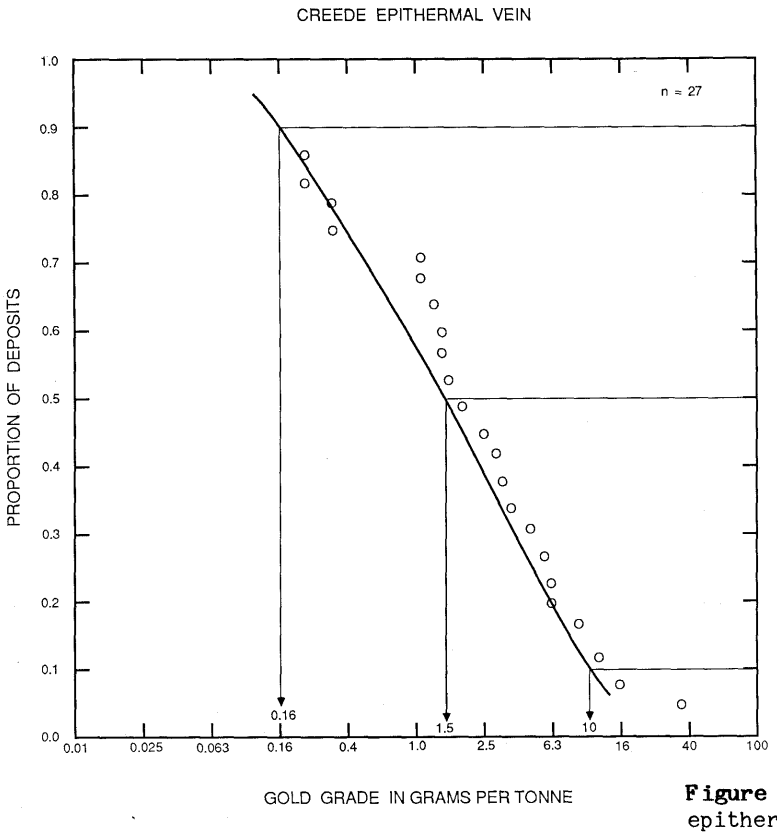

Figure 112. Gold grades of Creede epithermal vein deposits.