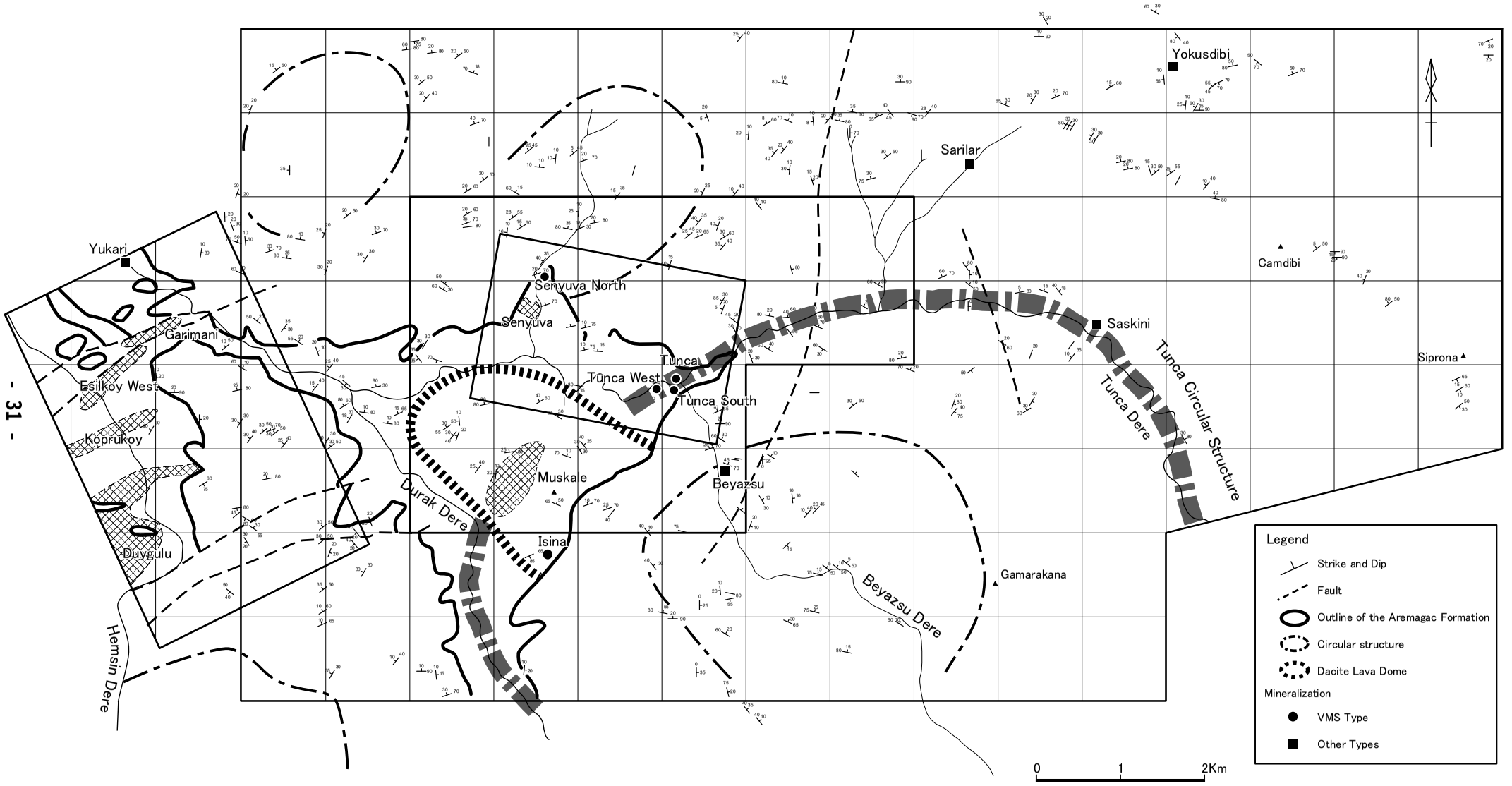


Fig. Ⅱ-1-11 Geological Structure of the Tunca Area

to the Eocene Kaçkar Granitic Rocks situating to the south of the area.

The area is dominated by the lineaments extending northeast to southwest and northwest to southeast, together with some circular structure. The dacite lava (Adcl) of the lower member of the Alemağaç Formation, being distributed an area centecircular Muşkale Mountain, has been erupted on the circular structure, and formed the lava dome.

1-1-2 Mineralization and Alteration

The volcanogenic massive sulphide mineralization, vein-type mineralization, and mineralization associated with intrusive rocks have been occurred in the area.

(1) Volcanogenic Massive Sulphide Mineralization

The volcanogenic massive sulphide mineralization in the area consists of the sulphide dissemination and massive sulphide mineralization in the dacite lava (Adcl) and dacitic pyroclastic rocks (Atf) of the lower member of the Alemağaç Formation. The sulphide is mainly composed of pyrite, being accompanied by minor-amounts of chalcopyrite and sphalerite. The massive sulphide is present only in the Tunca Deposit. The Tunca South Occurrence and Şenyuva Mineralized Zone are of sulphide dissemination in the green dacitic rocks (Adcg, Attf) of the upper member of the Alemağaç Formation. The green dacite has intruded ducircular the stage decreasing its hydrothermal activity right after the formation of the volcanogenic massive sulphide ore, and the sulphide dissemination in the green dacite has been formed associated with its hydrothermal activity. Accordingly, the ore horizon ranges from the upper part of the dacitic pyroclastic rocks (Atf) to the below of the reddish calcareous mudstone, the lowermost bed of the Çağlayan Formation.

The ore formation process of the volcanogenic sulphide deposits and mineral occurrences in the area is as follows.

(i) Formation of the Tunca Circular Structure

(ii) Eruption of the dacite lava (Adcl) on the circular structure, and formation of the lava dome.

(iii) Phreatic eruption on the flank of the dome, and deposition of the dacitic pyroclastic rocks (Atf).

(iv) Hydrothermal activity occurred, associated with the phreatic eruption. Formation of the volcanogenic massive sulphide ore.

(v) Intrusion of the purple dacite (green dacite), and sulphide dissemination inside of the pyroclastic rocks at the edge of the volcanic rock body.

The process has occurred continuously, and had no discontinuance during the activities.

The Tunca Deposit, Tunca South Occurrence, Muşkale Mineralized Zone, Şenyuva Mineralized Zone, Şenyuva North Occurrence Zone, and Garimani Mineralized Zone have been formed by the volcanogenic massive sulphide mineralization. The Garimani Mineralized Zone has been formed associated with other dacite (Adcl) body, and no alteration zone associated with mineralization exist nearby green dacite body.

(a) Tunca Deposit (Figures Ⅱ-1-12 to Ⅱ-1-13)

The ore deposit is situated in the north bank of the Tunca River, consisting of several accidental massive sulphide blocks presumably due to some landslide. It is presumed that the original ore body is situated to the northwest. The assay result of the ore is 0.12 to 0.57 g/t Au, 1.40 to 37.10 g/t Ag, 0.02 to 0.91 % Cu, <0.01 to 2.18 % Pb, 0.02 to 13.30 % Zn, <0.01 to 12.20 % Ba, and 20.95 to 48.00 % S.

(b) Tunca South Occurrence (Figure Ⅱ-1-12)

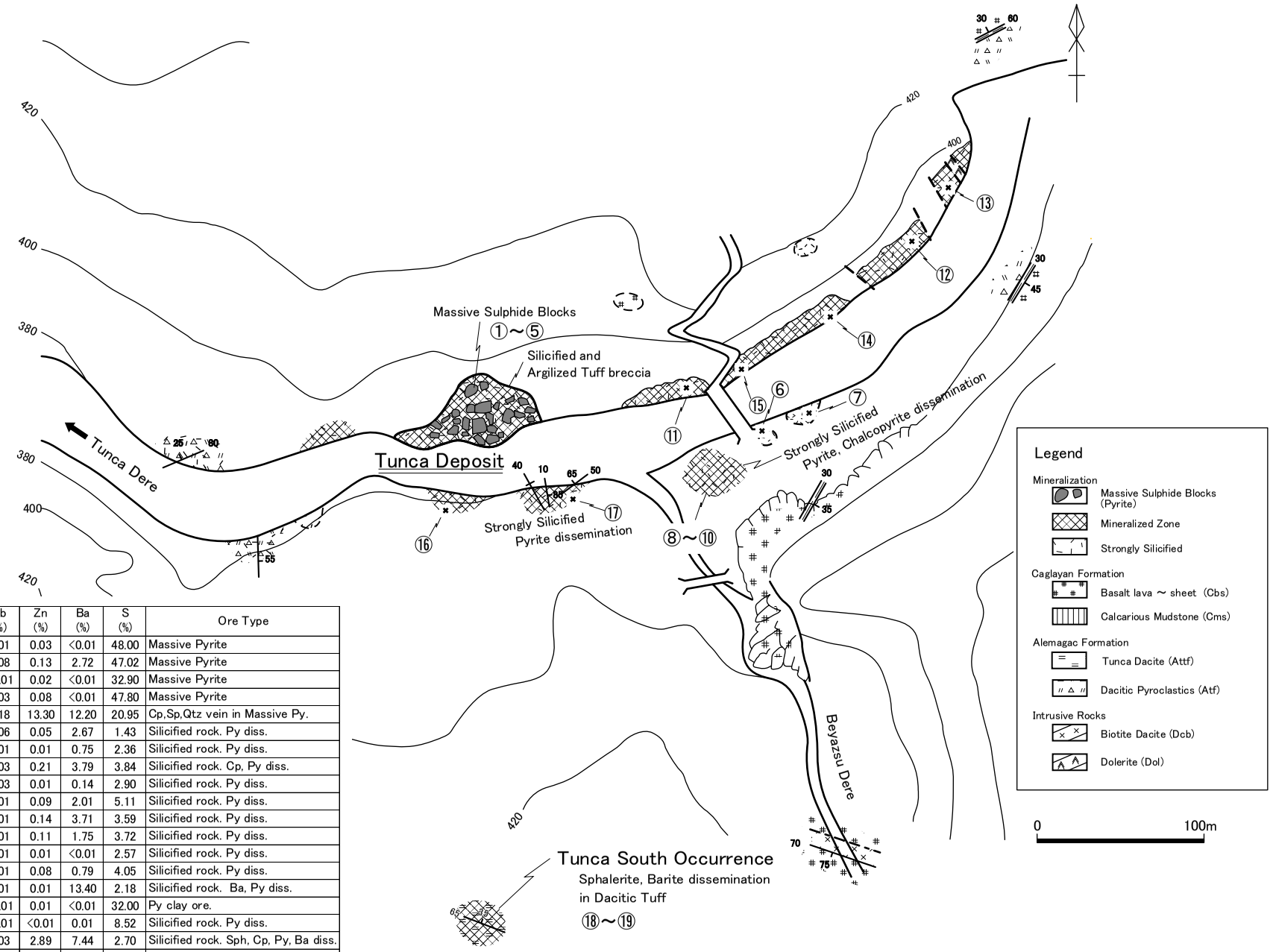
The sphalerite, chalcopyrite, and barite are disseminated in the green dacitic pyroclastic rocks (Attf). The assay result of the ore is 0.11 to 0.72 g/t Au, 8.55 to 19.60 g/t Ag, 0.26 to 0.29 % Cu, <0.02 to 0.03 % Pb, 2.32 to 2.89 % Zn, 5.91 to 7.44 % Ba, and 2.70 to 4.85 % B.

(c) Muşkale Mineralized Zone (Figure Ⅱ-1-14)

The mineralized zone is situated on the western flank of Muşkale Mountain, being distributed an area of 1,100 x 600 meters. The zone is composed of pyrite dissemination, and the assay result of the ore is <0.01 to 0.10 g/t Au, 0.50 to 21.20 g/t Ag, <0.01 to 0.37 % Cu, 0.004 to 0.187 % Pb, <0.01 to 3.61 % Zn, <0.01 to 3.61 % Ba, and 3.40 to 21.30 % S.

(d) Şenyuva Mineralized Zone (Figure Ⅱ-1-15)

The green dacite (Adcg) and dacitic pyroclastic rocks (Attf) have undergone silicification, sericitization, chloritization, and dissemination of chalcopyrite, sphalerite, and pyrite. The assay result of the ore is 0.26 g/t Au, 26.50 g/t Ag, 1.24 % Cu, 0.02 % Pb, 3.69 % Zn, 5.60 % Ba, and 13.70 % S.



No.	Sample	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)	Ore Type
①	A187	0.12	1.40	0.12	0.01	0.03	<0.01	48.00	Massive Pyrite
②	A188	0.29	16.00	0.28	0.08	0.13	2.72	47.02	Massive Pyrite
③	F024	0.42	5.00	0.02	<0.01	0.02	<0.01	32.90	Massive Pyrite
④	F025	0.27	4.65	0.10	0.03	0.08	<0.01	47.80	Massive Pyrite
⑤	A147	0.57	37.10	0.91	2.18	13.30	12.20	20.95	Cp,Sp,Qtz vein in Massive Py.
⑥	BA026	0.04	3.60	0.01	0.06	0.05	2.67	1.43	Silicified rock. Py diss.
⑦	BA030	0.07	1.40	<0.01	0.01	0.01	0.75	2.36	Silicified rock. Py diss.
⑧	BA031	0.14	34.30	0.53	0.03	0.21	3.79	3.84	Silicified rock. Cp, Py diss.
⑨	BA033	0.13	4.40	0.09	0.03	0.01	0.14	2.90	Silicified rock. Py diss.
⑩	BA034	0.20	11.00	0.10	0.01	0.09	2.01	5.11	Silicified rock. Py diss.
⑪	BA035	0.10	4.60	0.21	0.01	0.14	3.71	3.59	Silicified rock. Py diss.
⑫	BA037	0.28	10.40	0.05	0.01	0.11	1.75	3.72	Silicified rock. Py diss.
⑬	C117	0.01	32.00	0.01	0.01	0.01	<0.01	2.57	Silicified rock. Py diss.
⑭	C125	0.10	1.10	0.02	0.01	0.08	0.79	4.05	Silicified rock. Py diss.
⑮	C126	0.02	0.75	0.05	0.01	0.01	13.40	2.18	Silicified rock. Ba, Py diss.
⑯	D131	0.03	1.30	0.01	<0.01	0.01	<0.01	32.00	Py clay ore.
⑰	D132	0.04	0.85	<0.01	<0.01	<0.01	0.01	8.52	Silicified rock. Py diss.
⑱	G033	0.72	8.55	0.29	0.03	2.89	7.44	2.70	Silicified rock. Sph, Cp, Py, Ba diss.
⑲	G034	0.11	19.60	0.26	0.02	2.32	5.91	4.85	Silicified rock. Sph, Cp, Py, Ba diss.

Fig. Ⅱ-1-12 Sketch Map of the Mineralized Outcrop Around the Tunca Deposit

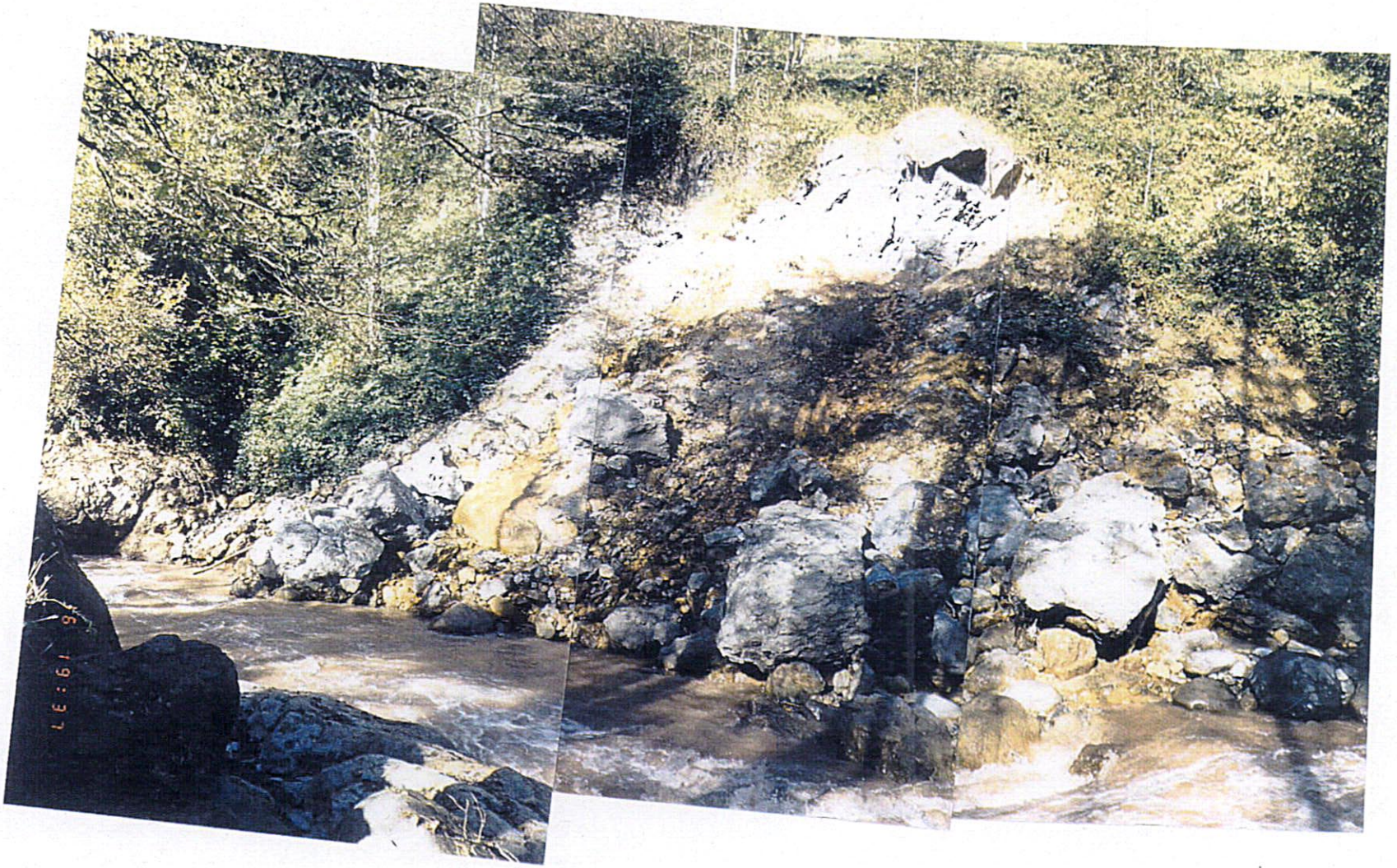
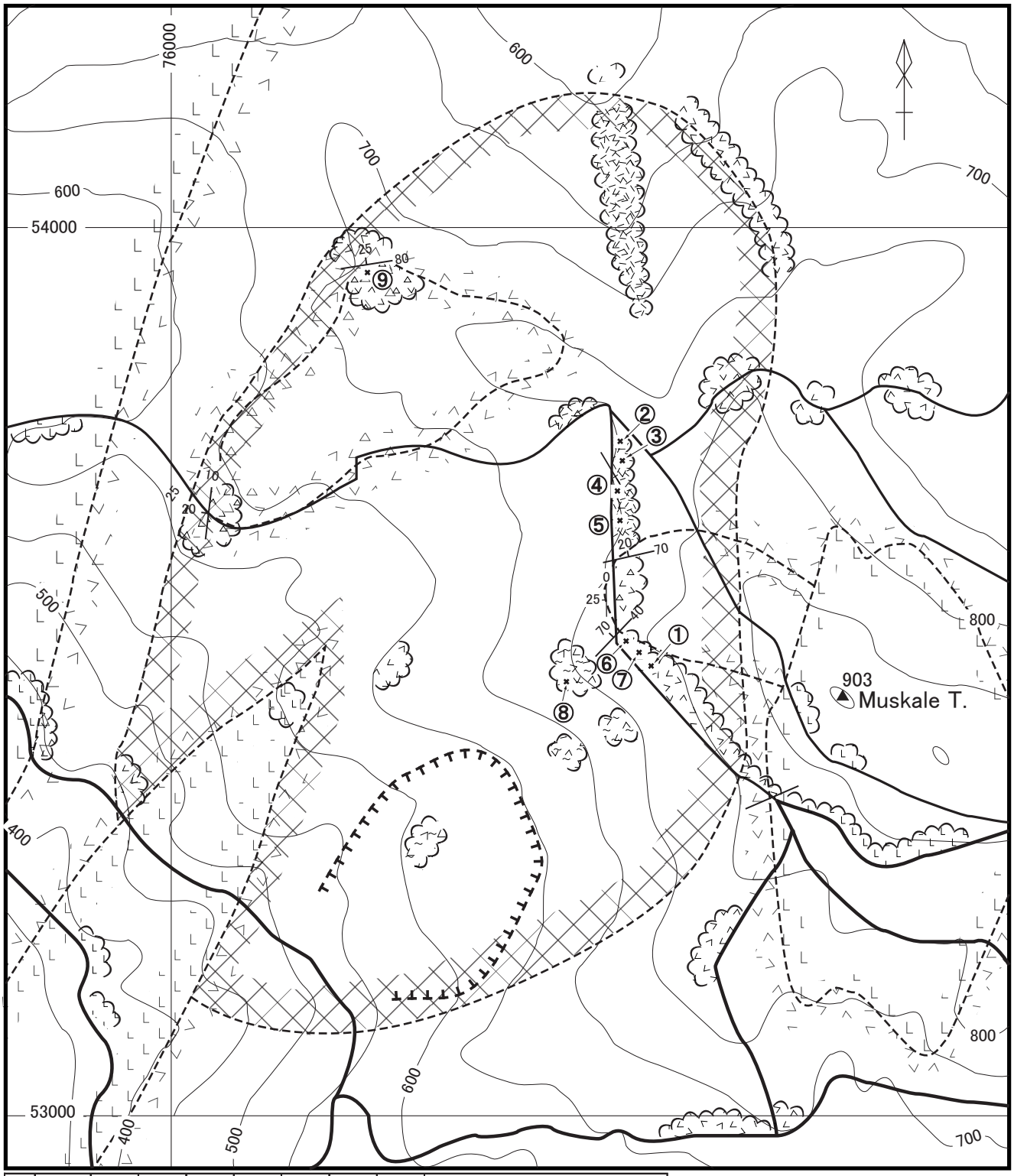


Fig. Ⅱ-1-13 Photograph of the Tunca Deposit

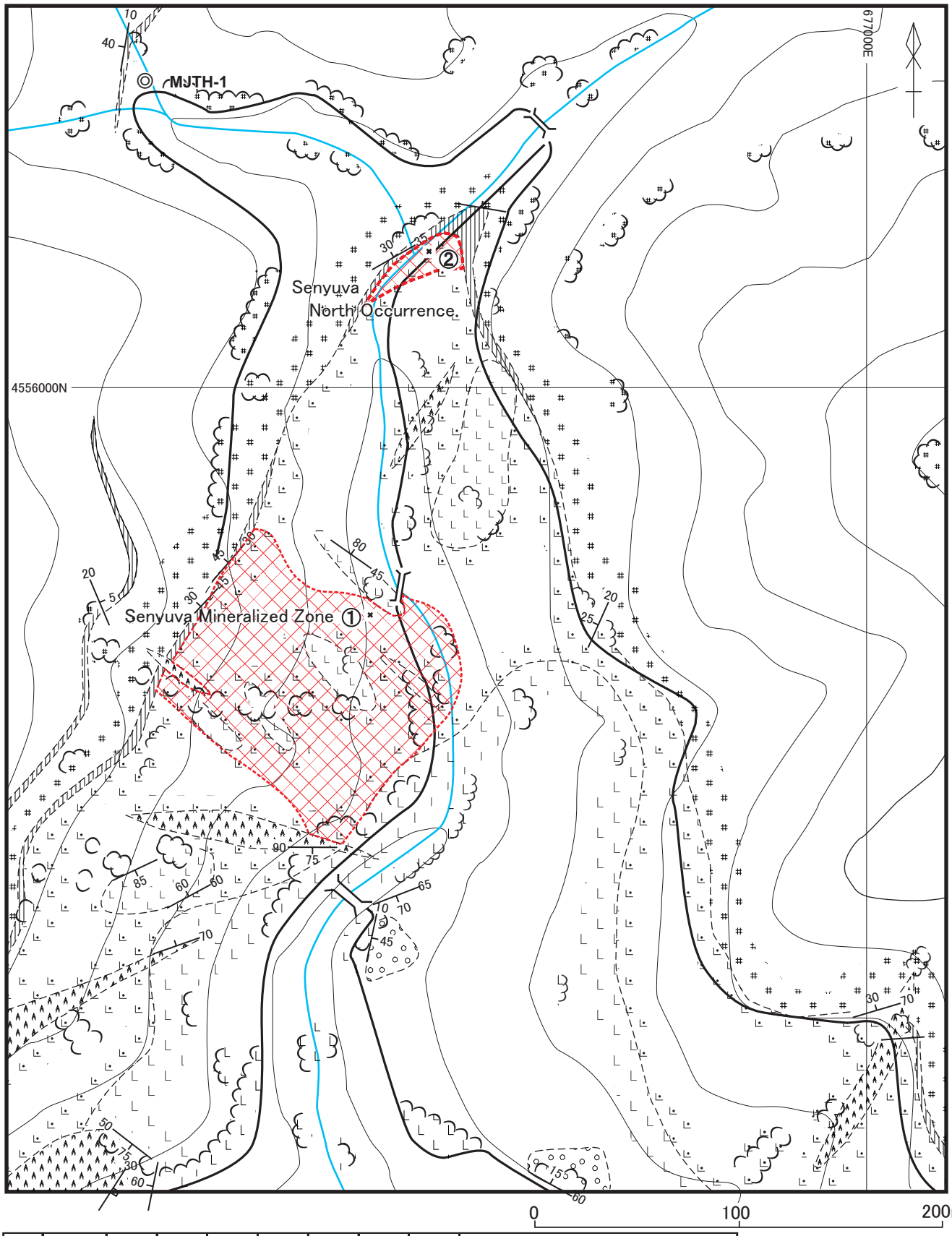


No.	Sample	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)	Ore Type
①	A096	0.06	7.80	0.26	0.19	3.61	3.08	4.09	Silicified Dacite. Sph, Py, Ba diss.
②	BA040	0.10	4.10	0.01	0.01	0.01	<0.01	21.30	Silicified rock. Py diss.
③	BA043	0.08	1.90	0.01	0.07	0.17	<0.01	9.69	〃
④	BA044	<0.01	0.50	<0.01	0.04	0.01	0.01	3.40	〃
⑤	BA046	0.01	3.35	0.15	0.01	0.60	<0.01	24.20	〃
⑥	BA051	0.03	21.20	0.05	<0.01	0.01	1.11	6.11	〃
⑦	BA052	0.03	3.65	0.37	0.02	0.39	0.58	4.57	〃
⑧	C139	0.08	5.30	0.15	0.01	0.11	<0.01	4.88	〃
⑨	C178	0.01	1.30	<0.01	<0.01	<0.01	<0.01	6.48	〃

Legend

Purple Dacite
Dacitic Pyroclastics
Dacite lava
Mineralized Zone
Silicification
Argillization
Land Slide

Fig. Ⅱ-1-14 Muskale Mineralized Zone



No.	Sample	Au (ppm)	Ag (%)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)	Remarks
①	E019	0.26	26.50	1.24	0.02	3.69	5.60	13.70	Silicified. Cp, Sph, Py diss.
②	G008	<0.01	1.20	<0.01	0.02	0.01	0.94	0.08	Silicified and Argilized Tuff. Py diss.

Legend

Sediment
Basalt
Calcareous Mudstone
Green Dacite
Purple Dacite
Dolerite
Mineralized Zone
Drilling Point

Fig. Ⅱ-1-15 Senyuva Mineralized Zone

(2) Other Mineralized Zone(Figure Ⅱ-1-16)

The Köpruköy Mineralized Zone, Yeşilköy West Mineralized Zone, and Şaşkını Occurrence have been formed by the vein-type mineralization. The Duygulu Mineralized Zone and Beyazsu Occurrence are situated around an igneous body. The mineralized zones distributed in the watershed of the Hemsin River are large in their scale, but they consist of pyrite dissemination. The assay result of the ore is <0.01 to 0.54 % Cu and <0.01 to 0.32 % Zn.

(3) Laboratory Test

(a) Fluid Inclusion (Table Ⅱ-1-1)

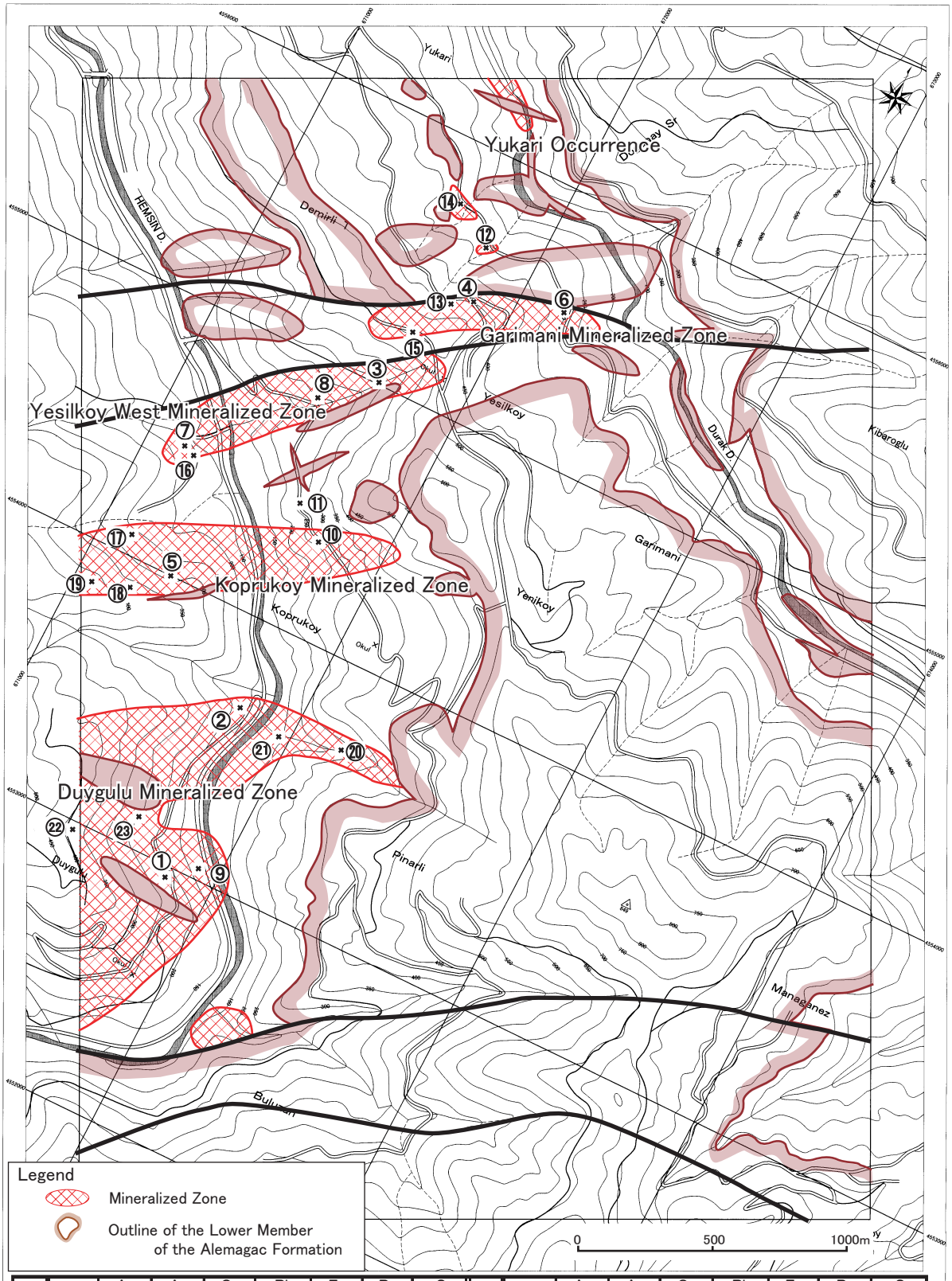
The average homogenized temperature of the quartz in the massive sulphide ore of the Tunca Deposit is 187 to 221 degree centigrade, and that of the sphalerite-barite-quartz vein is 217 to 220 degree centigrade. The homogenized temperature of the barite in the Muşkale Mineralized Zone is 216 degree centigrade, about same as that of the Tunca Deposit. The salinity ranges between 2.7 and 4.1 % for both.

Table Ⅱ-1-1 Results of Fluid Inclusion Test

No.	Sample	Location	Coordinates		Description	Temperature(℃)			Salinity(%)		Remarks
			UTM-E	UTM-N		Number	Range	Average	Number	NaCl eq.	
1	AA001	Peronit	0697915	4582824	Chalcedonic Quartz in massive sulphide ore	14	102 - 153	126.2	9	0	
2	AA002	Peronit	0697794	4582825	Chalcedonic Quartz in massive sulphide ore	20	113 - 162	141.4	15	0	
3	AA017	Cakmakkaya,Murgul	0716178	4568804	Quartz network. width 1cm.	20	232 - 305	269.5	17	0	
4	AA018	Cakmakkaya,Murgul	0716179	4568805	Quartz network width 6cm.	20	145 - 232	191.1	17	4.69	
5	AA019	Anayatak, Murgul	0716180	4568806	Chalcopyrite,Galena,Quartz vein.	20	101 - 152	131.7	15	0	
6	BA009	Cerattepe	0732994	4560592	Quartz vein in strongly silicified rock.	20	151 - 212	175.6	13	0.92	
7	A143-1	Tunca	78192	54773	Quartz block in massive Pyrite ore.	20	189 - 245	221.1	18	1.87	
8	A143-2	Tunca	78192	54773	Quartz block in massive Pyrite ore.	20	165 - 213	188.8	16	3.81	
9	A144	Tunca	78191	54773	Quartz block in massive Pyrite ore.	20	152 - 215	189.5	14	4.1	
10	B239	Manganez	78574	54144	Qtz vein	20	171 - 251	219.8	13	5.27	
11	A147-1	Tunca	78169	54773	Spharelite-Galena-Quartz vein.	20	173 - 242	216.7	15	3.72	
12	A147-2	Tunca	78169	54773	Spharelite-Galena-Quartz vein.	20	176 - 255	219.8	15	3.72	
13	A172	Tunca	72189	55461	Quartz block in massive Pyrite ore.	20	156 - 212	187.0	15	2.73	
14	B164	Manganez	73972	52715	Quartz vein.	20	242 - 311	280.3	15	3.72	
15	C139	Muskale	76455	53410	Barite	20	186 - 243	216.4	14	3.08	

(b) Age Determination (Table Ⅱ-1-2)

The result of the age determination by the K-Ar method indicates 70.2±2.2 to 73.0±6.6 Ma for the basalt (Cbs) of the Çağlayan Formation and 42.7±1.2 to 73.0± 6.6 Ma for the Kaçkar Granitic Rocks. The age for the mineralization indicates 82.0± 1.6 to 83.2±2.1 Ma for two specimens of the volcanogenic massive sulphide ores from the Tunca Deposit and Garimani Mineralized Zone, and one from the nearby Köpruköy vein-type mineralized zone. It is correspondent with the late Cretaceous Santonian, 86.6 to 83.0 Ma, to Campanian, 83.0 to 74.0 Ma.



No.	Sample	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)	No.	Sample	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)
①	M031	0.10	2.10	0.166	0.001	0.020	0.360	40.64	⑬	Q071	0.27	1.40	0.118	0.005	0.150	0.388	1.12
②	M035	0.02	0.95	0.002	0.002	0.002	0.030	13.00	⑭	R011	0.08	0.50	0.002	<0.001	0.021	0.055	4.99
③	M040	<0.01	0.50	0.002	<0.001	0.007	0.077	2.00	⑮	R020	0.18	0.65	0.419	0.001	0.008	0.022	3.33
④	M073	0.01	0.65	0.018	0.007	0.812	0.014	1.23	⑯	R041	0.92	0.50	0.002	<0.001	0.004	0.043	4.64
⑤	M081	0.02	0.60	0.032	0.001	0.020	0.040	1.69	⑰	R043	1.64	0.50	0.001	<0.001	0.008	0.027	0.07
⑥	N011	0.12	2.00	0.537	0.006	5.130	0.011	12.90	⑱	R050	0.04	10.00	0.080	0.003	0.019	0.027	30.79
⑦	N031	<0.01	0.75	0.034	0.002	0.020	0.036	0.12	⑲	R057	<0.01	1.35	0.005	0.002	0.008	0.035	25.70
⑧	N034	0.07	0.75	0.002	<0.001	0.060	0.085	38.40	⑳	R088	<0.01	2.25	0.004	0.001	0.003	0.026	2.10
⑨	N042	<0.01	0.50	0.001	<0.001	0.002	0.035	3.66	㉑	R091	<0.01	0.50	0.001	0.001	0.032	0.015	1.12
⑩	Q027	<0.01	0.50	0.001	0.001	0.006	0.042	2.70	㉒	R098	<0.01	0.45	0.003	0.001	0.062	0.035	1.41
⑪	Q031	<0.01	0.45	0.014	<0.001	0.006	0.049	0.69	㉓	R100	<0.01	0.60	0.002	<0.001	0.004	0.038	4.56
⑫	Q069	0.01	1.40	0.015	0.006	0.323	0.045	2.65									

Fig. Ⅱ-1-16 Distribution Map of Mineralized Zones in the Garimani Area

Table Ⅱ-1-2 Results of K-Ar Age Determination

No.	Name	Location	Coordinates		Rock	K-Ar age (Ma)	Age	Dating Mineral	Remarks
			UTM-E	UTM-N					
1	A139	Famurgi	78817	58313	Sbs	*97.8±2.9	Cretaceous	K-Feldspar,Albite, Chlorite	
2	B084	Sirpone	86441	55907	Kgr	44.4±1.3	Eocene	Sericite(K-Feldspar?), Albite	
3	B210	Tunca	78328	54623	Dcb	7.7±0.2	Miocene	Biotite	
4	C008	Muskale	75837	53429	Adcp	100.9±1.1	Cretaceous	K-Feldspar,Albite	
5	C037	Beyazsu	79274	52406	Gd	42.7±1.2	Eocene	K-Feldspar	
6	C046	Cacahona	81154	51354	Kgd	43.2±1.2	Eocene	Biotite	
7	C081	Goktoni	83139	54197	Dci	10.4±0.3	Cretaceous	Biotite	
8	C103	Cacahona	78930	51065	Cdb			None	
9	C107	Cacahona	79718	50837	Kdr	46.0±1.3	Eocene	K-Feldspar	
10	C150	Beyazsu	79200	53480	Dci	*48.0±1.4	Eocene		
11	D128	Buna	73119	57819	Dol	72.4±2.0	Cretaceous	K-Feldspar	
12	JE-01	Saskini	83949	54483	Cbs			None	
13	JE-06	Tahori	79250	55450	Cbs	*52.8±2.7	Eocene		
14	JE-07	Bayircik	75500	55150	Dci	*140.5±4.8	Cretaceous		
15	JE-08	Kibaroglu	73648	55424	Cbs			None	
16	JE-10	Bayircik	75583	56446	Cbs	70.2±2.2	Cretaceous	K-Feldspar	
17	JE-11	Guneykoy	77709	57140	Dr	87.4±2.6	Cretaceous	K-Feldspar	
18	JE-12	Guneykoy	77550	56400	Cbs	*47.8±1.7	Eocene		
19	JE-17	Manganez	74802	53740	Adcp	63.2±4.8	Paleocene	K-Feldspar,Albite	
20	JE-18	Manganez	74546	54136	Cbs	73.0±6.6	Cretaceous	K-Feldspar	
21	N009	Garimani Mineralized Zone	72172	55517	Adcl	83.1±2.1	Upper Cretaceous	Sericite	Volcanogenic Massive Sulphide
22	R051	K▪ruk▪ Mineralized Zone	71235	54790	Adcu	83.2±2.1	Upper Cretaceous	Sericite	Vein
23	A189	Tunca Deposit	78174	54761	Adcl	82.0±1.6	Upper Cretaceous	Sericite	Volcanogenic Massive Sulphide

1～20 : Rock Forming Age　　＊ : Reference value
21～23 : Mineralized Age

(4) Alteration

(a) Alteration Mineral Zoning (Figure Ⅱ-1-17)

The alteration mineral zoning is present from the center of the mineralized zone to the surrounding area, being associated with the volcanogenic massive sulphide mineralization, as follows.

(i) quartz-potassium feldspar-sericite

(ii) quartz-sericite-chlorite-(sericite/smectite mixed layered mineral)

(iii) quartz-(chlorite)-sericite/smectite mixed layered mineral-(smectite)

(iv) quartz-(sericite)-(chlorite)-laumontite

A relatively large-scale alteration mineral zone exists near the Muşkale Mineralization Zone, but it is smaller than that in the Murgul area. The vein-type mineralized zone in the watershed of the Hemsin River also shows some alteration mineral zoning.

(b) Alteration Index (AI, Figure Ⅱ-1-18)

The intense alteration zones, stronger than 90 percent AI, are distributed around the Muşkale Deposit, Tunca West Mineralized Zone, and Şenyuva Mineral

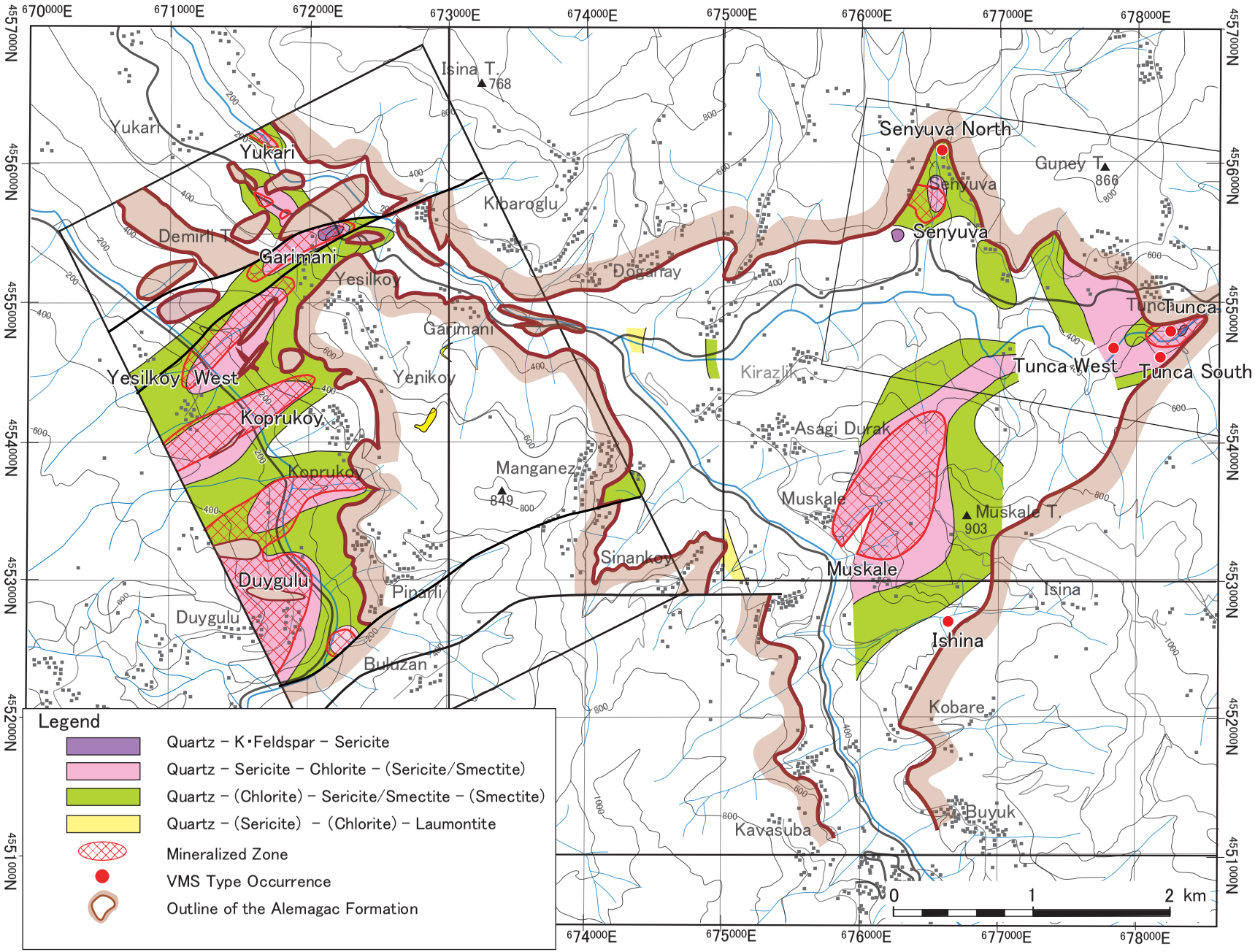


Fig. Ⅱ-1-17 Distribution Map of Alteration Zones in the Tunca Area

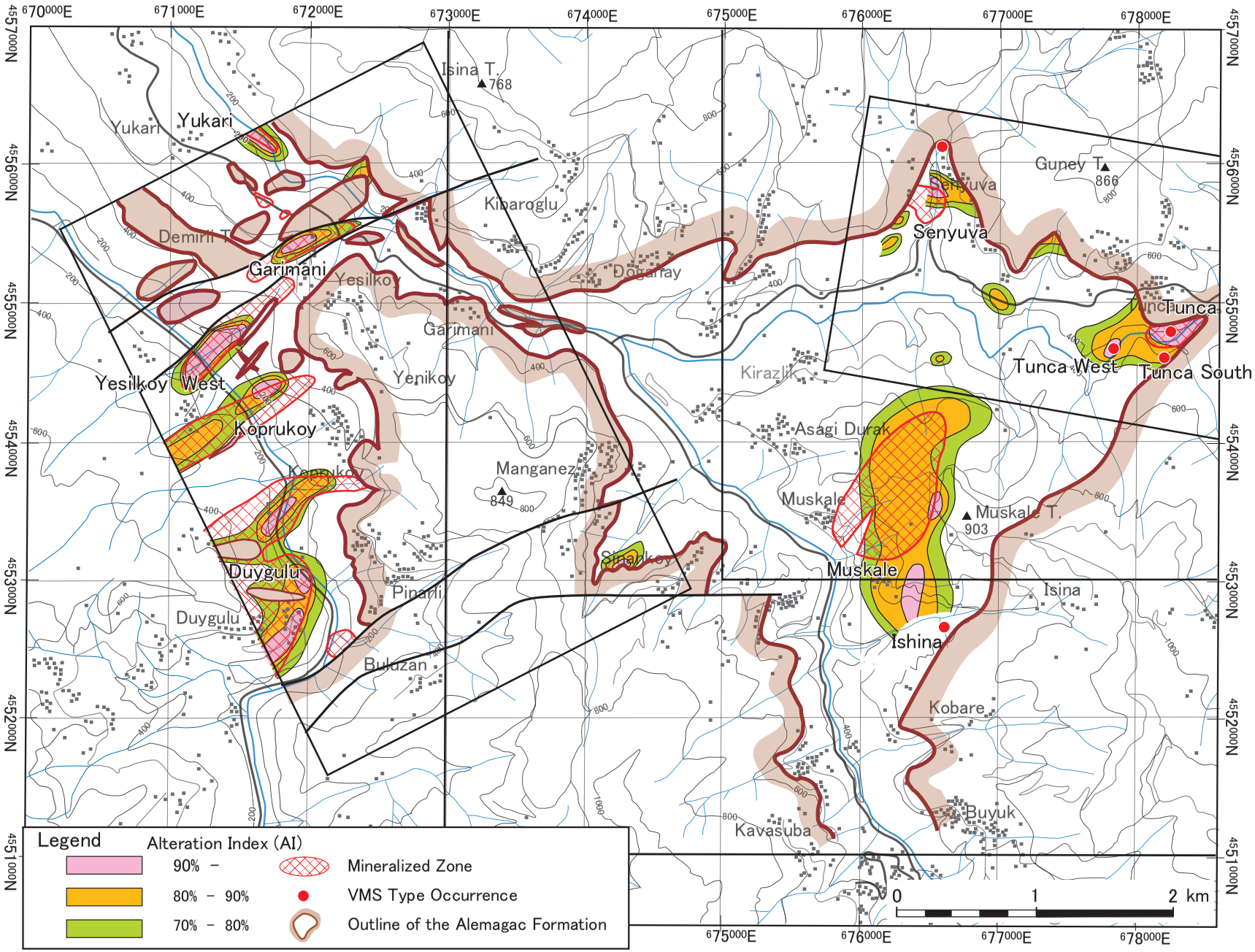


Fig. Ⅱ-1-18 Distribution Map of Alteration Index in the Tunca Area

Occurrence. Its scale is smaller than that of the Murgul area. The vein-type mineralized zones in the watershed of the Hemsin River also show intense alteration intensity zones.

1-2 Geochemical Survey (Figure Ⅱ-1-19)

The geochemical anomalies for stream sediments are scattered in the area. The anomalies in the rock geochemical survey are concentrated the areas from the Muşkale Mineralized Zone to the Şenyuva Occurrence and from the Muşkale Mineralized Zone to the Tunca Deposit.

1-3 Drilling Survey (Figures Ⅱ-1-6 to Ⅱ-1-7, Table Ⅱ-1-3)

The drilling survey has been performed in the Tunca district in the second year's program.

(1) MJTH-1 (Drilling length 314.15 meters)

The drill hole is situated to the northwest of the Şenyuva Mineralized Zone. The hole has been drilled to prospect the extension of the northern Şenyuva Mineralized Zone to the northwest.

Geology: Basalt lava of Çağlayan Formation is from the surface to the depth 112.2 meters. Purple dacite (Adcp) of Alemağaç Formation is after 112.2 meters down to the bottom.

Alteration: Basalt of Çağlayan Formation has been altered entirely to chlorite, calcite, and clay, except iron minerals in the formation. Purple dacite has generally undergone silicification, producing sericite and chlorite. Primary albite exists. Alteration Index is 19 to 63 percent.

Mineralization: Pyrite dissemination zone significantly altered to argillite in the uppermost position of purple dacite layer underneath basalt of Çağlayan Formation. Assay result of ore is 0.001 g/t Au, 0.05 to 0.15 g/t Ag, <0.01 % Cu, and 1.18 to 3.40 % S.

Result: Captured some mineral occurrence presumably of the extension of Şenyuva Occurrence, but low grade. Not reached to the lower member of Alemağaç Formation due to thick purple dacite.

(2) MJTH-2 (Drilling length 401.00 meters)

The drill hole is situated to the north of the Tunca Deposit. The hole has been drilled to search the main body of the Tunca Deposit.

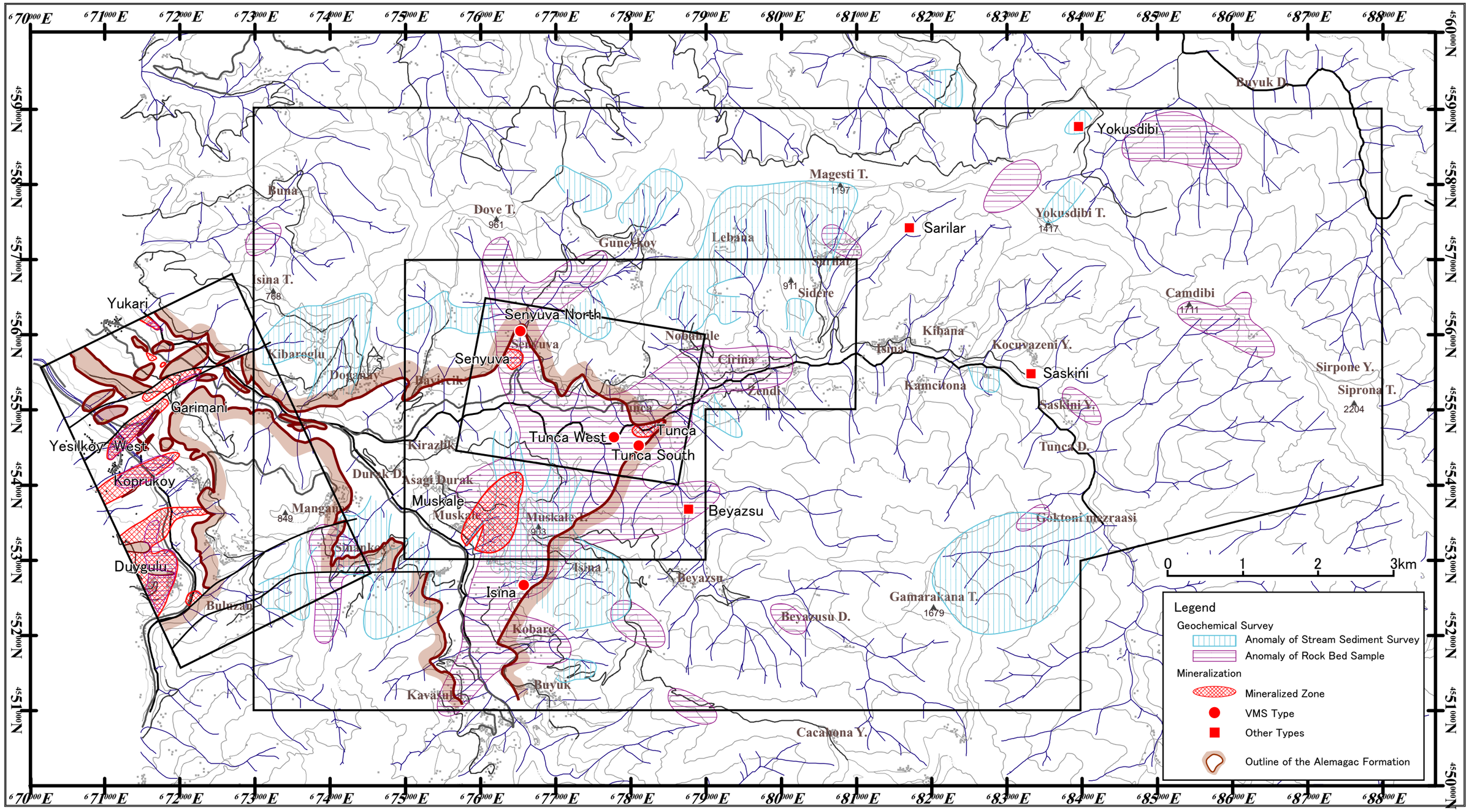


Fig. Ⅱ-1-19 Distribution Map of Geochemical Anomalies in the Tunca Area

Table Ⅱ-1-3 Results of Ore Grade Assay for Drilling Specimens

No.	Sample	Drilling No.	Depth(m) From	Depth(m) To	Ore Type	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)	Ga (ppm)	Ge (ppm)	In (ppm)	As (ppm)	Remarks
1	OA-1	MJTH-1	15.00 -	15.30 (0.30)	Basalt. Pyrite dissemination	<0.001	0.90	<0.001	<0.001	0.004	0.005	2.560	2	<1	<10	6	
2	OA-2	〃	44.50 -	45.00 (0.50)	〃	<0.001	0.25	0.005	<0.001	0.004	0.006	3.700	4	<1	<10	5	
3	OA-3	〃	111.20 -	111.40 (0.20)	〃	0.007	0.25	0.017	0.001	0.008	0.064	3.840	5	<1	<10	17	
4	OA-4	〃	113.50 -	114.00 (0.50)	Argilized Purple Dacite. Pyrite dissemination	0.001	0.15	0.001	<0.001	0.004	0.010	2.460	26	<1	<10	3	
5	OA-5	〃	114.00 -	114.50 (0.50)	〃	0.001	0.05	<0.001	<0.001	0.002	0.016	3.400	17	<1	<10	6	
6	OA-6	〃	114.50 -	115.00 (0.50)	〃	0.001	0.05	<0.001	<0.001	0.009	0.010	1.180	17	<1	<10	4	
7	OA-7	〃	238.50 -	239.00 (0.50)	Tuff breccia. Pyrite dissemination	0.023	0.15	0.001	<0.001	0.001	0.007	2.180	16	<1	<10	4	
8	OA-8	〃	280.00 -	280.50 (0.50)	Argilized Dacite. Pyrite dissemination	0.001	<0.01	0.001	<0.001	0.002	0.021	0.427	8	<1	<10	3	
9	OA-9	〃	282.10 -	282.60 (0.50)	〃	<0.001	0.05	0.006	<0.001	0.001	0.007	0.408	8	<1	<10	6	
10	OA-10	〃	282.60 -	283.10 (0.50)	〃	<0.001	0.05	0.005	0.001	0.002	0.029	0.376	11	<1	<10	6	
11	OB-1	MJTH-2	333.30 -	333.50 (0.20)	Silicified Tuff breccia. Pyrite dissemination	0.009	1.00	0.001	0.006	0.003	0.011	1.100	13	<1	<10	119	
12	OB-2	〃	334.00 -	334.10 (0.10)	Silicified Tuff breccia. Chalcopyrite dissemination	0.002	0.35	0.040	0.002	0.002	0.004	0.048	10	<1	<10	1	
13	OB-3	〃	342.20 -	342.40 (0.20)	〃	0.034	3.35	0.021	0.017	0.017	0.018	3.200	17	<1	<10	176	
14	OB-4	〃	349.30 -	349.50 (0.20)	Silicified Tuff breccia. Chalcopyrite Sphalerite dissemination	0.007	1.00	0.020	0.004	0.069	0.025	0.793	32	<1	<10	34	
15	OB-5	〃	352.30 -	352.50 (0.20)	〃	0.046	8.20	0.008	0.006	0.017	0.040	1.370	27	<1	<10	98	
16	OB-6	〃	355.50 -	356.00 (0.50)	Silicified Tuff breccia. Pyrite dissemination	<0.001	0.05	0.001	0.001	0.007	0.058	0.460	18	<1	<10	4	
17	OB-7	〃	372.00 -	372.20 (0.20)	〃	0.005	0.05	<0.001	0.001	0.007	0.051	0.137	14	<1	<10	3	
18	OB-8	〃	381.00 -	381.50 (0.50)	〃	0.003	0.05	0.001	0.001	0.003	0.014	0.019	12	<1	<10	1	
19	OB-9	〃	397.00 -	397.50 (0.50)	〃	0.001	0.05	0.001	0.001	0.006	0.048	0.443	15	<1	<10	5	
20	OB-10	〃	398.00 -	398.50 (0.50)	〃	0.002	0.05	0.001	0.001	0.003	0.015	0.011	13	<1	<10	1	
21	OC-1	MJTH-3	270.50 -	271.00 (0.50)	Silicified Dacite. Pyrite dissemination	0.001	0.35	0.012	0.002	0.014	0.056	0.177	14	<1	<10	4	
22	OC-2	〃	271.30 -	271.80 (0.50)	Argilized Tuff breccia. Pyrite dissemination	0.015	0.90	0.002	0.004	0.014	0.022	0.885	19	<1	<10	71	
23	OC-3	〃	271.80 -	272.30 (0.50)	〃	0.006	1.45	0.002	0.006	0.003	0.011	1.610	22	<1	<10	111	
24	OC-4	〃	272.30 -	273.00 (0.70)	〃	0.006	1.10	0.002	0.004	0.004	0.011	1.240	26	<1	<10	71	
25	OC-5	〃	274.00 -	274.50 (0.50)	Silicified Dacite. Pyrite dissemination	0.004	1.20	0.011	0.007	0.023	0.041	0.609	24	<1	<10	39	
26	OC-6	〃	274.50 -	275.00 (0.50)	〃	0.005	2.75	0.014	0.014	0.023	0.059	1.700	28	<1	<10	<1	
27	OC-7	〃	283.50 -	284.00 (0.50)	Silicified Tuff breccia. Pyrite dissemination	0.002	0.35	0.004	0.001	0.026	0.024	0.489	18	<1	<10	125	
28	OC-8	〃	284.00 -	284.50 (0.50)	〃	<0.001	0.15	0.004	0.001	0.016	0.028	0.318	15	<1	<10	8	
29	OC-9	〃	287.50 -	288.00 (0.50)	〃	0.001	0.25	0.006	0.002	0.017	0.062	0.717	16	<1	<10	8	
30	OC-10	〃	293.00 -	293.50 (0.50)	〃	0.046	2.30	0.005	0.007	0.005	0.034	1.330	15	<1	<10	55	

Geology: Basaltic rocks and calcareous mudstone of Çağlayan Formation is from the surface to the depth 238.5 meters. Dacitic pyroclastic rocks of Alemağaç Formation is down to the bottom. Upper part of the dacitic pyroclastic rocks (Adlh) from 322 meters is hanging-wall rock of the volcanogenic massive sulphide ore horizon, and lower part of the dacitic tuff-breccia (Adlf) is foot-wall of the ore horizon. Foot-wall has undergone silicification, being accompanied by minor-amounts of sulphide dissemination.

Alteration: Dacitic tuff-breccia (Adlf) has undergone alteration associated with alteration index 13 to 40 percent.

Mineralization: Sporadic dissemination of chalcopyrite and sphalerite in dacitic tuff-breccia (Adlf). Assay result is <0.001 to 0.046 g/t Au, 0.05 to 8.20 g/t Ag, <0.01 to 0.04 % Cu, <0.01 to 0.02 % Pb, 0.03 to 0.07 % Zn, <0.01 to 0.06 % Ba, 0.01 to 3.20 % S.

Result: Mineralization and alteration are weak. Main body of Tunca Deposit is of small-scale.

(3) MJTH-3 (Drilling length 308.40 meters)

The drill site is situated on the eastern extension zone from the alteration zone including the Tunca Deposit and Tunca South Mineral Occurrence.

Geology: Basalt and sedimentary rocks of Çağlayan Formation is from the surface to the depth 247.2 meters. It is dominant basalt in the upper part, and basaltic tuff in the lower part. From the depth 247.2 meters, it is layered tuff (Attf) of the uppermost part of Alemağaç Formation, intercalating calcareous mudstone thin beds. From the depth 260.2 meters, it is dacite (Adcl) and dacitic tuff-breccia of the foot-wall of the ore horizon. Dacite is autobrecciated and strongly silicified.

Alteration: Abundant sericite, chlorite, calcite in the layered tuff. Foot-wall dacite is strongly silicified, being accompanied by sericite and chlorite. Alteration index is 27 to 52 percent.

Mineralization: Pyrite dissemination in the foot-wall dacite, being scarcely accompanied by chalcopyrite and sphalerite. Assay result of the ore <0.001 to 0.046 g/t Au, 0.05 to 2.75 g/t Ag, <0.01 to 0.01 % Cu, <0.01 to 0.01 % Pb, <0.01 to 0.03 % Zn, 0.01 to 0.06 % Ba, 0.32 to 1.61 % S.

Result: Foot-wall rock is weakly mineralized by volcanogenic massive sulphide mineralization. Might be surrounding part of its main body.

Chapter 2 Murgul Area

The Murgul area is situated in the eastern Hopa area, including the Murgul Ore Deposit swarm. It is composed of the Kokolet, Ardiç, and Kabaca districts. The geological survey program has been performed in the area.

2-1 Geological Survey

2-1-1 Geology (Figures Ⅱ-2-1 to Ⅱ-2-3)

The area is underlain by the lower Cretaceous Kabaca Formation, upper Cretaceous Murgul, Ardiç, and Küre Formations, and andesite and dolerite intrusive bodies.

The Kabaca Formation (Kv) consists of basic volcanic rocks such as basalt and andesite, being disseminated by pyrite, and seen quartz veinlets in many places. The Murgul Formation consists of acidic volcanic rocks, and is divided into two members, the lower member emplacing the volcanogenic massive sulphide mineralized zones and upper member. The lower member is composed of dacite lava and dacitic pyroclastic rocks (Mdcl), containing many quartz phenocrysts, different from the Tunca area. The rocks are broadly distributed in the area, having been altered related with mineralization, containing pyrite dissemination. The upper member is composed of the pumice tuff (Mdlt) and fine-grained tuff (Mdu), overlying the lower member, and having been altered to smectite. The Ardiç Formation is characterized by basic volcanic activity, and divided in several units by intercalated sedimentary layers (Ams, Atf, Amd). The Küre Formation consists of mudstone (Kmd) and siltstone, and unconformably overlies the Ardiç Formation.

The intrusive bodies are composed of the Karatepe Dacite (Kd), granitic rocks (Gr), andesite (Ad), and dolerite (Dol). The Karatepe Dacite (Kd) is present in the Murgul area, having intruded the Murgul and Ardiç Formations.

The east to west structure system is dominant in the area, reflecting to the strike of the formations and trend of the faults. The circular structure formed by the Murgul and Çhorh Rivers is recognized in the LANDSAT TM image.

2-1-2 Mineralization and Alteration

(1) Mineralization(Figures Ⅱ-2-4 to Ⅱ-2-5)

The volcanogenic massive sulphide mineralization around the area has been caused in the lower member of the Murgul Formation. There exist the Murgul Deposit swarm consisting of the Damar, Çakmakkaya, and Çarkbaşı Deposits, and Kızılkaya, Karagöl, Lepüskür, and Upper Kokolet Occurrences in there. These mineral

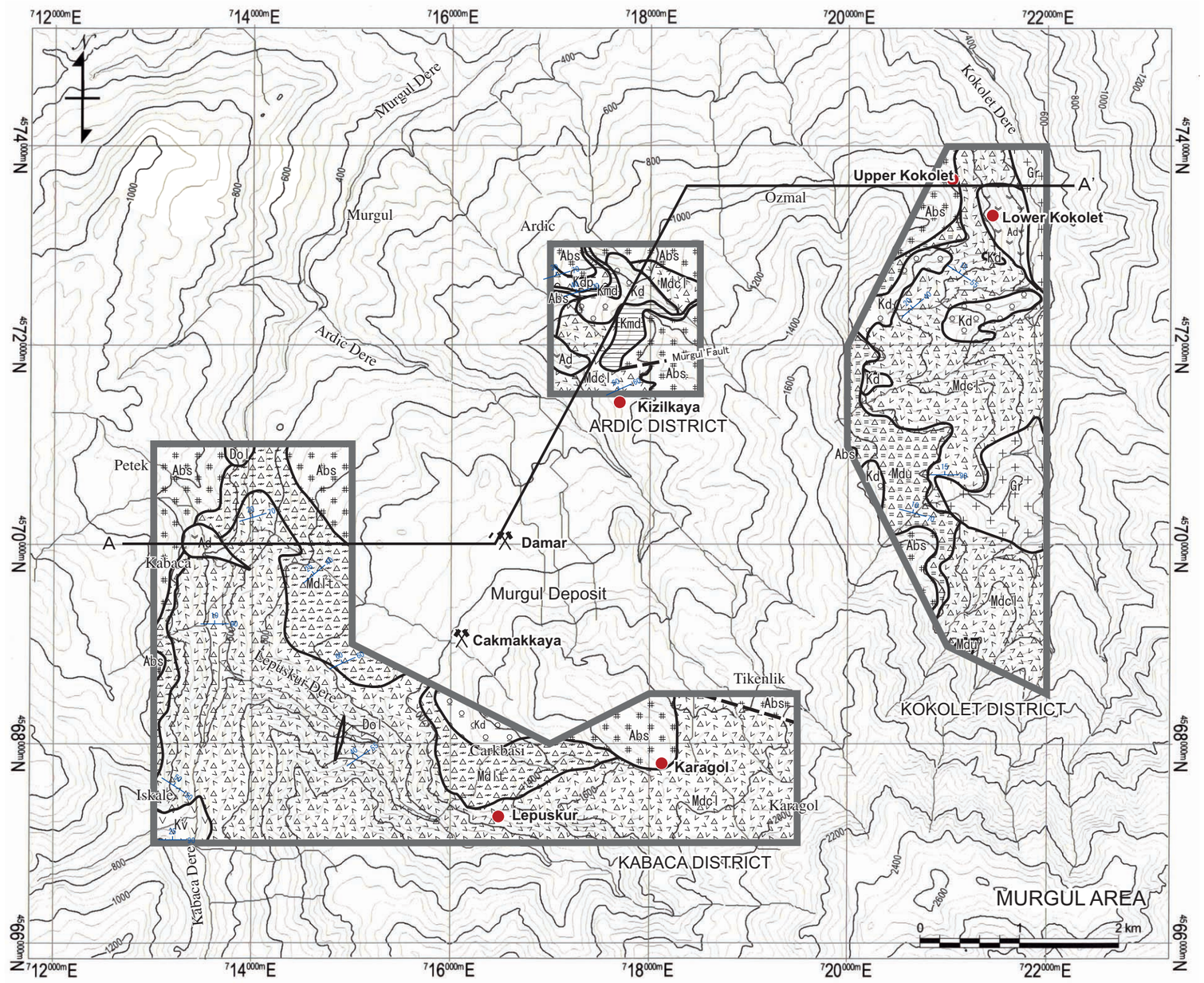


Fig. Ⅱ-2-1 Geological Map of the Murgul Area

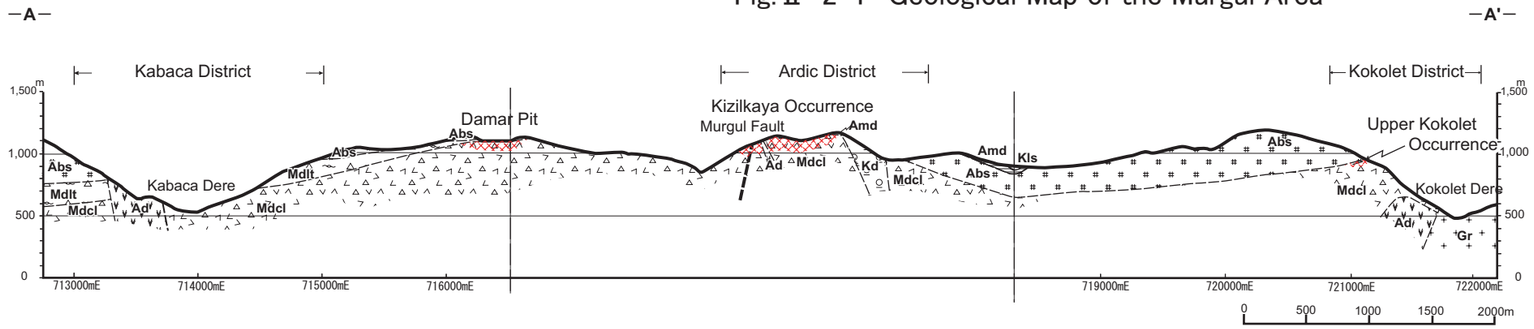


Fig. Ⅱ-2-2 Geological Cross Section of the Murgul Area

Legend

Intrusive Rocks
- Dol — Dolerite
- Ad — Andesite
- Gr — Grantic rocks

Karatepe Dacite
- Kdp — Dacitic Pyroclastics
- Kd — Porphyritic Dacite

Kure Formation
- Kmd — Mudstone
- Kls — Limestone

Ardic Formation
- Amd — Siltstone/Fine Tuff
- Abs — Basic Volcanics

Murgul Formation

Upper Member
- Mdu — Fine Tuff
- Mdlt — Pumiceous Tuff

Lower Member
- Mdcl — Dacite lava

Kabaca Formation
- Kv — Basic Volcanic Rocks

20/80 — Strike and Dip

Fault

Mineralized Zone

Occurrence

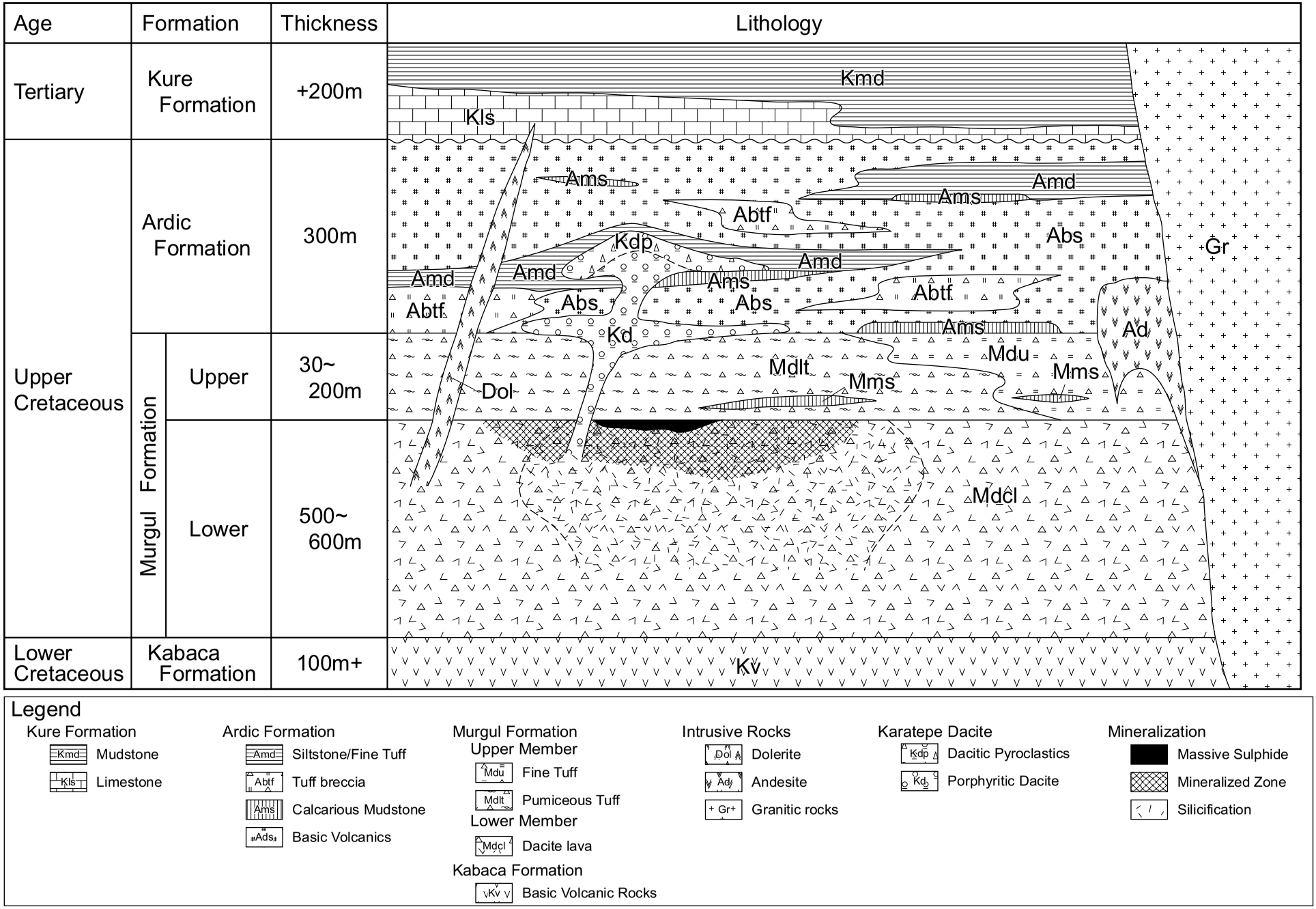
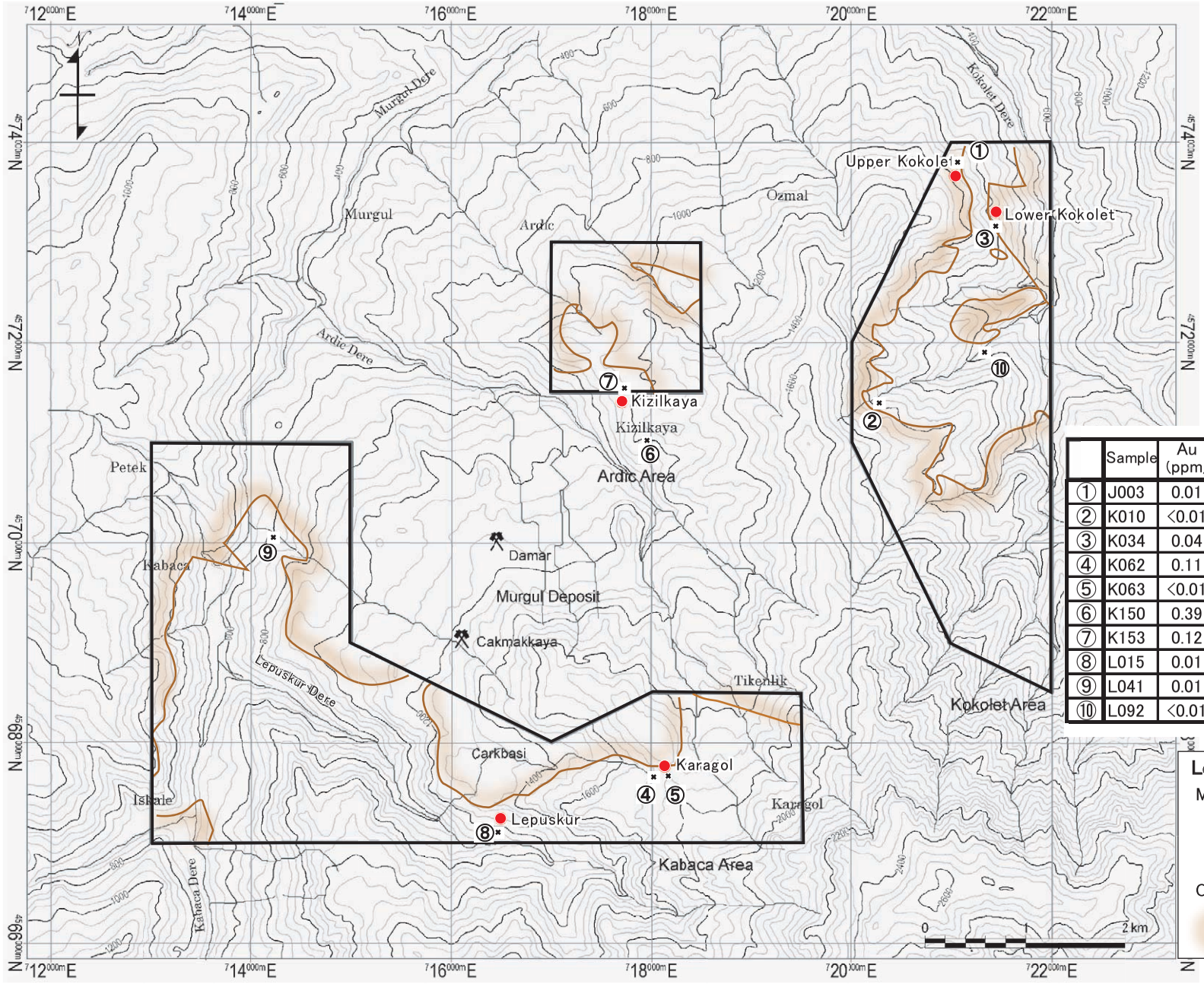


Fig. Ⅱ-2-3 Schematic Stratigraphic Column of the Murgul Area



	Sample	Au (ppm)	Ag (ppm)	Cu (%)	Pb (%)	Zn (%)	Ba (%)	S (%)
①	J003	0.01	0.15	0.005	<0.001	0.005	3.350	0.19
②	K010	<0.01	0.15	0.010	0.002	0.041	0.019	1.00
③	K034	0.04	0.05	<0.001	0.001	0.009	0.012	0.95
④	K062	0.11	0.06	0.002	0.001	<0.001	0.029	15.80
⑤	K063	<0.01	20.00	0.003	0.005	0.002	0.032	13.60
⑥	K150	0.39	3.35	0.017	0.011	0.081	0.084	7.15
⑦	K153	0.12	2.60	0.030	0.025	0.001	0.590	0.24
⑧	L015	0.01	0.15	0.001	0.001	0.001	0.029	1.36
⑨	L041	0.01	0.15	<0.001	<0.001	0.001	0.034	3.46
⑩	L092	<0.01	0.05	<0.001	<0.001	<0.001	0.037	1.85

Fig. Ⅱ-2-4 Distribution Map of Mineral Occurrences in the Murgul Area