DESCRIPTIVE MODEL OF Sn SKARN DEPOSITS

By Bruce L. Reed and Dennis P. Cox

DESCRIPTION Tin, tungsten, beryllium minerals in skarns, veins, stockworks and greisens near granite-limestone contacts (see fig. 34).

GENERAL REFERENCE Einaudi and Burt (1982), Einaudi and others (1981), Scherba (1970).

GEOLOGICAL ENVIROMENT

Rock Types Leucocratic biotite and(or) muscovite granite, specialized phase or end members common, felsic dikes, carbonate rocks.

Textures Plutonic textures most common (granitic, seriate, fine-grained granitic). Also porphyritic-aphanitic; skarn is granoblastic to hornfelsic, banded skarn common.

Age Range Mainly Mesozoic, but may be any age.

Depositional Environment Epizonal(?) intrusive complexes in carbonate terrane.

Tectonic Setting(s) Granite emplacement generally late (post erogenic).

Associated Deposit Types W skarn, Sn greisen, and, quartz-cassiterite-sulfide veins; at increasing distances from intrusive-carbonate contact Sn replacement and fissure lodes may develop (as at Renison Bell).

DEPOSIT DESCRIPTION

Mineralogy Cassiterite ± minor scheelite ± sphalerite ± chalcopyrite ± pyrhotite ± magnetite ± pyrite ± arsenopyrite ± fluorite in skarn. Much Sn may be in silicate minerals and be metallurgically unavailable.

Texture/Structure Granoblastic skarn, wrigglite [chaotic laminar pattern of alternating light (fluorite) and dark (magnetite) lamellae], stockworks, breccia.

Alteration Greisenization (quartz-muscovite-topaz ± tourmaline, fluorite, cassiterite, sulfides) near granite margins and in cusps. Topaz tourmaline greisens. Idocrase + Mn-grossular-andradite ± Sn-andradite ± malayaite in skarn. Late-stage amphibole + mica + chlorite and mica + tourmaline + fluorite.

Ore Controls Mineralized skarns may or may not develop at intrusive contact with carbonate rocks; major skarn development up to 300 m from intrusion controlled by intrusion-related fractures; cross-cutting veins and felsic dikes.

Weathering Erosion of lodes may lead to deposition of tin placer deposits.

Geochemical Signature Sn, W, F, Be, Zn, Pb, Cu, Ag, Li, Rb, Cs, Re, B. Specialized granites characteristically have SiO_2 > 73 percent, K_2O > 4 percent and are depleted in CaO, TiO_2, MgO, and total Fe. They are enriched in Sn, F, Rb, Li, Be, W, Mo, Pb, B, Nb, Cs, U, Th, Hf, Ta, and most REE. They are depleted in Ni, Cu, Cr, Co, V, Sc, Sr, La, and Ba.

EXAMPLES

Lost River, USAK	(Dobson, 1982)
Moina, AUTS	(Kwak and Askins, 1981)
	(Scherba, 1970)

GRADE AND TONNAGE MODEL OF Sn SKARN DEPOSITS

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COMMENTS Normally a grade-tonnage model would not be built with so few deposits. However, this model is presented because tin skarn deposits are significantly different than replacement deposits in grades, tonnages, and other characteristics. Because of the small number of deposits plotted, the cumulative plot of discrete data points differes from the continuous lognormal curve. If the deposits had been plotted in descending order, the points would fall on the other side of the curve. Potential by-products from these deposits include tungsten, fluorite, beryllium, zinc, and gold. See figs. 35, 36.

DEPOSITS

Name	Country
Gilliam	AUQL
Lost River	USAK
Moina	AUTS
Pinnacles	AUQL

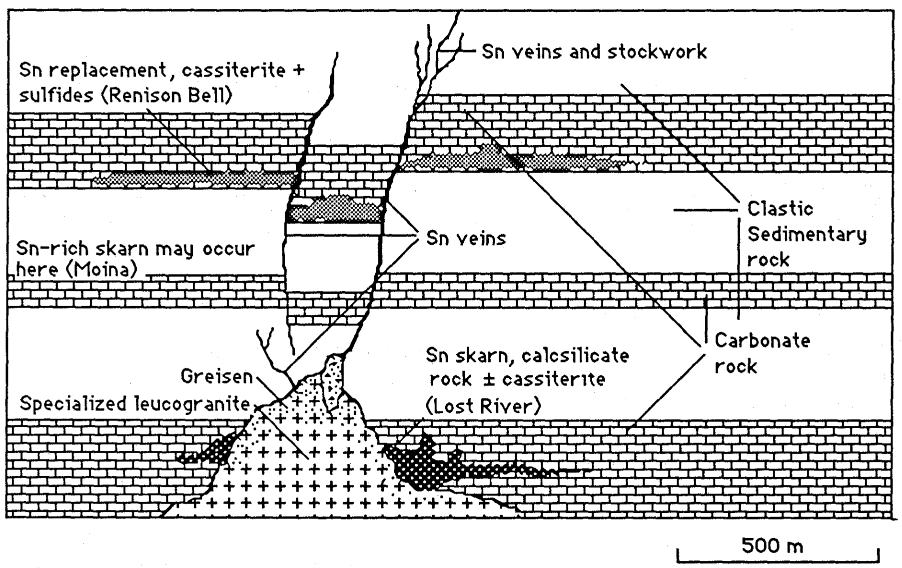

Figure 34. Cartoon cross section showing relation between Sn skarn, replacement Sn and Sn vein deposits, and granite intrusions.

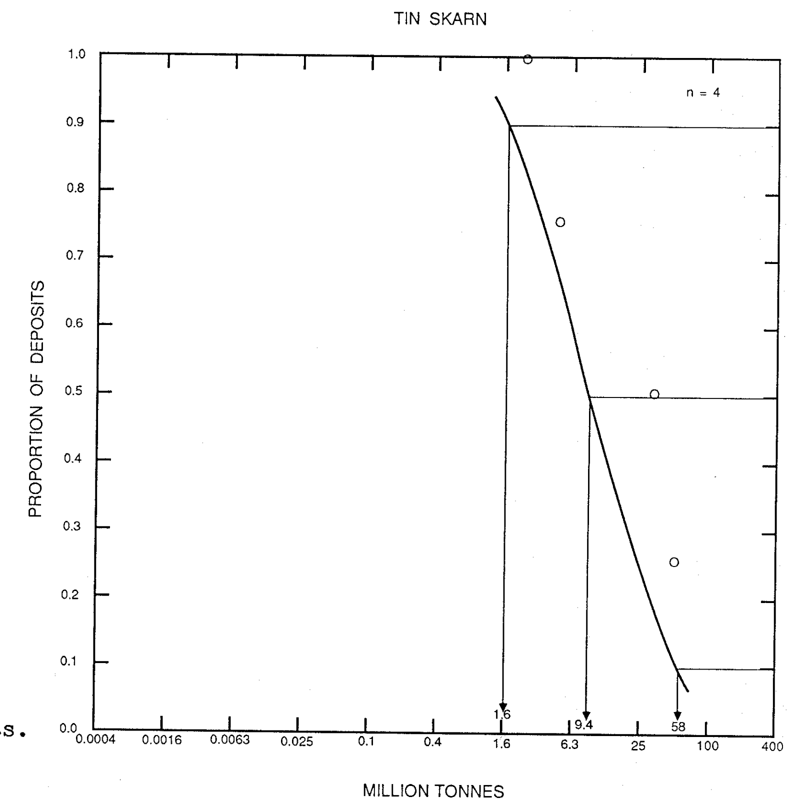

Figure 35. Tonnages of Sn skarn deposits.

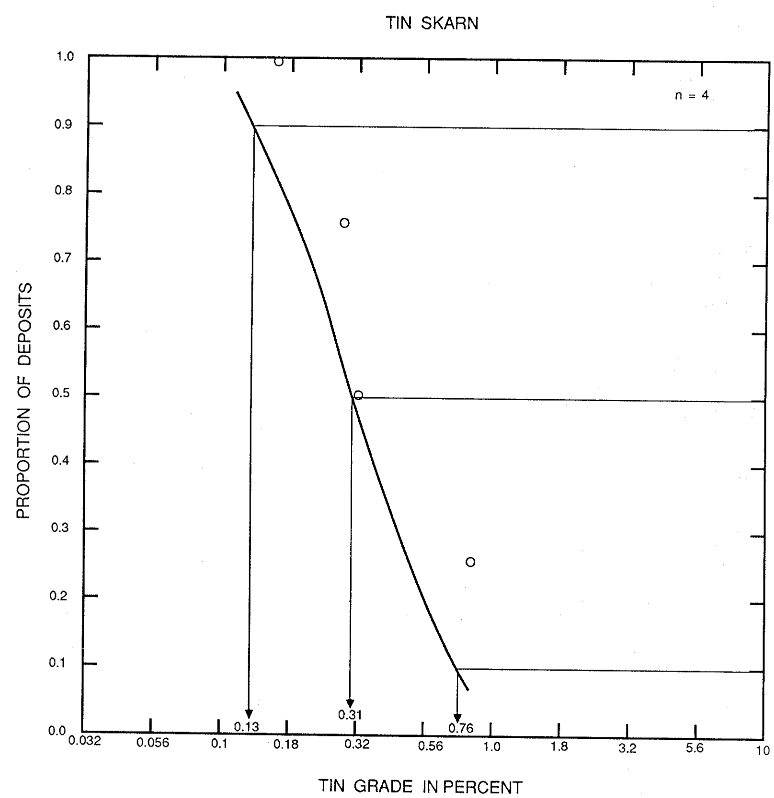

Figure 36. Tin grades of Sn skarn deposits.