Table II-2-4 Ore Deposits and Ore-showings in Har-airag District(1)

NAME	MINERALS	TYPE	RESERVE (M.t)	ORE GRADE (%. Au.Ag:g/t)	LOCATION LONGITUDE	LATITUDE	ALT	NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE SUR	TRC	DRL	ADT	EPT	AGE OF DEPOSIT (Ma)	HOST ROCK (youngest)	DISCOVERY AND NOTES
* BOR-UNDUR	CaF_2	Vein Qz-Fl	20.9	CaF_2 39.1 %	109°25′18″ 109°26′16″	46°15′21″ 46°16′19″	1,250 1,333	33	W: 1～18 L: 200～500 H: 100～400	○	○	○	○	○	Cretaceous	Basalt, Qp, Granite	1956 USSR production 210,000t/y CaF_2 32%
* ADAG	CaF_2	Vein Qz-Fl	4.0 ($B+C_1$) + 6.0 (C_2)	CaF_2 40 %	109°19′32″	46°17′44″	1,500	3	4 ×2.800 ×250 Max width 13～18m	○	○	○	○	○	Cretaceous	Granite, Qp	? production 60,000t/y CaF_2 27% ～29 %
* CHOL-TSAGAAN-DEL	CaF_2	Vein Qz-Fl	1.4	CaF_2 40～53 %	107°14′21″	46°55′48″	1,440	8	width: 3～4m length: 100 ～200 ?	○	○	○	○	○	Cretaceous	Phyl. Sch. Dol. Ls	1978 USSR production 60,000t/y CaF_2 40% ～53 %
* HONGOR I II III IV TOTAL	CaF_2	Vein Qz-Fl	0.24 0.66 0.47 1.37	CaF_2 34.0 % CaF_2 29.3 % CaF_2 33.0 % CaF_2 31.4 %	109°44′51″ 109°46′01″ 108°53′58″ 109°15′00″	45°48′17″ 45°48′20″ 45°47′58″ 45°47′35″	1,250 1,220 1,240	1 22 3 2	680×4×65 100×31max 680×6.9 240×5.6	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	○ ○ ○ ○	Jurassic	Sch. Ls. Protero Carbon	1978 USSR closed. 1977-1979 Product 259,729t crude ore
* MAIHANTA I	CaF_2	Vein Qz-Fl	2.89	CaF_2 36.5 %	108°38′20″	45°49′50″	1,190	3	920×0.6～9.5×320	○	○	○ 36 holes	—	—	?	Gns. Ls, Protero.	1971 USSR Abandoned difficulty in ore-dressing
II		Cal-Fl	0.20	CaF_2 33.1 %	108°39′54″	45°51′22″	1,180	1	350×1.2～4.4×130	○	○	○ 6 holes	—	—	?	Grdp, Dio, Grpo, Late Palaeozoic	
* TSAGAAN-TAKHILCH	CaF_2	Vein Qz-Fl	1.82	CaF_2 40.5 %	108°37′36″	45°47′46″	1,215	2	2.000×1.5 x 200	○	○	○	—	—	Jurassic	Gns. Gr, Ls	1971 USSR Abandoned 55 holes 6.800m

Table Ⅱ-2-4 Ore Deposits and Ore-showings in Har-airag District(2)

NAME	MINERALS	TYPE	RESERVE (M.t)	ORE GRADE (%. Au.Ag:g/t)	LOCATION			NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE					AGE OF DEPOSIT (Ma)	HOST ROCK	DISCOVRRY
					LONGITUDE	LATITUDE	ALT			SUR	TRC	DRL	ADT	EPT			
HAMAR-US	CaF_2	Vein Qz-Fl	1.05	CaF_2 47.1 %	110° 10′ 28″	46° 25′ 13″				○	○	○	○	○			Working
DZOON-TSAGAAN-DEL	CaF_2	Vein	1.05	CaF_2 32.1 %	110° 02′ 18″	46° 22′ 12″				○	○	○	○	○			Working
TSAGAAN-ELEGENI	CaF_2	Vein	1.10	CaF_2 46.0 %	30km southeast from Dzoon-Tsagaan-del					○	○	○					
HAJUU-ULAAN	CaF_2	Vein	0.58	CaF_2 39.0 %	109° 52′ 05″	46° 19′ 24″				○	○	○					
BUDJIGER	CaF_2	Vein	0.38	CaF_2 37.9 %	109° 10′ 30″	46° 48′ 25″				○	○	○					
HAILTA	CaF_2	Vein	0.03	CaF_2 47.1 %	109° 21′ 50″	45° 45′ 07″				○	○	○					

高を減じており，標高 1,000m～ 1,200mのなだらかな丘陵地帯を成している。

水系は，ボル・ウンドル北方の分水嶺を境として，南のゴビ低地へ注ぐ水系群と北のケルレン川に注ぐ水系群に分けられる。本地区は降水量が小さいため常時流水のある河川は無いが，谷型は火成岩が多いことを反映して樹枝状を示すものが多い。

2－4－3　気候及び植生

各種の気候指標は，年間平均気温－0.5 ℃～1℃，年間無霜日数 105日から115 日，年間の最高・最低気温はそれぞれ 35.6 ℃及び－38.3℃である。年間降水量は 170㎜～210㎜で，降水量は夏に多く冬に少ない。また，4月と5月の2か月間は特に風が強く，年間24日前後の砂嵐日がある。

植生は，やや乾燥した草原ないし半砂漠となっている。

2－4－4　地質概要

地質は，原生代の各種片麻岩～結晶片岩類，晶質石灰岩，石炭紀流紋岩類，二畳紀花崗岩類，花崗斑岩，花崗閃緑斑岩，ジュラ紀黒雲母花崗岩，白亜紀玄武岩，石英斑岩，アプライト及びアプライト質花崗岩等からなっている。

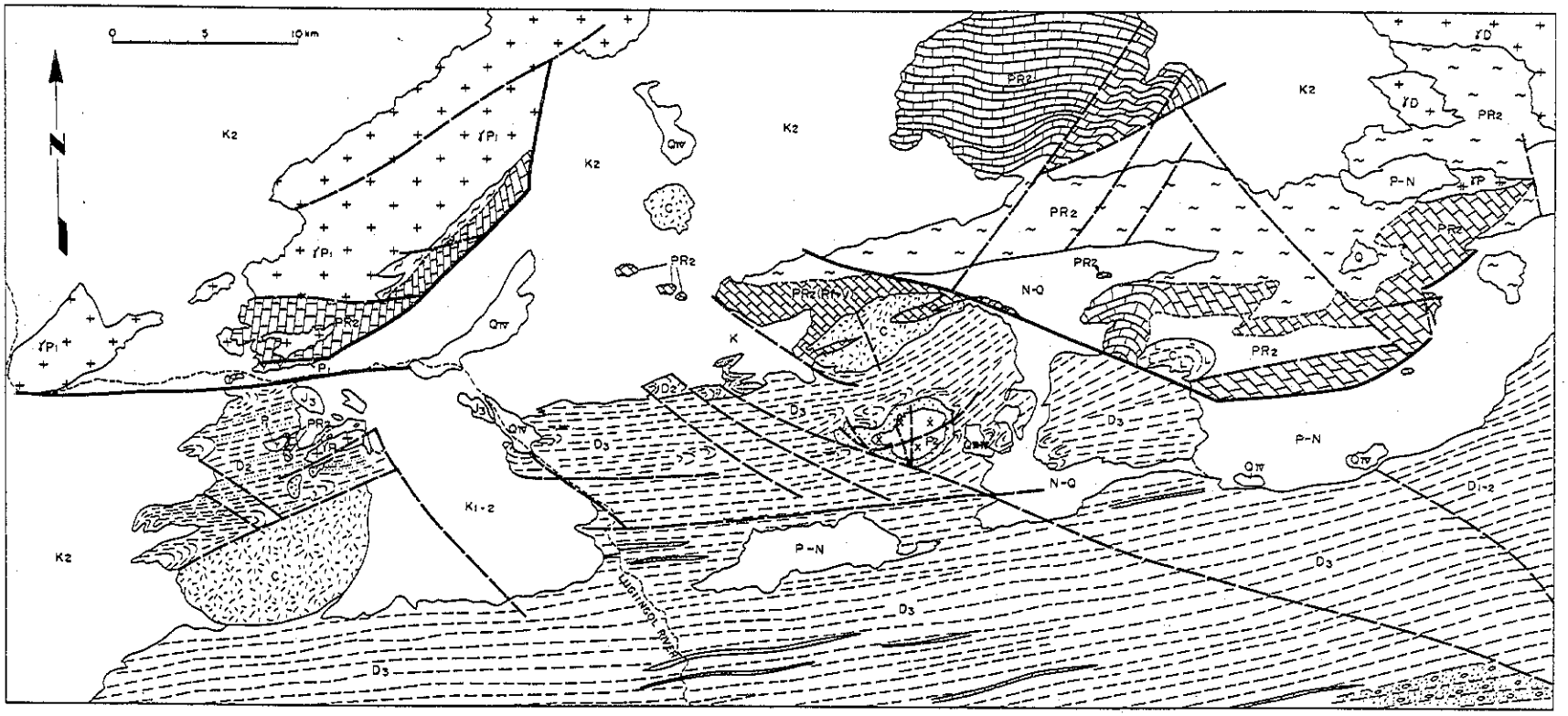
これらの火成活動に伴って，ボル・ウンドル，アダグ，ハル・アイラグ，ホンゴル等，多数の蛍石鉱床が形成されている。最大の鉱床は埋蔵鉱量2,000 万トン以上を有するボル・ウンドル鉱床であり，ハル・アイラグ地区全体では蛍石の総資源量は5,000 万トンに達すると報告されている。

2－4－5　鉱　　床

ハル・アイラグ地区の主要な鉱床は，Table Ⅱ-2-4 のとおりである。

2－4－6　考　　察

ハル・アイラグ地区は，オーダムタル地域の中で最も交通の便が良く，したがって鉱床探査を初めとする地質調査が最も進んでいる地区である。地区内には国内最大の蛍石鉱山であるボル・ウンドルを初めとしてモンゴル国の主要な蛍石鉱床の多くが集中し，一大蛍石鉱床地帯を形成している。しかし蛍石は西側諸国の市場では価格が安く，モンゴル国の地理的な条件を考え合わせると，今後暫くは積極的な探鉱対象鉱物としては取り上げにくいと考えられる。また，あらゆる調査手法を駆使して繰り返し精力的な調査が行われてきたにもかかわらず，これまでに発見された鉱物は蛍石のみであり，今後の調査対象としては取り上げにくい。



LEGEND

- Andesite ~ basalt
- Basalt
- Rhyolite, rhyolitic tuff
- Flysch; siltstone, mudstone, sandstone (Lugiingol Formation)
- Sandstone, mudstone
- Sandstone
- Limestone
- Conglomerate
- Basal conglomerate
- Hornfels
- Limestone ~ marble
- "Gneissose granite", gneiss, amphibolite, "greenstone"
- Granite
- Alkali granite (Olon-Ovoot body)
- "Plagio granite" (Ulaan-Zeeg body)
- Nepheline syenite (Lugiingol body)
- Nepheline syenite with sericitization (Lugiingol body)
- Fault
- Inferred fault

Fig. Ⅱ-2-5-1 Geologic Map of Lugiingol District (phase Ⅰ)

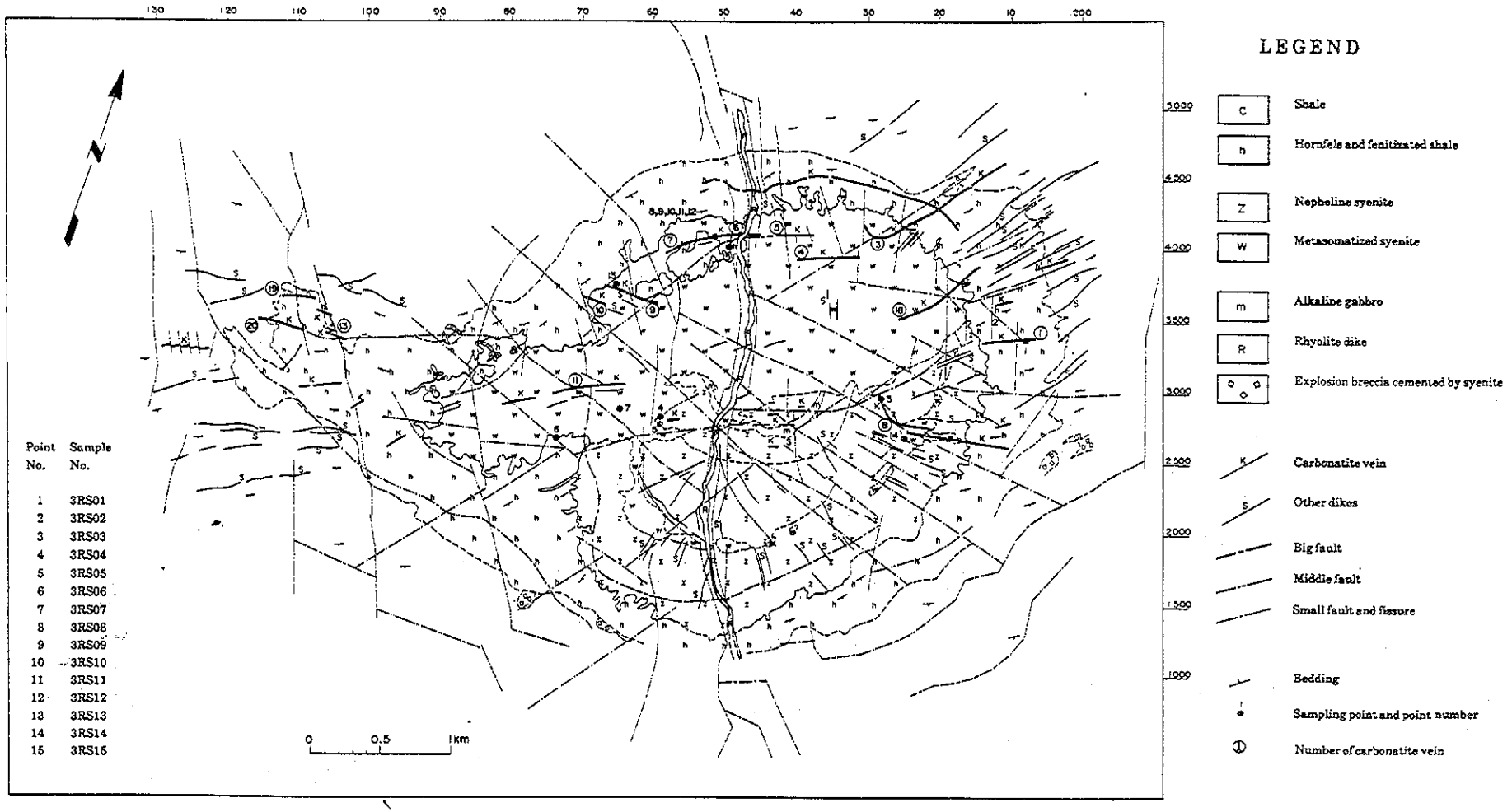


Fig. Ⅱ-2-5-2 Geologic Map of Lugiingol Ore Deposit

Table Ⅱ-2-5 Ore Deposit in Lugiin-gol District

NAME	MINERALS	TYPE	RESERVE (M.t)	ORE GRADE (%, Au.Ag:g/t)	LOCATION			NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE					AGE OF DEPOSIT (Ma)	HOST ROCK	DISCOVRRY
					LONGITUDE	LATITUDE	ALT			SUR	TRC	DRL	ADT	EPT			
LUGIIN-GOL	REE (Carbonatite)	Vein	0.43	TREO 2.86 %	108°35′04′	42°58′38′		60 carbonatite dikes	27~850×0.3×250 max.	○	○	○	—	—	Triassic 237±12 229±11 234±12 239±12 242±12	Alkaline rock complex	left

2－5　ルギーン・ゴル地区

2－5－1　位置・交通

ルギーン・ゴル地区は、モンゴルゴビ砂漠の東南端に位置する東西約70km×南北50kmの区域である。行政的には東ゴビ県ハタン・ブラグ村に属し，県都サインシャンドの南西約240kmに位置する。

ウランバートルからサインシャンドまでは，鉄道と主要道路が通じており，車で片道約10時間で行くことができる。サインシャンドからルギーン・ゴル地区までの約 300km間は，砂漠を車で約７時間半の行程である。

2－5－2　地形及び水系

本地区はゴビ低地の南側に広がる標高 1,040ｍないし 1,140ｍの丘陵地帯である。地形は，埋積された谷と比高約 100ｍの残丘からなり，なだらかな丘陵地帯をなす。

2－5－3　気候及び植生

年間を通じて降水量に乏しく，春先に風が強いため植生に乏しい岩石砂漠となっている。気温は年間を通じて45℃から－40℃付近まで変動する。また４月から６月まではとくに風が強く，年間30日前後の砂嵐日があるなど，気候条件がきびしい。

2－5－4　地質概要

地質は，二畳紀末の頁岩・砂岩及びこれを貫く三畳紀のルギーン・ゴル・アルカリ岩コンプレックスからなる。ルギーン・ゴル鉱床はこのアルカリ岩コンプレックスに伴われるLa,Ce などの軽希土類を主体とする脈状カーボナタイト鉱床である。。

2－5－5　鉱　　床

ルギーン・ゴル地区の主要な鉱床を，Table Ⅱ-2-5 に示す。

2－5－6　考　　察

ルギーン・ゴル鉱床は，平均脈幅 0.3ｍの小規模なカーボナタイト岩脈60条からなる。その総埋蔵鉱量は C_1+C_2 ＝ 436,000 t（TREO＝2.86%）と小規模・低品位であり，現時点では資源的価値は認められない。

なお，ルギーン・ゴル・アルカリ岩コンプレックス中の霞石閃長岩の K-Ar 年代は，228 ±11～234 ±12 Ma であり，三畳紀の初期～中期のものと推定される。

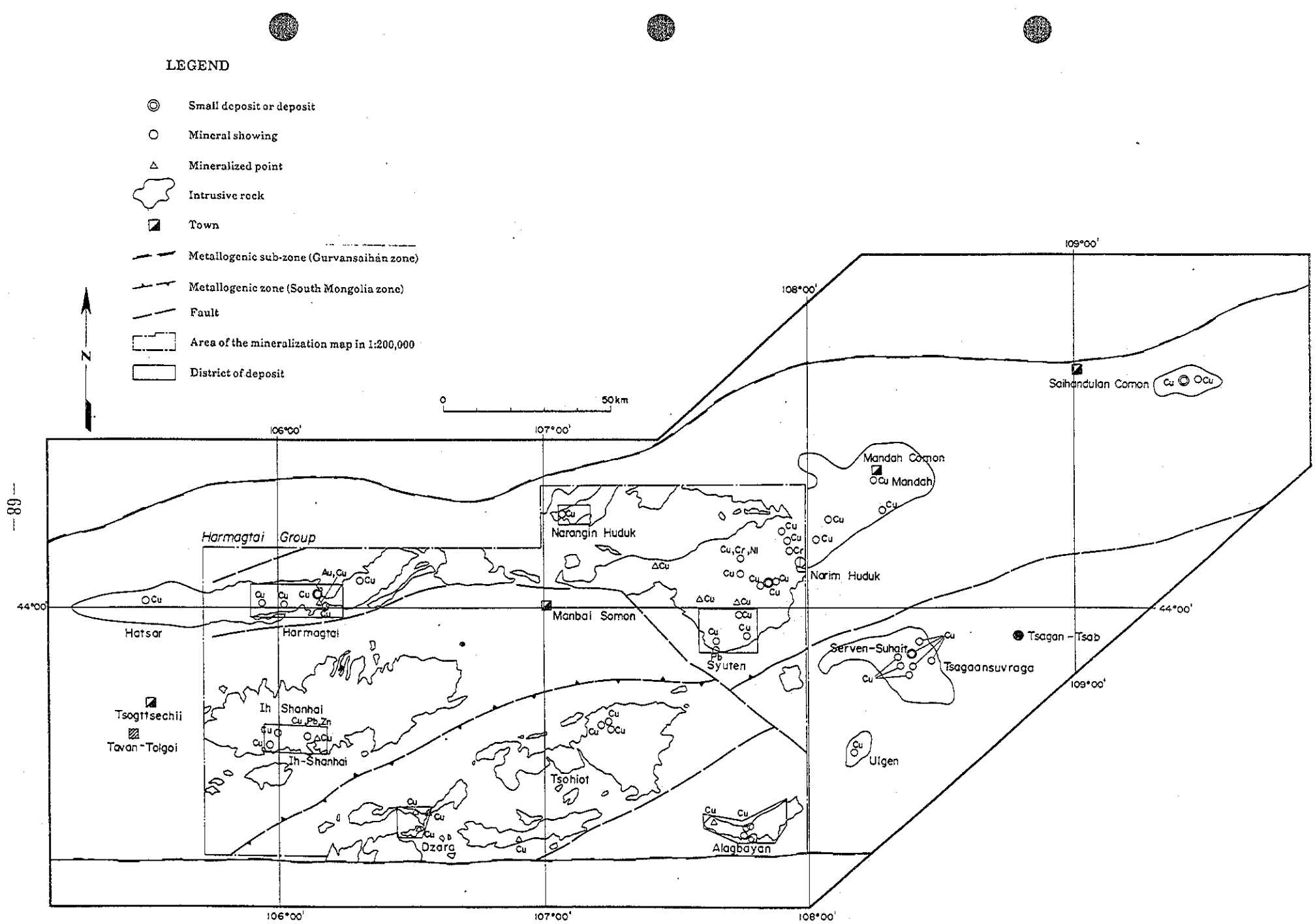
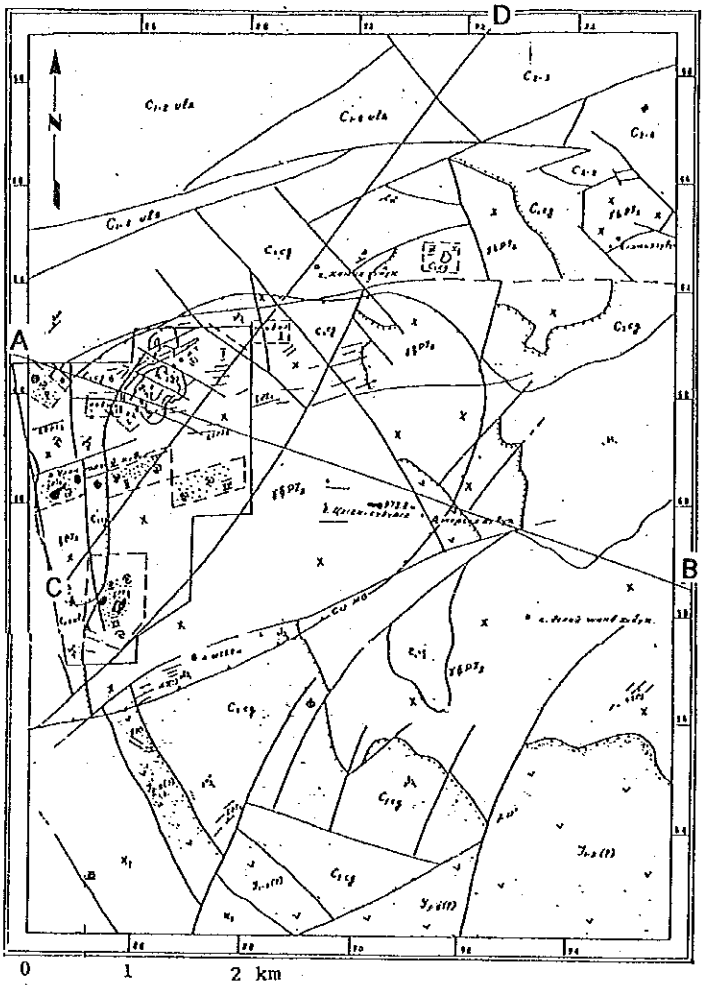


Fig. Ⅱ-2-6-1 Location of Ore Deposits in Tsagaan-suvraga District (phase Ⅰ)



LEGEND

Quarternary

CRETACEOUS

Conglomerate, sandstone, mudstone, siltstone

JURASSIC

Intermediate effusive rocks and tuff

CARBONIFEROUS

Middle - Upper: Conglomerate, arkose, andesitic porphyrite

Lower - Middle: Ulidzei Formation; Conglomerate, sandstone

Lower: Tsagaan-Suvraga Formation: Sandstone, siltstone, syenite, diorite, limestone

JURASSIC(?)

Andesitic porphyry dike

UPPER PALEOZOIC

Keratophyre, syenite - porphyry

Aprite

UPPER PALEOZOIC

Leucocratic granite

MIDDLE PALEOZOIC

Dioritic porphyrite, andesitic porphyrite

Syenite - diorite, "grano-syenite", Syenite

"Quartzose" stock

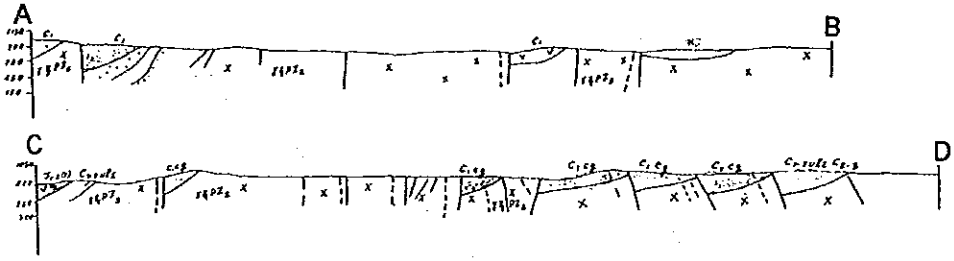
Hydrothermal alteration (silicified, sericitized, K-feldspathization)

1.Fault, 2.Inferred fault

Fossil

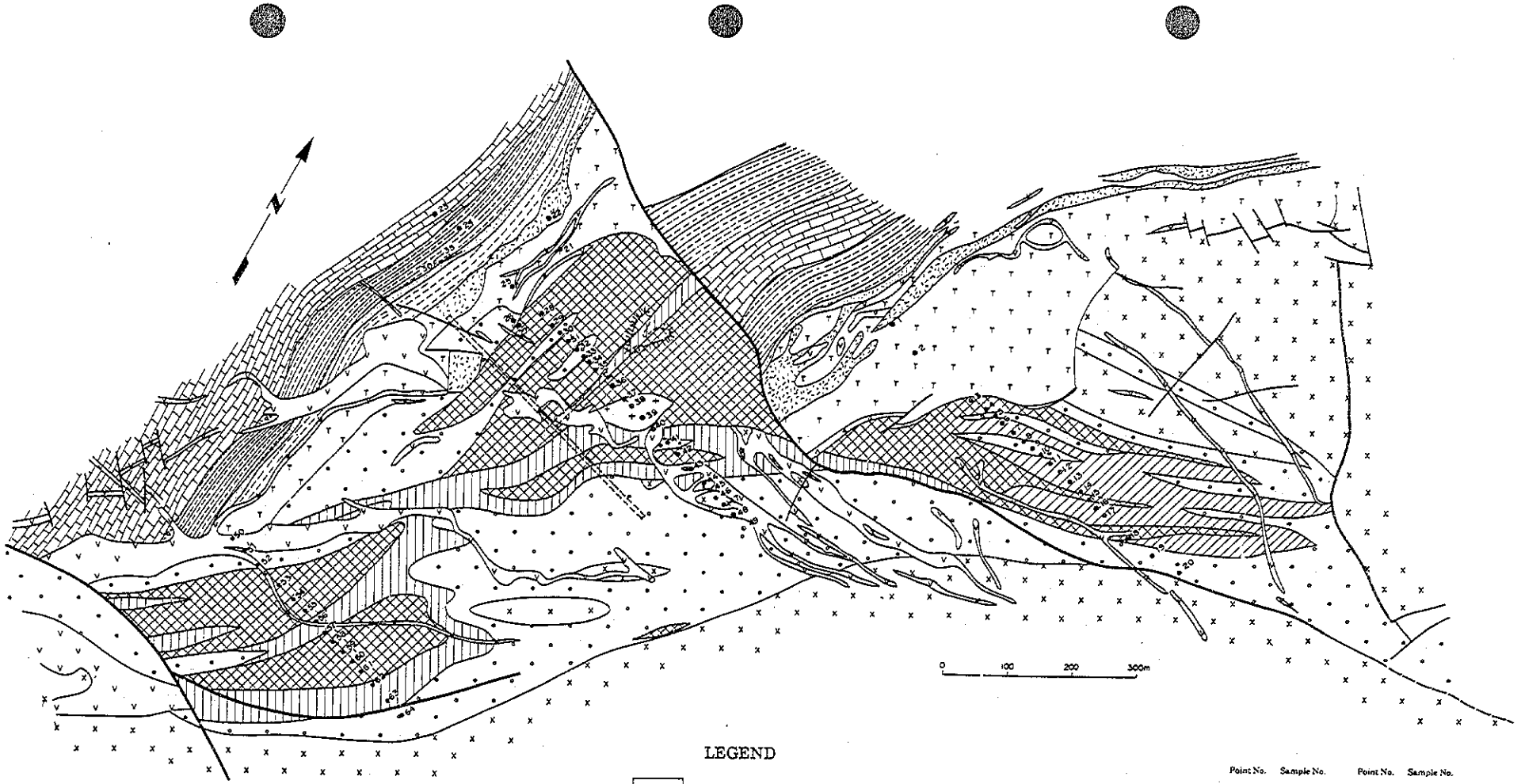
Tsagaan-Suvraga mineralized zone

Mineralization district



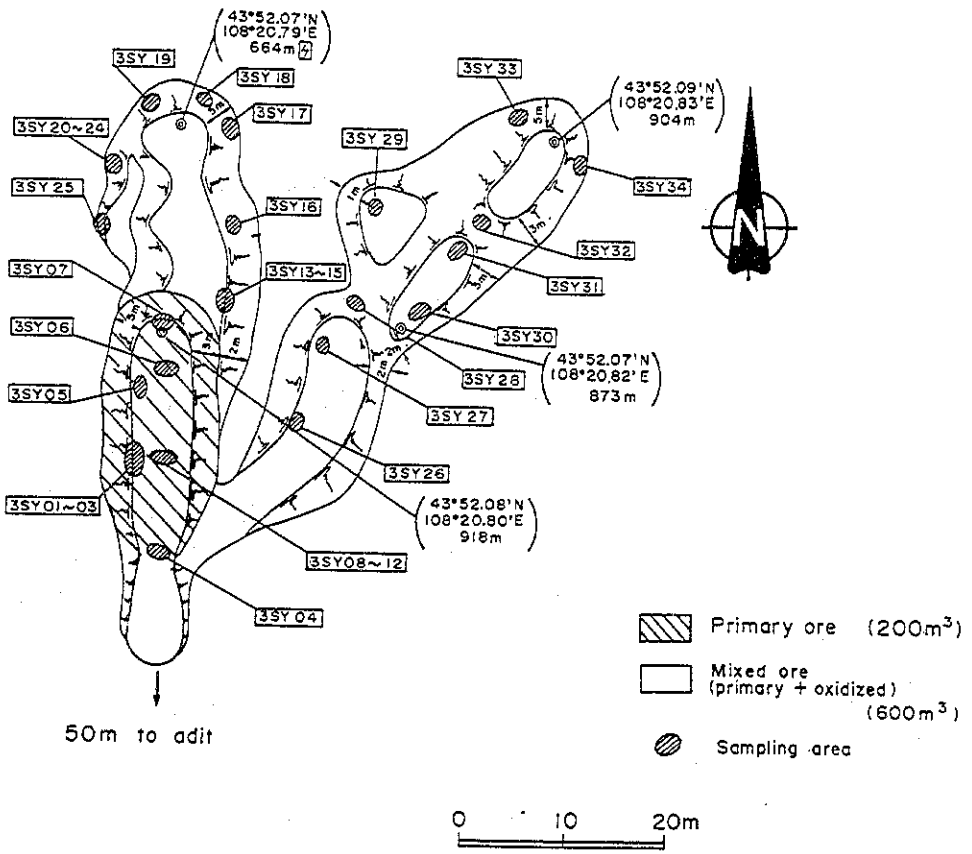
GEOLOGIC CROSS SECTION

Fig. Ⅱ-2-6-2 Geologic Map of Tsagaan-suvraga Ore Deposit



Point No.	Sample No.	Point No.	Sample No.
1	3SN 1	33	3SS 19
2	3SN 2	34	3SS 20
3	3SN 3	35	3SS 21
4	3SN 4	36	3SS 22
5	3SN 5	37	3SS 23
6	2SN 6	38	3SS 24
7	3SN 7	39	3SS 25
8	3SN 8	40	3SS 26
9	3SN 9	41	3SS 27
10	3SN 10	42	3SS 28
11	3SN 11	43	3SS 29
12	3SN 12	44	3SS 30
13	3SN 13	45	3SS 31
14	3SN 14	46	3SS 32
15	3SN 15	47	3SS 33
16	3SN 16	48	3SS 34
17	3SN 17	49	3SS 35
18	3SN 18	50	3SS 36
19	3SN 19	51	3SS 37
20	3SN 20	52	3SS 38
21	3SS 7	53	3SS 39
22	3SS 8	54	3SS 40
23	3SS 9	55	3SS 41
24	3SS 10	56	3SS 42
25	3SS 11	57	3SS 43
26	3SS 12	58	3SS 44
27	3SS 13	59	3SS 45
28	3SS 14	60	3SS 46
29	3SS 15	61	3SS 47
30	3SS 16	62	3SS 48
31	3SS 17	63	3SS 49
32	3SS 18	64	3SS 50

Fig. II-2-6-3 Geologic Map of Serven-suhait Ore Body



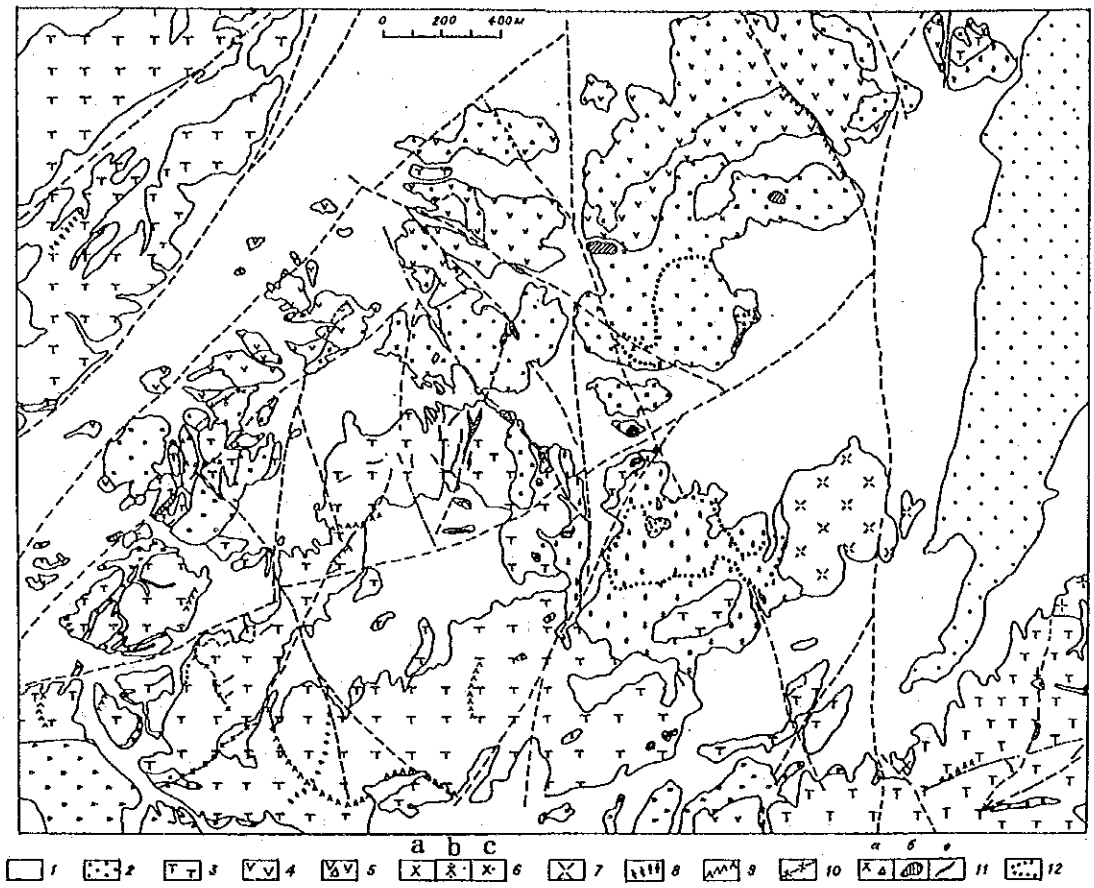
ASSAY OF CHIP SAMPLES FOR MICROSCOPIC OBSERVATION

SAMPLE NO.	Cu %	Mo %	Au ppm	Ag ppm
3 SY 1	3.210	0.079	0.040	16
3 SY 3	0.323	0.001	0.020	<2
3 SY 12	0.980	0.009	0.075	4
3 SY 14	3.250	0.040	0.185	12
3 SY 15	1.005	0.005	0.040	4
3 SY 21	1.090	0.006	0.045	2
3 SY 22	1.125	0.003	0.070	2
3 SY 24	5.040	0.042	0.230	22

ASSAY OF ORE-STOCK PILE

SAMPLE NO.	Cu %	Mo %	Au ppm	Ag ppm
3 SY 4	0.630	0.020	0.130	16
3 SY 5	0.383	0.005	0.025	2
3 SY 6	0.275	0.003	0.035	2
3 SY 7	0.475	0.006	0.035	2
3 SY 8	0.632	0.018	0.065	8
3 SY 13	0.374	0.068	0.025	2
3 SY 16	0.457	0.023	0.025	2
3 SY 17	0.375	0.017	0.040	<2
3 SY 20	0.350	0.025	0.030	<2
3 SY 25	0.400	0.006	0.020	2
3 SY 26	0.483	0.015	0.030	2
3 SY 27	0.376	0.024	0.025	<2
3 SY 28	0.718	0.020	0.050	2
3 SY 29	0.562	0.014	0.020	<2
3 SY 30	0.570	0.012	0.055	<2
3 SY 31	0.480	0.031	0.030	<2
3 SY 32	0.515	0.028	0.020	<2
3 SY 33	0.308	0.047	0.015	<2
3 SY 34	0.475	0.004	0.025	<2
AVERAGE	0.465	0.020	0.037	2.6

Fig. II-2-6-4 Assay of Ore Pile by Grab Samples at Serven-suhait Ore Body



L E G E N D

1 Quaternary sediments

2 Barungoiot formation(K_2), red clay, calcareous sandstone

3 Ugomur formation($D_{1\sim2}$), tuff, tuffaceous sandstone, tuff breccia

4 Andesite

5 Brecciated lava of andesite

6 Diorite porphyry (a, b, c, fine-, medium-, coarse-grained)

7 Granodiorite porphyry

8 Andesite dyke

9 Diorite porphyry dyke

10 Granodiorite porphyry dyke

11 Breccia

a explosion

b quartz-hematite-tourmaline stockwork

c quartz-hematite-tourmaline vein

12 Hydrothermal alteration zone

Fig. Ⅱ-2-6-5 Geologic Map of Harmagtai

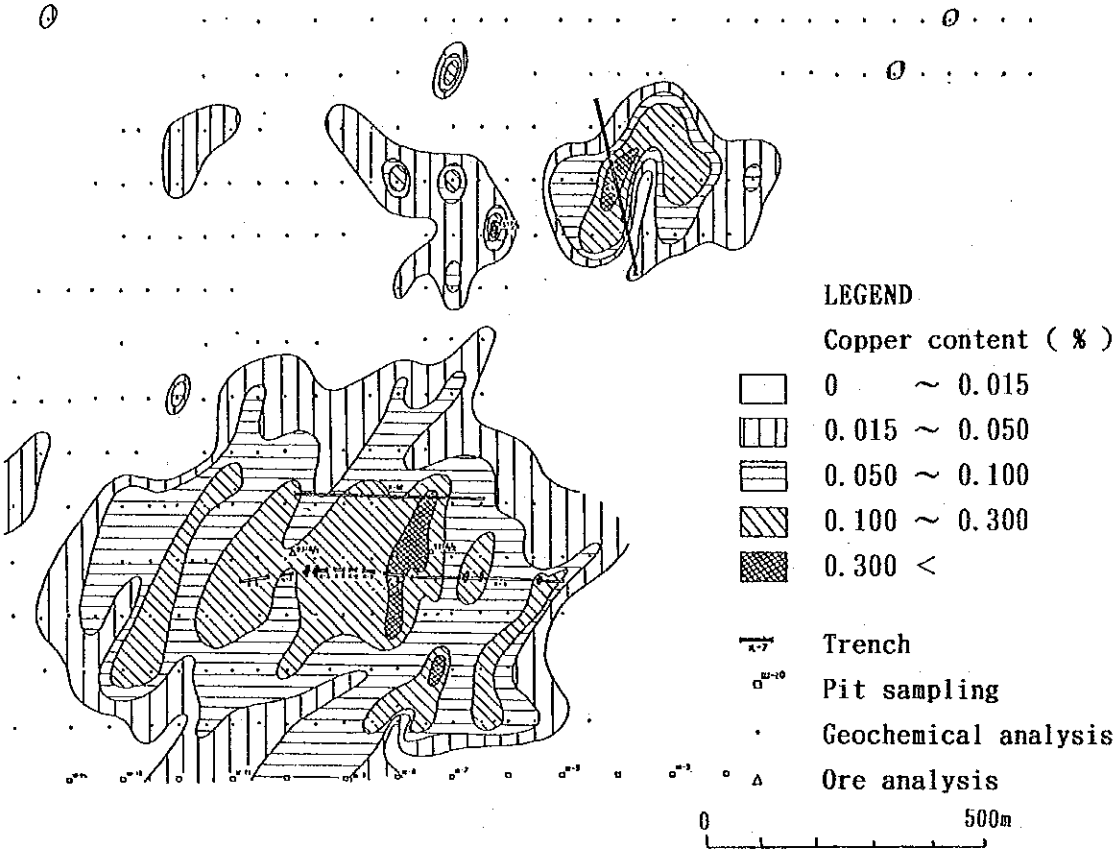
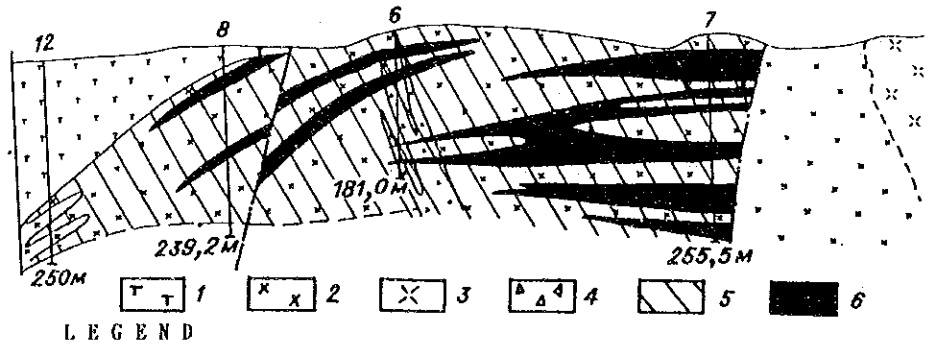


Fig. Ⅱ-1-24 Assay map of the Harmagtai ore deposit



L E G E N D

1 Ugomur formation(D_{1-2}), tuff, tuffaceous sandstone, tuff breccia

2 Diorite

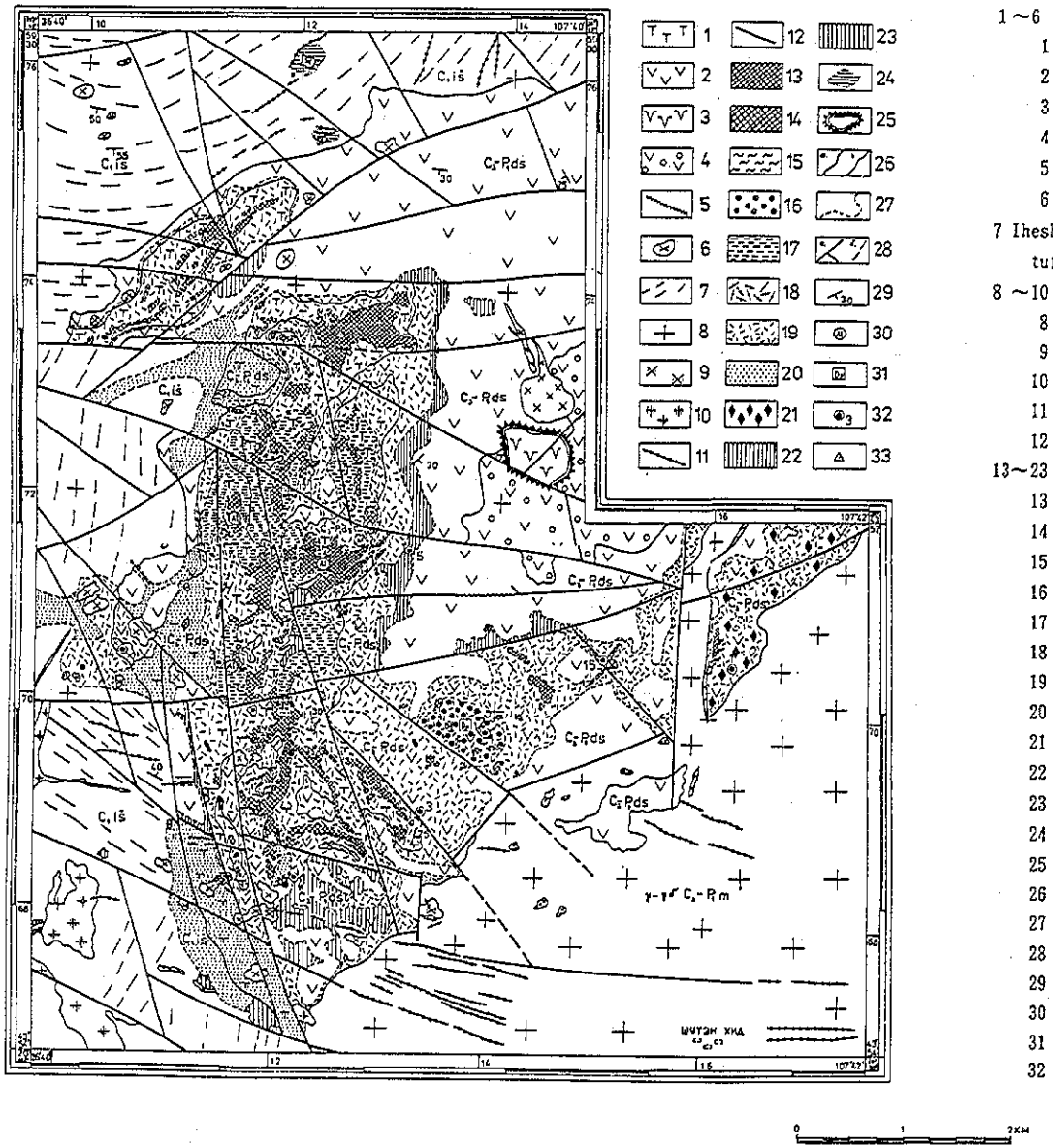
3 Granodiorite porphyry

4 Breccia dyke

5 0.1% ≤ Cu < 0.3%

6 Cu > 0.3%

Fig. Ⅱ-2-6-6 Geologic Profile of the Harmagtai Ore Deposit



L E G E N D

1～6 Dusinob Formation (C_3 ~P_1 ds) :
- 1 Pyroclastic rocks, brecciated lava
- 2 Andesite, andesitic porphyrite
- 3 Andesite (neck)
- 4 Andesitic agglomerate
- 5 Rhyolite-porphyry
- 6 Diorite, "Syeno-diorite porphyrite"

7 Iheshanhai Formation (C_1 is): Eugeosynclinal tuffaceuos sediments and sedimentary rocks

8～10 Intrusive Mantah Complex (C_3 ~P_1 m):
- 8 Granite and granitic rocks(Syuten Mass)
- 9 Diorite
- 10 Granite, syenite-porphyry
- 11 Granodiorite-porphyry
- 12 Quartz vein

13～23 Hydrothermal alteration zones
- 13 Silicified zone
- 14 Ferrous silicified rockzone
- 15 Tourmaline-bearing silicified rock zone
- 16 Quartz-diaspore zone
- 17 Quartz-alunite zone
- 18 Quartz-pyrophyrite zone
- 19 Quartz-sericite zone
- 20 Quartz-clay zone
- 21 Quartz-andalusite zone
- 22 Propyrite zone
- 23 Quartz-tourmaline zone

24 Silicified rocks of Ihesyanhai Formation
25 Center of volcanic activity
26 Geologic boundary
27 Boundary of the alteration zones
28 Fault: a/Assured, b/inferred
29 Strike and dip of bedding
30 Alunite zone
31 Diaspore zone
32 Drilling hole

Fig. Ⅱ-2-6-7 Geologic Map of Shuten

Table Ⅱ-2-6 Ore Deposits and Ore-showings in Tsagaan-suvraga District(1)

NAME	MINERALS	TYPE	RESERVE (M.t)	ORE GRADE (%, Au, Ag:g/t)	LOCATION LONGITUDE	LATITUDE	ALT	NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE SUR	TRC	DRL	ADT	EPT	AGE OF DEPOSIT (Ma)	HOST ROCK (youngest)	DISCOVERY AND NOTES
* TSAGAAN-SUVRAGA	Cu, Mo	Porphy-ry						9	Area: 2km ×3.5 km						339±17 Carboni-ferous	Quartz-monzonite	1964 MPR
No.1		Qz-Ser-K-fel	240.044	Cu 0.53, Mo 0.018	108°20′47″ (Serven-Suhait)	43°51′56″	1.188	1	1980×500 ×>470	○	○	○	○	−		Qz-monz	97 holes
No.2		K-fel	16	Cu 0.32				1	510 × 20	○	○	○	−	−		Qz-monz	2 holes
No.3		K-fel	−	Cu 0.03～0.46				1	600 ×200	○	○	−	−	−		Qz-monz	
No.4		K-fel	14.000	Cu 0.39				1	1180～620 ×90×200	○	○	?	−	−		Qz-monz	
No.5		K-fel	0.737	Cu 0.40				1	180 × 45	○	○	○	−	−		Qz-monz	3 holes
No.6		K-fel	0.050	Cu 0.35				1	470 × 50	○	○	○	−	−		Qz-monz	6 holes
No.7		K-fel	−	Cu 0.08～0.4				1	300 × 12	○	○	−	−	−		Qz-monz	
New No.1		K-fel	0.048	Cu 0.42				1	450 ×300	○	○	○	−	−		Qz-monz	8 holes
New No.2		K-fel	0.160	Cu 0.33				1	400 × 90	○	○	○	−	−		Qz-monz	1 hole
This ore deposit is characterized by the poor 2ndary enrichment of copper.																	
DUCHIN-HURAL	Cu dissem+stock w.	Porphy-ry	2.60	Cu 0.31 :	106°18′00″ 106°20′25″	44°04′30″ 44°05′50″	about 1.000	1	200 ～400 ×5 ～20	○	○	○	−	−	C_3 ～ P_1	An, Grd(C_3 ～ P_1).	1971 MPR 12 holes
HARMAG-TAI	Cu dissem+stock w.	Porphy	139.60	Cu 0.25	106°08′40″	44°01′30″	about 1.000	3	550 ×250 ×>200, 400 ×300 ×>200	○	○	○	−	−	C_3 ～ P1	Diorite-porohyry	1971 MPR 17 holes
IH-SHANHAI	Cu	Porphy	−	Cu 0.01～2.5 Au 0.03～3g/t	106°00′00″	43°40′20″	about 1.000	>3	1500×10, 100 ×30,	○	○	−	−	−	C_3 ～ P1	An, Tf, silt (D_3 ~C_1), Gr, Grd, Grdp(C_3 ～ P_1)	1971 MPR air-borne magne and IP 10km
NARIN-HUDAG	Cu	Porphy	8.60	Cu 0.58	107°11′00″	44°14′10″	1.000	8		○	○	○	−	−	C_3 ～ P1	An, Gd, Dio C_3 ～ P_1	1971 MPR 1/50,000 geol. surv , IP.
• Central				Cu 0.3 ～1.17				6	6 ～23× 100 ～400								
• North				Cu 0.36				1	20×300								
• South				Cu 0.01～0.41				1	50×300								

Table Ⅱ-2-6 Ore Deposits and Ore-showings in Tsagaan-suvraga District(2)

NAME	MINERALS	TYPE	RESERVE (M. t)	ORE GRADE (%. Au. Ag: g/t)	LOCATION			NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE					AGE OF DEPOSIT (Ma)	HOST ROCK	DISCOVRRY
					LONGITUDE	LATITUDE	ALT			SUR	TRC	DRL	ADT	EPT			
OVOOTU-HIRA	Cu	Porphy Qz-stock-work	—	Cu 0.05～0.3 Ag 0.2 ～0.6 Au ≦5g/t	105° 02′ 10′	44° 01′ 05′	about 1.000	2	200 ×300	○	○	○	—	—	C_3 ～ Pl Grdp	D_3 ～ C_1	1971 MPR 14 holes, chem. Mag Trench
SYUTEN	Cu, Au	Sil. zone	12.6	Cu 0.31 Cu 0.33 Cu 0.1 Cu 0.8. Ag 6g/t Cu 0.05～0.15 Cu 0.3 Cu 0.01～2.0	107° 40′ 00′	43° 50′ 00′	1.000	12	200 ×300 200 ×100 30×0.3 60×2 20×5 10×3 300 ×5	○	○	○	—	—	C_3 ～ Pl	ss, sh: C_1 And, Rhy: C_3 ～ P_1 Gr, Dio, Grd Por	1971 MPR
UHAA-HUDAG	Cu	Porphy -ry dissem stockw	— type type	Cu 0.05～3 Ag 0.1 ～12.3	106° 12′ 30′	44° 01′ 45′	1.000	12	200 ×300 2000×600 450 ×350	○	○	○	—	—	C_3 ～ Pl	And, Tuff, Grd(C_3 ～ P_1)	1971 MPR 3 holes

2－6　ツァガーン・スヴラグ地区

2－6－1　位置・交通

ツァガーン・スヴラグ地区は，東ゴビ・中央ゴビ及び南ゴビの３県にまたがる東西約200 ㎞×南北 100㎞の区域である。

本地区を代表するツァガーン・スヴラグ鉱床は，ソ蒙中鉄道まで 180㎞，ダランザドガドまで 320㎞（いずれも直線距離）であり，人影まばらなゴビ砂漠の中に位置する。

ウランバートルから本地区へは，南ゴビ県ダランザドガドから行く方法と，東ゴビ県サインシャンドから行く方法がある。ウランバートルからダランザドガドまでは飛行機で片道約１時間25分の飛行である。ダランザドガドから先は半砂漠～砂漠を車で片道５時間～13時間の行程である。

2－6－2　地形及び水系

本地区は，モンゴル高原の南端部とゴビ低地またがる。地形は，一般に北に高く南に標高を減じている。ゴビ低地はモンゴル南部を北東から南西に伸びる標高 1,000ｍ程度の広大な乾燥した盆地であり，この中に所々標高1,500 ｍ程度までの隆起基盤山地が分布している。

本地区は降水量が小さいため常時流水のある河川は無い。水系は，モンゴル高原から南のゴビ低地へ注ぐ水系群と，ゴビ低地の中に分布する隆起基盤山地の水系群に分けられる。これらはそれぞれその大局的な地形を反映して，前者は平行状，後者は放射状の水系を形成している。谷型は，火成岩地帯では樹枝状，古生代の堆積岩類は格子状，ジュラ系～白亜系は羽毛状を示すものが多い。これらの谷は，夏季の降雨時に一時的に河川となり，下流は蒸発や地下への浸透で消滅するかまたは塩湖に注いで消滅している。

2－6－3　気候及び植生

各種の気候指標は，年間平均気温 3.4℃，年間無霜日数 150日以上，年間の最高・最低気温はそれぞれ 40.8 ℃及び－41.4℃である。年間降水量は70㎜から 120㎜の間で，夏に多く冬に少ない。また，３月から５月までの３か月間は強風が吹き荒れる。

乾燥した気候を反映して植生に乏しく，半砂漠ないし砂漠となっている。

2－6－4　地質概要

地質は，中～上部デボン系ないし下部石炭系とこれを貫く石炭紀から二畳紀前期の花崗岩類及び閃長岩類からなる。石炭紀から二畳紀前期の酸性火成岩類に伴って，東西約 300

km×南北約60kmの範囲にツァガーン・スヴラグ，ハルマクタイ(Harmagtai)，イヒ・シャンハイ(Ih-Shanhai)，シュテン(Shuten)その他のポーフィリー型銅鉱床や鉱徴地が多数分布しており，モンゴル国第２のポーフィリー型銅鉱床帯を形成している。

２－６－５　鉱　　床

ツァガーン・スヴラグ地区の主要な鉱床は，Table Ⅱ-2-6 のとおりである。

２－６－６　考　　察

ツァガーン・スヴラグ地区の主要な鉱床については，1960年代の後半以降，繰り返し種々の手法で精力的な調査が実施されている。

その結果，ツァガーン・スヴラグ鉱床最大のセルベンスハイト(Serven Suhait) 鉱体（鉱量２億４千万トン，Cu 0.53%，Mo 0.018% ）は，ボーリングと坑道によりかなりの探鉱がなされており，黄鉄鉱に乏しく，二次富化帯の発達が微弱であるなどの性格が明かとなっている。したがって，本鉱床は探鉱余地に乏しい。その他の鉱床についても銅については比較的良く探鉱されている。その結果，いずれも鉱量・品位・インフラ・鉱質等の点で問題があり，現時点での開発は困難であろうと考えられる。

一方，上記の調査によりシュテン，ハルマクタイ，イヒ・シャンハイ，オボート・ヒラ等の鉱徴には金の産出が知られている。とくにシュテンは，その変質帯の性質が浅熱水性～温泉性金鉱床のそれに酷似しており，銅鉱床としてよりもむしろ金を対象とした調査と再評価が必要と考えられる。

２－７　ウルジート地区

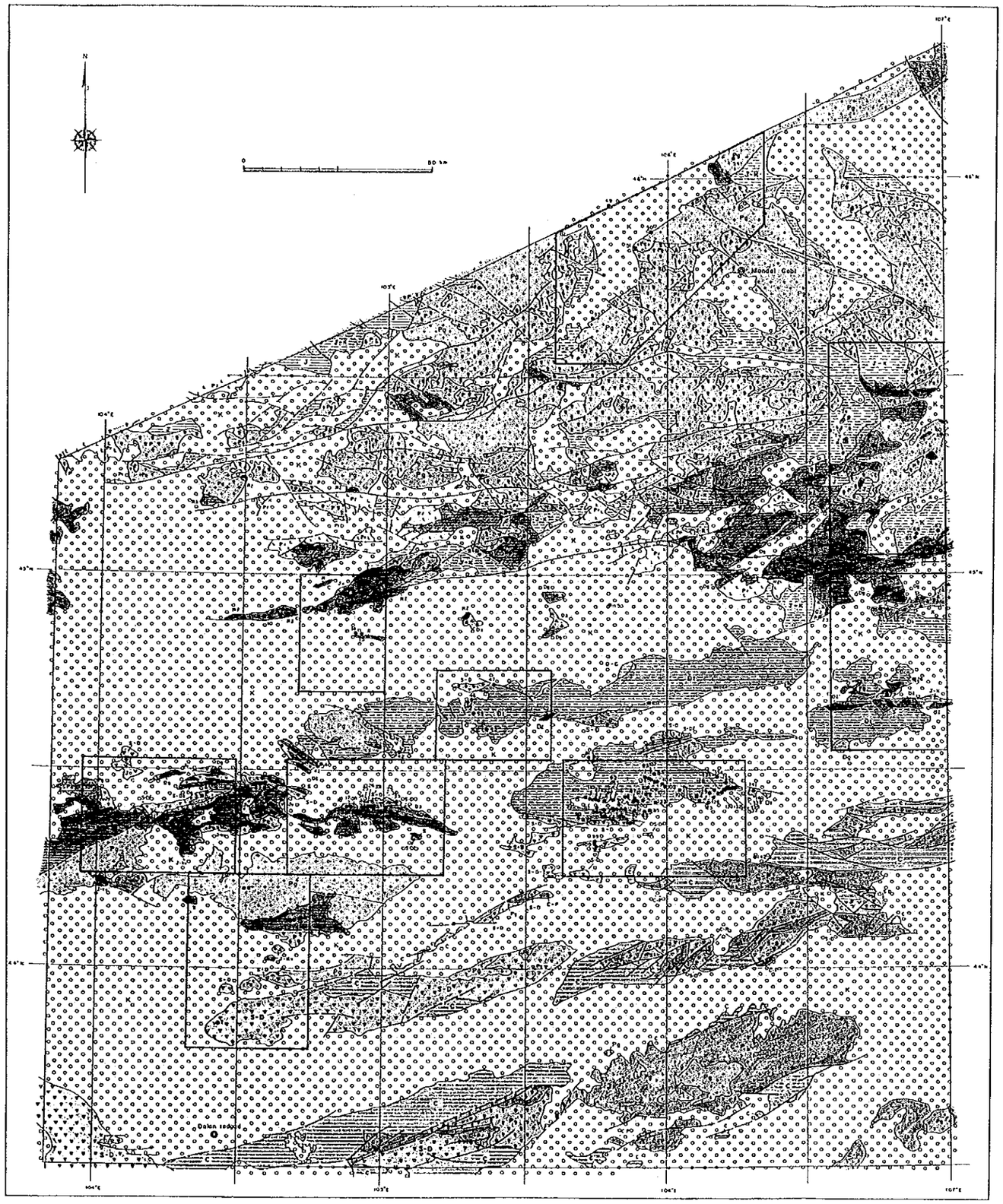
２－７－１　位置・交通

第１年次調査のウルジート地区は，東ゴビ・中央ゴビ及び南ゴビの３県にまたがる東西約 250km×南北80kmの区域である。

第２年次調査のウルジート地区は，第１年次調査のツァガーン・スヴラグ地区の一部を含む東西約 250km×南北 250kmの区域である(Fig. I-1-1)。

本地区の基点となるオロン・オボートは，ウランバートルから 460km，ダランザドガドから 120kmであり，人口稀薄なゴビ砂漠の中に位置している。

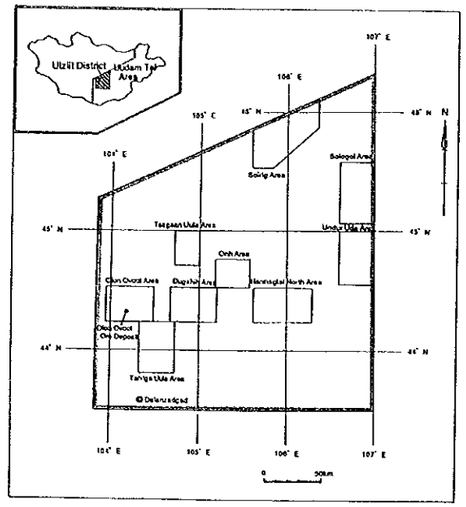
ウランバートルから本地区へは，直接車で行く方法と，南ゴビ県ダランザドガドから行



PL. II – 1 – 1

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Ulziit District



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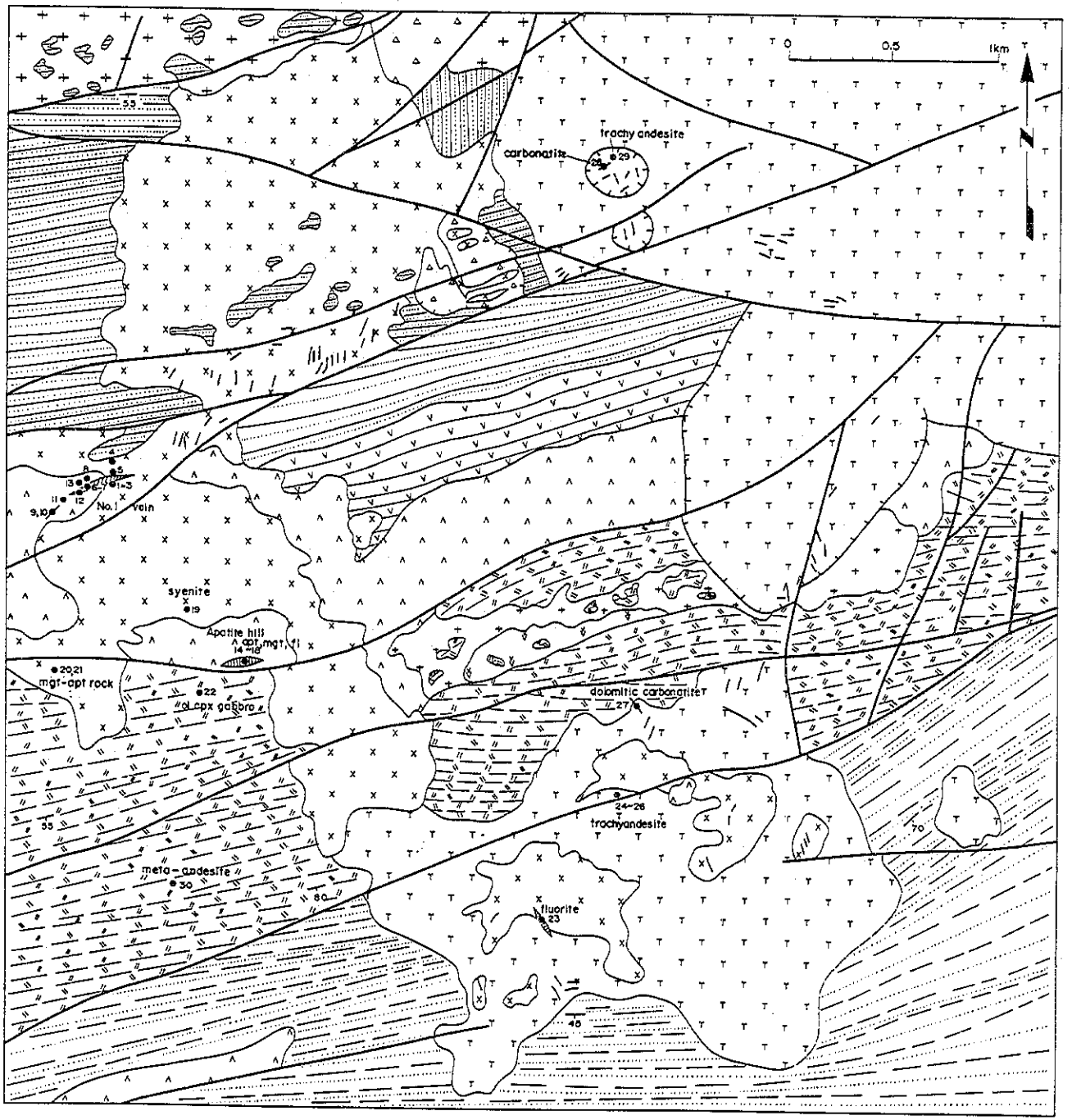
LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Tertiary	Tv		olivine basalt, tuff
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D3		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1		sandstone, shale, siltstone
Silurian-Devonian	S-D3		limestone
	S-D		dacite, rhyolite, andesite, tuff
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	R3		limestone
	R		quartzite, phyllite, sandstone, gneiss, amphibolite
Intrusive Rocks	P1		granite, granosyenite
	Pr		rhyolite, rhyolitic breccia, quartz porphyry
	D1		granite, granodiorite

● ore showing

K	unit name and boundary
T	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

Fig. II-2-7-1 Geology and Location of the Survey Areas of the Ulziit District (phase II)

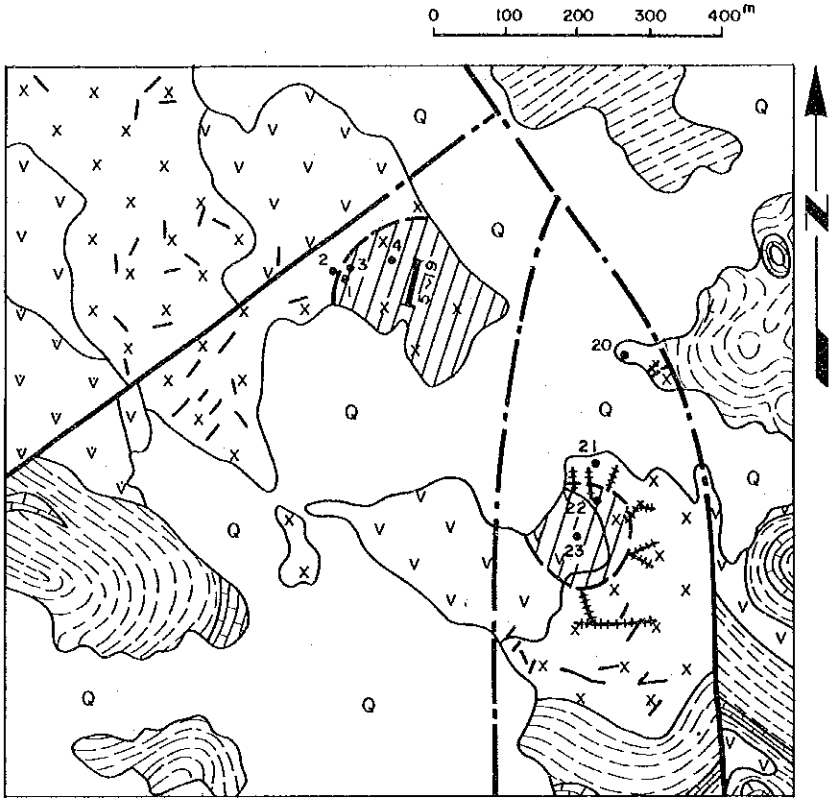


LEGEND

J3ul	Upper Jurassic (Ulgei F.)		Trachyte, leucocratic trachyte Conglomerate, volcanic breccia
D1ir2	Lower Devonian (Irtishsyanburul F.)		Sandstone, siltstone, limestone, conglomerate
D1ir1			Acidic tuff, shale, sandstone, limestone
S2-D1mh	Middle Silurian ~ Lower Devonian (Manhaasal F.)		Rhyolite, dacite, acidic tuff, conglomerate, sandstone
S1-2ma	Middle ~ Lower Silurian (Mandalobia F.)		Sandstone, siltstone, limestone, conglomerate
μpD1	Early Devonian		Dacite
ξJ3	Late Jurassic		Syenite, melano-syenite
γP1	Early Permian		Leucocratic porphyritic granite
γD2	Middle Devonian		Plagio-granite
νD2			Mdg gabbro
			Carbonatite vein
			Circular structure
			Fault
			Sampling point and number

Point No.	Sample No.	Point No.	Sample No.
1	3US01	16	3US16
2	3US02	17	3US17
3	3US03	18	3US18
4	3US04	19	3US19
5	3US05	20	3US20
6	3US06	21	3US21
7	3US07	22	3US22
8	3US08	23	3US23
9	3US09	24	3US24
10	3US10	25	3US25
11	3US11	26	3US26
12	3US12	27	3US27
13	3US13	28	3UN18
14	3US14	29	3UN19
15	3US15	30	3UN20

Fig. Ⅱ-2-7-2 Geologic Map of Mushgia-hudag



Point No.	Sample No.
1	3US 81
2	3US 82
3	3US 83
4	3US 84
5~19	3US 85~99
20	3US 100
21	3US 101
22	3US 102
23	3US 103
24	3US 104

LEGEND

Quarternary
- Q — Alluvium and Diluvium

Late Jurassic
- Conglomerate, sandstone, siltstone
- Limestone
- Rhyolite, acidic tuff
- Trachyte, trachytic tuff
- Syenite
- Stockwork of carbonatite and celestite

- Carbonatite vein
- Quartz vein
- Fault
- Concealed fault
- Trench
- 1 — Sampling point and number

Fig. Ⅱ-2-7-3 Geologic Map of Bayan-khushuu

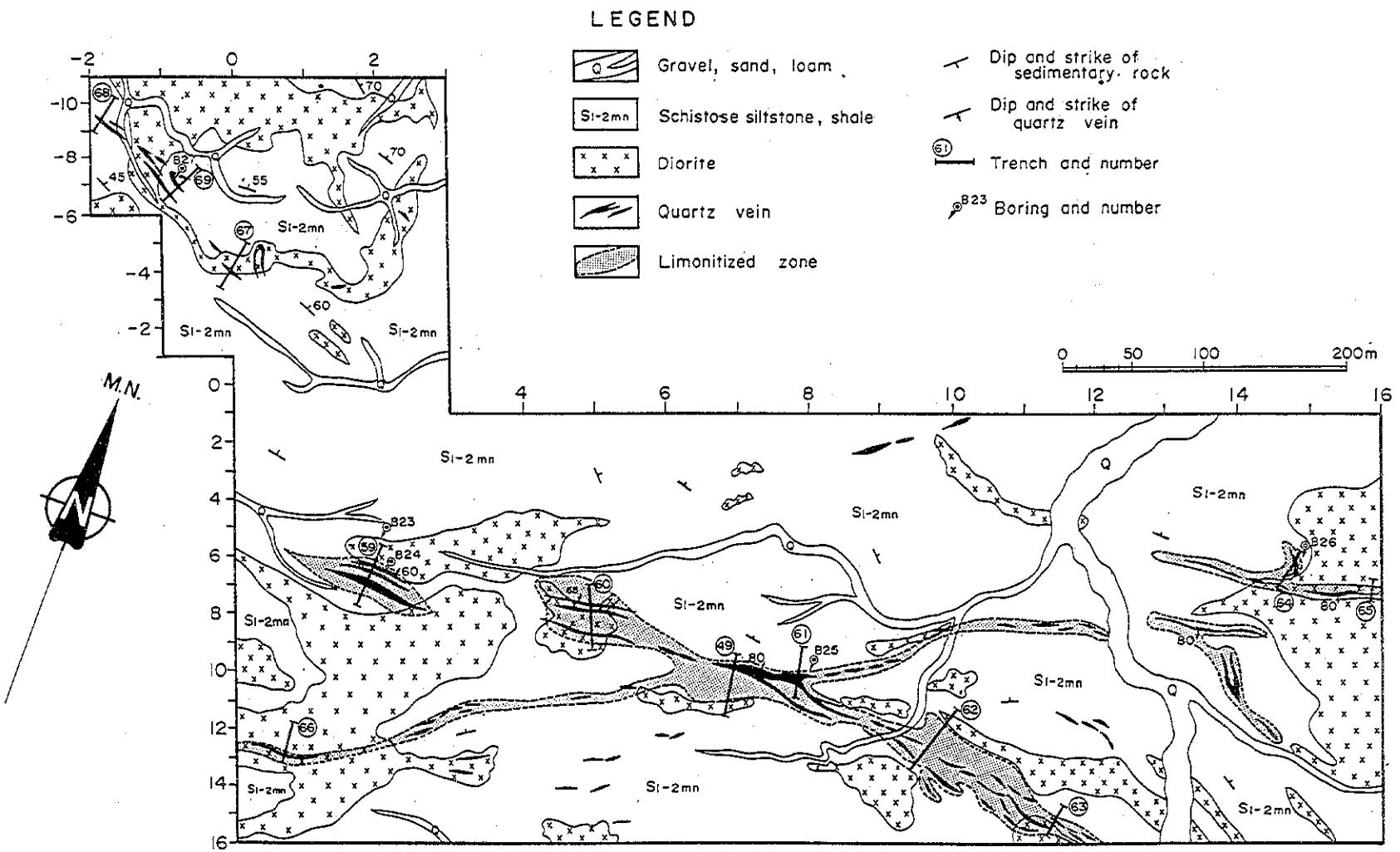


Fig. II-2-7-4 Geologic Map of the Olon-ovoot

Table Ⅱ-2-7 Major Ore Deposits and Ore-showings in Ulziit District(Phase Ⅰ)

NAME	MINERALS	TYPE	RESERVE (M.t)	ORE GRADE (%, Au, Ag:g/t)	LOCATION LONGITUDE	LATITUDE	ALT	NUMBER OF ORE BODY	SIZE OF ORE BODY (m)	EXPLORATION STAGE SUR	TRC	DRL	ADT	EPT	AGE OF DEPOSIT (Ma)	HOST ROCK	DISCOVRRY
* MUSHGIA-HUDAG	REE	Car-bona-tite	398.000	TREO 1.53	104°00′16′	44°23′41′	1.160	>50	Area: 1700×500	○	○	○	−	−	132±7 (C_1)	Syenite. Syenite-porphyry	1974-1977 USSR/MPR Ore re-serve de-creased now.
	Apatite type		44.500	TREO 3.37					50×300 max.								
	Carbonate	type	353.500	TREO 1.30													
* BAYAN-HUSHUU	Sr celestite	Msv. Stock work	0.700	SrO 40 ～50	104°21′19′	44°20′17′	1.129	1	80×100 ×80	○	○	○	−	−		Rhy, Rhytic -tuff, Dio. Dio-por (J_3)	1976 USSR 20 bore holes
* OLON-OVOOT	Au	Qz-V + Netw	0.700 ?	Au 3.3g/t	104°09′44′	44°22′28′	1.205	6	50～100 <25× >50	○	○	○	−	−	283±14, 301±15	Ss, Sh(S-D) Dio(D)	1990 MPR under ex-ploration
* HORIMT-HUDAG	Au	Qz-V	−	max 16.5 g/t Au	104°06′40′	44°20′58′	1.200	7	2×200 max.	○	○	○	○	−	?	Ss, Sh(S-D)	1979-1982 USSR. 2 bore-holes
* DUGSHIH	Au	Qz-V	−	0.03 g/t Au (2 pcs) = Treshinii	104°55′48′	44°24′29′	1.284	several veins	0.6 ×30 max.	○	○	−	−	−	?	Ss, Sh(S-D) Diorite	1979-1982 USSR.
* ONH	Au	Qz-V	−	≦ 0.04 g/t Au (13 pcs)	105°22′29′	44°36′12′	1.260	vein-swarm area: 2,500	1 ×50～ 200 max. × 600	○	○	−	−	−	?	Ss, Sh, Gab, Rhy (S-D)	1979-1982 USSR. 5 trenches
* BAYAN-BOR-NURUU	Au	Qz-V	−	≦ 0.06 g/t Au	104°53′06′	44°24′25′	1.275	vein-swarm about 100 area: 360	0.1 ～1.5 ×100 max. veins × 60	○	○	−	−	−	?	Ss, Sh(S-D) Diorite	1979-1982 USSR

く方法がある。ウランバートルから直接車で行く場合は，ベースとなるオロン・オボートまで片道約16時間を要する。ウランバートルからダランザドガドまでは飛行機で片道約1時間25分の飛行である。ダランザドガドーオロン・オボート間は，車で約3時間の行程である。

2－7－2　地形及び水系

本地区はモンゴル高原の西端に位置し，地形的には，白亜系が分布する標高 1,100m程度の低地と，これより 100m～ 200m高い古生層を主とする隆起基盤岩山地からなる。隆起基盤岩山地は，一般にやや起伏に富む丘陵地をなしている。

本地区は降水量が小く河川は無い。水系は，火成岩地帯では樹枝状，古生代の堆積岩類は格子状，ジュラ系～白亜系は羽毛状を示すものが多い。これらの谷は，降雨時にのみ一時的に河川となり，下流は蒸発や地下への浸透または塩湖に注いで消滅している。

2－7－3　気候及び植生

気候は砂漠気候に属し，年間を通じて乾燥している。各種の気候指標は，年間平均気温3℃～ 4.5℃，年間無霜日数約 130日，年間の最高・最低気温はそれぞれ 37.5 ℃及び－36.5℃である。年間降水量は80㎜から 120㎜の間で，夏に多く冬に少ない。また，4月と5月の2か月間は特に風が強く，年間約40日の砂嵐日がある。

植生に乏しく，地区の北部は半砂漠，南部は山地は岩石砂漠，低地は土漠となっている。

2－7－4　地質概要

地質は，上部原生界，上部シルル系・下部デボン系・上部石炭系及び二畳系等の古生界と，これを貫き，覆う三畳系，不整合に覆うジュラ系，白亜系からなる。石炭紀から二畳紀前期の酸性火成活動に伴って形成された多数の金鉱徴が存在するほか，ジュラ紀末～白亜紀初期の酸性火成活動に伴ってカーボナタイト鉱床やストロンチウム鉱床が形成されている。

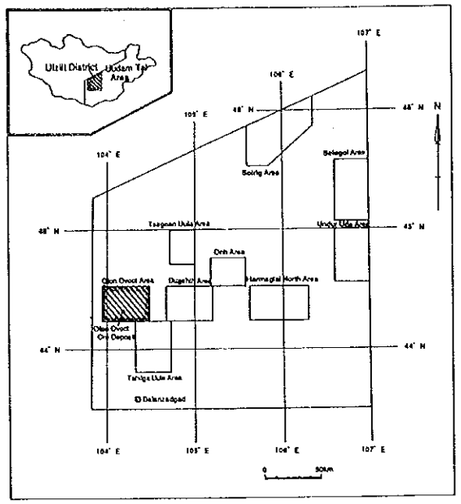
2－7－5　鉱　　床

本地区には，オロン・オボート鉱床をはじめとする多数の金鉱徴地が存在するほか，カーボナタイト鉱床（ムシギア・ホダク），ストロンチウム鉱床（バヤン・ホショー），螢石鉱床など種々の鉱床が存在する。主要な鉱床を，Table Ⅱ-2-7 に示す。

一方，第2年次調査の地質概査結果，ゴビ地域には，多数の大規模な金鉱徴が存在することが確認された。第2年次調査で確認した鉱徴を，Table Ⅱ-2-7-1 ～Table Ⅱ-2-7-9 に

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Olon Ovoot Area



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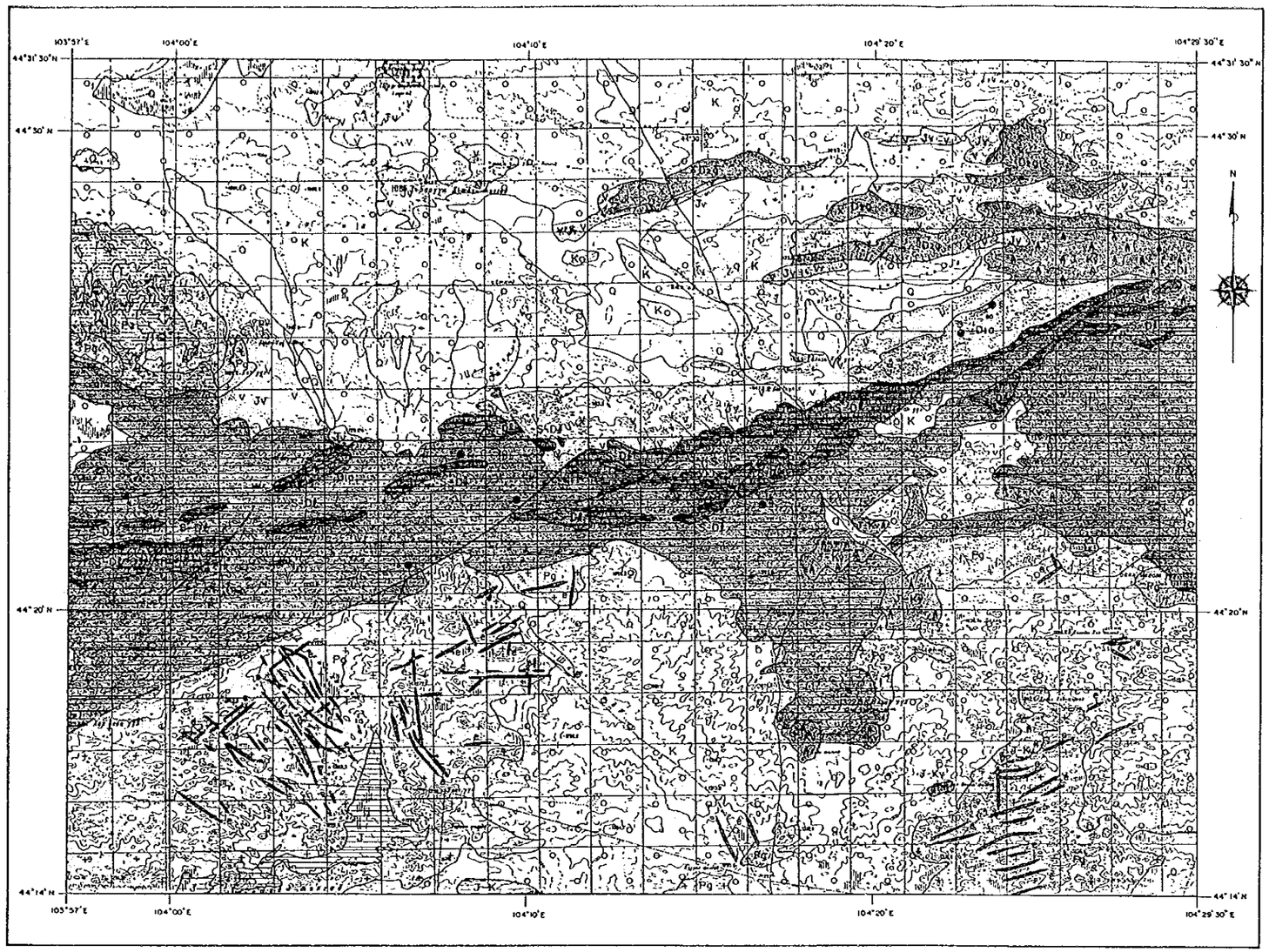
JANUARY 1993



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2f		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1f		limestone
	D1h		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone

Silurian-Devonian	S-Df	limestone
	S-D	dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S	sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ	sandstone, siltstone, clayey shale
Ripheian	Rf	recrystallized limestone
	R2	quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2	shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	e	granodiorite porphyry
	d	diorite, microdiorite, diorite porphyry
	Pg	granite, granosyenite
	Pr	rhyolite, quartz porphyry
	C-Pg	granite, granodiorite, granosyenite, diorite
	D2g	granite, granodiorite
	D2d	diorite, gabbro
	D1r	rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

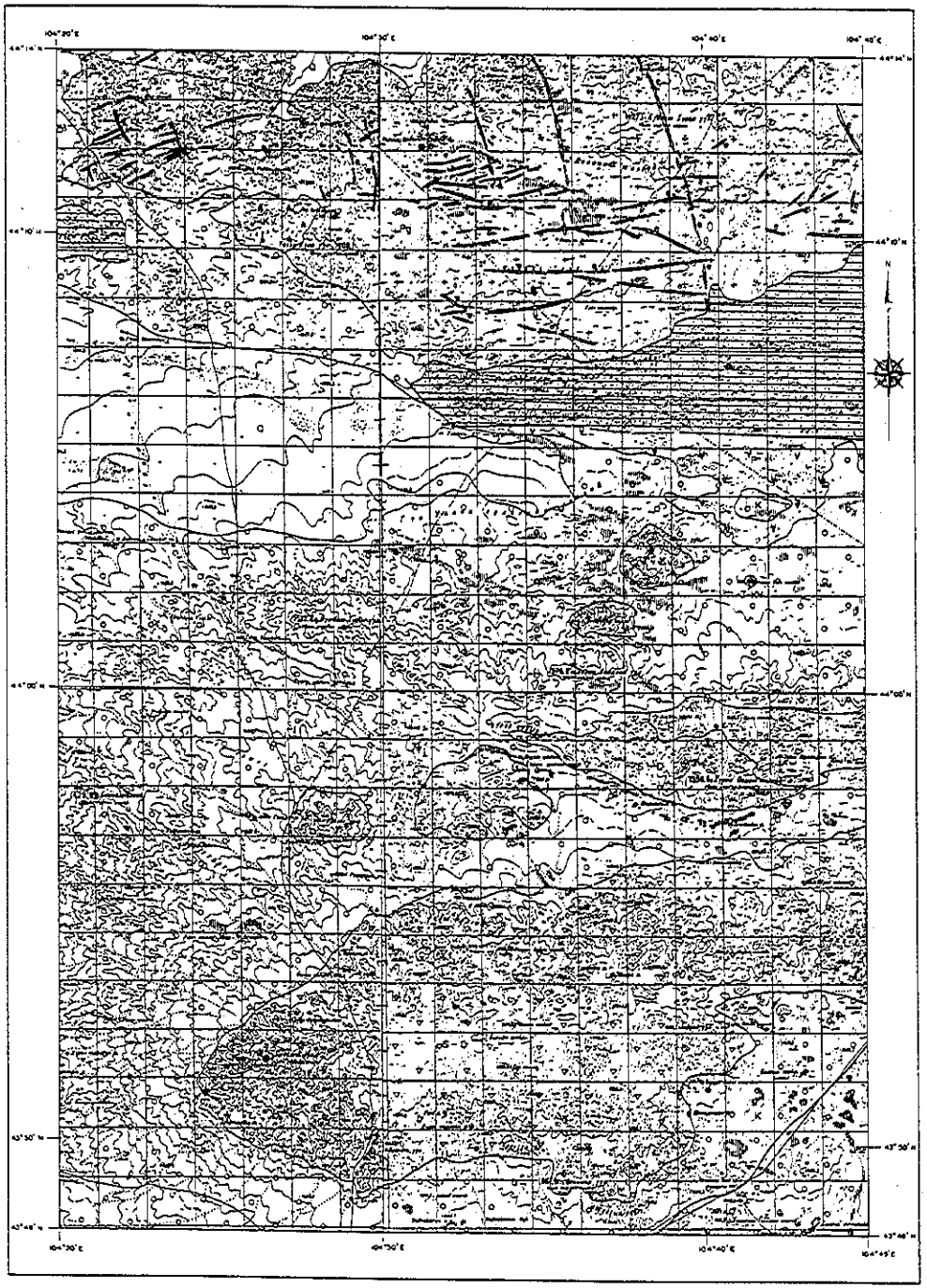
Fig. II-2-7-5 Geologic Map of the Olon-ovoot Area (phase II)

Table Ⅱ-2-7-1 Ore Deposits and Ore-showings in the Olon-ovoot Area (1)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	N o t e
1	Horimt Hudag	Au	Qz-v	104° 06′ 40″	44° 20′ 58″	parallel quartz veins unit vein size Max. 2m×200 m Seven major veins are known within four mineralized zones. vein zone: 200m×1,200 m Vein quartz is characterized by coarse grained comb quartz and semi-transparent quartz.	siltstone, sandstone of S_{1-2} Mandal Ovoo F.	1.44 ～ 16.58	0.6 ～ 1.7	3	138 ～232	Qz-ka-Serpy	Strike: E-W ~N80° E. dip : 60°~80° N discocery: 1979-1982 Three trenches and two drillings were done. Small diorite rock bodies are seen around the veins. Visible gold occurs.
2	North Olon Ovoot	Au	Qz-v	104° 08′ 09″	44° 23′ 18″	nine quartz veins scattered in the area of 2km ×0.5km unit vein size Max. 12 m×30m Vein quartz is characterized by chalcedonic～tourmaline-bearing milky quartz.	siltstone, sandstone of S_{1-2} Mandal Ovoo F.	0.30 ～ 1.75	0.4 ～ 1.9	7	102 ～323	Qz-chl	Strike: E-W ~N80° E. dip : 60°~80° N reen copper occurs
3	Olon Ovoot	Au	Qz-v	104° 09′ 42″	44° 22′ 21″	consists of six major quartz vein zones scattered in the area of 1 km×0.4km Vein quartz is characterized by semi-transparent ～milky quartz. Pyritization is commonly seen in the wall rocks. Many diorite～granodiorite rock bodies are seen around.	siltstone, sandstone of S_{1-2} Mandal Ovoo F.	up to 223g/t	up to 7.2g/t M<0.2	2.500	148 ～356 Av=256℃	Qz-chl. Qz-ser-chl	Strike: N60° W~E-W ~N80° E dip : steeply dipping to north or south discovery: 1990 twenty eight trenches and several drillings were done by Geology company. visible gold occures K-Ar age of sericite: 283 ±14 Ma, 301±15 Ma

Table Ⅱ-2-7-1 Ore Deposits and Ore-showings in the Olon-ovoot Area (2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
4	Boroodon	Au	Qz-v	104° 16′ 49″	44° 22′ 16″	single quartz vein vein size Max. 1.5 m×40 m Vein quartz is characterized by chalcedonic milky quartz.	siltstone, sandstone of S_{1-2} Mandal Ovoo F.	—	—	—	—	(Qz-chl)	Strike: N55° E. dip : 55° S discovery: 1979-1982
5	Unegt Uul West	Au	Qz-v	104° 22′ 31″	44° 25′ 51″	single quartz vein vein size Max. 4 m×100 m unit vein size Max. 12 m×30m milky white mono quartz, no sulfide(segregation vein?)	dark gray phyllite S_{1-2} Mandal Ovoo F.	—	—	—	—	(Qz-ser)	Strike: N70° E. dip: 75° N
6	Unegt Uul	Au	Qz-v	104° 23′ 25″	44° 26′ 26″	more than eight parallel quartz veins are distributed in the area of 1.2km×0.2km . Vein quartz is characterized by milky white compact mono-quartz very poor in sulfide.	carbonaceous pelitic schst S_{1-2} Mandal Ovoo F.	—	—	—	228 ～368 Av=285	Qz-ser	Strike: N75°～80° E. dip: 75° N～90°



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D3l		limestone
	D3		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1l		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone
Silurian-Devonian	S-D1		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	R1		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	ε		granodiorite porphyry
	δ		diorite, microdiorite, diorite porphyry
	Pγ		granite, granoeyenite
	Pr		rhyolite, quartz porphyry
	C-Pγ		granite, granodiorite, granoeyenite, diorite
	D2γ		granite, granodiorite
	D2δ		diorite, gabbro
	D2ε		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

PL.Ⅱ－1－3

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE Ⅱ)

Geologic Map of the Tahilga Uula Area

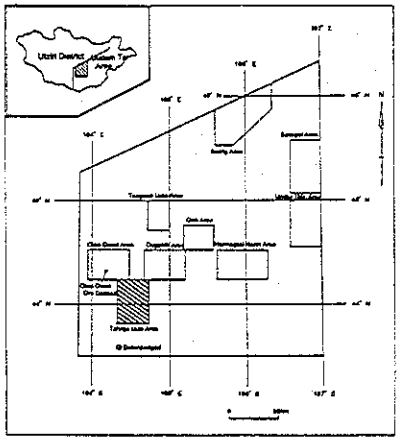


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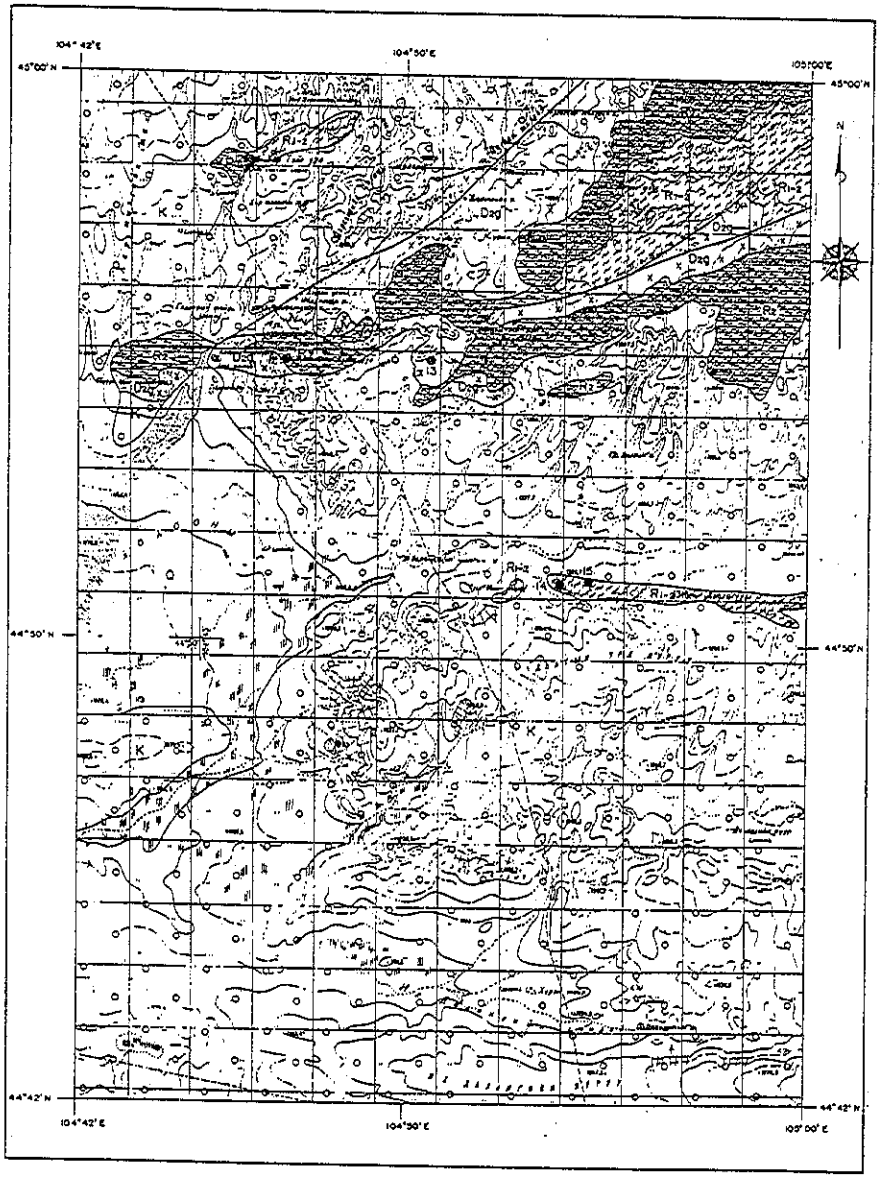
Fig. Ⅱ-2-7-6 Geologic Map of the Takhilga-uula Area (phase Ⅱ)

Table Ⅱ-2-7-2 Ore-showings in the Takhilga-uula Area

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Note
7		Au	Qz-v	104° 26′ 23″	43° 51′ 43″	small quartz veins vein size Max. 0.15m×15m Some veinlets are sporadically seen in the area of 30m×300 m. Vein quartz is characterized by chalcedonic milky quartz very poor in sulfide.	siltstone. sandstone (C_3-P_1)	0.04 ～ 3.29	0.4 ～ 1.1	2	—	(Qz-ser-chl)	strike: N5° E. dip : 40° E Very poor in quartz vein and wall rock alteration.
8		—	Qz-v pegmatite	104° 31′ 21″	44° 11′ 58″	aplite dike cut by the veinlets of pegmatitic quartz. size of dike Max. 20 m×100 m	granite (C_{2-3})	—	—	—	—	(K-fel)	strike: N-S dip : vertical? No value for exploration
9		Au	Qz-v	104° 40′ 52″	44° 07′ 14″	single mono quartz vein size of the vein: 0.4 m×40m silicified zone: Max. 2 m×40m wall rock alteration is very small and weak.	dark gray schist(D_1)	—	—	—	—	Silicification	strike: N30° E. dip: 65° W No value for exploration



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2l		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1l		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone
Silurian-Devonian	S-D1		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	Rl		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	α		granodiorite porphyry
	δ		diorite, microdiorite, dioritic porphyry
	Pl		granite, granosyenite
	Py		rhyolite, quartz porphyry
	C-Pl		granite, granodiorite, granosyenite, diorite
	D2l		granite, granodiorite
	D2δ		diorite, gabbro
	D1r		rhyolite, dacite

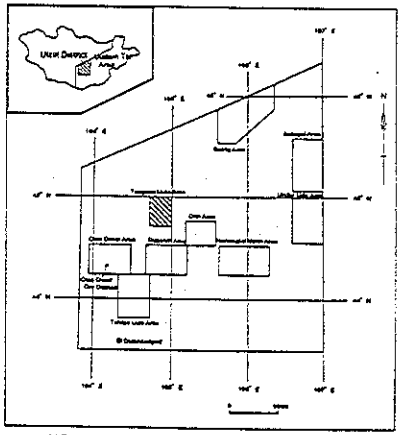
● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

PL.Ⅱ－1－4

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE Ⅱ)

Geologic Map of the Tsagaan Uula Area



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JANUARY 1993

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Fig. Ⅱ-2-7-7 Geologic Map of the Tsagaan-uula Area (phase Ⅱ)

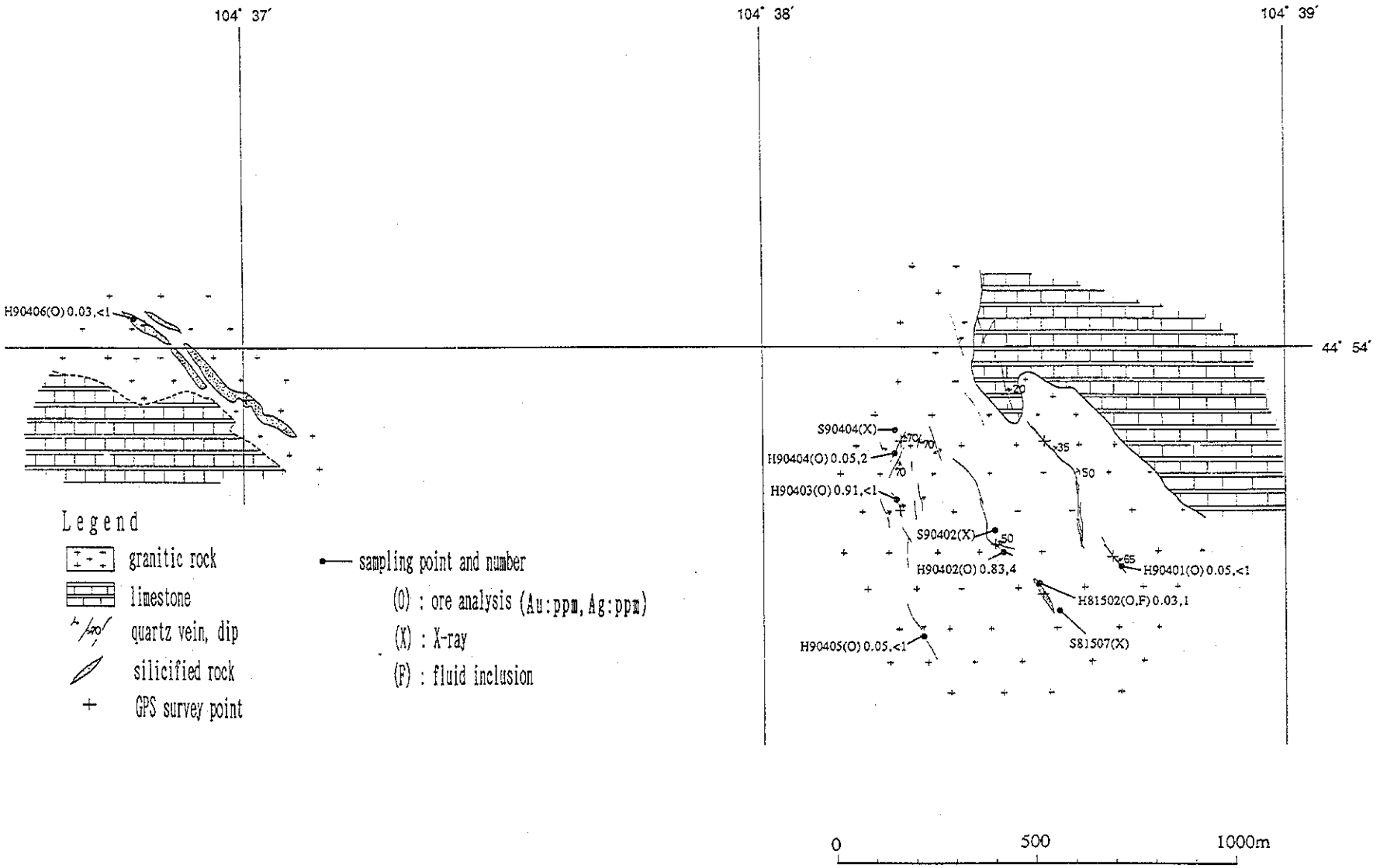


Fig. Ⅱ-2-7-8 Geologic Map of Ore-showing No. 11

Table Ⅱ-2-7-3 Ore-showings in the Tsagaan-uula Area (1)

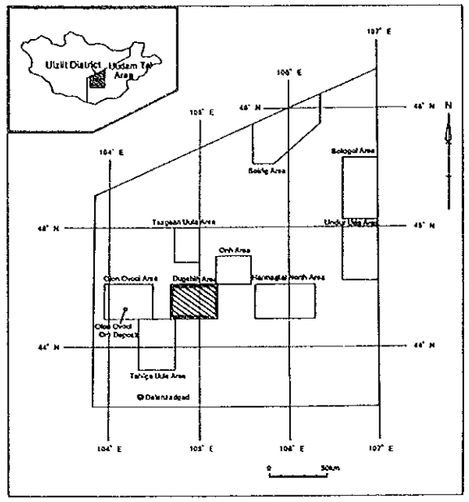
No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
10	Zuun hailhan Uul	Au	Qz-v	104° 35′ 44″	44° 53′ 18″	single quartz vein vein size Max. 4.5 m×1500m Vein quartz is characterized by chalcedonic milky quartz.	limestone, siltstone of Vendian-Cambrian	0.04	0.8	1	98 ～150 Av. 118	Qz-cal	Strike: N60° W, dip: 45° N enplaced in the fault
11	Huturiin Tolgoi	Au	Qz-v	104° 38′ 32″ ～ 104° 36′ 49″	44° 53′ 40″ ～ 44° 54′ 02″	quartz vein swarm vein size Max. 20 m×450 m vein zone 500 m×2.600 m milky white mono quartz	phyllite, lime limestone, granite (V-C)	0.03 ～ 0.91	0.4 ～ 3.8	7	259～298 Av. 276	Qz-ser	Strike: N30°～45° W, dip: 50°～70° NE
12	Makangiin Huren Uul	Au	Qz-v	104° 47′ 08″	44° 55′ 00″	Four milky mono quartz veins are aligned along the boundary between limestone and granite. vein size Max. 6m×60 m length of vein zone 350 m	granite and limestone	0.03	3.2	1	—	Qz-pl-K-fel-ser	Strike: N35° W, dip: 50° NE
13	Daaga Uul	Au	Qz-v	104° 50′ 41″	44° 55′ 00″	About twelve quartz veins are distributed in the area of 200 m× 300m. Milky white vein quartz is disseminated by small amount of galena.	limestone and schist	0.06	0.9	1	—	Qz-chl-cal	Strike: NS～N60° E, dip: 30° NW～50° SE
14		Au	Qz-v	104° 53′ 50″	44° 51′ 07″	stockwork of milky white quartz veinlets vein size Max. 2m× 40 m stock work: 30m×70m	pelitic schist	0.04	0.6	1	—	Qz-pl-ser-cal	Strike: N80° E, dip: 9 0° (champion vein)

Table Ⅱ-2-7-3 Ore-showings in the Tsagaan-uula Area (2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
15		Au	Qz-v	104° 54′ 32″	44° 51′ 10″	four parallel quartz veins are seen in the area of 100 m × 100 m vein size Max. 6 m × 30m Veins are characterized by milky white mono quartz and development of hydro-fracturing.	limestone,	0.03	0.6	1	—	Qz-Ser-chl	Strike: N80° E, dip: 90° ? This area is mostly covered by aluvial deposit.

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Dugshih Area



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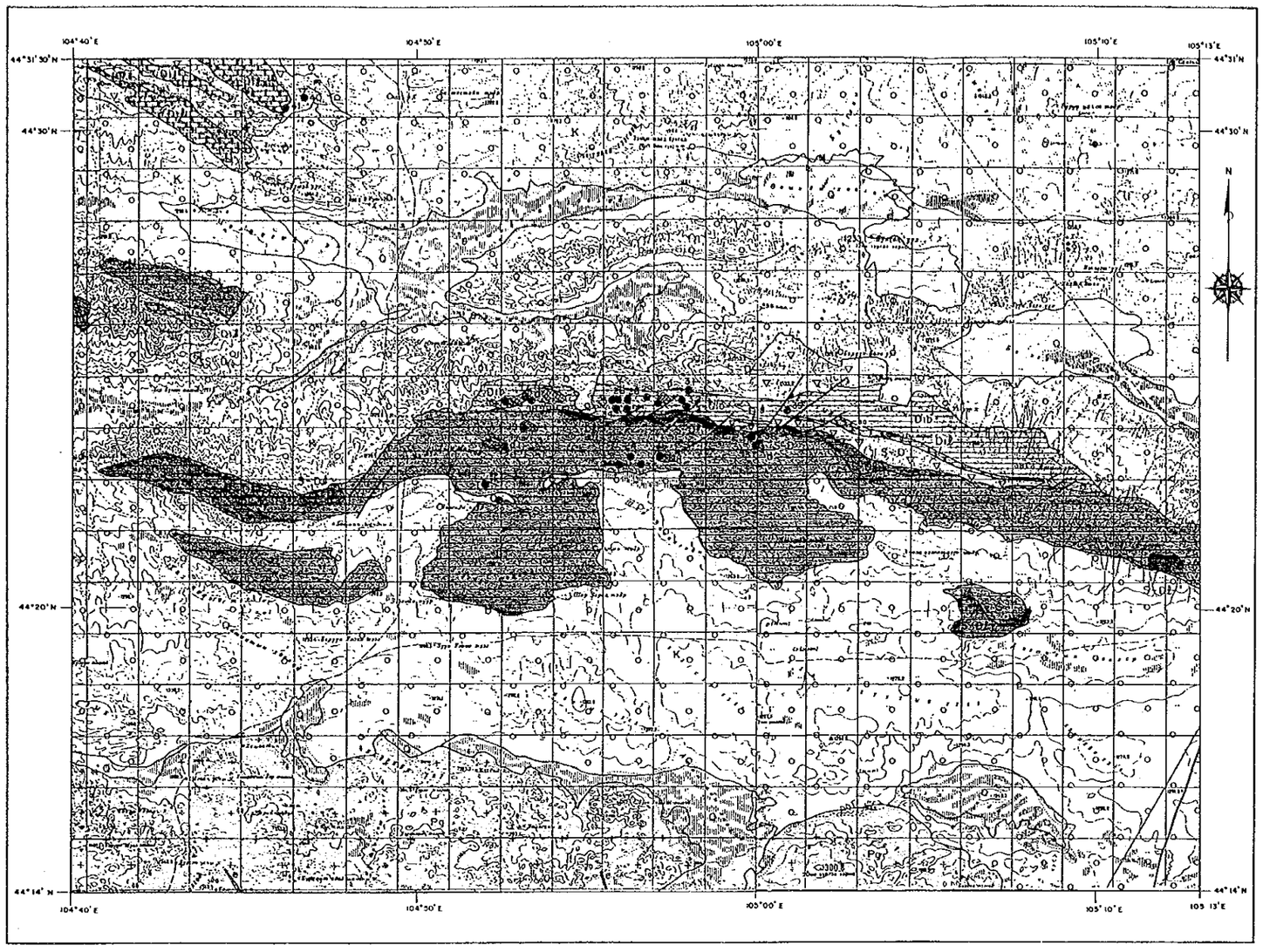
JANUARY 1993



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2l		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1l		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone

Silurian-Devonian	S-Dl		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Ripheian	Rl		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	ε		granodiorite porphyry
	d		diorite, microdiorite, diorite porphyry
	Pg		granite, granosyenite
	Pr		rhyolite, quartz porphyry
	C-Pg		granite, granodiorite, granosyenite, diorite
	D2g		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direcion
	anticline
	syncline
	fault
	inferred fault
	thrust fault

Fig. II-2-7-9 Geologic Map of the Dugshih Area (phase II)

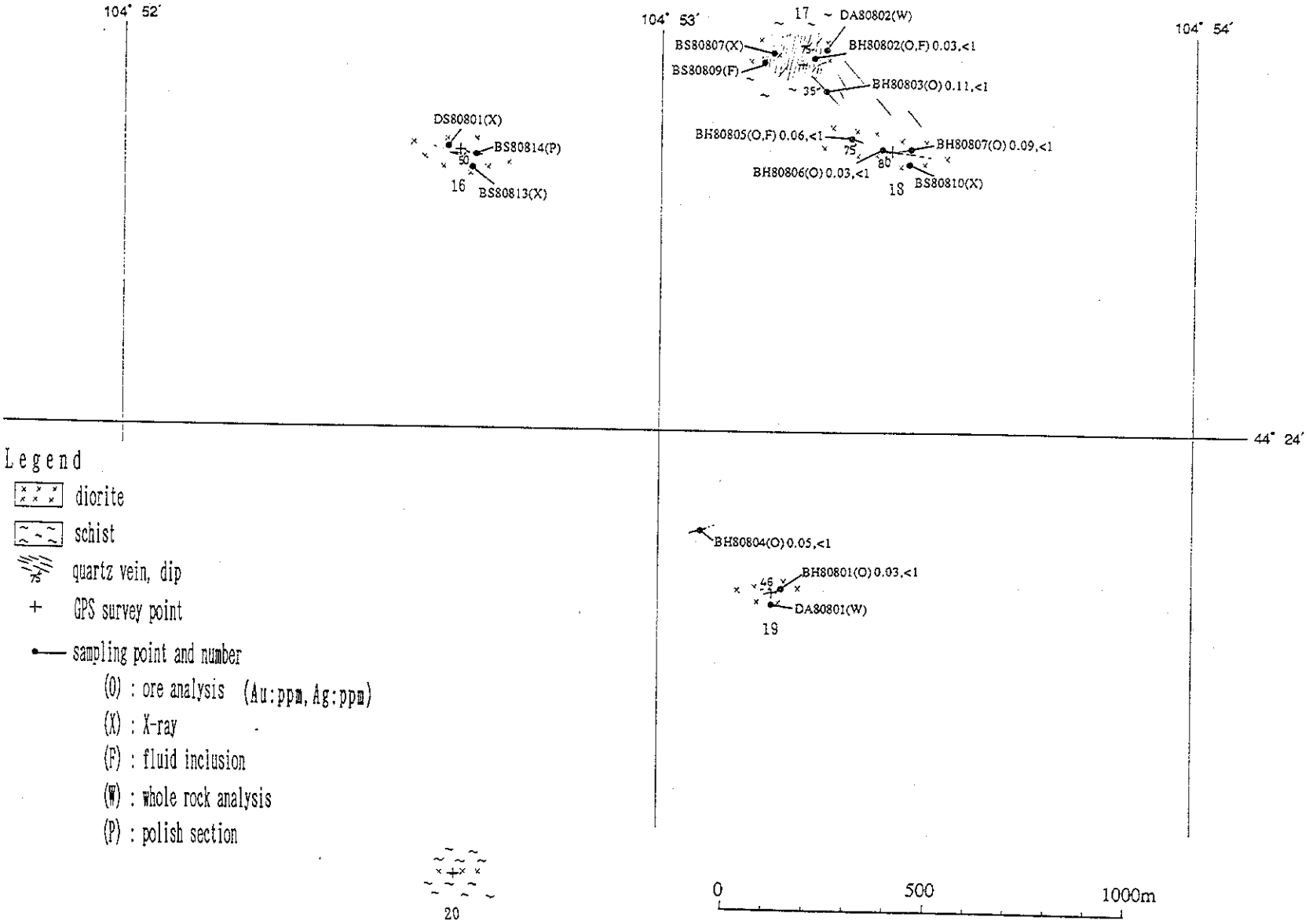


Fig. Ⅱ-2-7-10 Geologic Map of Ore-showings No. 16～20 (Bayan-bor-nuruu)

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (1)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
16		Au	Qz-v	104° 52′ 38″	44° 24′ 22″	Five quartz veins are seen in the area of 30m×80m. vein size Max. 0.6 m×25m Milky white quartz contains small amount of pyrite, pyrrohtite and chalcopyrite.	micro diorite	0.03 ～ 0.09	0.4	2	—	(Qz-chl)	Strike: N50° W~N80° W, dip: 50° ~75° S
17	Bayan Bor Nuruu	Au	Qz-v	104° 53′ 16″	44° 24′ 29″	quartz vein swarm vein size Max. 0.4 m×120 m vein zone: EW 120 m×NS 140m milky white mono quartz 23～25 veins / section average width: 0.15 m	diorite	0.03	0.4	2	120～320	Qz-ser-chl-pl	Strike: N30° ~50° E. dip: 50° ~80° W
18	Bayan Bor Nuruu (eastern extension)	Au	Qz-v	104° 53′ 26″	44° 24′ 23″	More than ten milky mono-quartz veins are seen in the area of EW 500m×NS 200m. Maximum size of a vein is 0.7 m wide × 80 m long.	diorite, schist	0.06	0.6	1	—	Qz-chl-cal-pl	Strike: N50° ~80° W. dip: 75° ~80° SW
19		Au	Qz-v	104° 53′ 13″	44° 23′ 47″	Three quartz veins are distributed in the area of 30m×40m. Milky white vein quartz is disseminated by small amount of pyrite.	diorite	0.03	0.6	1	—	(Qz-chl)	Strike: N80° E. dip: 46° N

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
20		Au	Qz-v	104° 52′ 40″	44° 23′ 24″	quartz vein swarm formed at the contact of diorite and psammitic schist vein size: Max. 0.7 m×15 m vein zone: EW 60m×NS 30 m	diorite and schist	0.03	0.4	1	—	(Qz-chl)	Strike: N80° W, dip: 90°? Three vein zones are recognized.
21		Au	Qz-v	104° 52′ 04″	44° 22′ 36″	milky white chalcedonic quartz vein at the contact of diorite and schist vein size: Max. 0.3 m×4.5 m	diorite and schist	—	—	—	—	(Qz-chl)	Strike: N75° W, dip: 30° S
22	Umnu Nuur (eastern extension)	Au	Qz-v	104° 52′ 12″ ~ 104° 52′ 46″	44° 22′ 12″ ~ 44° 22′ 21″	More than ten milky white quartz veins are seen in the area of EW 800m×NS 100m. Maximum size of a vein is 1.5 m wide × 100m long.	micro diorite andesite	0.03 ~ 0.04	0.4 ~ 0.6	2	—	Qz-chl-pl	Strike: N70°~80° E. dip: 10°~75° S epi-chl alt. no sulfide
23	Sultin Hudag (eastern extension)	Au	Qz-v	104° 56′ 23″	44° 23′ 11″	More than five milky white quartz veins are seen in the area of EW 200m×NS 200m. Maximum size of a vein is 2 m wide × 30 m long. This area is completely covered by alluvial deposits.	not obvious	0.03	0.4	2	129~289	?	Strike: N70° E. EW. dip: steep pyrite and goethite are visible

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (3)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
24		Au	Qz-v	104° 56′ 23″	44° 23′ 11″	milky white chalcedonic quartz veins in the diorite rock body vein size: Max. 0.3 m×10m vein zone: Max. 10m×30m	diorite	—	—	—	—	Qz-chl	Strike: N70° W. dip: 45° N
25	Repelnii	Au	Qz-v	104° 55′ 50″	44° 24′ 23″	quartz vein swarm formed at the contact of diorite and psammitic schist vein size: Max. 4.2 m×88m vein zone: EW 140 m×NS 100m	diorite and schist	0.03	0.4	3	139～354	Qz-ser-cal pl	Strike: N85° W. dip: 35°~60° N There are two vein zones and four trenches applied to them.
26		Au	Qz-v	104° 56′ 01″	44° 24′ 23″	milky white chalcedonic quartz veins scattered in the diorite rock body vein size: Max. 1.8 m×15m vein zone: Max. 50m×150 m More than twelve small veins are seen in two vein zones.	diorite					Qz-Ser	Strike: N70°~85E°. dip: 75°~80° N
27		Au	Qz-v	104° 56′ 16″	44° 24′ 12″	Six semi-transparent mono-quartz veins are sporadically seen in pelitic mica schist. vein size: Max. 0.5 m×3 m vein zone: Max. 30m×40m	diorite	—	—	—	—	(Qz-Ser)	Strike: N10° W. dip: ?

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (4)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
28		Au	Qz-v	104° 56′ 17″	44° 24′ 24″	milky white chalcedonic quartz vein zone in sericite schist vein size: Max. 0.3 m×5 m vein zone: Max. 3 m×65m about ten small quartz veins	sericite schist	—	—	—	—	(Qz-Ser)	Strike: N70° W, dip: ?
29		Au	Qz-v	104° 56′ 52″	44° 24′ 26″	quartz vein swarm formed in the pelitic schist vein size: Max. 0.3 m×5 m vein zone: Max. 25m×150 m	pelitic schist	—	—	—	—	Qz-chl-pl	Strike: N77° W, dip: 85 °N
30		Au	Qz-v	104° 57′ 13″	44° 24′ 19″	milky white chalcedonic mono-quartz vein in the diorite rock body vein size: Max. 1.8 m×80m	diorite	0.02 ～ 0.04	0.4 ～ 0.6	2	142～204 Av. 174	Qz-ser-cal	combination of two veins N55° E, 75~90° N ×N70° E, 75° S
31		Au	Qz-v	104° 58′ 05″	44° 24′ 34″	parallel quartz veins in psammitic schist vein size: Max. 0.5 m×80m vein zone: Max. 50m×200 m Wesern end of the zone is covered by colluvial deposit. average vein ratio≦ 10 %	diorite	0.07	0.4	1	162～343 Av. 252	Qz-ser-chl-pl	Strike: N80° W, dip: 75° ~90° S

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (5)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
32		Au	Qz-v	104° 57′ 54″	44° 24′ 22″	milky white chalcedonic quartz vein zone in sericite schist vein size: Max. 0.1 m×10m vein zone: Max. 3 m×60m	sericite schist. diorite	0.03	0.6	1	101～301 Av. 182	Qz-chl-pl	Strike: N80° E. dip: 45S. Strike: N55° E. dip: 55S
33		Au	Qz-v	104° 58′ 03″	44° 24′ 14″	four parallel quartz veins in diorite rock body vein size: Max. 3 m×80 m vein zone: Max. 50m×80 m milky white mono quartz	diorite	0.03	0.4	1	130～292 Av. 196	Qz-Ser-chl-cal-pl	Strike: N45° E. dip: 75° NW
34	Treshinii	Au	Qz-v	104° 55′ 59″	44° 24′ 12″	ten to eleven parallel quartz veins in the diorite rock body milky white mono-quartz vein size: Max. 0.6 m×30m vein zone: Max. 50m×30m	diorite	0.03	0.6 ～ 1.3	2	151～329 Av. 238	Qz-pl	Strike: N20° E. dip: 60° ~80° W
35		Au	Qz-v	104° 56′ 41″	44° 23′ 01″	three quartz veins along the boundary between diorite and psammitic schist vein size: Max. 0.3 m×10m vein zone: Max. 40m	diorite	—	—	—	—	(Qz-ser)	Strike: N63° E. dip: 35° N

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (6)

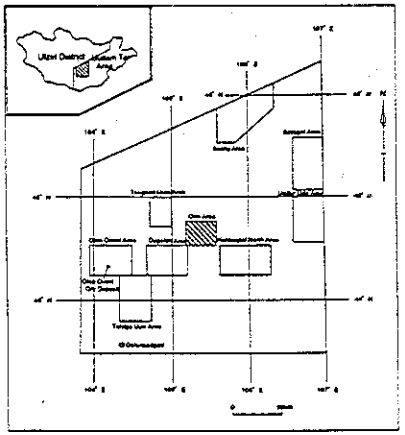
No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
36		Au	Qz-v	104° 57′ 14″	44° 23′ 10″	Three quartz veins are seen in the area of 20m×70m. vein size Max. 0.6 m×20m Milky white mono quartz	micro diorite	—	—	—		(epi-chl)	strike: N75° E. dip: 90°
37	Haraat Shand	Au	Qz-v	105° 00′ 02″	44° 23′ 24″	quartz vein swarm vein size Max. 0.5m×30m vein zone: EW 20m×NS 30 m milky white mono quartz 10 veins / section average width: 0.2 m	diorite	0.04	1.5	1	—	(Qz-ser)	strike: N25° W. dip: 75° SW
38		Au	Qz-v	104° 59′ 55″	44° 23′ 35″	Five parallel milky mono-quartz veins are seen in the area of EW 100m× NS 20m. Maximum size of a vein is 3 m wide × 40 m long.	diorite (schistose)	0.03	0.4	1	154～325 Av. 243	(Qz-ser)	strike: N70°～85° E. dip: 45°～85° NW
39		Au	Qz-v	104° 00′ 59″	44° 24′ 08″	milky white mono quartz vein zone vein size Max. 1m×35m vein zone:NS 100m× EW 1000m	diorite (schistose)	0.03	0.4	1	149～392 Av. 251	Qz-cal	strike: N80° w. dip: 80° N
40	Dersen Us Hudag	Au	Qz-v	104° 46′ 51″	44° 30′ 46″	milky white mono quartz veins vein size Max. 5m×150 m vein zone:NS 100m× EW 1000m	schist (pelitic)	0.03	< 0.3 ～ 2.5	2	110～262 Av. 199	ser-chl	strike: N60° w. dip: 60° NE~90° Mn Oxide bering

Table Ⅱ-2-7-4 Ore-showings in the Dugshih Area (7)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Scale	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
41		Au	Qz-v. sil-r. alt clay	104° 46′ 16″	44° 30′ 30″	white clay zone with pyrite-rich silicified rock and fragments of milky white chalcedonic vein quartz size of alteration zone: EW ≧100 m× NS ≧300 m	schist	0.03 ～ 0.04	< 0.3 ～ 2.7	4	—	Qz-ka-ser	Strike: N15°W, dip: 90°? Hot spring type
42	Ayagch	Au	Qz-v	105° 03′ 23″	44° 32′ 50″	milky white chalcedonic quartz vein with silicified rock single vein, mono-quartz vein size: Max. 8 m×300 m average width 1 ～2 m	syenite	0.03	0.4	1	139～319	—	Strike: N70°W, dip: 90°?

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Onh Area



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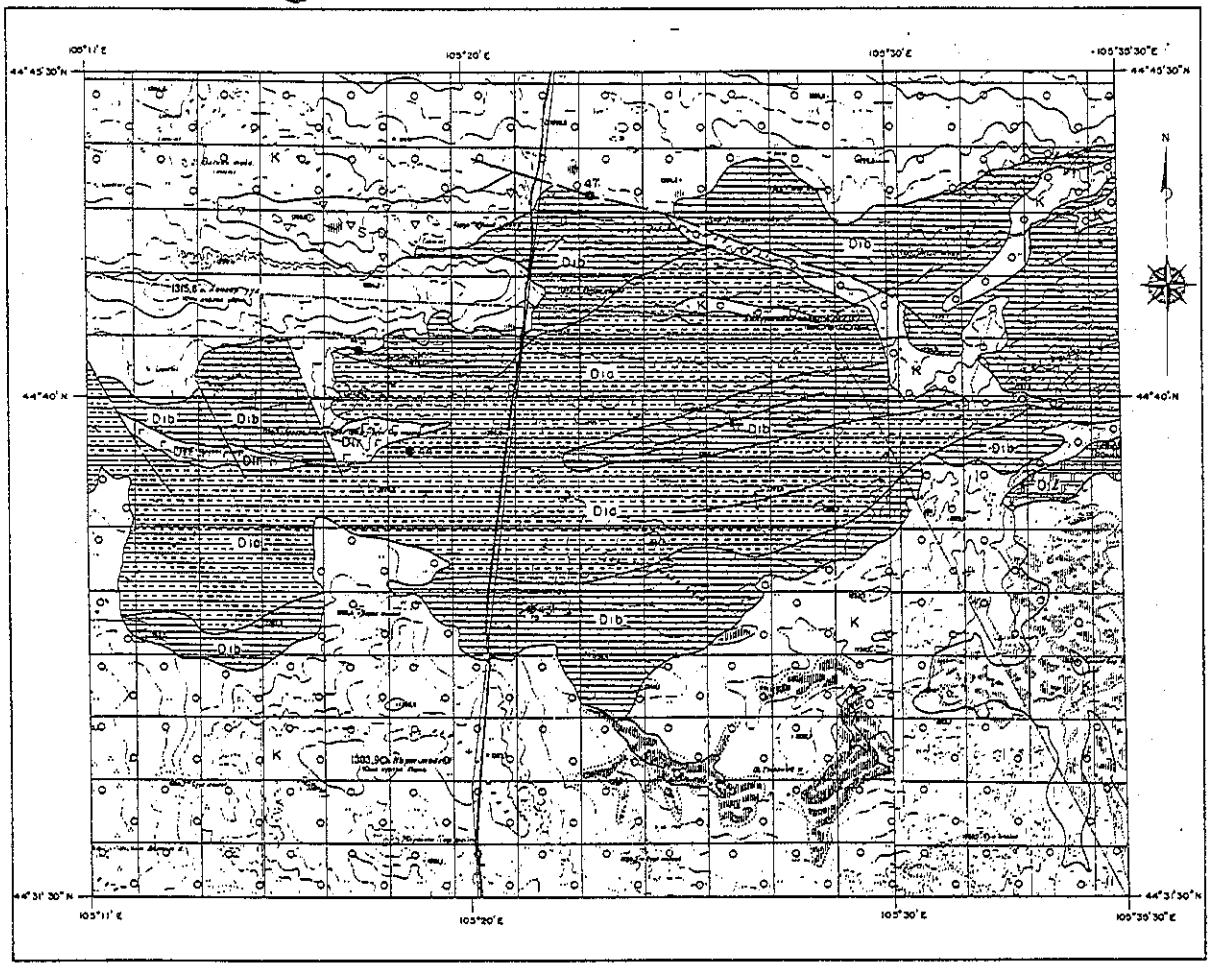
JANUARY 1993



0 5 10km

LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2l		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1l		limestone
	D1b		sandstone, shale, siltstone
	D1t		shale, siltstone, sandstone

Silurian-Devonian	S-D/		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	R/		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	α		granodiorite porphyry
	δ		diorite, microdiorite, dionte porphyry
	Pt		granite, granosyenite
	Pr		rhyolite, quartz porphyry
	C-Pt		granite, granodiorite, granosyenite, dionte
	D2t		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

Fig. II-2-7-11 Geologic Map of the Onh Area (phase II)

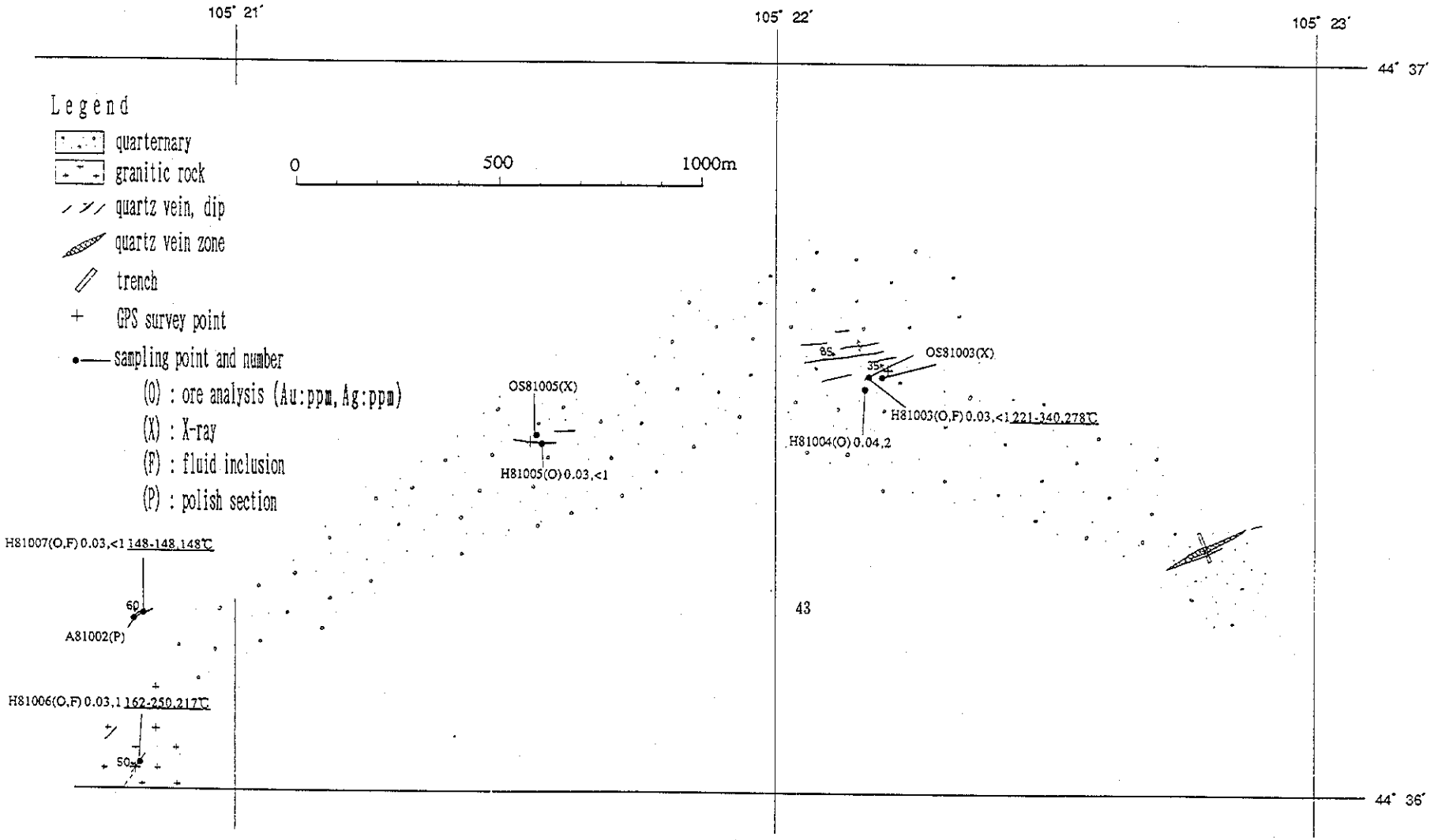


Fig. Ⅱ-2-7-12 Geologic Map of Ore-showing No. 43 (Onh)

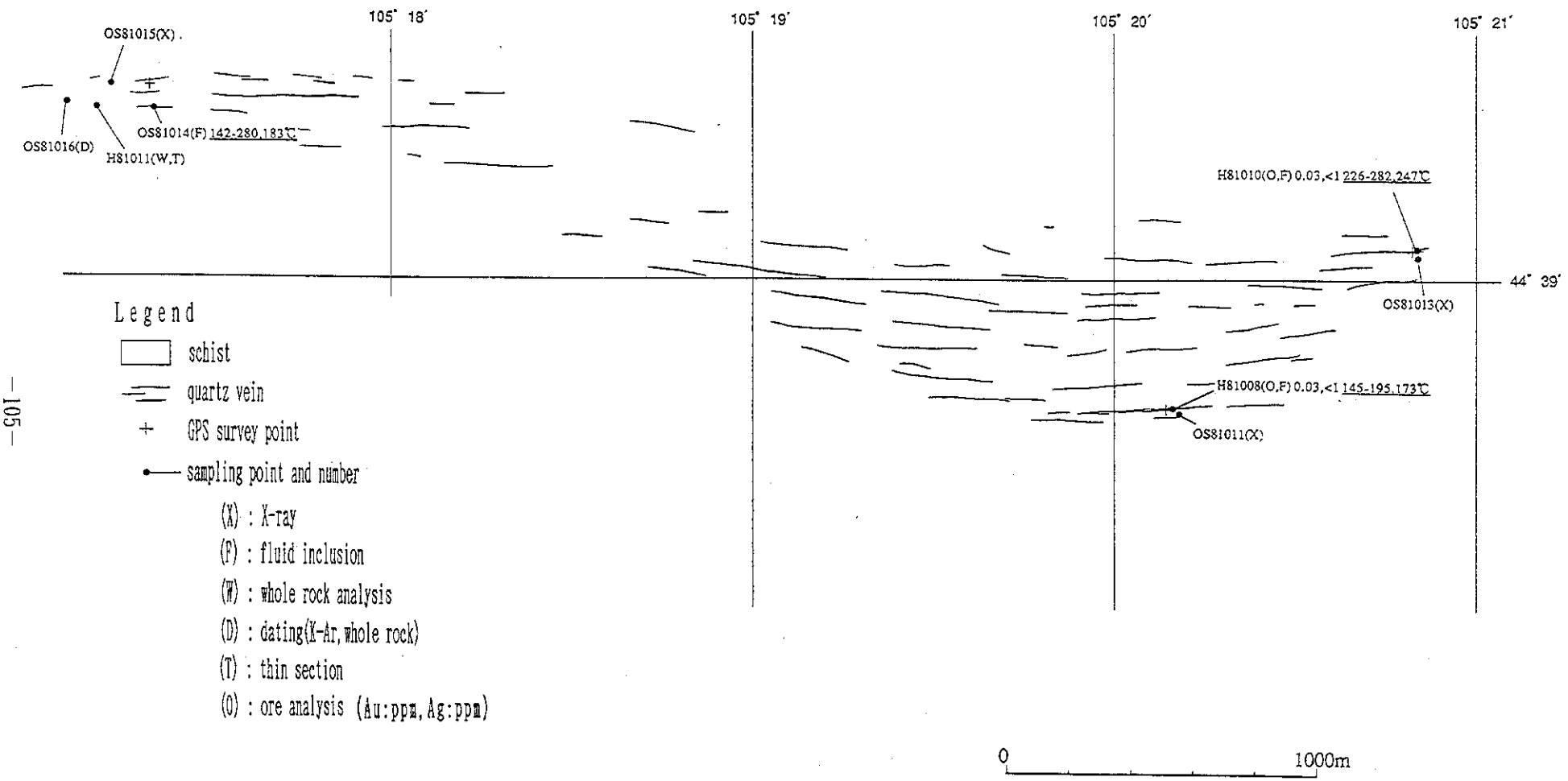


Fig. Ⅱ-2-7-13 Geologic Map of Ore-showing No. 44 (North-onh)

Table Ⅱ-2-7-5 Ore-showings in the Onh Area (1)

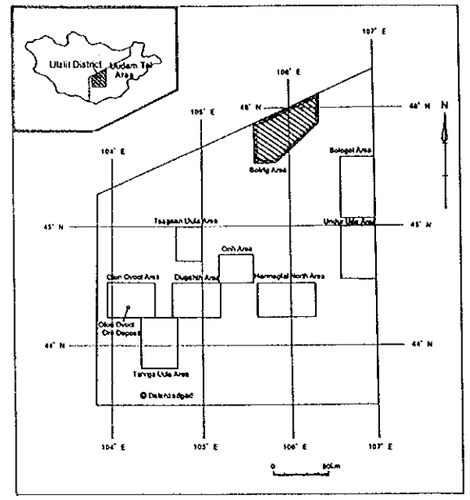
No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
43	Onh	Au	Qz-v	105° 22′ 12″ ～ 105° 20′ 50″	44° 36′ 32″ ～ 44° 36′ 14″	Many quartz veins are scattered in the area of 3,000 m × 1,000 m. vein size Max. 1m wide, 50 ～ 200 m long This area is mostly covered by colluvial deposit and dune sand	schist(S_2 - D_1), granite rhyolite and gabbro	0.03 ～ 0.04	< 0.3 ～ 1.7	7	148～340	Qz-ser-cal-pl	strike: N60°~80° E. dip: 35° NW~90°
44	North Onh	Au	Qz-v	105° 20′ 08″ ～ 105° 17′ 13″	44° 38′ 45″ ～ 44° 39′ 23″	parallel quartz vein swarm vein size Max. 2.0m×150 m vein zone: EW 3,500 m×NS 500 m milky white mono quartz veins run every 10～20m intervals	schist(S_2 - D_1)	0.03	< 0.3 ～ 0.6	3	142～282	Qz-ser-cal-pl	strike: E-W, dip: steeply dipping to the north or south
45		Au	Qz-v	105° 17′ 26″	44° 40′ 46″	parallel quartz veins quartz veins are seen in the area of EW 800m× NS 100 m. Maximum size of a vein is 4 m wide × 80 m long.	gry ser sch (S_2 -D_1)	0.03	< 0.3	1	182～305	Qz-ser-chl-pl	strike: N70° W dip: 85° S
46		Au	Qz-v	105° 18′ 12″	44° 41′ 03″	milky white mono quartz vein (amethyst bearing) vein size Max. 0.5 m×8 m	schist (S_2 - D_1)	0.03	0.4	1	—	—	strike: N70° E, dip: 9 0°

Table Ⅱ-2-7-5 Ore-showings in the Onh Area (2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
47		Au	Qz-v.	105° 22′ 55″	44° 43′ 24″	milky white chalcedonic quartz veins aligned along the border line between tal and hilly zone vein size Max. 1m×2 m vein zone 100 m long	trachy-andesite (J_3)	0.03	< 0.3	1	—	Qz-talc	strike: N70° W. dip: vertical

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Soirig Area



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JANUARY 1993

LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2*l*		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1*l*		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone
Silurian-Devonian	S-D*l*		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	R*l*		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	e		granodiorite porphyry
	d		diorite, microdiorite, diorite porphyry
	Pg		granite, granosyenite
	Pr		rhyolite, quartz porphyry
	C-Pg		granite, granodiorite, granosyenite, diorite
	D2g		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

Fig. II-2-7-14 Geologic Map of the Soirig Area (phase II)

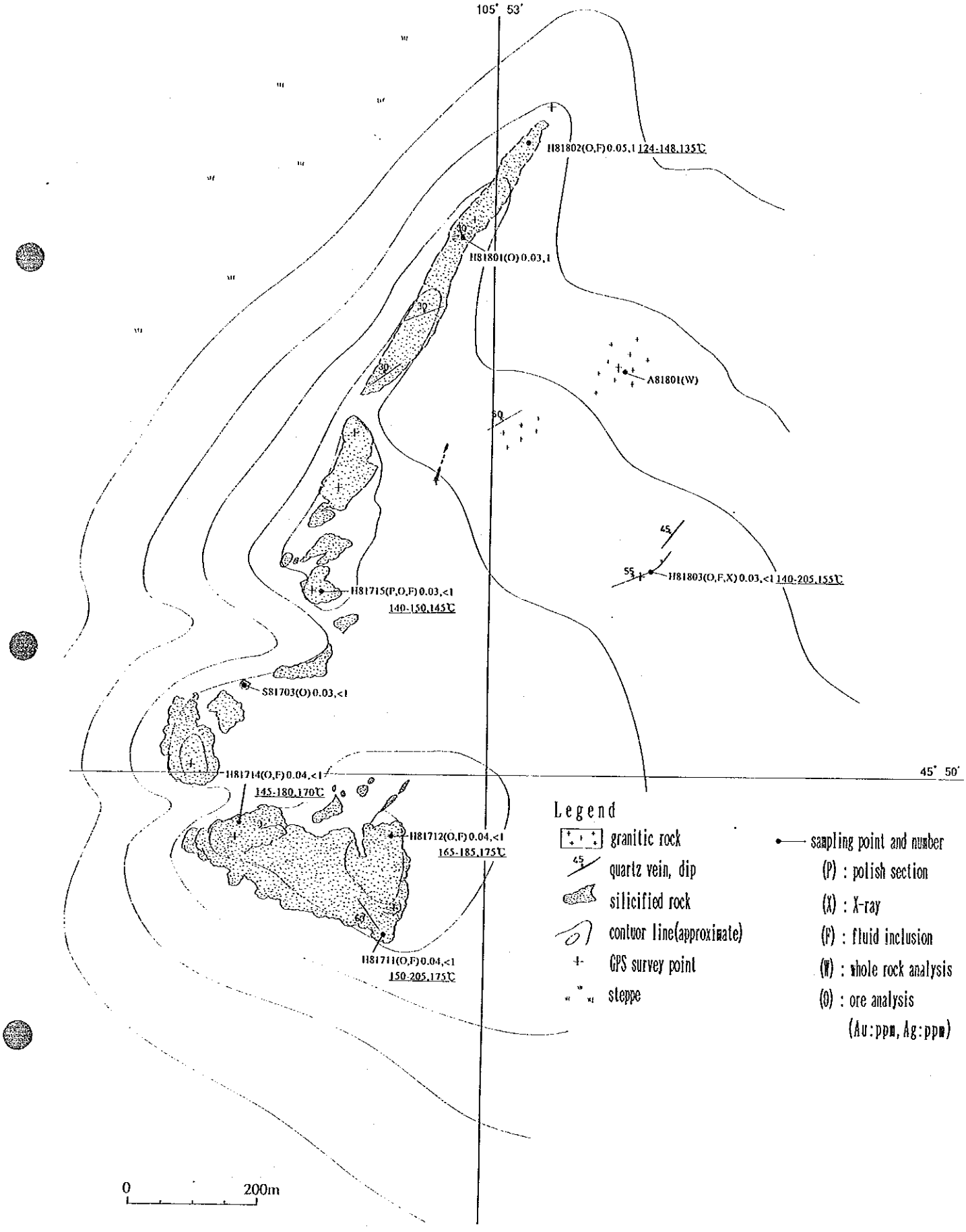
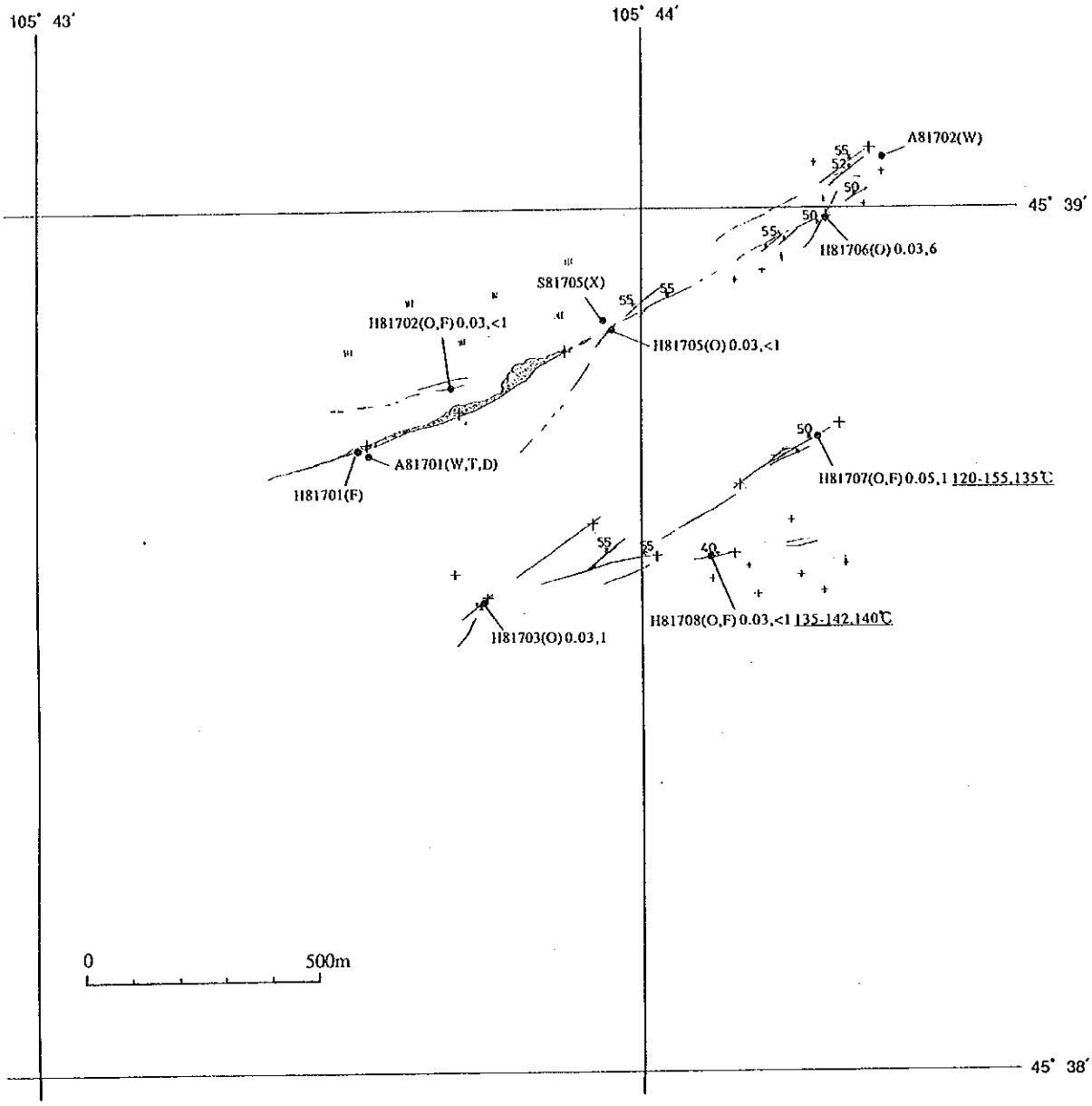


Fig. Ⅱ-2-7-15 Geologic Map of Ore-showing No. 51 (Munh-tsagaan-tolgoi)



Legend

granitic rock

quartz vein, dip

silicified rock

GPS survey point

steppe

sampling point and number

(O) : ore analysis (Au:ppm, Ag:ppm)

(X) : X-ray

(F) : fluid inclusion

(W) : whole rock analysis

(T) : thin section

(D) : dating(K-Ar, whole rock)

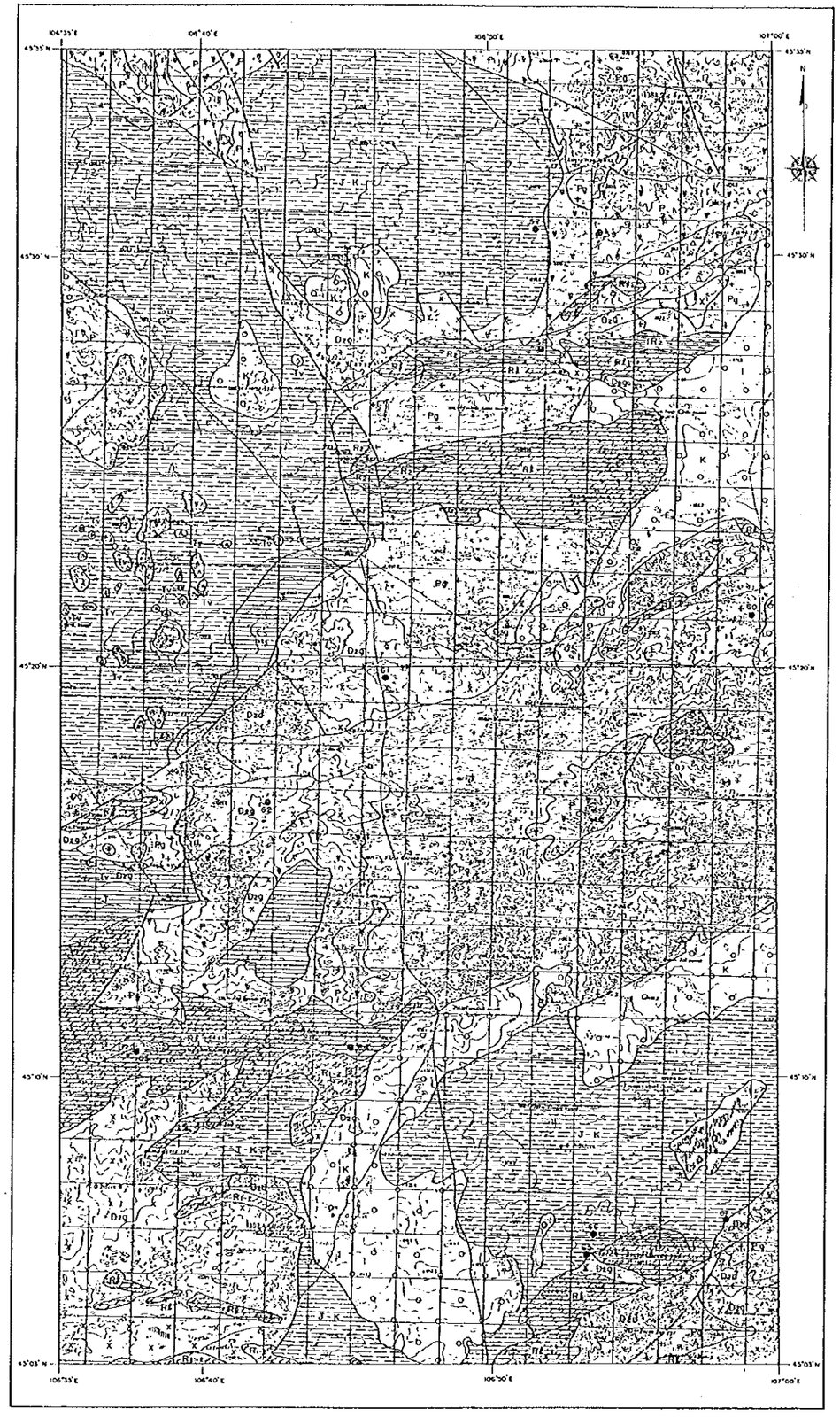
Fig. Ⅱ-2-7-16 Geologic Map of Ore-showing No. 52 (Zalaa-uul)

Table Ⅱ-2-7-6 Ore-showings in the Soirig Area(1)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
48		Cu	Skarn	105° 19′ 18″ ～ 105° 19′ 29″	45° 43′ 46″ ～ 45° 44′ 01″	magnetite-epidote-garnet skarn green copper bearing there are two ore showings ①four ore bodies, Max. 20 m× 50m, alignes N70 °E direction zone: 650 m× 80 m Cu<0.3% ②two ore bodies, Max. 20m× 20m, alignes N-S direction zone: 50m× 20 m Cu<0.3%	alkali-granite	—	—	—	—	epidote-garnet	strike: N70° E. N-S dip: ?
49		Au	Qz-v silicif-ed zone	105° 47′ 16″	45° 56′ 00″	Four milky white quartz veins align N 65° W direction with silicified zone. Maximum size of a vein is 2 m wide × 15 m long. vein zone: 50 m long	gneissose-granite	—	—	—	—	(Qz-ser)	strike: N65° W dip: 85° SW
50	North Munh Tsagaan Tolgoi	Au	Qz-v	105° 55′ 59″ ～ 105° 56′ 25″	45° 52′ 02″ ～ 45° 52′ 12″	single quartz vein with silicified rock. mono-quartz Maximum size of the vein is 20m wide × 1,500m long.	granite	0.03 ～ 0.12	0.4 ～ 0.6	3	—	Qz-ser	strike: N50° E~N72° E dip: steeply to N?
51	Munh Tsagaan Tolgoi	Au	Qz-v	105° 52′ 47″	45° 49′ 53″	massive siliccified rock and milky white mono-quartz veins Max. size 340m×1300m	granite	0.03 ～ 0.05	0.4 ～ 1.3	9	124～205	Qz-ser-K-fel	strike: N30° E~N70° E dip: 30 °~50° NW

Table Ⅱ-2-7-6 Ore-showings in the Soirig Area(2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
52	Zalaa Uul	Au	Qz-v.	105° 43′ 41″ ～ 105° 44′ 22″	45° 38′ 35″ ～ 45° 39′ 04″	milky white quartz vein and massive silicified rock vein size Max. 20 m×1500m vein zone: 700m×1500m mono-quartz vein with hydro-fracturing	granite	0.03 ～ 0.05	0.6 ～ 5.7	6	119～202	Qz-ser-chl K-fel-pl	strike: N60° E~N85° E dip: 40°~55° N
53	Ongon Tsagaan Tolgoi	Au	Qz-v.	105° 41′ 57″ ～ 105° 41′ 32″	45° 34′ 49″ ～ 45° 34′ 34″	three milky white quartz veins and stockwork of quartz veinlets, partly silicified vein size Max. 2m×120 m vein zone: 300m×700 m mono-quartz vein with small amount of pyrite	trachy-andesite	0.03	0.6 ～ 2.7	2	122～202	Qz-Ser	strike: N10° W, N4 5° E, E-W dip: 80° E, 40° N, 60° NW
54		SiO_2	pegmatite	106° 14′ 29″	46° 03′ 03″	pegmatite quartz vein(milky white mono-quartz vein size: 1.5m×20m	granite	—	—	—	—	(K-feld)	strike: N80° E, dip: 90°?
55		SiO_2	pegmatite	106° 39′ 41″	45° 55′ 36″	massive pegmatite quartz size: 50m ×150m, 50m ×80m	granite	—	—	—	—	(K-feld)	elliptic shape area: 200m×200m
56		china clay	china clay	106° 55′ 16″	45° 44′ 19″	china clay deposit in lithoidditic welded tuff size: 50m ×100m class×3~4	lithoiditic welded tuff	—	—	—	—	(Qz-ser)	elliptic shape area: 400m×400m



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2ℓ		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1ℓ		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone
Silurian-Devonian	S-Dℓ		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Ripheian	Rℓ		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	e		granodiorite porphyry
	d		diorite, microdiorite, diorite porphyry
	Pg		granite, granosyenite
	Pr		rhyolite, quartz porphyry
	C-Pg		granite, granodiorite, granosyenite, diorite
	D2g		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip directon
	anticline
	syncline
	fault
	inferred fault
	thrust fault

PL. II – 1 – 9

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Sologoi Area

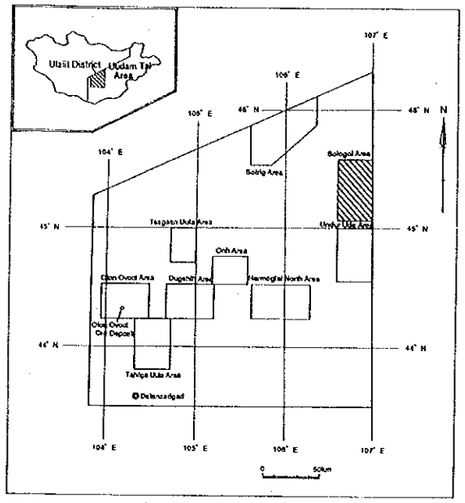


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Fig. II-2-7-17 Geologic Map of the Sologoi Area (phase II)

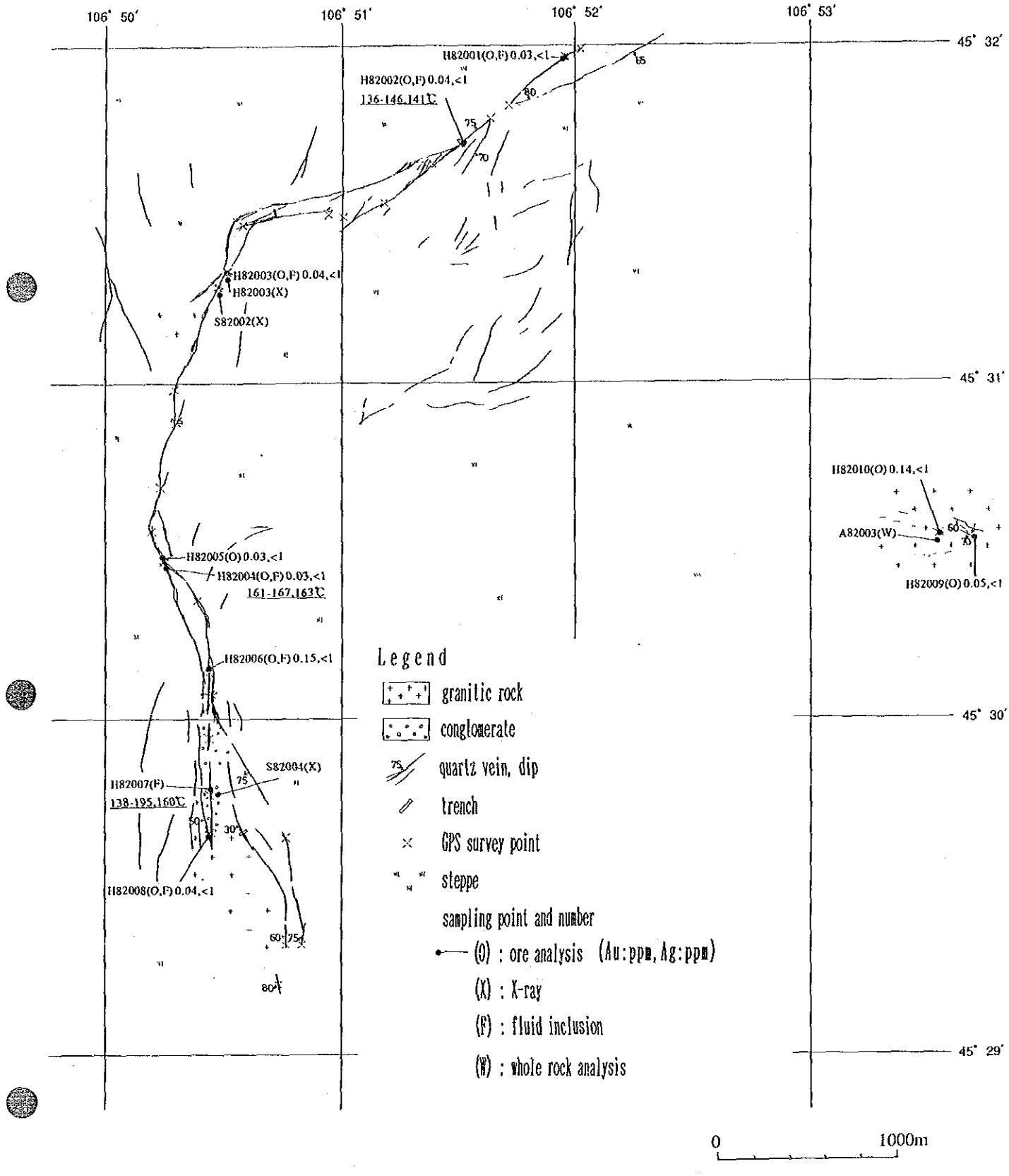


Fig. Ⅱ-2-7-18 Geologic Map of Ore-showing No. 57 (Dersen-us-hudag)

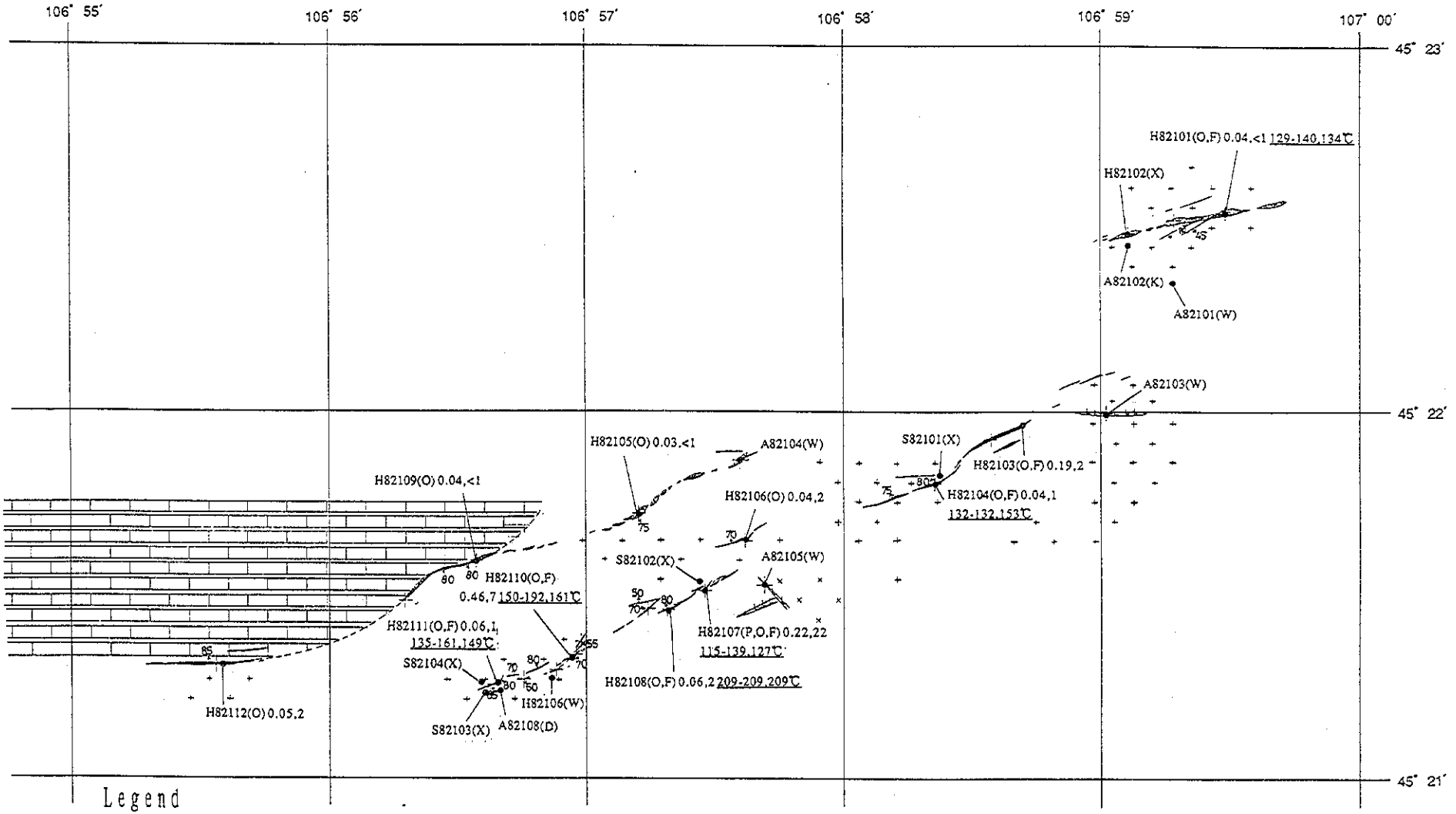


Fig. Ⅱ-2-7-19 Geologic Map of Ore-showing No. 60 (Morit)

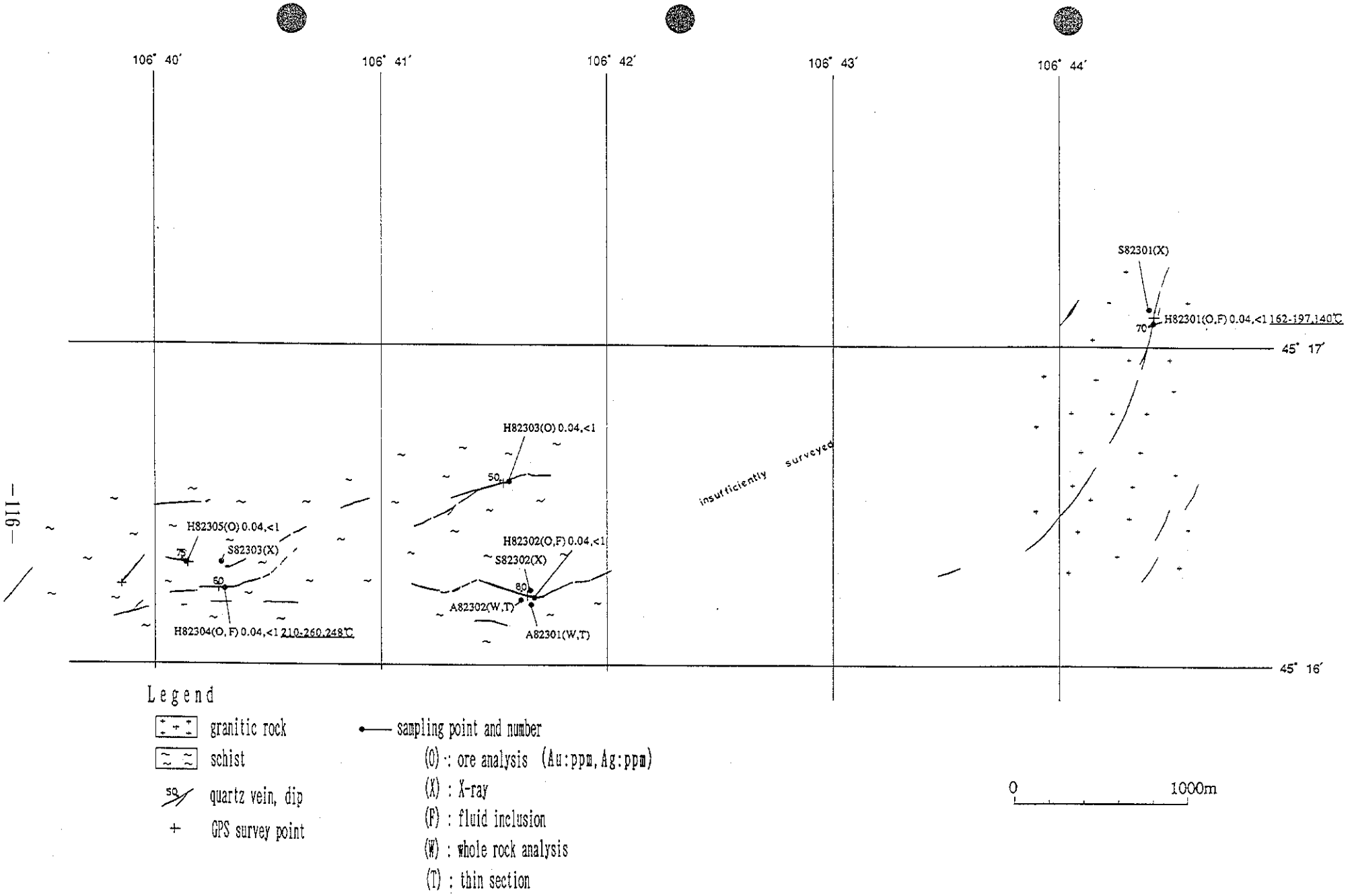


Fig. Ⅱ-2-7-20 Geologic Map of Ore-showing No. 62 (Futul-us)

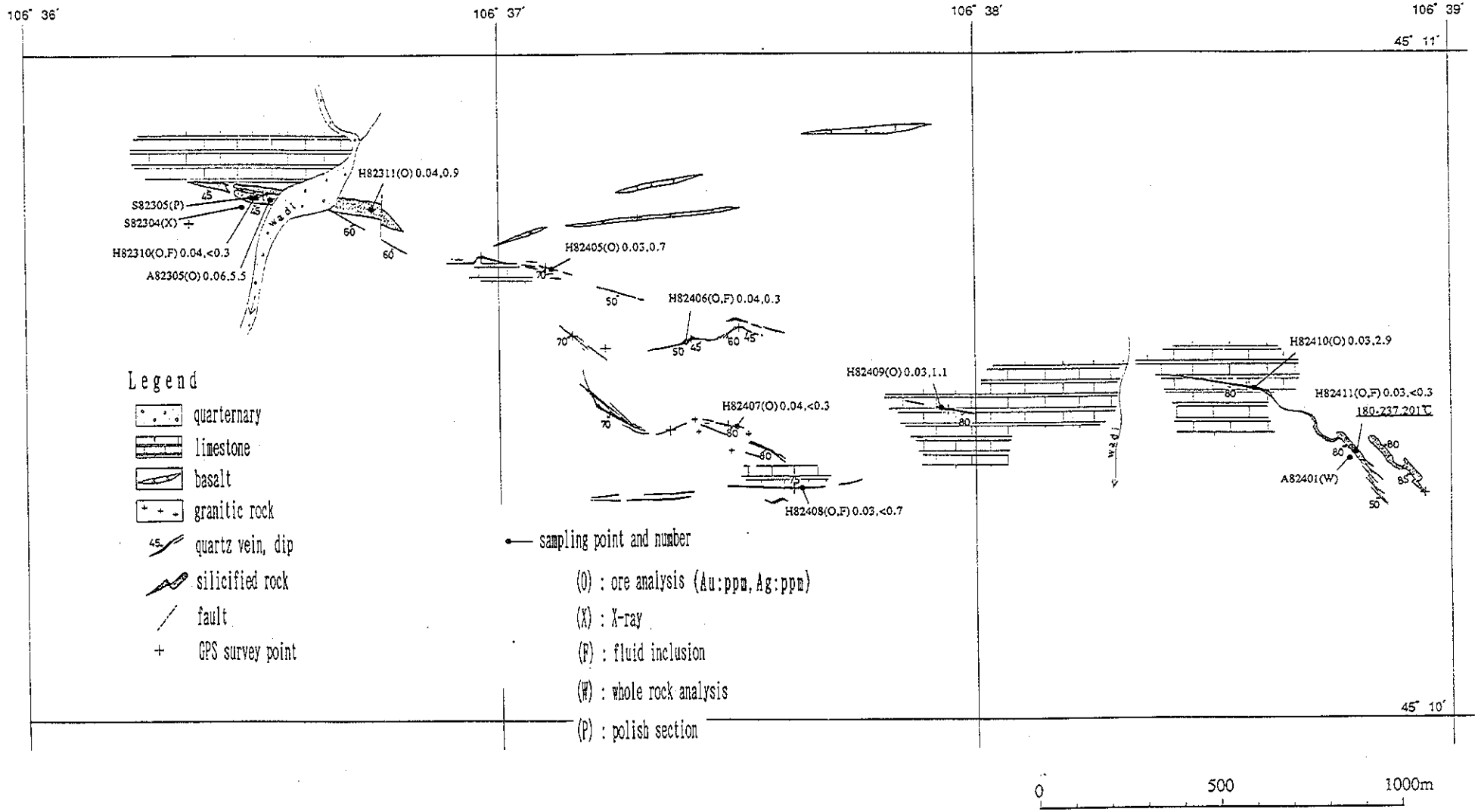


Fig. II-2-7-21 Geologic Map of Ore-showing No. 63 (Ulziit-ovoo)

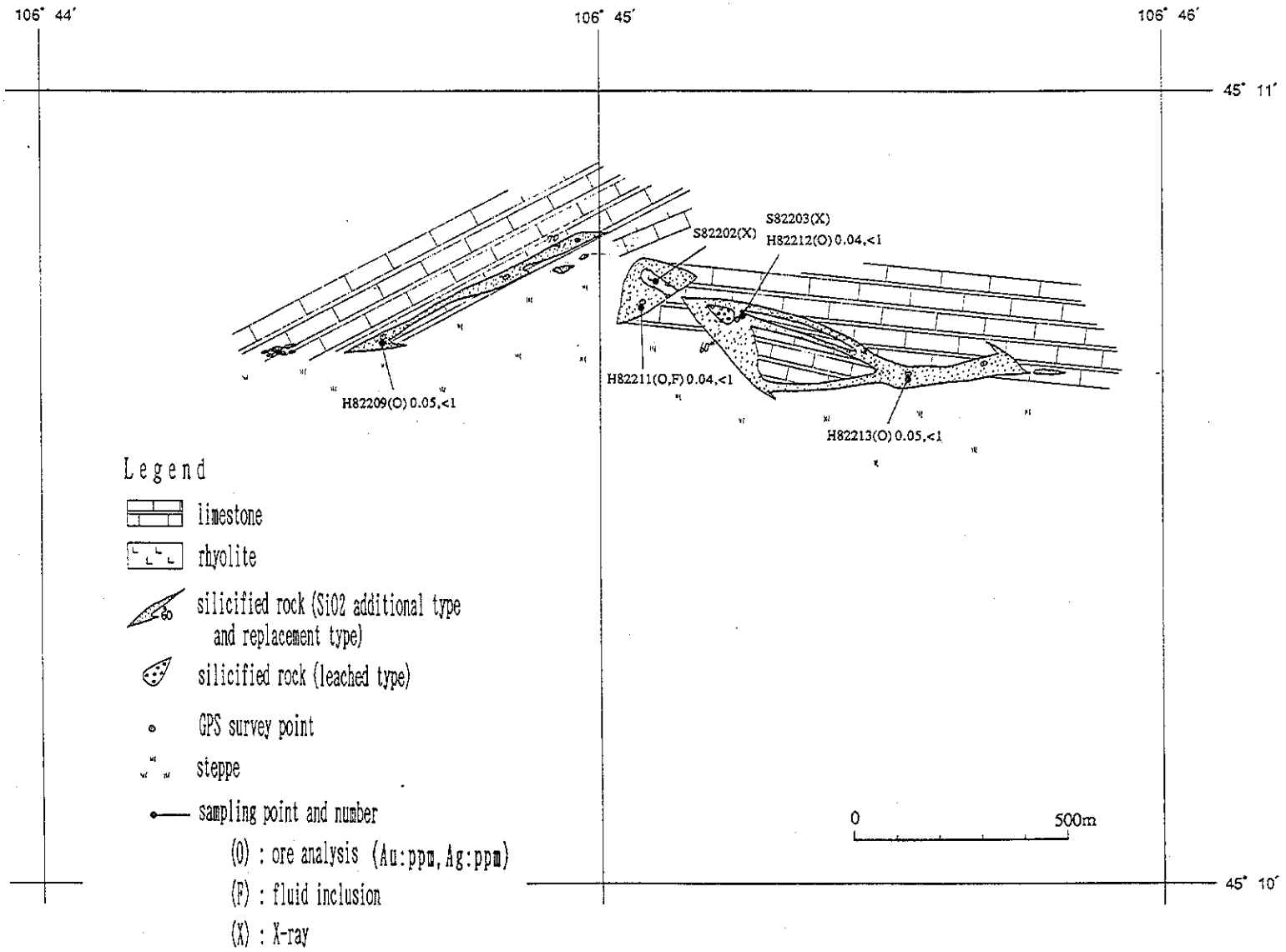


Fig. Ⅱ-2-7-22 Geologic Map of Ore-showing No. 64 (Sologoi-bayan)

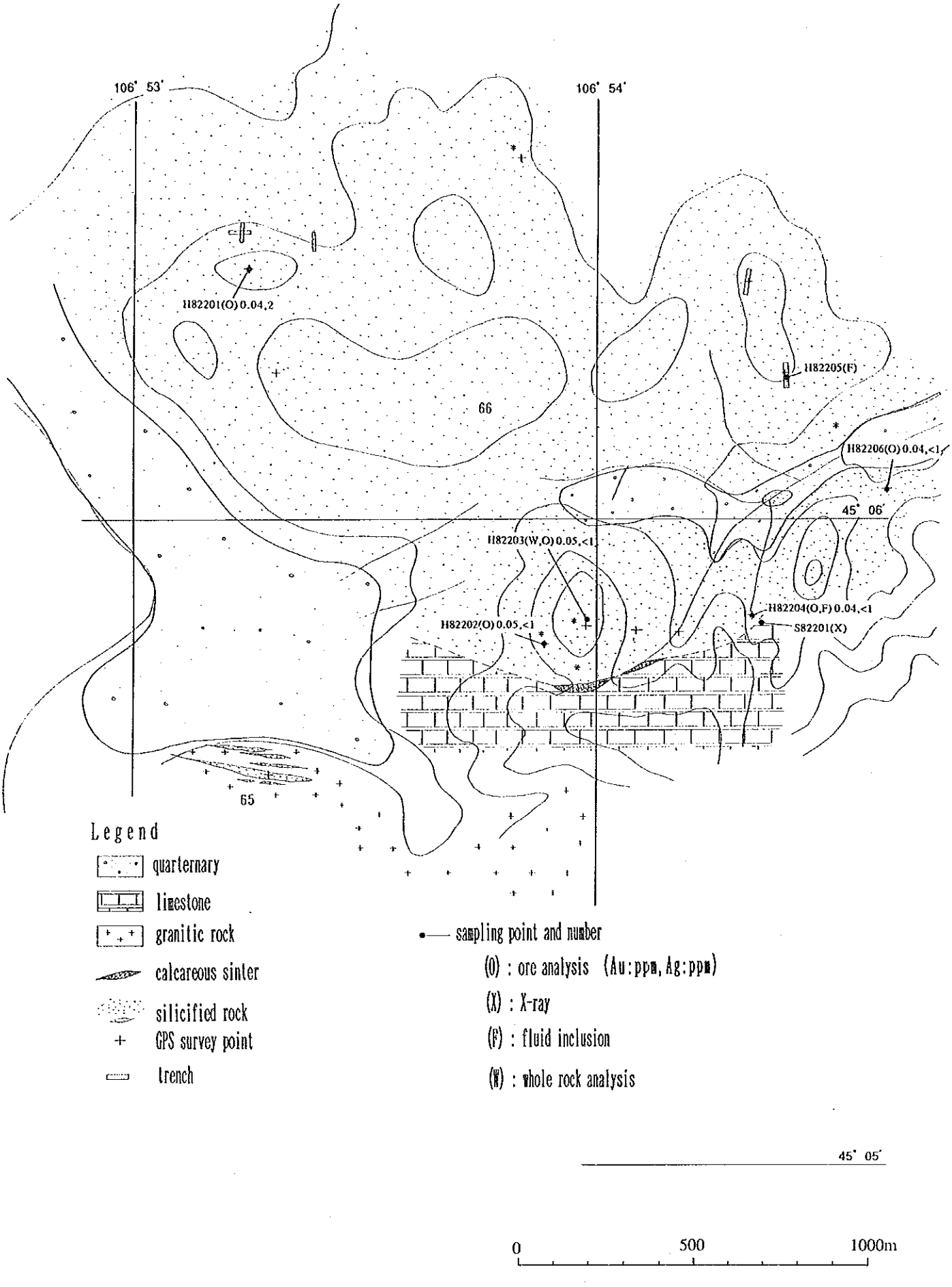


Fig. Ⅱ-2-7-23 Geologic Map of Ore-showing No. 65, No. 66 (Hetsuu-tsagaan-tolgoi)

Table Ⅱ-2-7-7 Ore-showings in the Sologoi Area (1)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
57	Dersen Us HUdak	Au	Qz-v	106° 52′ 00″ ～ 106° 50′ 51″	45° 31′ 59″ ～ 45° 29′ 20″	many quartz veins, silicified rocks and stock works are seen in the area of 3 km ×6 km. vein size Max. 15m×6.5 km chalcedonic quartz vein has banded structure.	granite(PZ1), tuff, tuff-breccia, conglomerate sandstone (P_{1-2})	0.03 ～ 0.15	< 0.3 ～ 0.4	7	136～195	Qz-pl-K-fel	Strike: N80° E~N60° E~N20° E~N-S~N45° W~N80° W dip: 50°~90° to both side hydro-fracturing and geyserite are seen. fluorite occures
58		Au	Qz-v	106° 51′ 39″	45° 27′ 45″	milky white chalcedonic mono-quartz veins (parallel veins) vein size Max. 10m×120 m vein zone 300 m×300 m Southeastern end of Dersen Us Hudag	granite(PZ1),	—	—	—	—	—	Strike: N45°~70° E, N50° W dip: 90°? hematite-bearing hydro-fracturing. csg mono qz
59		Au	Qz-v	106° 53′ 41″	45° 30′ 33″	milky white chalcedonic mono-quartz veins(parallel veins) vein size Max. 0.6m×50m vein zone 100 m×300 m Eastern end of Dersen Us Hudag	diorite, schist	0.05 ～	< 0.3 ～	2	—	Qz-pl-K-fel	Strike: N45°~70° W, dip: 60°~90° SW banded
60	Morit	Au	Qz-v	106° 59′ 29″ ～ 106° 58′ 28″	45° 22′ 32″ ～ 45° 19′ 58″	Six major quartz veins and silicified rocks are distributed in a couple of vein zones vein size Max. 5m×1,000 m vein zone 1 km×6.5 km pyrite, pyrrhotite, chalcopyrite	granite(PZ_1) limestone(V-C_1)	0.03 ～ 0.46	<0.3 ～ 21.6	11	115 ～209	Qz-ser-K-fel-pl	Strike: N65°~80° E, dip: 50°~80° N, 75°~80° S

Table Ⅱ-2-7-7 Ore-showings in the Sologoi Area (2)

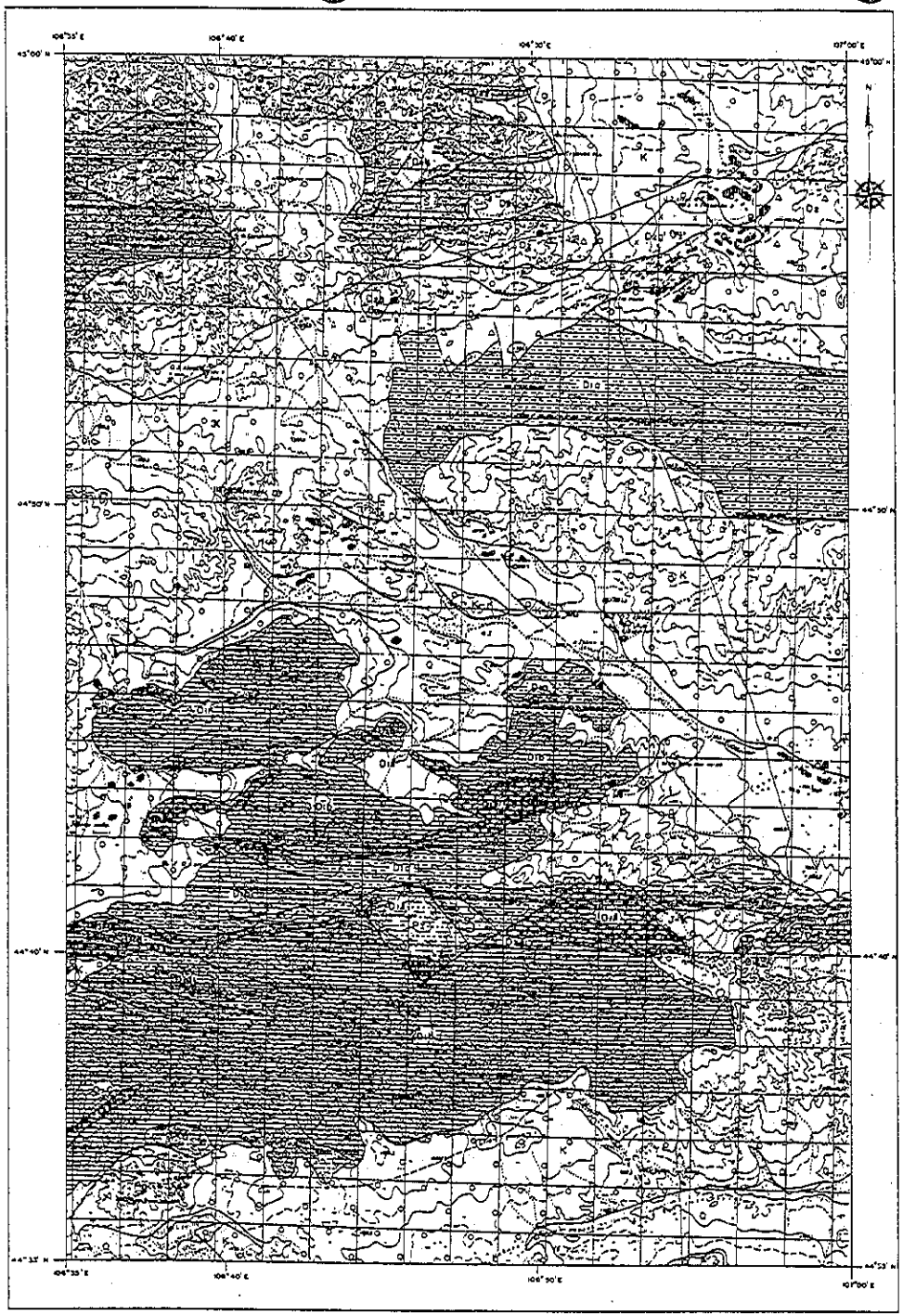
No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	pcs	Filling Temp ℃	Alteration type	Remarks
61		Au	Qz-v	106° 45′ 43″ ～ 106° 46′ 46″	45° 19′ 39″ ～ 45° 19′ 47″	Silisified rocks and quartz veins in three vein zones. vein size: Max. 10m×500 m area: EW 1.5 km ×NS 1.2 km	diorite(C_{2-3})	0.04 ～ 0.05	< 0.3 ～ 0.6	5	—	—	N25° W·45° E, N60° W·44° NE. N50° W·45° E, N70° ~80° E·60 ~76° NE
62	Futur Us	Au	Qz-v	106° 39′ 51″ ～ 106° 44′ 25″	45° 16′ 15″ ～ 45° 17′ 05″	milky white quartz veins in the area of 2 km×7 km fluorite occures in the eastern part. vein size: Max. 8 m×500 m	graphite gneiss($V-C_1$) diabase, diorite, gabbro	0.04 ～ 0.06	< 0.3	6	140 ～260	Qz-ser-Musc-pl-K-fel	N25° E·70° W, N75 ° E·50° NW N75° W·80° N, N80 ° W·75° N hydro-fracturing is commonly seen
63	Ulziit Ovoo	Au	Qz-v	106° 36′ 21″ ～ 106° 38′ 48″	45° 10′ 45″ ～ 45° 10′ 24″	More than ten milky white quartz veins are seen in the area of EW 3,500m×NS 1,000m Maximum size of a vein is 1.5 m wide × 100m long.	limestone ($V-C_1$) basalt	0.03 ～ 0.04	< 0.3 ～ 2.9	9	142 ～237	Qz-ser	N80° W·45° S, N60° W·60° S N80° W·70° S, N60° W·70° S E-W·75° N, N85° E·50° S N60° W·80° NE, N40° W·50° SW green copper and galena
64	Sologoi Bayan	Au	Massive silicified r. + Qz-v	106° 44′ 25″ ～ 106° 45′ 41″	45° 10′ 41″ ～ 45° 10′ 39″	Three massive silicified bodies with network of quartz veinlets. Unit size Max. 120m× 800m area 500m× 1900 m South side is covered by dune and colluvial deposits.	limestone ($V-C_1$)	0.04 ～ 0.04	< 0.3 ～ 0.8	4	—	Qz-Ka-pyp	N65° E·70° S, N65° W·70° N E-W·50° S, N50° W·60° SW

Table Ⅱ-2-7-7 Ore-showings in the Sologoi Area (3)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
65		Au	Qz-v	106° 53′ 18″	45° 05′ 36″	parallel quartz veins and silicified rock vein size: Max. 5m×400 m vein zone: Max. 80m×400 m	granite	0.04	0.3	1	—	(Qz-Ser)	Strike: N80°W, dip: 75°S? graphite bering
66	Hetsuu Tsagaan Uul	Au	Hot spring type	106° 53′ 14″ ～ 106° 53′ 53″	45° 06′ 23″ ～ 45° 05′ 48″	silicified zone with silicious and calcaleous sinter cones. siliceous sinter is cut by chalcedonic quartz veinlets. silicified zone: EW 2.5 km×NS 2.5 km	limestone(Rf) siltstone, sandstone(J-K)	0.04 ～ 0.05	< 0.3 ～ 1.9	8	119 ～133	Qz-cal	N80°E·60°N. N-S and others. surface of the sinter-cones are widely covered by the fragments of siliceous sinter and dune. This zone is located at southeastern lim of the mesozoic depression.
67		Au	massive silicified rock	106° 58′ 09″	45° 06′ 28″	a couple of massive silicifid rocks vein size: Max. 15 m×280 m vein zone: Max. 100m×300 m	limestone(Rf)	0.04	0.3	2	—	(Qz-cal)	Strike: N50°~60°E. dip: 55°~60°NW Silicified rock bodies are located at the southeastern corner of the Mesozoic basin.
68		Au	Qz-v	107° 08′ 49″ ～ 107° 07′ 59″	45° 10′ 43″ ～ 45° 10′ 21″	a couple of milky white monoquartz vein cut by two faults. vein size: Max. 15 m×1,200 m insufficiently surveyed	granite (PZ_1)	—	—	—	—	—	Strike: N75°~85°E. dip: 40°~45°S about 12 km east of Sologoi area

Table Ⅱ-2-7-7 Ore-showings in the Sologoi Area (4)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate Longitude	Coodinate Latitude	Characteristics and Size	Host Rock	Assay Au(g/t)	Assay Ag(g/t)	Assay pcs	Filling Temp ℃	Alteration type	Remarks
69		Au	silicif-ed zone	107° 07′ 01″	45° 11′ 36″	silicified zone along the lim of the Mesozoic depression. zone: Max. 23m×> 1 km	sandstone, siltstone (J-K_1)	—	—	—	—	(Qz-?)	Strike: N50° E. dip: 50° S insufficiently surveyed
70		Au	Qz-v	106° 29′ 29″	45° 14′ 27″	parallel quartz vein swarm in limestone(V-C_1) vein size: Max. 40m×1.5 km	limestone (Rf)	—	—	—	—	(Qz-?)	strike and dip: E-W·80° N, N78° E·75° N insufficiently surveyed
71		Au	Qz-v with sil sinter	106° 02′ 18″	45° 10′ 52″	milky white chalcedonic mono-quartz veins with siliceous sinter. two parallel veins vein size: Max. 5 m×100 m	granite, granodiorite (P_2)	—	—	—	—	(Qz-?)	parallel quartz veins N30° E·90° ? insufficiently surveyed
72		Au	Qz-v & alterat-ion zone	106° 10′ 55″	45° 01′ 31″	parallel quartz veins and sil-icified rocks in wide hydro-thermal alteration zones. vein size: 1~5 m×100 m zone: 500 m×> 5 km	pelitic~ psammitic schist (PZ_1)	—	—	—	—	(Qz-Ser)	N70° W·90° There are about ten alter-ation zones in a profile.
73			massive silicif-ed rock	106° 27′ 36″	45° 07′ 42″	single massive silicified rock body at the lim of the Meso-zoic depression. size: 100 m×800 m	limestone(Rf)	—	—	—	—	(Qz-?)	N70° W·90° insufficiently surveyed



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2/		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1/		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone
Silurian-Devonian	S-D/		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	R/		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	g		granodiorite porphyry
	d		diorite, microdiorite, diorite porphyry
	Pg		granite, granocyenite
	Pr		rhyolite, quarz porphyry
	C-Pg		granite, granodiorite, granocyenite, diorite
	D2g		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

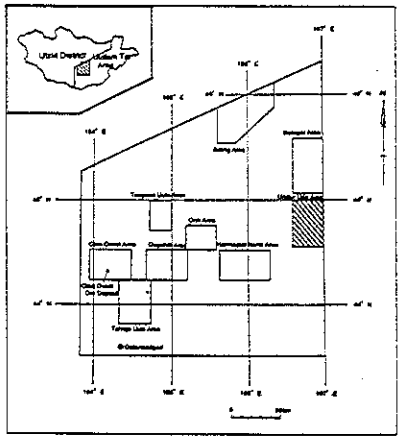
● ore showing

K	unit name and boundary
	strike and dip direction
	anticline
	syncline
	fault
	inferred fault
	thrust fault

PL. II – 1 – 10

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the Undur Uda Area



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JANUARY 1993

Fig. II-2-7-24 Geologic Map of the Undur-uda Area (phase II)

Table Ⅱ-2-7-8 Ore-showings in the Undur-uda Area (1)

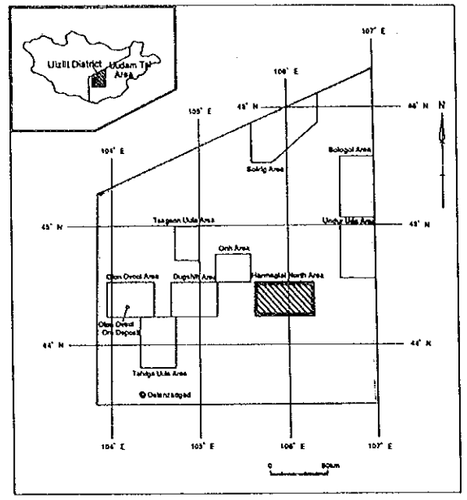
No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
74		Au	Qz-v	106° 50′ 14″	44° 56′ 08″	a couple of small quartz veins in the area of 20 m×20m.	fng amphibolite~melanocratic gns	—	—	—	—	epidotization	E-W·90°, N80° W. 80 °S no other ore-showings around
75		Au	Qz-v	106° 45′ 32″	44° 54′ 37″	milky white single quartz vein vein size: Max. 0.8m×150 m	granodiorite-porphyry	0.04	0.9	1	—	—	N75 °W·60°N, N40° E·40° NW N70° W·60° N
76		Au	Qz-v	106° 52′ 27″	44° 43′ 50″	three parallel quartz veins. vein size: Max. 0.6 m×20m	chl-ser sch, phyllitic	—	—	—	—	(chl-ser)	N85° W· 75°~80° S
77		Au	Qz-v	106° 46′ 39″	44° 41′ 23″	quartz-pipe formed at the contact between granite and limestone size: Max. 25m×45m	granite and limestone (PZ_1)	0.04	< 0.3	1	—	Qz-ser-pl-K-fel	elongated to N80° E direction
78		Au	Qz-v	106° 39′ 51″	44° 42′ 20″	parallel quartz veinlets. vein size: Max. 0.3 m×3 m area: 10m×15m	chl-ser sch, lithoidite dike	—	—	—	—	Qz-Ka-ser	N80° W· 50° S
79		Au	Hot spring type	106° 32′ 51″	44° 53′ 26″	quartz vein, siliceous sinter and mud pots aligned to N 75° E direction size of sinter cone: Max. 50m ×50m area: 50m×500 m	chl-ser sch, phyllitic	—	—	—	—	Qz-Ka-K-fel	extending to N75° E Sinter cones are alined along the northern lim of the Mesozoic depression.

Table Ⅱ-2-7-8 Ore-showings in the Undur-uda Area (2)

No.	Name of deposit	Mineral	Type of Deposit	Coodinate		Characteristics and Size	Host Rock	Assay			Filling Temp ℃	Alteration type	Remarks
				Longitude	Latitude			Au(g/t)	Ag(g/t)	pcs			
80		Au	silicif-ied zone	106° 08′ 43″ ～ 105° 43′ 19″	44° 42′ 17″ ～ 44° 38′ 38″	massive silicified rocks containing fragments of milky quartz size: Max. 20m×800 m	limestone (D₂)	—	—	—	—	—	N45°~60° E· 75° S

MINERAL EXPLORATION
IN
THE UUDAM TAL AREA, MONGOLIA (PHASE II)

Geologic Map of the North Harmagtai Area



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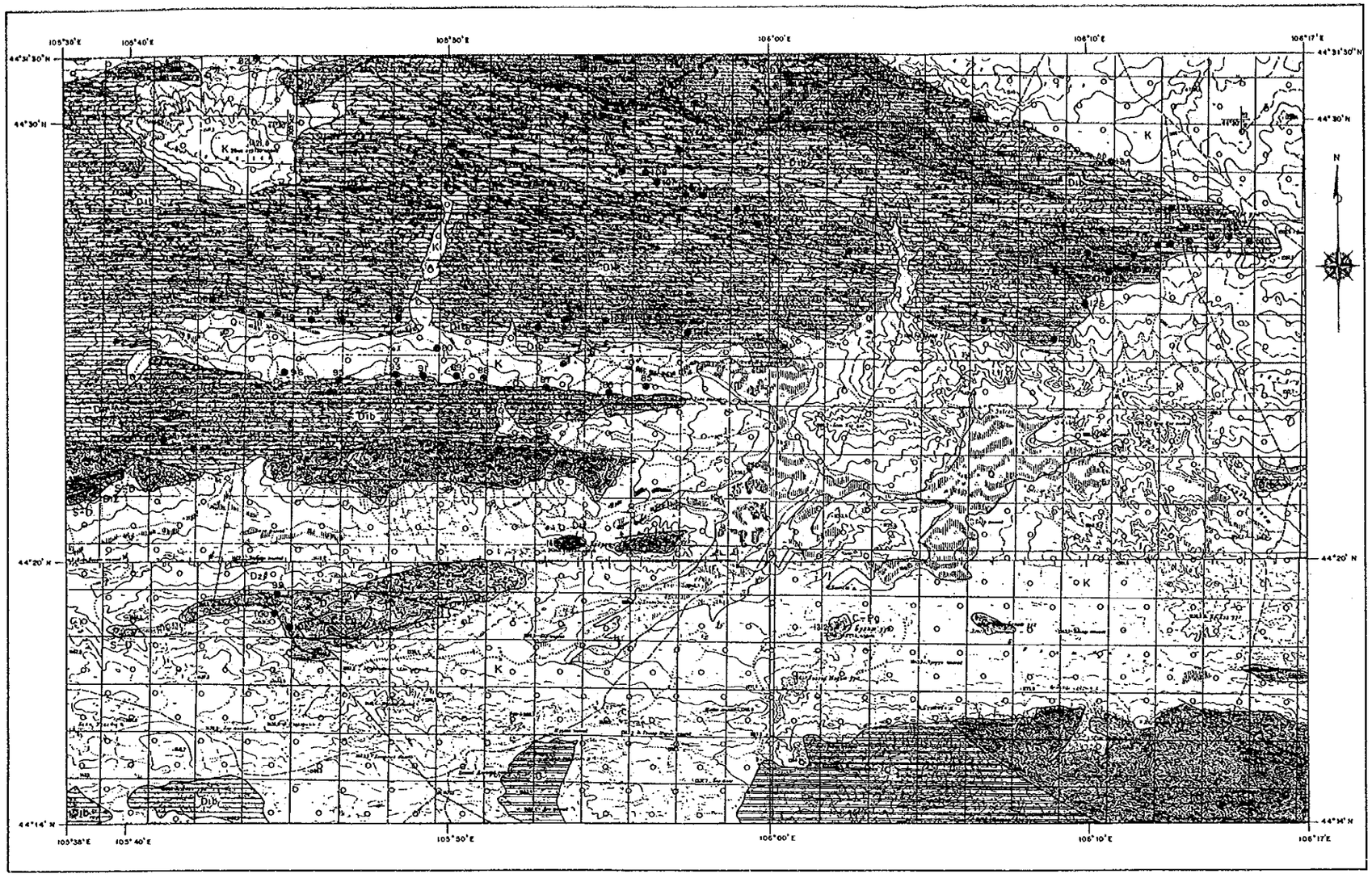
JANUARY 1993



LEGEND

Geologic Age	Geologic Unit	Symbol	Rock Types
Quaternary	Q		sand, gravel, loam
Tertiary	Tv		olivine basalt
Cretaceous	K		sandstone, siltstone, conglomerate, limestone, coal
Jurassic-Cretaceous	J-K		conglomerate, siltstone, sandstone
	J-Kv		basalt, trachybasalt-trachyandesite, trachyte
Jurassic	J		conglomerate, siltstone, sandstone
	Jv		trachyte-dacite, trachyrhyolite
Permian	P		trachyte, andesite, trachyandesite, dacite, tuff
Carboniferous-Permian	C-P		basalt, trachyandesite, andesite, tuff, conglomerate
Carboniferous	C		sandstone, siltstone, conglomerate, mudstone
Devonian-Carboniferous	D-C		tuffaceous conglomerate, sandstone, siltstone
Devonian	D2ℓ		limestone
	D2		basalt, trachybasalt, andesite, dacite, rhyolite, tuff
	D1ℓ		limestone
	D1b		sandstone, shale, siltstone
	D1a		shale, siltstone, sandstone

Silurian-Devonian	S-Dℓ		limestone
	S-D		dacite, rhyolite, andesite, tuff, phyllite, shale
Silurian	S		sandstone, siltstone, shale, phyllite
Undifferentiated Paleozoic	PZ		sandstone, siltstone, clayey shale
Riphean	Rℓ		recrystallized limestone
	R2		quartzite, phyllite, siltstone, sandstone, amphibolite
	R1-2		shale, amphibolite, quartzite, phyllite, gneiss
Intrusive Rocks	ε		granodiorite porphyry
	d		diorite, microdiorite, diorite porphyry
	Pγ		granite, granosyenite
	Pr		rhyolite, quartz porphyry
	C-Pγ		granite, granodiorite, granosyenite, diorite
	D2γ		granite, granodiorite
	D2d		diorite, gabbro
	D1r		rhyolite, dacite

● ore showing

K	unit name and boundary
	strike and dip direcion
	anticline
	syncline
	fault
	inferred fault
	thrust fault

Fig. II-2-7-25 Geologic Map of the North-harmagtai Area (phase II)