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Version: Supplemental Material

Article:

Peng, Z, Wang, C, Poulton, SW orcid.org/0000-0001-7621-189X et al. (3 more authors) (2022) Origin of the Neoproterozoic VMS-BIF Metallogenic Association in the Qingyuan Greenstone Belt, North China Craton: Constraints from Geology, Geochemistry, and Iron and Multiple Sulfur ($\delta^{33}\text{S}$, $\delta^{34}\text{S}$, and $\delta^{36}\text{S}$) Isotopes. *Economic Geology*, 117 (6). pp. 1275-1298. ISSN 0361-0128

<https://doi.org/10.5382/econgeo.4920>

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Table S1 Location, type, associated rocks and analyses contents of VMS and BIF ore samples incorporated in this study.

Location/Sample	Type	Associated rocks	Mineral	Analyses contents
Hongtoushan VMS				
HTM-1	Massive-semimassive		Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTM-2	Massive-semimassive		Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTM-3	Massive		Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTM-4	Massive		Py	Whole rock geochemistry and multiple sulfur isotope
HTD-1	Densely disseminated-stockwork	FII-type dacite of the middle HF	Py	Whole rock geochemistry, multiple sulfur isotope
HTD-2	Sparsely disseminated-veinlet		Py	Whole rock geochemistry, multiple sulfur isotope
HTD-3	Sparsely disseminated		Py	Multiple sulfur isotope
HTD-4	Densely disseminated-stockwork		Py	Whole rock geochemistry and multiple sulfur isotope
HTD-5	Sparsely disseminated		Py	Whole rock geochemistry and multiple sulfur isotope
HTB-1	Bedded		Py	Iron and multiple sulfur isotopes
HTB-2	Bedded		Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTB-3	Bedded		Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTB-4	Bedded	Garnet actinolite schist of the middle HF	Py	Whole rock geochemistry, iron and multiple sulfur isotopes
HTB-5	Bedded		Py	Iron and multiple sulfur isotopes
HTB-6	Bedded		Py	Whole rock geochemistry and multiple sulfur isotope
Xiaolaihe BIF				
XLH-Si1	Silicate BIF		Mag	Iron isotope
XLH-Si2	Silicate BIF	FII-type dacite and N-MORB type basalt of the upper SF	Mag	Iron isotope
XLH-Si3	Silicate BIF		Mag	Iron isotope

XLH-Si4	Silicate BIF		Mag	Iron isotope
Taiyanggou BIF				
TYG-Si1	Silicate BIF		Mag	Iron isotope
TYG-Si2	Silicate BIF	FII-type dacite of the middle HF	Mag	Iron isotope
Xiadianzi BIF				
XD-Si1	Silicate BIF		Mag	Iron isotope
XD-Si2	Silicate BIF	N-MORB type basalt of the lower NF	Mag	Iron isotope
XD-Si3	Silicate BIF		Mag	Iron isotope
XD-Su1	Sulfide-bearing BIF		Mag	Iron isotope
XD-Su2	Sulfide-bearing BIF		Py and Mag	Iron and multiple sulfur isotopes
XD-Su3	Sulfide-bearing BIF	Chlorite garnet biotite schist of the lower NF	Py and Mag	Iron and multiple sulfur isotopes
XD-Su4	Sulfide-bearing BIF		Py and Mag	Iron and multiple sulfur isotopes

Notes: Py-pyrite, Mag-magnetite.

Ba	1040	1100	1140	1100
U	6.10	5.50	2.40	2.30
Th	20.8	19.9	17.1	18.4
Y	28.9	26.5	38.7	39.2
Nb	22.3	21.2	11.1	10.7
Cu/Cu+Zn	0.84	0.85	0.97	0.96

Ref. is short for reference values of the standards; the superscript R1 and R2 are duplicates for the same sample.