DESCRIPTIVE MODEL OF EPITHERMAL QUARTZ-ALUNITE Au

By Byron R. Berger

APPROXIMATE SYNONYM Acid-sulfate, or enargite gold (Ashley, 1982),

DESCRIPTION Gold, pyrite, and enargite in vuggy veins and breccias in zones of high-alumina alteration related to felsic volcanism.

GENERAL REFERENCE Ashley (1982).

GEOLOGICAL ENVIRONMENT

Rock Types Volcanic: dacite, quartz latite, rhyodacite, rhyolite. Hypabyssal intrusions or domes.

Textures Porphyritic.

Age Range Generally Tertiary, but can be any age.

Depositional Environment Within the volcanic edifice, ring fracture zones of calderas, or areas of igneous activity with sedimentary evaporates in basement.

Tectonic Setting(s) Through-going fracture systems: keystone graben structures, ring fracture zones, normal faults, fractures related to doming, joint sets.

Associated Deposit Types Porphyry copper, polymetallic replacement, volcanic hosted Cu-As-Sb. Pyrophyllite, hydrothermal clay, and alunite deposits.

DEPOSIT DESCRIPTION

Mineralogy Native gold + enargite + pyrite + silver-bearing sulfosalts ± chalcopyrite ± bornite ± precious-metal tellurides ± galena ± sphalerite ± huebnerite. May have hypogene oxidation phase with chalcocite + covellite ± luzonite with late-stage native sulfur.

Texture/Structure Veins, breccia pipes, pods, dikes; replacement veins often porous, and vuggy, with comb structure, and crustified banding.

Alteration Highest temperature assemblage: quartz + alunite + pyrophyllite may be early stage with pervasive alteration of host rock and veins of these minerals; this zone may contain corundum, diaspore, andalusite, or zunyite. Zoned around quartz-alunite is quartz + alunite + kaolinite + montmorillonite; pervasive propylitic alteration (chlorite + calcite) depends on extent of early alunitization. Ammonium-bearing clays may be present.

Ore Controls Through-going fractures, centers of intrusive activity. Upper and peripheral parts of porphyry copper systems.

Weathering Abundant yellow limonite, jarosite, goethite, white argillization with kaolinite, fine-grained white alunite veins, hematite.

Geochemical Signature Higher in system: Au + As + Cu; increasing base metals at depth. Also Te and (at El Indio) W.

EXAMPLES

Goldfield, USNV	(Ransome, 1909)
Kasuga mine, JAPN	(Taneda and Mukaiyama, 1970)
El Indio, CILE	(Walthier and others, 1982)
Summitville, USCO	(Perkins and Nieman, 1983)
Iwato, JAPN	(Saito and Sate, 1978)

GRADE AND TONNAGE MODEL OF EPITHERMAL QUARTZ-ALUNITE Au

By Dan L. Mosier and W. David Menzie

COMMENTS See figs. 120-123.

DEPOSITS

Name	Country
Chinkuashih	TIWN
El Indio	CILE
Goldfield	USNV
Iwato	JAPN
Kasuga	JAPN
Masonic	USCA
Mohave	USCA
Stedman	USCA

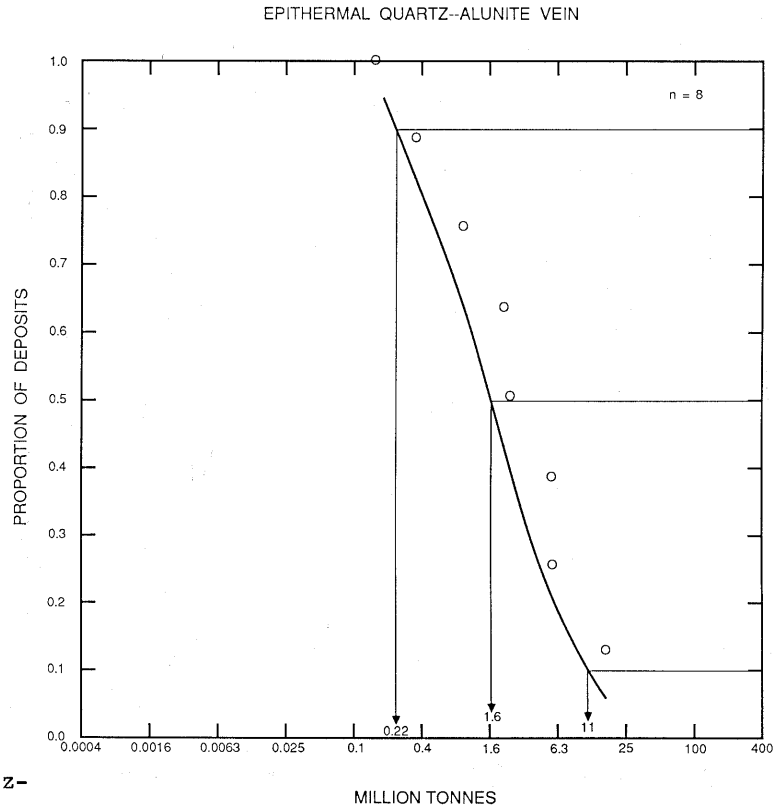

Figure 120. Tonnages of epithermal quartz-alunite vein deposits.

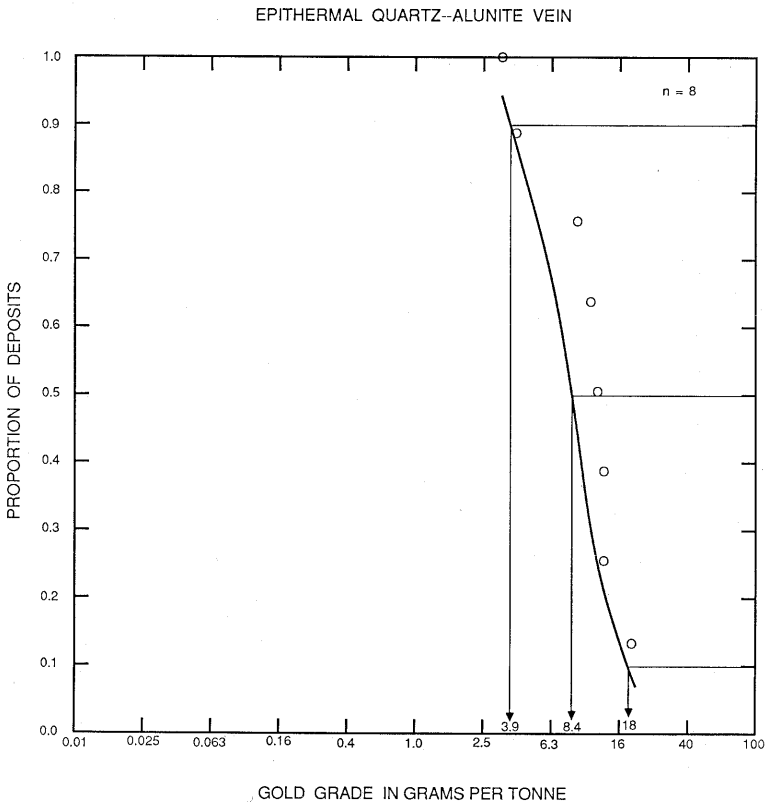

Figure 121. Gold grades of epithermal quartz-alunite vein deposits.

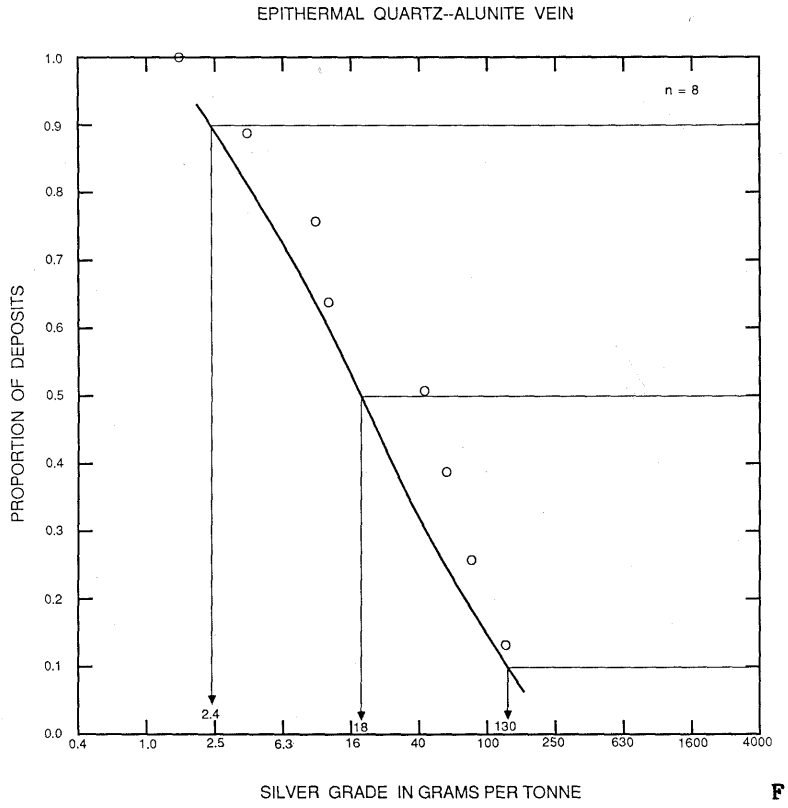

Figure 122. Silver grades of epithermal quartz-alunite vein deposits.

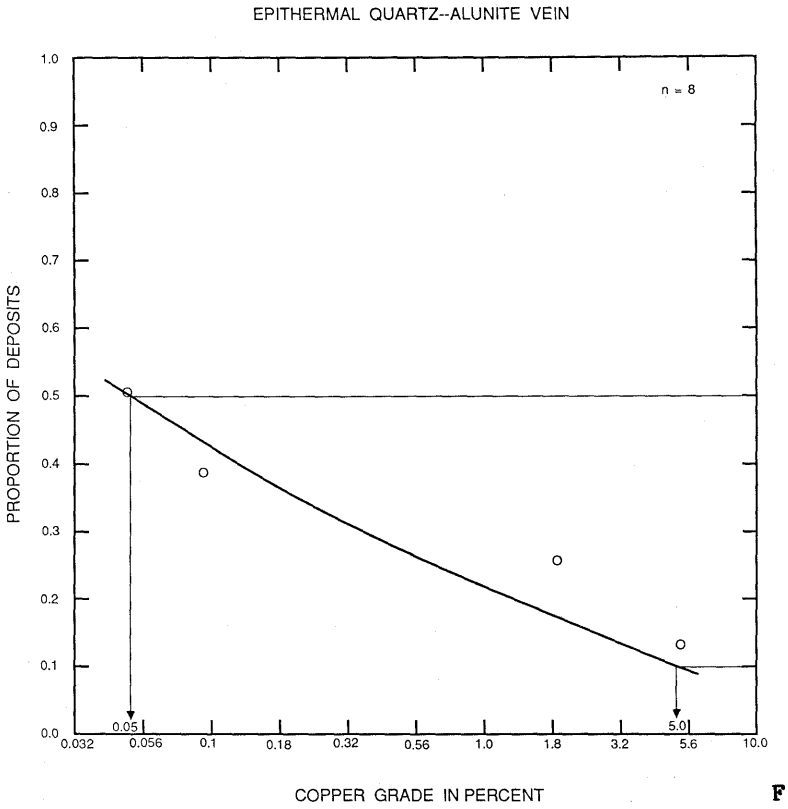

Figure 123. Copper grades of epithermal quartz-alunite vein deposits.