TABLE DR1. Characteristics of Selected Porphyry Copper Deposits and Depth Estimates for their Magmatic Sources. All deposits listed have large "background potassic" zones, in which the essential alteration is biotitization of mafic minerals, with low grade Cu. The emphasis in this table is on higher grade zones contained within the larger zones of background potassic alteration.

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<td>bn-cc-mt, bn-cp-mt, cp-mt; sec mt more abundant than Cu sulfides; (cp common only in areas of late veins and sericitic all’n overprinting)</td>
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<td>bn-dg-mt, bn-cc-mt; bn-cp where late alteration overprint is present, cp-mt, cp-only or cp-py where it is very strong; sec mt usually &gt; Cu sulfides</td>
<td>q-sec ols-bi-(rt); ols is the sec feldspar instead of Kf due to low-K rocks; bi may be chloritized and olig sericitized due to late overprint</td>
<td>P.A. Mitchell, unpub., 1997-1998; J.M. Proffett, unpub., 1997-2004; Clode et al., 1999; Setyandhaka et al., 2008</td>
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<td>cp-bn, cp-py; py present mainly near edge of deposit and with late overprint; mt not present, or afld to hm in high grade zones</td>
<td>q-Kf-bi-ahn-olsig-(rt)</td>
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<td>Gustafson and Hunt, 1975; Gustafson et al., 2001</td>
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Ann-Mason Pass; Yerington district, Nevada, USA "Early halo type"

Quartz monzodiorite and quartz monzonite of Yerington Batholith (~169 Ma; part of Yerington batholith)

Swarms of granite porphyry dikes above porphyritic granite source batholith (~168 Ma; part of Yerington batholith)

Swarms of thin, early veinlets in subparallel sets with few mm- to few cm-thick all'n halos, and with most Cu sulfides in the halos; truncation of early veinlets at porphyry contacts is not commonly observed

cp-bn, cp; cp-pp in peripheral parts and with late overprint; prim mt partly to completely destroyed; little or no sec mt

Early veinlet halos are ser-Kf-bi-(rt); sec Kf between ser and q

Top of underlying porphyritic granite source estimated to have been 5 km below surface at time of mineralization

Structural reconstruction of volcanic surface above deposit for time of mineralization; underlying pluton exposed in sectional view due to tilting

Mapping summarized in Proffett, 1977 & Proffett and Dilles, 1984, 1991; see also Dilles and Proffett, 1995

Bear, Yerington district, Nevada, USA "Early halo type"

Quartz monzodiorite and quartz monzonite of Yerington Batholith (~169 Ma; part of Yerington batholith)

Swarms of granite porphyry dikes above porphyritic granite source batholith (~168 Ma; part of Yerington batholith)

Swarms of thin, early veinlets with few mm- to few cm-thick all'n halos, and with most Cu sulfides in the halos; truncation of early veinlets at porphyry contacts is not commonly observed

cp-bn, cp; cp-pp in peripheral parts and with late overprint; prim mt partly to completely destroyed; little or no sec mt

Early veinlet halos are ser-Kf-bi-(rt); sec Kf between ser and q

Top of underlying porphyritic granite source estimated to have been 5 km below surface at time of mineralization

Structural reconstruction of volcanic surface above deposit for time of mineralization


Butte, Montana, USA "Early halo type"

Bolton granite of the Boulder batholith, ~74-76 Ma

Steward quartz porphyries, three 3-30 m thick, steep, WNW trending dikes of mafic-poor granite porphyry, ~65-70 Ma (?) (7)

Sets of subparallel, thin, early veinlets with few mm- to few cm-thick EDM all'n halos with abundant Cu sulfides (also "S" or "PGS" halos in upper part of potassic zone); veinet swarms not closely associated spatially with individual porphyry dikes

cp, cp-bn and cp-pp, diiss in EDM halos; cp-pp in "S" or "PGS" halos; prim mt partly to completely destroyed and sec mt rare or absent in EDM halos, but may occur in the veinlets; mt rare in "S" or "PGS" halos but may occur in the veinlets

EDM halos: sec bi & ser in plag & mafic sites; see Kf between ser and primary q grains; andal & other Al silicates may be present; rt in mafic sites; "S" or "PGS" halos lack biotite and may lack Kf


Deepest drill exposures estimated to have been ~7 km below surface during mineralization; mafic-magmatic source of fluids and quartz porphyries not exposed and was still deeper

Volcanic roof rocks related to host batholith are >20 km distant, consistent with deep exposure. Fluid inclusion Th in deepest early alteration suggests P=1.7 kb in order to be consistent with mafic-based T estimates


Chaquicamata, Chile "Early halo type"

East porphyry, the main and largest intrusion of the Chaquicamata Porphyry Complex, 34-35 Ma (latest Eocene)

Banco porphyry and West porphyry, small intrusions in the Chaquicamata Porphyry Complex, 34-35 Ma (latest Eocene)

Sets of thin subparallel early veinlets with few mm- to few cm-thick alteration halos that contain abundant Cu sulfides; veinet swarms not closely associated spatially with individual porphyry intrusions

bn-(dg)-(tn)-(cp)-(amh); cp-bn or cp with late all'n overprint; no py except with strong late all'n overprint, generally no mt or hm

Two main types: "K-nil": Kf-q-anh-a Na-plag-(rt)-(exer); "Early ser": ser-q-anh-Kf-(rt). Sec Kf commonly occurs between q and ser

Ossandon et al., 2001; 2005; 2007; Faunes et al., 2005

Direct depth estimate not available; geology consistent with relatively deep mafic-magmatic source, which is not exposed, even in deepest exposures

Late Cretaceous-Eocene section 4-5 km thick projects well above Pz-TR metamorphic and granitic hosts of Chaquicamata Porphyry Complex

Tomilinson and Blanco, 1997; Dilles et al., 1997; Ossandon et al., 2001; J.M. Proffett, unpub., 2003-2007

RT, Chaquicamata, district, Chile "Early halo type"

RT porphyry (= East porphyry) of the Chaquicamata Porphyry Complex, 34-35 Ma (latest Eocene)

Small intrusions similar to the Banco porphyry and West porphyry of Chaquicamata, 34-35 Ma (latest Eocene)

Sets of thin, subparallel, early veinlets with few mm- to few cm-thick alteration halos that contain abundant Cu sulfides; veinet swarms not closely associated spatially with individual porphyry intrusions

bn-(dg)-(tn)-(cp)-(amh); cp present mainly with late alteration overprint; generally no py, mt or hm

Kf-qt-ser-bi-(rt)+ andal; sec Kf commonly occurs between q and ser; ser may occur as relic clusters in interior of Kf grains

J.M. Proffett, unpub., 2002-2006

Direct depth estimate not available; geology consistent with relatively deep mafic-magmatic source, which is not exposed

Late Cretaceous-Eocene section 4-5 km thick projects well above Pz-TR metamorphic and granitic hosts of Chaquicamata Porphyry Complex

Tomilinson and Blanco, 1997; Dilles et al., 1997; Ossandon et al., 2001; J.M. Proffett, unpub., 2003-2007
Abbreviations: alt'n = alteration; nodal = nodalized; amb = amphibole; bi = biotite; bm = bemeite; bx = broeck; cc = chalcocite or digenite; cp = chalcopyrite; dg = digenite; diss = disseminated; EDM = early dark micaceous; hz = hematite; Kf = K-feldspar; mb = molybdenite; mt = magnetite; olg = oligoclase; P = pressure; plag = plagioclase; prim = primary; py = pyrite; PZ = Paleozoic; q = quartz; rt = rutile; sec = secondary; ser = sericite; ser'c = sericitic; T = temperature.

Th = fluid inclusion homogenization T; tm = temeculite; TR = Triassic; (*) = minor phase; ± = phase not always present; unpub. = unpublished work.

* "type" refers to type of high Cu grade zones as described in text.
Proffett, "High Cu grades in porphyry Cu deposits and their relationship to emplacement depth of magmatic sources." Geology, Table DR1 references

REFERENCES FOR TABLE DR1


Gustafson, L.B. and Quiroga, Jorge, 1995, Patterns of mineralization and alteration below the porphyry copper orebody at El Salvador, Chile: Econ. Geol., v. 90, p. 2-16.


