

REFERENCES

Reference

- Dejidmaa G. and Naito K. (1998): Previous studies on the Erdenetiin-Ovoo porphyry copper-molybdenum deposit, Mongolia. Bull. Geol. Surv. Japan, Vol. 49(6), p.299-308.
- Gavrilova, S. P., Maximyk, I. E., Orolmaa, D. (1989) : The molybdenum deposits Erdenetiin ovoo, Mongolian People's Republic, Publication of IMGRE, Moscow, 40 p. (in Russian).
- Geological Survey of Japan and Geological Survey of Mongolia(1996) : Research and Developments of Mineral Resources in Mongolia, 139P., ITIT Rep. 91-1-3.
- Gerel, O. (1998) Ohanerozoic felsic magmatism and related mineralization in Mongolia, Bull. Geol. Surv. Japan, Vol.49(6), p.239-348.
- Jargalsaihan, D., Kazmer, M., Baras, Z. and Sanjaadori, D. (1996) Guide to the geology and mineral resources of Mongolia, Geological Exploration, Consulting and Services Co. Ltd., 329.
- Jargalan Sereenen and Murao Satoshi (1998): Fluorite deposits in Mongolia: an outline, Bulletin of the Geological Survey of Japan, 49, 6,309-318,(Geological Survey of Japan)
- Jargalan Sereenen and Murao Satoshi (1998): Preliminary study on the characteristics of Tsagaan tsakhir uul gold deposit, Bayankhongor, southern Mongolia, Bulletin of the Geological Survey of Japan,49,6,291-298,(Geological Survey of Japan)
- JICA and MMAJ (2001): Report on geological survey in the central north area, Mongolia.
- Kishimoto Fumio (1979a) : Development of porphyry copper deposit in Mongolia, Chishitsu News, no.299, 49-55.
- Kishimoto Fumio (1979b) : Discovery of new ore deposits in Mongolia, Chishitsu News, no.299, 56-57.
- Kishimoto Fumio (1984) : On the earth of Gobi, Mongolia, Chishitsu News, no.357, 47-51.
- Kurimoto Shiro (1997) : Visiting Bayankhongor in Mongolian glasslands, Chishitsu News, no.509, 49-58.
- Murao Satoshi, Dorjgotov, Danjindorjiin and Tseden Tsagaanbilegiin (1998): K-Ar dating of granitoids and hydrothermal micas from the northern part of Kherlen Depression, Mongolia, Bulletin of the Geological Survey of Japan, 49,6,249-255, (Geological Survey of Japan)
- Naito Kazuki and Sudo Sadahisha (1999): Visiting Erdenet Mine, Mongolia, Chishitsu News, no.534, 19-30.
- Nukushima Renzo (1998) A manual of Romanization of Mongolian geographical terms, Bulletin of the Geological Survey of Japan, 49, 6, 319-340, (Geological Survey of Japan)
- Pearce, J. A., Harris, B.B.W. and Tindle, A.G. (1984): Trace element discrimination diagrams for the tectonic interpretation of granitic rock, Journal of Petrology, Vol. 25, Part 4, 956-983.
- Richard H. Sillitoe (1995) : Exploration of porphyry copper lithocaps, PACRIM, 527-532.

- Sato Takeo (1991) : Travel to Mongolia, Chishitsu News, no.438, 39-51.Satoshi Kanisawa (1999) :
Igneous activity in Mongolia, Chishitsu News, no.534, 31-40.
- Takahashi Y., Arakawa Y., Oyungerel S. and Naito K. (2000): Geochronological data of granitoid in
the Bayankhongor area, central, Bulletin of the Geological Survey of Japan, 51, 5,157-174,
(Geological Survey of Japan)
- Takahashi Yuhei (1999): Geological research works in, Bulletin of the Geological Survey of Japan,
50, 4,279-289, (Geological Survey of Japan)
- Takahashi Yuhei, Oyungerel Sambuu, Naito Kazuki, Delgersogt Baljinnyamiin (1998): The granitoid
series in Bayankhongor area, central Mongolia, Bulletin of the Geological Survey of
Japan,49,1,25-32, (Geological Survey of Japan)
- Takahashi Yuhei, Oyungerel Sambuu, Naito Kazuki and Delgersogt Baljinnyamiin (1998):
Mineralogical characteristics of feldsparts of the granitoids in Bayankhongor area, central
Mongolia,Bulletin of the Geological Survey of Japan,49,8,439-446,(Geological Survey of
Japan)
- Teraoka Y., Suzuki M., Tungalag F., Ichinnorov N. and Sakamaki Y. (1996) Tectonic framework of
the Bayankhongor area, Bulletin of the Geological Survey of Japan, 47, 9, 447-455,
(Geological Survey of Japan)
- Tsagaanbilegiin Tsenden, Satoshi Murao and Dangindorjiin Dorjgotov (1992): Introduction to
geology of Mongolia, Bulletin of the Geological Survey of Japan,43,12, 735-744,(Geological Survey
of Japan)
- Tsenden Tsagaanbilegiin, Murao Satoshi, Dorjgotov Dangindorjiin (1992):Introduction to Geology of
Mongolia, Bulletin of the Geological Survey of Japan, 43, 12, 735-744, (Geological
Survey of Japan)
- Tsenden Tsagaanbilegiin, Murao Satoshi, Baatarhuyag Abirmediin, Altantsetseg Dambiin and
Oyunchimeg Chagnaadorjiin (1998): A note on newly found ore fields in Govi-Altai area,
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(Geological Survey of Japan)

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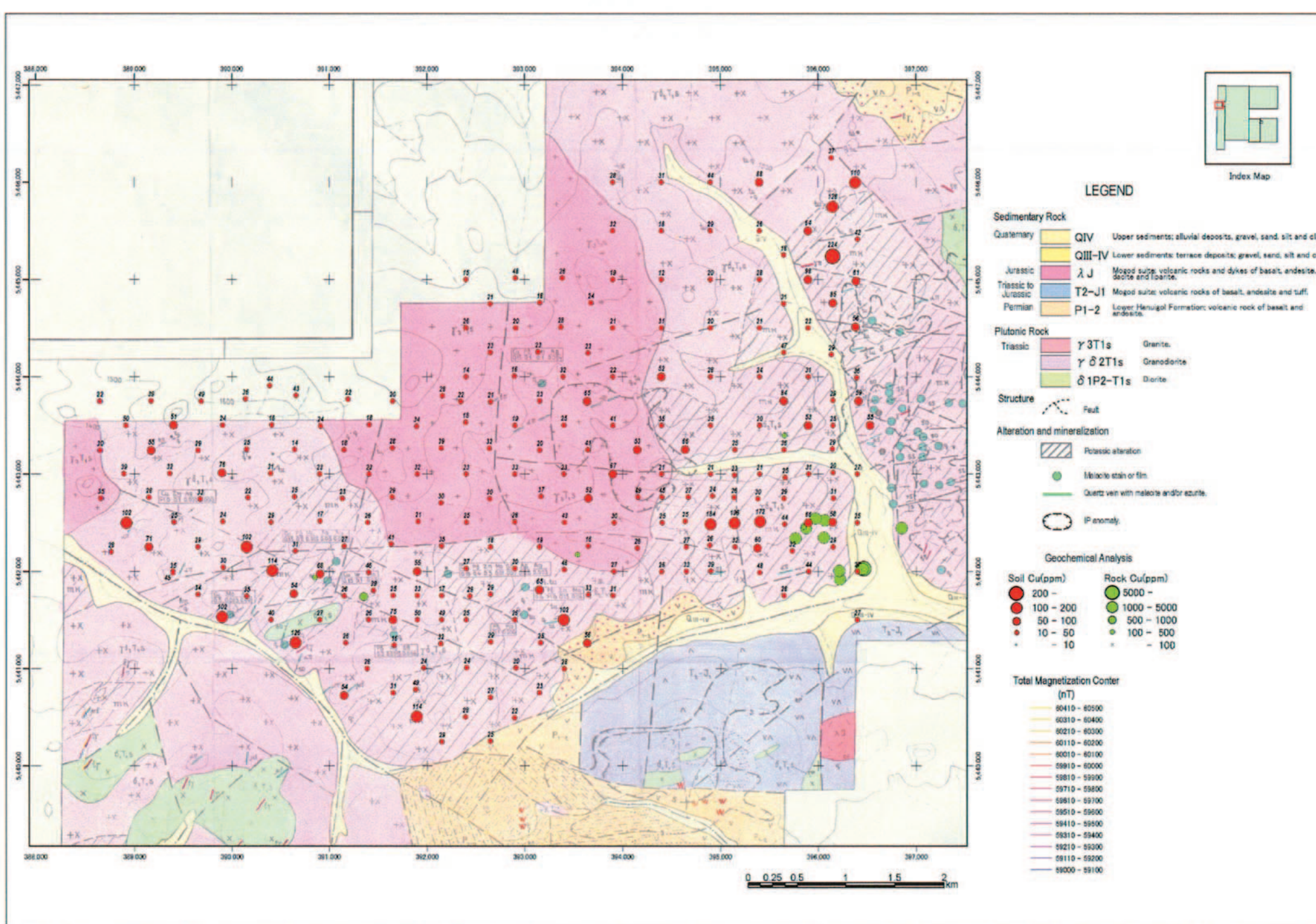
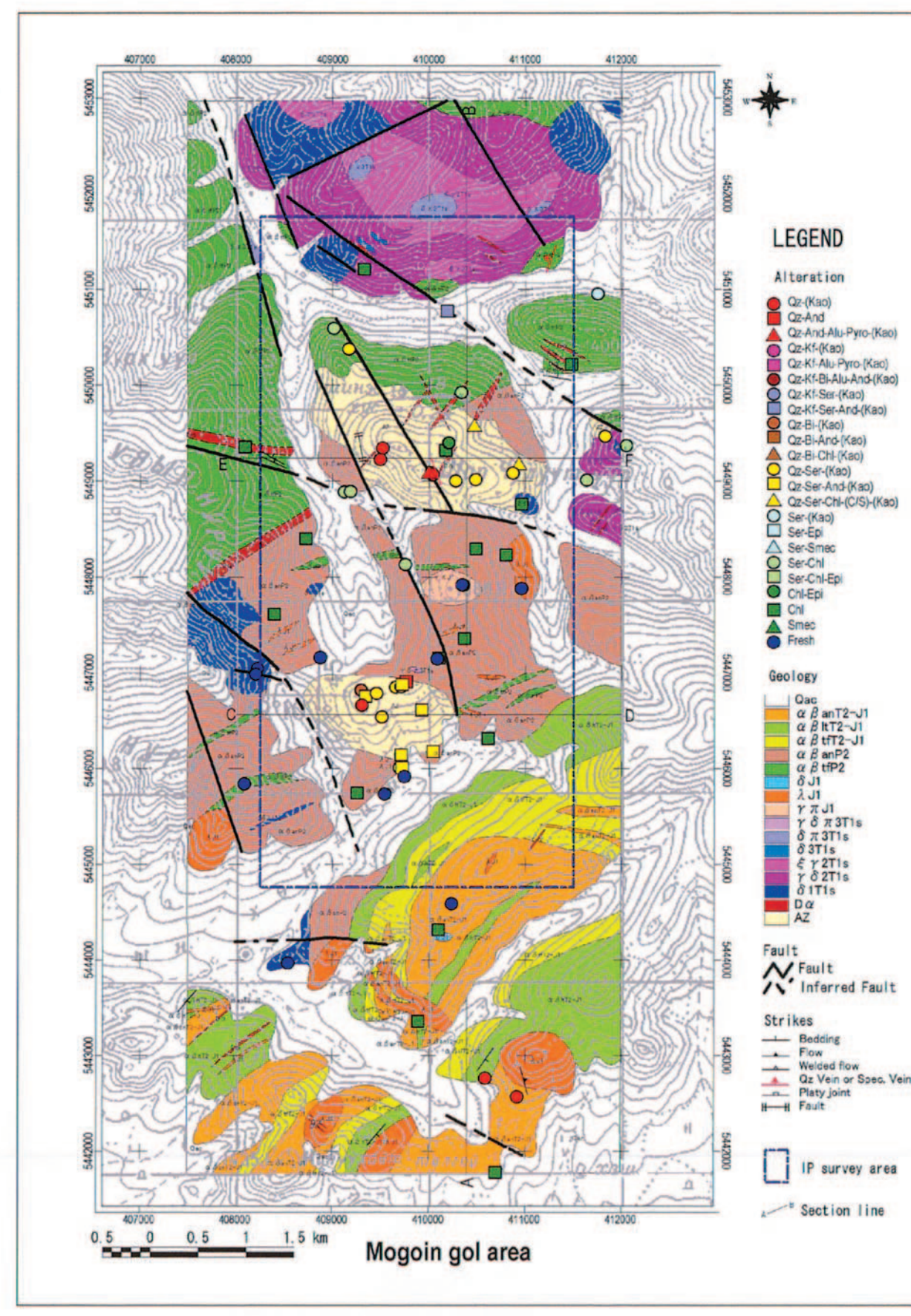
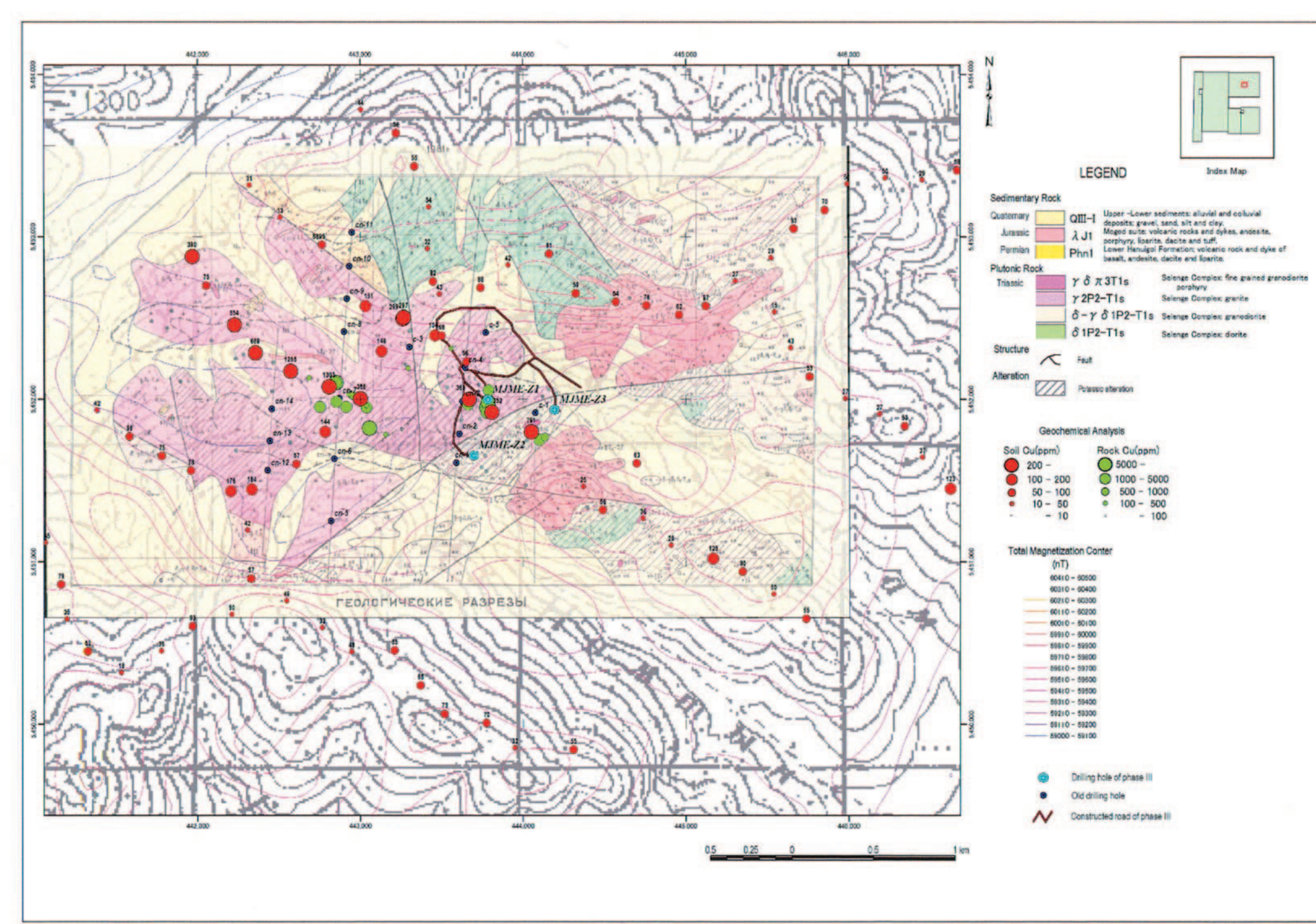
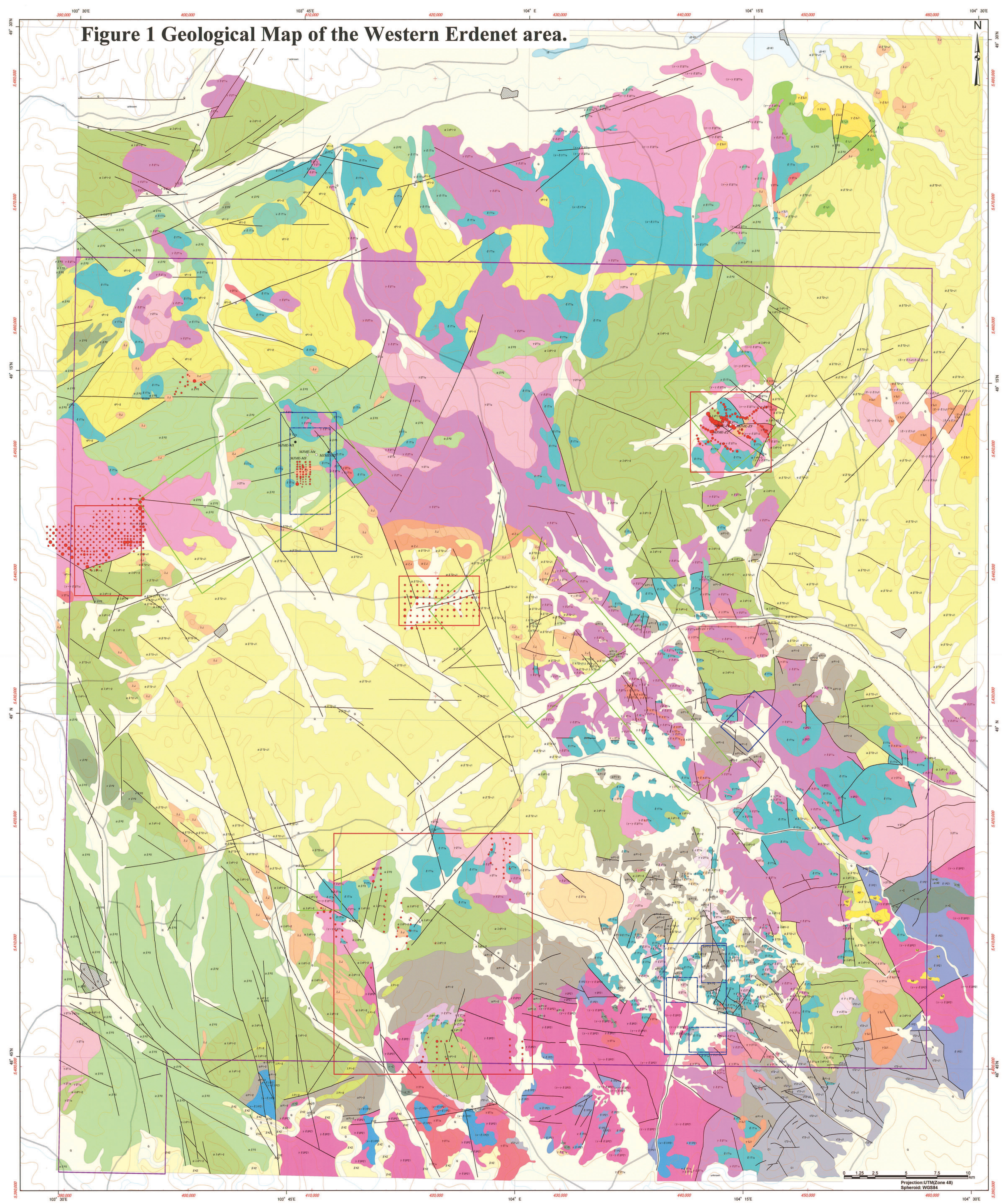
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Plate 2	Compiled geophysical maps and drilling survey results in the western Erdenet area.

Figure 1 Geological Map of the Western Erdenet area.



LEGEND

Geology

CENOZOIC	Q	Quaternary deposits: loam, silt, sand and gravel
	KZ	Cenozoic: basalt
Neogene Tertiary	N2	Pliocene sediments: gravel, sand, silt and clay
JURASSIC TO CRETACEOUS	J2-K1	conglomerate, gravel stone, sandstone
Jurassic to Cretaceous	J2	Jurassic to Cretaceous deposits: conglomerate, gravel stone, sandstone
Lower Jurassic	γ 2 J1	Third phase: fine to moderate grained, leucocratic granite
	γ 2 J2	Second phase: moderate to coarse grained, biotite granodiorite
	γ 2 J3	Second phase: moderate to coarse grained, granite
	(δ 2 - γ 2) J1	First phase: fine to moderate grained, diorite, biotite granodiorite
Jurassic	δ 1 J1	First phase: fine to moderate grained, diorite and gabbro
	λ 1 J	Jurassic subvolcanic rock: rhyolite, andesite-dacite
	α 1 J	Jurassic subvolcanic rock: andesite-dacite
TRIASSIC TO JURASSIC	ε T2 - J1	andesite, andesitic basalt, trachyandesite, trachy-basalt, dacite and tuff breccia, tuff stone, tuffaceous sandstone
Middle Triassic to Early Jurassic	α β T2 - J1	andesite, andesitic basalt, trachy-andesite, trachy-basalt, tuff breccia, tuff stone, tuffaceous sandstone
	λ β T2 - J1	dacite and tuff breccia, tuff stone, tuffaceous sandstone
	γ β T2 - J1	Middle Triassic to Jurassic subvolcanic rocks: gabbro, diabase, diabasic porphyry
Early Triassic	γ δ α 3 T1a	Third phase: fine to moderate grained, granodiorite porphyry
	γ δ α 3 T1b	Third phase: fine to moderate grained, leucocratic syenite granite porphyry
	γ δ α 3 T1c	Third phase: fine to moderate grained, granite nepheline
	γ δ α 3 T1d	Third phase: fine to moderate grained, porphyry, leucocratic diorite granite
	γ δ α 3 T1e	Third phase: fine to moderate grained, porphyry, leucocratic diorite granite
	γ δ α 3 T1f	Third phase: fine to moderate grained, porphyry, leucocratic nepheline granite diorite
	γ δ α 3 T1g	Third phase: fine to moderate grained, porphyry, leucocratic nepheline granite
	γ δ α 3 T1h	Third phase: fine to moderate grained, porphyry, granite
	δ 2 T1a	Second phase: medium grained, nepheline
	δ 2 T1b	Second phase: medium grained, biotite syenite
	γ δ 2 T1a	Second phase: medium grained, biotite granite nepheline
	ε γ 2 T1a	Second phase: medium grained, biotite nepheline granite
	γ δ 2 T1a	Second phase: medium grained, biotite granite syenite
	γ δ 2 T1b	Second phase: medium grained, biotite granite
	γ δ 2 T1c	Second phase: medium grained, biotite granodiorite
	(γ - γ δ 2) T1a	Second phase: medium grained, diorite granodiorite
	δ 1 T1a	First phase: medium to coarse grained, diorite
	γ δ 1 T1a	First phase: medium to coarse grained, diorite, gabbroic diorite
	(γ - δ 1) T1a	First phase: medium to coarse grained, gabbroic diorite
	β 1 T1a	First phase: medium to coarse grained, gabbro
PERMIAN	α β P2	andesite to rhyolite, rhyolite, andesitic tuff, tuffaceous stone, tuff
Late Permian	β P2	Late Permian: Gabbro-diabase, diabase, diabase porphyry, gabbro
	IP1-2	andesite, andesite to basalt, tuffaceous stone
	α P1-2	Lower to upper Permian subvolcanic rocks: rhyolite
	α λ P1-2	Lower to upper Permian subvolcanic rocks: andesitic rhyolite
	α P1-2	Lower to upper Permian subvolcanic rocks: andesite
CARBONIFEROUS	C1	Lower Carboniferous sediments: conglomerate, sandstone and siltstone
DEVONIAN TO CAMBRIAN	γ PZ1	Second phase: granite
Devonian to Cambrian	γ δ PZ1	Second phase: medium to coarse grained, biotite granodiorite
	(γ - γ δ) PZ1	Second phase: medium to coarse grained, biotite granite to granodiorite
	δ 1 PZ1	First phase: medium to coarse grained, diorite
	γ δ 1 PZ1	First phase: medium to coarse grained, gabbroic diorite
	(γ - δ 1) PZ1	First phase: medium to coarse grained, gabbro to diorite
PRECAMBRIAN TO CAMBRIAN	V-C	Rhyolite to Cambrian limestone
UNKNOWN	unknown	unknown geological unit
STRUCTURE		Fault
Soil geochemical analysis Cu(ppm)		
●	≥ 1001 ppm	
●	501 - 1000	
●	201 - 500	
●	101 - 200	
●	51 - 100	
●	21 - 50	
●	< 20ppm	
□	Airborne survey area/Phase I	
□	Geological survey area/Phase I	
□	Geological survey area/Phase II	
□	IP geological survey area/Phase I	
□	IP geological survey area/Phase II	
●	Drilling site(Phase I)	
○	Drilling site(Phase II)	