TABLE A. ADDITIONAL CHARACTERISTICS OF SELECTED FE-OXIDE(-REE-Cu-Au-U)-BEARING REGIONS

Location / District	Age / setting	Size* / metals / alteration	Comments	References
Cenozoic				
Red Sea region (Afar, Atlantis II)	Holocene / rift-transform setting with basaltic volcanism and abundant evaporites	>100? (>15?) / FeOx + MnOx in sediments with modern Fe-rich hot springs or (Zn-Cu-Pb brines) / local sodic ± peralkaline alteration	Modern geothermal circulation through evaporitic beds leading to syngenetic FeOx ± Zn+Pb sulfides	Bonatti et al. (1972); Zierenberg and Shanks (1983)
Chilean Andes (El Laco, Magnetita Pedernales)	Neogene / intermediate volcanic centers in closed basins	>1,000? (>500) / FeOx in two districts/ minor sodic ± peralkaline alteration, extensive gypsum	Arid climate; volcanos are adjacent to high-altitude salars containing halite	Grez et al. (1891); Stoertz and Ericksen (1974); Vivallo et al. (1994)
Mexican Altiplano, Cerro de Mercado, La Perla, Hercules	Mid-Tertiary / continental arc felsic volcanic centers (incl. calderas)	>300 (>100) / FeOx ± minor REE, Cu in >20 occurrences / modest sodic ± peralkaline alteration , local stratiform FeOx with gypsum	Arid paleoclimate, sulfate evaporites in volcanic basins, Jurassic evaporites	Lyons (1988); Van Allan (1978); D.A. Johnson and M.D. Barton, unpubl. data
Mesozoic				
Basin & Range province, USA (Humboldt complex; Cortez Mtns.)	Jurassic / extensional or back-arc mafic or felsic volcano-plutonic complexes	>1,000 (>75) / FeOx in > 40 occurrences, ± minor REE & Cu / regionally extensive sodic ± peralkaline ± minor potassic alteration	Arid paleoclimate, evaporites in region; variable S (locally heavy); VMS in same arc	Battles and Barton (1995); Johnson et al. (1993); Muffler (1964)
Chilean coastal belt (El Romeral, Candelaria)	Jurassic-Early Cretaceous / extensional arc mafic-intermediate volcanoplutonic complexes	>3,000 (350) / FeOx ± major Cu(Au), minor Co, REE in >100 occurrences / regionally extensive sodic ± minor potassic alteration	Arid paleoclimate, Jurassic evaporites; variable S (locally heavy)	Bookstrom (1995); Oyarzun and Frutos (1984); Ruiz et al. (1968)
Peruvian coastal belt (Raul, Monterrosas, Marcona)	Early Cretaceous / extensional arc mafic-intermediate volcano-plutonic complexes	>1,100 (>900) / FeOx ± major Cu in >20 occurrences / regional sodic (± peralkaline?) alteration and skarn	Local red beds & evaporites; evidence for evaporite/seawater source; VMS in same arc	Ripley and Ohmoto (1977), (1979); Sidder (1984); Sato (1983); Vidal et al. (1990)
Anhui & Hankow regions, east-central China (Fanchang?)	Jurassic / extensional back-arc mafic-intermediate volcano-plutonics	>1,000 (>300) / FeOx ± minor Cu in >25 occurrences / extensive sodic ± minor potassic alteration and skarn	Local red beds & Triassic evaporites; evidence for evaporite/seawater source	Song et al. (1981); Xu (1990); Zhang (1986)
Transvaal, RSA (Messina)	Jurassic (?) / mafic volcanics & intrusions associated with Limpopo aulacogen	>10 (>?) / Cu (~3%) associated with FeOx / extensive sodic alteration	Controversial, but geochemistry and structure interpreted to indicate Jurassic evaporitic source	Sawkins (1990); Sawkins and Rye (1979)
Mid-Atlantic, USA (Cornwall, Grace)	Triassic-Jurassic / mafic sills in early Mesozoic basins	>350 (>100) / FeOx ± minor Cu, Co (± U) in >100 occurrences / skarn and sodic alteration	Deposits in northern half of rift with redbeds & minor evaporites; evidence for evaporite source	Robinson (1988); Rose et al. (1985)
Siberian Platform, Russia (Krasnoyarsk, Korshunovsk)	Permo-Triassic / mafic flows and intrusions in flood basalt province	>3,000 (>650) / FeOx + minor Cu, anhydrite & halite in >150 deposits / skarn and sodic alteration	Interaction of dolerites with Cambrian salts (>0.5 km); geochemical evidence for evaporite involvement	Smirnov (1977); Vakhrushev et al. (1981); Vakhrushev and Ryabkov (1984); Yudina et al. (1977)

Paleozoic				
Turgai province, Kazakhstan (Sarbai, Kachar)	Carboniferous / mafic-intermediate arc volcano-plutonic complex	>4,000 (>1,500) / FeOx + minor Cu, Co, MnOx / extensive sodic ± minor potassic alteration & skarn	Arid paleoclimate, possible evaporites; setting analogous to Mesozoic central Andes	Kochergin (1985); Smirnov (1977); Zonenshain et al. (1990)
Altai-Sayan, central Asia (Tuva, Abakan)	Mid-Paleozoic / volcano-plutonic complexes (mafic-felsic), redbeds	>2,000 (>500) / FeOx ± significant REE, Cu, U in > 25 occurrences / extensive sodic alteration and skarn	Arid paleoclimate; Devonian evaporites in region; geochemical evidence for evaporite involvement	Prikhod'ko (1987); Smirnov (1977); Zharkov (1984)
Central Iran (Bafq, Gole Gohar, Hamadan)	Cambrian (and younger) / anorogenic felsic volcanic successions	>2,500 (>1,000) / FeOx ± Cu ± REE in stratiform & cross-cutting bodies in > 25 occurrrences/ sodic ± peralkaline ± minor potassic alteration	Extensive regional Cambrian and younger evaporites; distal MnOx & Pb+Zn	Főrster (1990); Főrster and Jafarzadeh (1994); Muecke and Younessi (1994)
Proterozoic				
Northwestern Canada (Great Bear, Wernecke Mtns.)	Early & mid-Proterozoic intermediate arc-like volcano-plutonic centers	>50? (>10?) / FeOx ± Cu, U, Ag, Co in > 25 occurrences/ regionally extensive sodic ± minor potassic alteration	No evaporites reported; zoned from central FeOx to outward Ag-Co-U mineralization	Badham (1978); Bell (1978); Hildebrand (1986); Hitzman et al. (1992); Laznicka and Edwards (1979)
Stuart Shelf, South Australia (Olympic Dam, Acropolis, Emmie Bluff)	Mid-Proterozoic / extensional anorogenic(?) felsic-mafic(?) volcano-plutonic sequence	>3,000 (>2,000) / FeOx + major Cu, REE, U, Au in >5 deposits / ± minor potassic alteration	No published evidence for evaporites in mid-Proterozoic	Gow et al. (1994); Parker (1990); Reeve et al. (1990); Oreskes and Einaudi (1992)
Northern Sweden (Kiruna, Svappavaara, Ekstromberg, Gallivare)	Mid-Proterozoic / mafic-felsic volcanic sequence, possibly extensional	>5,000 (>2,000) / FeOx + minor Cu, REE, Au, U in >20 deposits / regional sodic ± peralkaline ± minor potassic alteration	Evidence for rifting with evaporitic materials	Geijer and Odman (1974); Hitzman et al. (1992); Parak (1975)
Bayan Obo, Inner Mongolia	Mid-Proterozoic(?) overprinted(?) by Paleozoic / felsic sediments & dolomites, younger granitoids	>1,000 / FeOx + major REE in stratabound orebodies / extensive sodic ± peralkaline ± minor potassic alteration	Controversial origin; features interpreted as syngenetic and epigenetic	Chao et al. (1992); Hauck (1990)
Northeastern USA (Benson mines, Mineville, Dover)	Mid-Proterozoic / intermediate-felsic anorogenic suite overprinted & intruded by Grenville granitoids	>1,000 (200) / FeOx + REE ± minor Cu, U, Au in > 30 occurrences as discordant and stratabound orebodies / extensive sodic (± peralkaline) alteration & skarn	Evaporites present, some interpret FeOx to be related to Grenville event rather than mid-Proterozoic	Buddington (1966); Sims (1958); Whitney and Olmsted (1988)
Bihar-Orissa area, India (Bihar, Singhbhum)	Mid-Proterozoic / mafic-intermediate igneous complex	>? (?) / FeOx ± zoned REE, Cu, U in >15 occurrences with discordant and stratabound ores / extensive sodic ± minor potassic alteration	Strongly deformed and metamorphosed; local peralkaline alteration; well developed zoning	Banerji (1962); Banerji (1981)
Southeastern Missouri, USA (Pea Ridge, Boss-Bixby, Pilot Knob)	Mid-Proterozoic / anorogenic felsic province	> 1000 (>300) / FeOx ± Cu ± REE, U, Au in > 25 occurrences/ minor sodic and potassic alteration known	No published evidence for evaporites; distal	Emery (1968); Panno and Hood (1983); Pratt and Sims (1990)

*In millions of tonnes; first number is total district resource, numbers in parantheses are tonnages for largest deposit within the district

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