was being eroded out. The erosion continued until the peneplain was formed. It is thought that, in the period of the Mesozoic Era to the Tertiary Period, the sedimentation was in the continental or shallow sea environment and that the present topographical features have been formed since the period of the Alpine orogenic movement, accompanying the fault activities and the land upheaval. The fault activities in the period of the Alpine orogenic movement are characterized by the overthrusts of the E-W trend, accompanying relative uplift of the massif in the south of the fault. In the subject area, such faults are represented by the Amezmiz fault, which divides the alluvium plains from the mass of the Paleozoic formations in the northern part of the surveyed area, and by the Medinat fault, which is located near the Medinat village in the central part of the surveyed area, having caused the uplift of the southern massif. The trend of the eastern extension of the Medinat fault varies to the northeast or north-northeast and it is absorbed in the Amezmiz fault which is running in the north. The beds of the Mesozoic and later periods are monotonously horizontal in general, although some drug folds are recognized with some disturbances around the above faults, which reveals that no folding movement occurred in the period of the Alpine orogenic movement this area.

2-1-2 Results of the Geochemical Survey

In the North Area, geochemical survey was carried out, in parallel with the geological survey, by collecting stream sediments for the analysis of minor metal elements contained in them, for the purpose to clarify the distribution of indicating of mineralization in the subject area, especially to make a thorough examination for the presence of undiscovered favorable ore deposits. The localities of the sampling points are shown in the PL.10 and the results of the analysis (five elements of Cu, Pb, Zn, Mo and W) are listed in the Table 12-1. The samples were collected at 460 localities.

Values of the chemical analysis were treated statistically, and the consideration was given on the characters of the population, the anomalies and the correlative relation among the elements. The anomalous values detected are shown in the PL.7 and the examination for the presence of the relation to the mineralization was completed.

(1) Statistic treatment

For the statistic treatment, logarithm of the analysis values, which show almost normal distribution, was employed for the consideration, as the distribution of the analysis values of each element had an extreme partiality for low grade side.

Statistical values of every element analysed and threshold for anomalous values are shown in the Table 1-1. The histograms of the logarithmic values of the elements of Cu, Pb and Zn, Mo and W are shown in the Fig. 5-1 to the Fig. 5-5. Cummulative frequency distribution of the elements of Cu, Pb and Zn is shown in the Fig. 5-6, while the same distribution of the elements of W and Mo is shown in the Fig. 5-7.

For the establishment of the anomalous values, statistic values of G, G+σ and G+2σ were employed as the standards of the

Table I-1 Statistic Values and Threshold Values of Stream Sediment Samples in Northern Area

Variable \ element	Cu	Pb	Zn	W	Mo
Number	460	460	460	460	460
Minimum value	10.000 ppm	7.000 ppm	15.000 ppm	1.000 ppm	1.000 ppm
Maximum value	3000.000 ppm	2000.000 ppm	3700.000 ppm	550.000 ppm	50.000 ppm
Arithmetic mean	76.978 ppm	70.648 ppm	198.902 ppm	18.746 ppm	2.450 ppm
Logarithmic mean (Lm)	1.496	1.546	2.073	0.705	0.245
Logarithmic standard deviation (SD)	0.375	0.445	0.352	0.512	0.286
$G = \log^{-1} Lm$	32 ppm	36 ppm	119 ppm	5 ppm	1.8
$G+\sigma = \log^{-1}(Lm+SD)$	75 ppm	98 ppm	267 ppm	17	3.4
$G+2\sigma = \log^{-1}(Lm+2SD)$	177 ppm	273 ppm	599 ppm	54	6.7
Skewness (SK)	(7.656)→2.716	(7.339)→0.931	(5.762)→1.343	(6.097)→1.888	(8.329)→1.459
Kurtosis (KU)	(66.266)→9.394	(73.283)→0.636	(35.496)→3.877	(41.250)→3.738	(80.485)→4.071
Classification of anomalies					
Strong anomaly $\geq G+2\sigma$	Cu≥177 ppm	Pb≥273 ppm	Zn≥599 ppm	W≥54 ppm	Mo≥6.7 ppm
Weak anomaly $> \geq G+\sigma$	177ppm>Cu≥ 75ppm	273ppm>Pb≥ 98ppm	599ppm>Zn≥ 267ppm	54ppm>W≥17ppm	6.7ppm>Mo≥3.4ppm
Indication $> \geq G$	75ppm>Cu≥32ppm	98ppm>Pb≥36ppm	267ppm>Zn≥ 119ppm	17ppm>W≥5ppm	

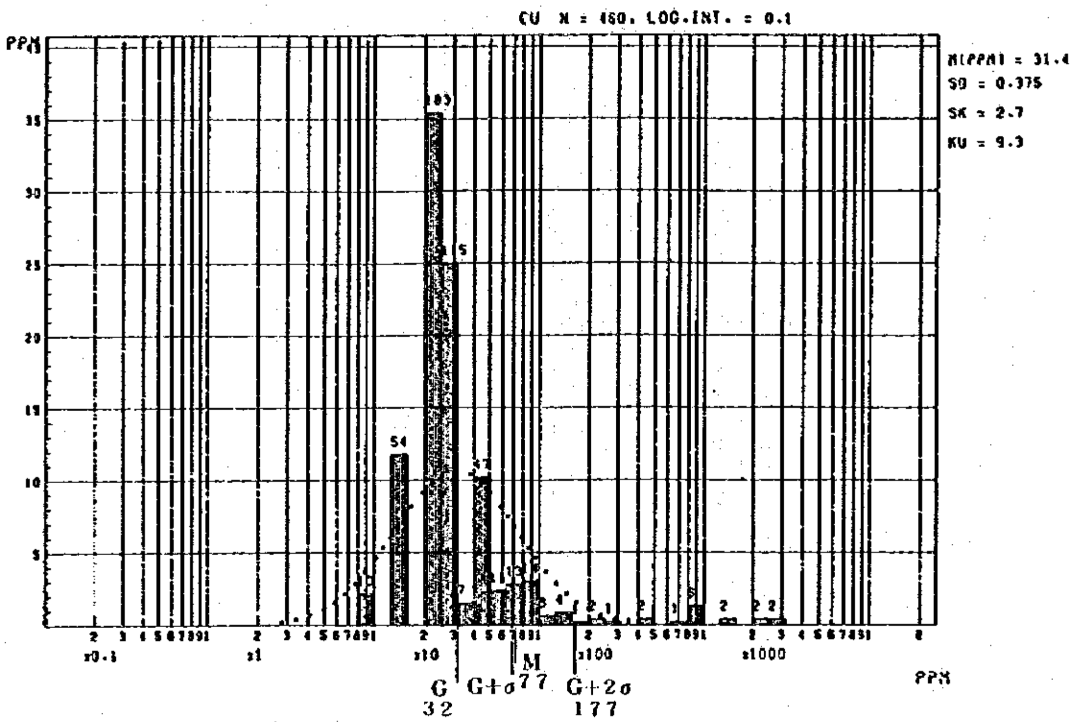


Fig. 5-1 Histogram for Cu of Stream Sediment Samples in Northern Area

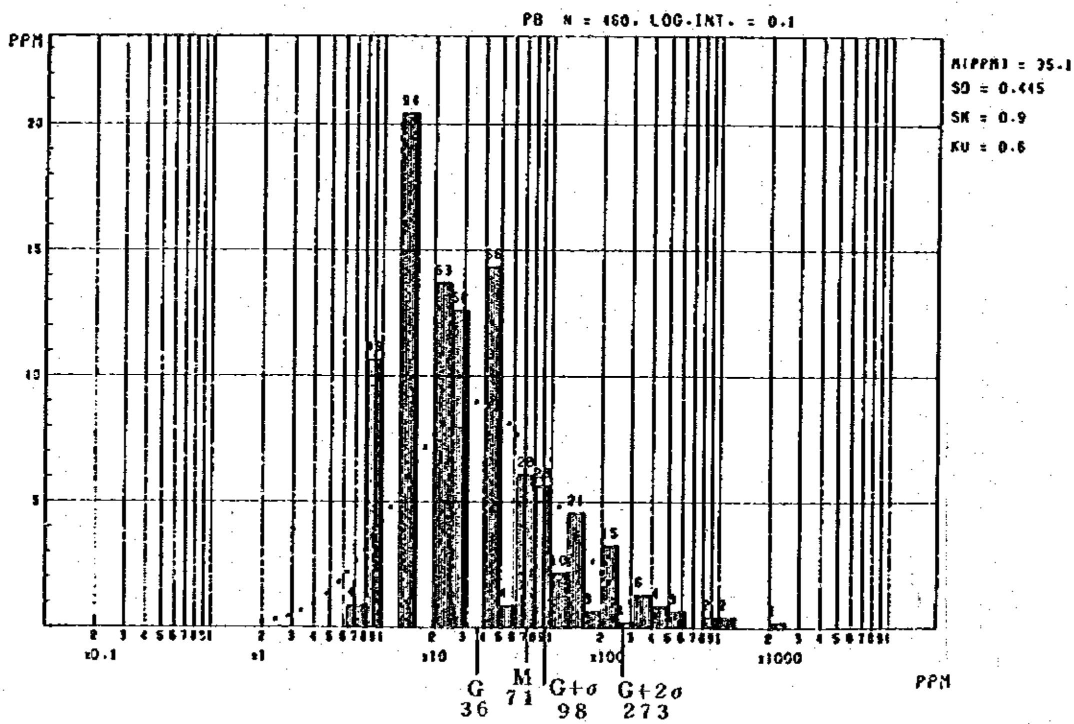


Fig. 5-2 Histogram for Pb of Stream Sediment Samples in Northern Area

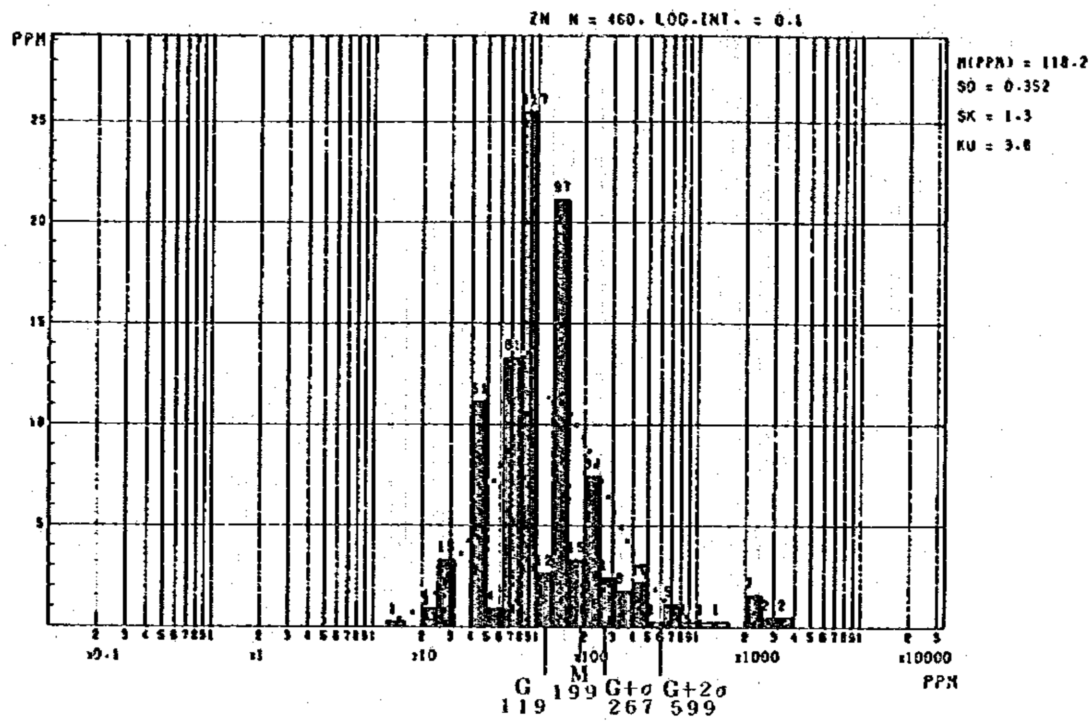


Fig. 5-3 Histogram for Zn of Stream Sediment Samples in Northern Area

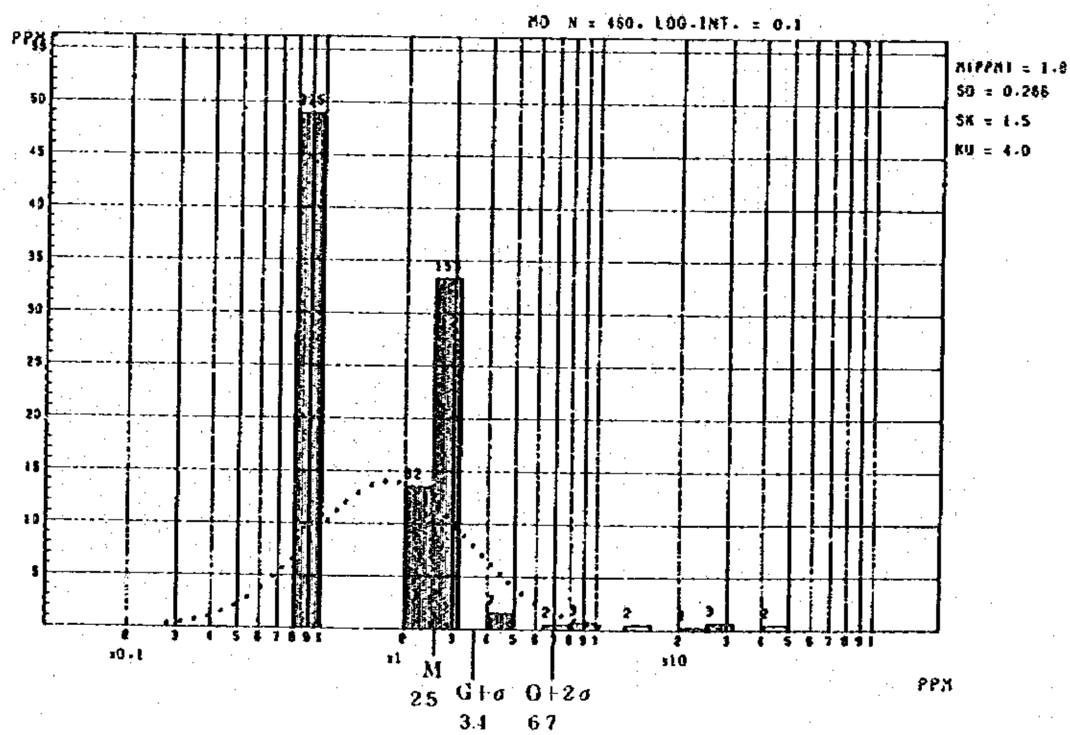


Fig. 5-4 Histogram for Mo of Stream Sediment Samples in Northern Area

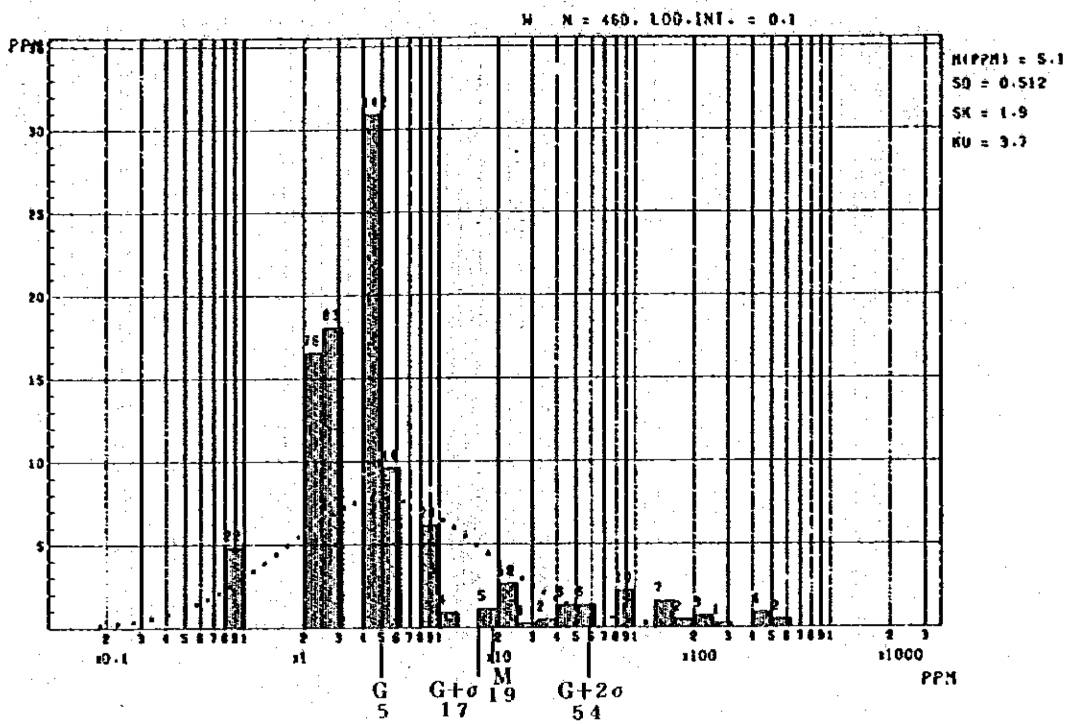


Fig. 5-5 Histogram for W of Stream Sediment Samples in Northern Area

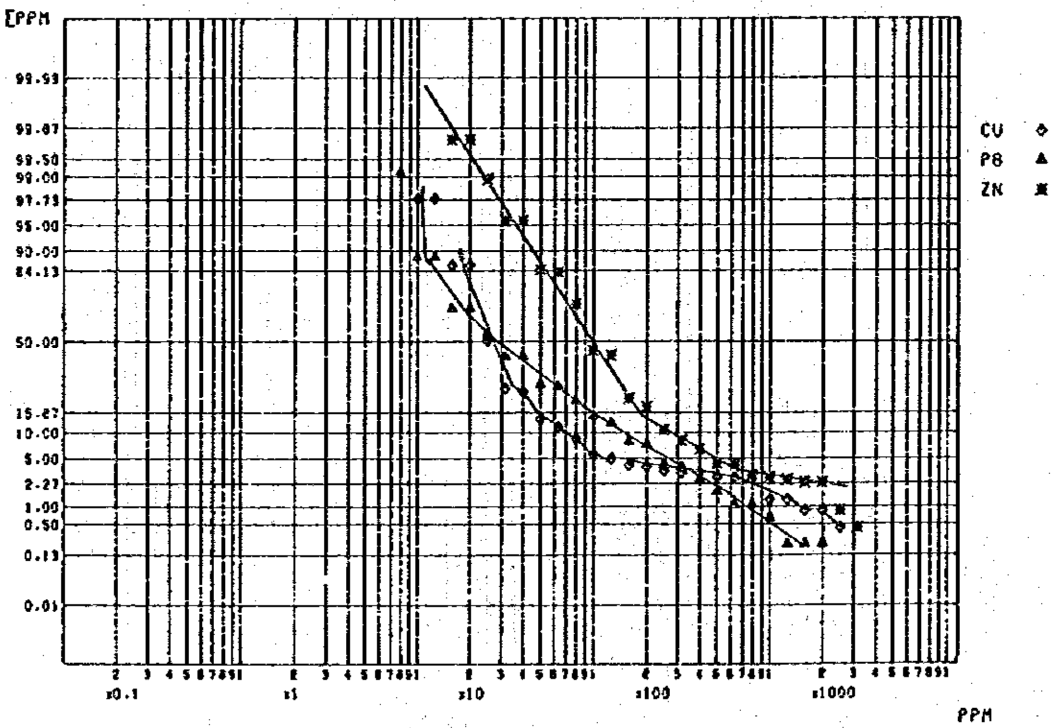


Fig. 5-6 Cumulative Frequency Distribution for Cu, Pb and Zn of Stream Sediment Samples in Northern Area

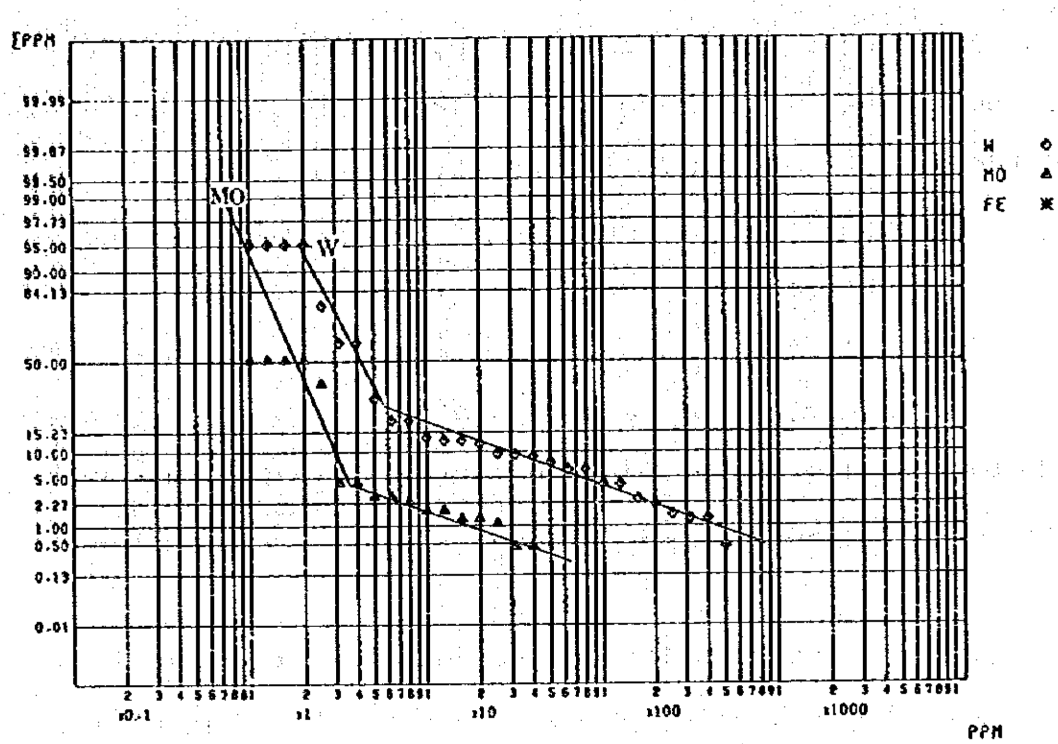


Fig. 5-7 Cumulative Frequency Distribution for W and Mo of Stream Sediment Samples in Northern Area

classification. The indicated zone, the weakly anomalous zone and the remarkably anomalous zone are determined as follows, and the results are shown in the PL.7.

Strong anomaly zone	$\geq G + 2\sigma$
Weak anomaly zone	$G + 2\sigma > \sim \geq G + \sigma$
Indicated zone	$G + \sigma > \sim \geq G$

The characters of each population and the relation to the anomalous values as well as the correlative relation among the elements are described as follows.

1) Cu: On the cummulative frequency distribution graph, there are slight bending points at around Cu 30 ppm and at around Cu 80 ppm. Viewing the positions of these bending points, the former is correspondent roughly to the G value while the latter is correspondent almost to the M value or to the level of the G+σ value. Especially, the values under 32 ppm are thought to reveal the background values of Cu in this area. Accordingly, it is thought to be appropriate to establish the anomalous zones by the thresholds of the G value, the $G + \sigma$ value and the $G + 2\sigma$ value.

2) Pb: On the cummulative frequency distribution graph, there is a bending point at around Pb 40 ppm. This position is correspondent to the level of the G value. The values over 40 ppm and those under 40 ppm belong to the different populations respectively, and the values under 40 ppm are thought to compose background values in this area. Accordingly, the anomalous values and the threshold values above-stated are thought to

fulfil the required condition.

3) Zn: On the cummulative frequency distribution graph, there are bending points at around 200 ppm and at around 600 ppm. These positions are correspondent to the M value and to the G + 2σ value respectively, and the groups divided by these values are belonging possibly to the different populations. Here, taking the values under the G value to be the background values in this area, the above threshold values for the anomalous values were determined.

4) Mo: The chemical analysis values of Mo have three detectable limits of 5 ppm, 3 ppm and 1 ppm. Therefore, for the statistical treatment, respective values were represented by the integers of half of the values after divided by 2 (raising decimal place to a unit). The histogram by the logarithm of the above values has a partiality of 95 % to the low grade side (Mo less than 3 ppm), which can not be taken to be normal distribution. However, if the sensitivity of the chemical analysis is higher than that employed in the present analysis (1 ppm), it is possible that they would show normal distribution. Accordingly, the present consideration was given on the assumption that the histogram has normal distribution. On the cummulative frequency distribution graph, there is a bending point at around 3 ppm or 4 ppm. This position is correspondent roughly to the level of the G + σ value, and it is thought that the group over this value and the group under this value are belonging to the different populations.

Especially, there is a possibility that the former values are to reveal the background values in this area. Accordingly, the values of Mo were divided into two categories of strong anomaly and weak anomaly.

5) W: The chemical analysis values of W have three detectable limits of 5 ppm, 4 ppm and 1 ppm. Therefore, for the statistical treatment, respective values were represented, as was the case of Mo, by the integers of half of the values after divided by 2. On the cummulative frequency distribution graph, there is a bending point at around W 5 ppm or 6 ppm. This position is correspondent roughly to the level of the G value. The group of the values under this value and the group of the values over this value are belonging to the different populations, and it is possible that the former values are revealing background values. Accordingly, it is thought that the above threshold values fulfil the required conditions.

6) Mutual relation among the analysed elements: Consideration was given on the mutual relation of the analysed elements of Cu, Pb, Zn, Mo and W, and the results as shown in the Table 1-2 have been obtained. By this table, Cu has quite a high correlative relation to Mo, while it has negative correlation to any other elements, which would reveal that there is no correlation. Although Pb has quite a high correlative relation to Zn, no correlation has been recognized with this Pb element to any other elements. Zn has no correlation to any other elements than Pb. W has no correlation to any of the elements

analysed in the present geochemical survey. Mo is not recognized to have correlation to any other elements than the above-stated element of Cu.

Table I-2 Correlation Coefficients of Stream Sediment Samples in Northern Area

	CU	PB	ZN	W	MO	NOTE
CU	1.00000 0.0000 460	-0.00171 0.9709 460	-0.00259 0.9558 460	-0.04447 0.3413 460	0.85915 0.0001 460	CORRELATION COEFFICIENTS
PB	-0.00171 0.9709 460	1.00000 0.0000 460	0.67807 0.0001 460	-0.01393 0.7657 460	0.01199 0.7975 460	
ZN	-0.00259 0.9558 460	0.67807 0.0001 460	1.00000 0.0000 460	-0.01758 0.7069 460	0.01580 0.7353 460	PROB > IRI UNDER HO:RHO=0
W	-0.04447 0.3413 460	-0.01393 0.7657 460	-0.01758 0.7069 460	1.00000 0.0000 460	0.02660 0.5693 460	
MO	0.85915 0.0001 460	0.01199 0.7975 460	0.01580 0.7353 460	0.02660 0.5693 460	1.00000 0.0000 460	NUMBER OF OBSERVATIONS

(2) Consideration on the anomalous values (Refer to PL.7)

The stream sediments collected in the geochemical survey were those which had been transported down from the upstream area of the respective sampling points. In the subject area, there are three principal rivers flowing northward in the eastern part, in the central part and in the western part; the Nfis river, the Amezmiz river and the Assif Al Mal river. There are many branching valleys from the above principal rivers. Therefore, the consideration on the anomalous values of each element in the present geochemical survey was given to each of the river basins of the above three principal rivers.

The results of the consideration on the distribution of the anomalous values of each element and on their relation to the mineralization are described hereunder.

Cu: The strong anomalous values were recognized at 18 localities. Of them, 15 localities are distributed along the principal Nfis river in the eastern part. However, it is thought that the sediments showing these anomalous values had been transported to these localities from the far upstream area of the Nfis river (southern area), because only one strong anomaly and a weak anomaly were recognized around the Tizi Mill copper vein in a branched stream of this principal river, and because the strong anomalies were also recognized in the upstream area of the confluence of the principal Nfis river with the above branched stream. The other strong anomalous values were found at only two localities; at a point around Erdouz along a branched stream of the Amezmiz river and at another point around Anammer village along a branched stream of the Assif Al Mal river. The former is located in an area where the Erdouz mine is distributed in its upstream area, with the 14 points of the weak anomalies recognized in the vicinity. But there was no anomalous point in the downstream area of the Azegour village. In this river basin, there is an weak anomaly reflecting copper-lead-zinc veinlets accompanied by barite, in the vicinity of Tilftine. As for the latter strong anomaly, there are three points of weak anomalies around it, which is reflecting the existence of the old workings of copper, lead and zinc near the Anammer village. As above-mentioned, it is thought as to the Cu element that the anomalies would be related to the known ore deposits or indications of mineralization, except for the anomalies found in the river basin of the Nfis river in the eastern part.

Pb: The strong anomalies were detected at 17 localities. The 14 localities of them were distributed in the river basin of the Amezmiz river. Especially, in the area from the downstream of the Erdouz mine to near the Azegour village, all the sampling points, except those in the area where the Cretaceous formations are distributed, were revealing either strong anomalies or weak anomalies. Also, many weak anomalies were recognized in the branched stream, which are thought to have been influenced remarkably by the existence of the Erdouz mine. Other than the above-stated, there were two strong anomalies; the one was in the downstream area of the Azegour and the other was along the Nfis river. Many weak anomalies were associated with the former anomaly in the area where the Paleozoic formations are distributed. In this area, it is thought that there would be influences of the Azegour ore deposit and that there would be some possibility of the existence of small scaled ore deposits of the same type. The latter is correspondent to the Tiz Mill ore deposit and to the mineral indications of the Taourirt barite copper ore vein, each of which is seen to be associated with weak anomalies in the surrounding areas. Also, as to the localities of weak anomalies other than those above-mentioned, the weak anomalies correspondent to the Areg mineral indication (Cu) and to the Titrouine mineral indication (Cu) along branched streams of the Assif Al Mal river.

As mentioned above, Pb anomalies were detected in such areas related to the known indications of mineralization as around the Erdouz mine, around the Azegour mine and in its northwestern area.

Zn: The strong anomalies were detected at 19 localities. The 18 localities of them were distributed in the area from around Erdouz along a branched stream of the Amezmiz river to the Azegour village. Other strong anomaly was found around the Taourirt mineral indication along a branched stream of the Nfis river. The weak anomalies were distributed around these strong anomalies and their branched streams as well as in the downstream area of the Ait Bourd mineral indication (barite, lead) located in the northwest of Azegour. Thus, as to the Zn element, anomalies were recognized, in almost same area as was the case of the Pb element. That is, the anomalies were recognized in the areas related to the known indications of mineralization such as Erdouz mine, Ait Bourd mineral indication.

Mo: The strong anomalies were detected at 11 localities. The 10 localities of them were distributed along whole of the Nfis river in the eastern part. The other one anomaly was recognized along a small stream at the northeast of Erdouz, branched from the Amezmiz river. These anomalies have no direct relation to known ore deposits or mineral indications. Especially, in the Azegour area where molybdenum dissemination was recognized megascopically, even an weak anomaly was not detected. The other weak anomalies were found in the upstream and downstream areas of the above strong anomalies as well as along the Assif Al Mal river and along its branched stream.

Viewing from the fact that there is comparatively high correlation between Mo and a part of Cu, it is thought that the conditions would have been same at the periods of the sedimentation for the two elements. However, the localities where Cu anomalies were coincident to the Mo anomalies were merely along the Nfis river. Around the Mo anomalies in the east of Erdouz, there is no Cu anomaly so far recognized.

W: The strong anomalies were recognized at 32 localities. The 23 localities of them were distributed along the river basin of the Amezmiz river, especially in the northeastern area of Erdouz. The anomalies located in its western end were correspondent to the Mo anomalies. The other strong anomalies were concentrated in the northwestern area of Azegour. No direct relation of the former to mineral indications has been recognized, but the area is where there are many dykes of microgranite, intruding in the direction of north and south. The latter is also correspondent to the peripheral zone of Azegour granite body. The weak anomalies were recognized mainly in the northern area of Azegour, and in the upstream of a branched stream of the Assif Al Mal river in the western part. Also, one each weak anomaly was recognized in such areas as along the Nfis river, at the northeastern margin of the subject area and around Anammer. Almost no correlative relation has been recognized between W and other elements, and it is thought that tungsten is derived in quite different way from themineralization of the other elements, but that it would be related to the intrusion of the granitic rocks.

2-1-3 Mineralization

There are more than 30 localities of mineralization represented by ore deposits and mineral indications in whole of the North Area. The locations of the mineralization are displayed in the Fig. 6, and the outlines of the ore deposits and the mineral indications are shown in the Table 2.

As to the types of the mineralization, vein type ore deposits are most abundant, but other than this type, less amounts of skarn type ore deposits and stratiform type ore deposits are recognized. The vein type ore deposits contain copper, lead, zinc, silver and barite while the skarn type ore deposits contain molybdenum, tungsten, copper and iron. Marbles and rock salts are recognized as the stratiform type deposits.

The outline of the ore deposits of each of the types of mineralization is described in the following.

(1) Vein type ore deposits

The wall rocks containing vein type ore deposits are the metamorphic rocks of the Paleozoic formations and the granitic rocks intruding them. Among the barite ore deposists, there are some of huge sizes as is the case of the SMIM ore deposit, whose greatest width is 20 meters, with the horizontal extension of 80 meters and the vertical continuity of 110 meters.

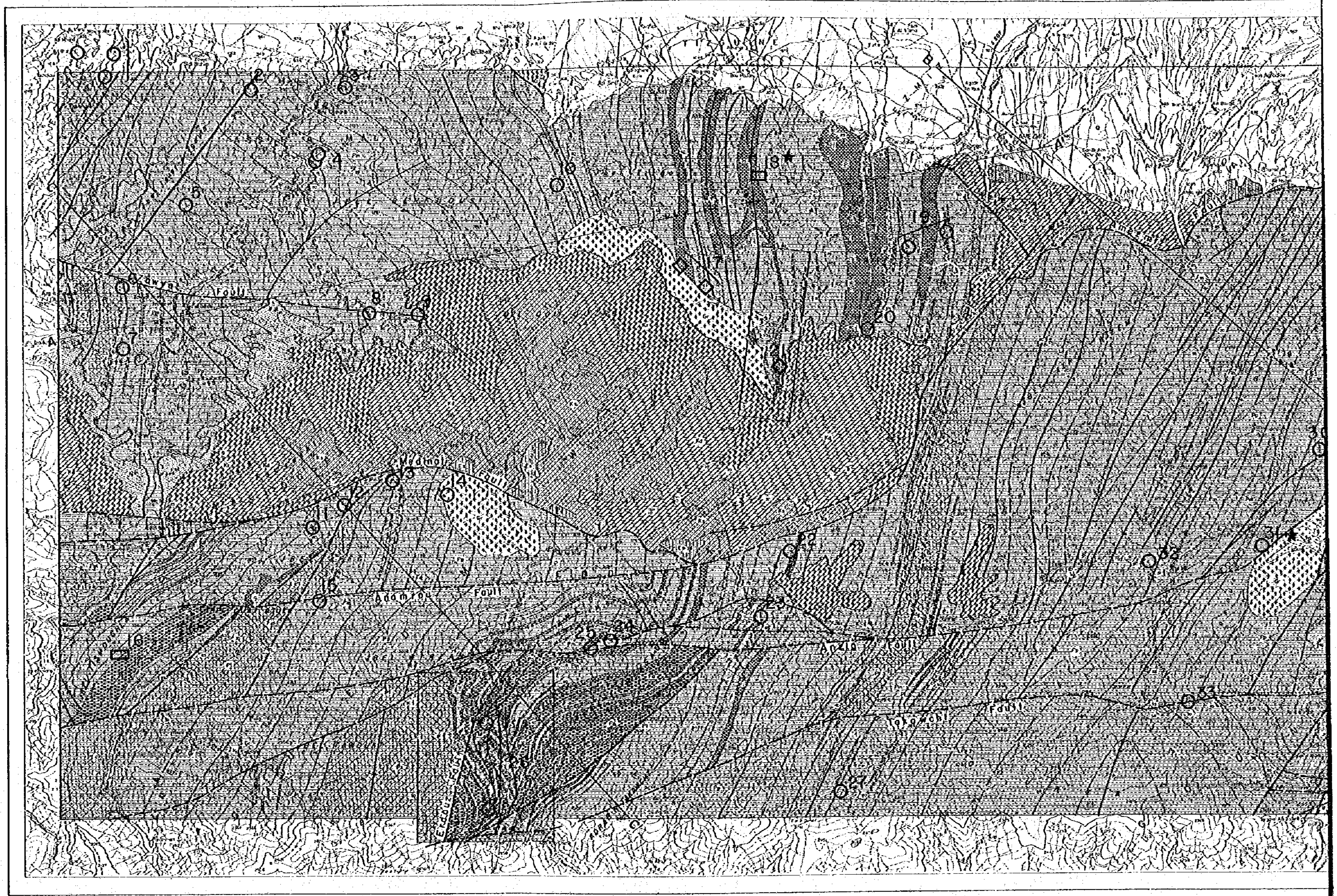
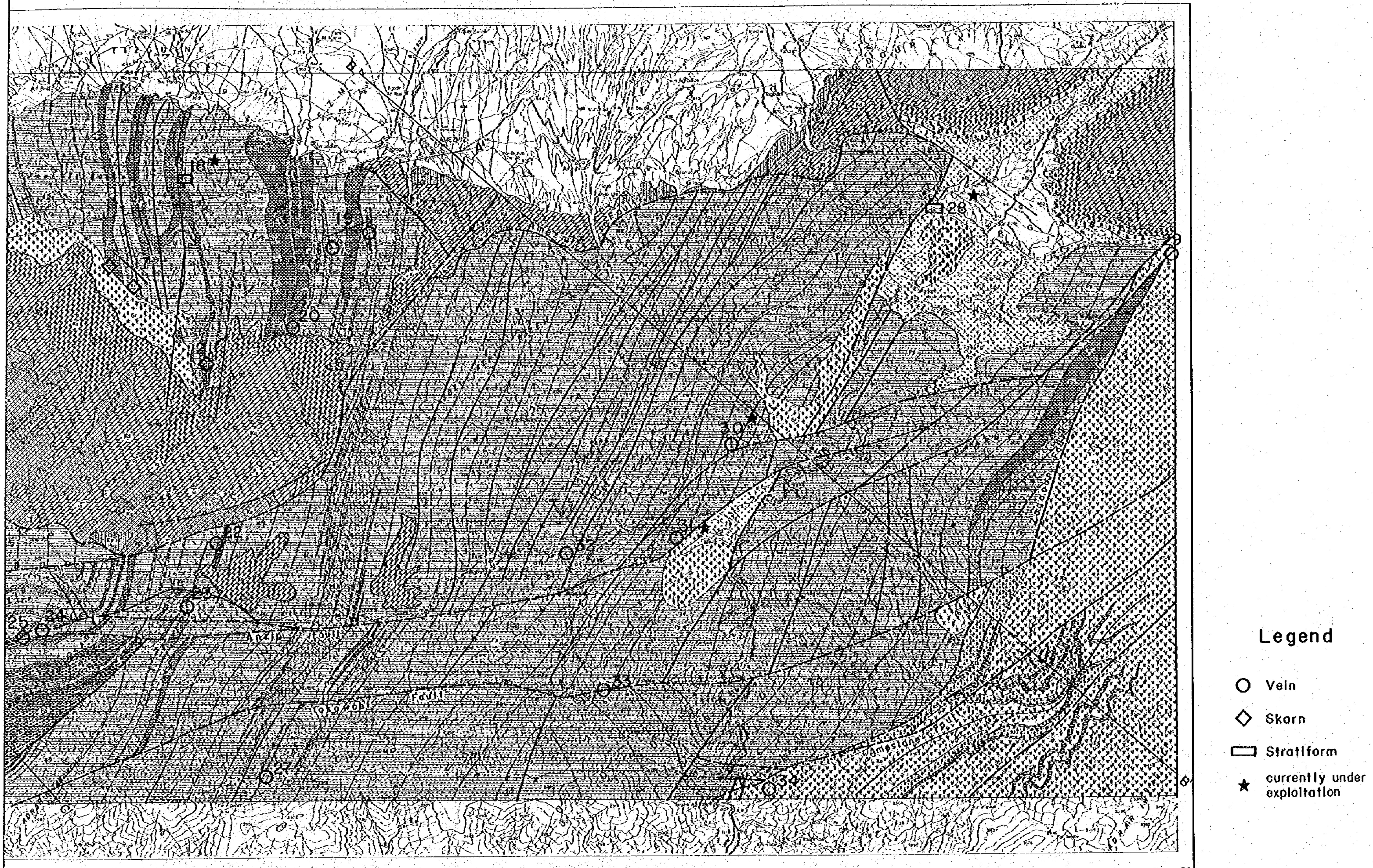


Fig. 6 Ore Deposits and Mineral showings in Northern Area



re Deposits and Mineral showings in Northern Area

Table 2 List of Mineralization in Surveyed Area (1)

Serial No.	Name	Location	Type of deposit	Remarks
1	Ait Brahim, Agadir-n- Hallout	Sidi Bou Otmane WNW 7 km	Vein Barite	3 Barite VNs; N40E 70 NW 0.7mx20m(wd.xExt.) N65E 70 NW 1.1mx40m, N60E 80NW 1mx50m
2	Imi-n-Ouassif	Sidi Bou Otmane WNW 2.2 km	Vein Py	Pyrite Qtz VN. Wd. 3m MR-27 0.1m tr 0.04 0.01 10 length Cu% Pb% Zn% Ag g/t
3	Assif Al Mal	Sidi Bou Otmane NE 0.7 km	Vein Pb,Zn,Cu	Principal VN; N-S, Vert. 0.2mx150mx110m (Wdx Lat. Ext. x Vert. Ext.) No.3 VN; N-S, Vert. Lat. Ext. 70m No.4 VN; N-S, 80E Lat. Ext. 90m Prin. VN had been under exploitation during 1950s'. Monthly Production (1957), mined ore 1500t Zn 7%, Pb 1% Cu 0.1-0.2%.
4	Anebdour	Sidi Bou Otmane S 1.5 and 1.8 km	Vein Cu	Qtz VN; N55W, 70N Wd. 0.1m MR 25 0.1m 0.50 0.02 0.05 10 Qtz VN; N80W 40N Wd. 0.5m azurite-malachite stains, followed by tunnel 5m length
5		Taskourt NW 1.5 km	Vein Barite	4 Barite VNs; Wd. 0.1∿0.5m N30-60E, 30-70S, followed by 10-25m tunnels. Under exploitation
6	Amegdoul	Amegdoul E 0.7 km	Vein Pb,Barite	Floats
7	Talborit Mine	Adassil N 5 km, Left bank of the Assif Al Mal	Vein Barite (Pb)	3 Barite VNs in the south are almost worked out and 300m northern extention 1 Barite VN is under-exploitation, Wd. 1∿3m, N10E, Vert.
8	Ighermane	Ighermane NE 1.7 km	Vein Pb,Zn	Qtz VN; N10W, 60E MR-23 1.0m 0.01 0.03 1.0 10
9	Tifirt	Tifirt SW 1.2 km	Vein Barite Cu	Barite VN; N55E, 20N Wd. 0.5m Test pit 5mx1m with a little malachite MR-22 0.05m 0.10 tr tr 2

Serial No.	Name	Location	Type of deposit	Remarks
10	Ait Bourd	Ait Bourd S 2 km	Vein Pb,Barite	Fissure; N50W, 70S Wd. 1.2m MR-1, 0.01 3.1 0.06 13
11	Areg	Areg N 0.1 km	Vein Cu,Pb,Ag	Ls F.W. fault; N60W, 50S Dissemination of galena and malachite Old working 30mx30m
12	Areg tunnel	Areg NE 1.1 km	Vein Cu,Pb,Zn	Qtz VN; N-S, 35W Wd.0.2-0.4m Ext. 12m + followed by tunnel MW 5 0.3m 1.65 4.20 0.20 440 MW 6 0.35m 0.28 0.54 0.17 74 MW 7 0.4m 0.70 0.31 0.57 38 MW 8 0.2m 0.43 1.08 8.40 330 MW 9 0.3m 1.20 0.30 0.43 125
13	Anammer	Anammer	Vein Pb	Qtz VN; N55E, 70 SE Wd. 0.02∿0.05mxlat.Ext.10m Tunnel collapsed at 10m from the portal. MK 1, - 0.01 0.15 0.70 20
14	Tifrouine	Tifrouine W 1.2 km	Vein Cu	Fissure; N20E 70E Wd. 0.01∿ N50E 70 SE 0.02m chalcopyrite, pyrite imp. within quartz diorite rock
15	Tizgul	Areg S 2.0 km	Vein Cu	Qtz VN; with malachite stains vein structure obscure
16	Targa	Targa NNW 0.7 km	strati- form Pb	Mineralization along the bedding plane of limestone; N30-70E, 50S thickness 0.05- 0.1m ext. 40m+GK 127 0.1m 0.05 0.11 0.11 3
17		Toulkine N 2 km	Skarn Fe,Ba	length Wd. depth 3 open pits (max. 15mx4mx20m) with botryoidal hematite. Mineralization occurred in garnet skarn along the periphery of granite intrusive.
18	Tiglit	Ait Wagna SSE 3.5 km	strati- form marble	Open pit mining 50 t/d

Serial No.	Name	Location	Type of deposit	Remarks
19		Mine road Azegour and Amezmiz	Vein Cu	19-1 Qtz VN; Wd. 0.2∼0.3m N60E 30NW Ext. Nm lenticular with malachite stains 19-2 Fissure; N30E, 50 NW F.W. of 3m micro granite dike. malachite stains followed by 5m tunnel
20	Toug al Kheyr	Toug al Kher NW 2 km	Vein Ba	Barite VN; N-S, 70 W Wd. 0.1 ∼0.5m Ext. 250m Followed by trench and tunnel
21	Azegour	Azegour NNE 1.5 km	Skarn Cu,Mo,W	Explained in detail in a different paragraph.
22	Tiifltine	Azegour SE 3.8 km	Vein Pb,Zn,Ba	Barite VNs; N-S, 70 E followed by a tunnel 60m+ MW1 0.3m 2.05 13.00 7.80 540 MW2 0.25m 0.65 0.48 48.29 135
23	Tnirt	Tnirt SSE 2 km	Vein Mo	Qtz VN; N55E 80S Wd. 0.1∼0.5m ext. 350m
24	Anamrou tunnel No.1	Anamrou SW 1.7 km	Vein Pb,Zn	Qtz VN; N60E 70SE Wd. 0.01∼0.03m Prospection tunnel 70m length. MW 3 0.03m 0.04 0.08 0.12 11
25	Anamrou tunnel No.2	Anamrou SW 2.2 km	Vein Cu,Pb,Zn	Fissure; N50E, 40-50SE Prospection tunnel 75m length. MW 4 0.35m 0.34 0.08 0.14 25
26	Erdouz N Erdouz S		Vein Pb,Zn	Explained in detail in a different paragraph.
27	Aghrass	Kettou S 4.7 km	Vein Pb,Zn	Qtz VN; N45E, 70 SE Wd. 0.2m Ext. 5m
28			Strati-form NaCl	3 Halite bearing sandstone thickness 1m ≥ are contained in the red formation of Triassic age.
29	Tinzert	Tinzert SE 1 km	Vein Cu	Qtz VN; N20E 55NW Wd. 0.05m Ext. 10m chalcopyrite-malachite-pyrite MR 19 0.05m 2.50 0.01 0.01 3

Serial No.	Name	Location	Type of deposit	Remarks
30	SMIM	Imigdal NW 2 km	Vein Ba Pb,Zn	Barite VN; N30E 30NW hor.87mxWd.max.22mxVert.117m underground mining daily production 150t GN 131 - 0.23 33.70 3.90 1060
31	Imidel	Imidel W 2 km	Vein Ba	5 parallel barite VNs; N60-70W, 85-90N Wd. 2-3m ext. 200∿300m daily production 50t
32	Tizi Mill	Tizi Mill W 0.5 km	Vein Cu	Qtz VN; N30W Vert. Wd. 0.1∿ 0.3m malachite-chalcopyrite-pyrite
33	Taourirt	Taourirt E 0.5 km	Vein Ba,Cu	Barite Qtz VN; N55E 65S, Wd. 1m barite-malachite bearing MR 18 - 0.30 tr 0.01 10
34	Iguer-n-Kouris	Iguer-n-Kouris SE 1 km	Vein Ba	6 parellel barite VNs; N40-80W, 50-90S Wd. 0.1-1.3m each followed by tunnels max. 20m long.

However, concerning the other species of the ores than barite, the sizes of the ore deposits are small to moderate from those of the width of several centimeters and the horizontal extension of several meters to those of the width of 1.20 meters and the extension of several ten meters.

The strikes of the ore veins are classified into the following three groups (Refer to Fig.7).

1. NNE-SSW system (No. of mineral indication: 3, 7, 8, 12, 14, 19, 20, 22, 29, 30)
2. NE-SW system (No. of mineral indication: 1, 5, 9, 13, 14, 16, 23, 24, 25, 27, 33)
3. NW-SE system (No. of mineral indication: 4, 10, 11, 31, 32, 34)

These directions are intimately related to those of the fault systems observed in the Paleozoic formations in this area, that is, the directions of the ore veins are same as those of the fault systems. This fact is thought to be suggesting that the mineralization would have followed the faulting movement.

According to the localization of the vein type ore deposits, they have different species of ore minerals. Those containing lead and zinc are distributed mainly in the central western part where the limestones are predominant. Those with barite ores are found in the weatern part of the down-stream area of the Assif Al Mal river, in the river basin of the Nfis river and in the west bank of the Amezmiz river. Copper minerals are recognized in quartz veinlets in whole of the subject area.

The ore grades of the vein type ore deposits, excluding the grade of barite, are; Cu: 0.01 ∿ 2.05 %, Pb: 0.08 ∿ 13.00 %,

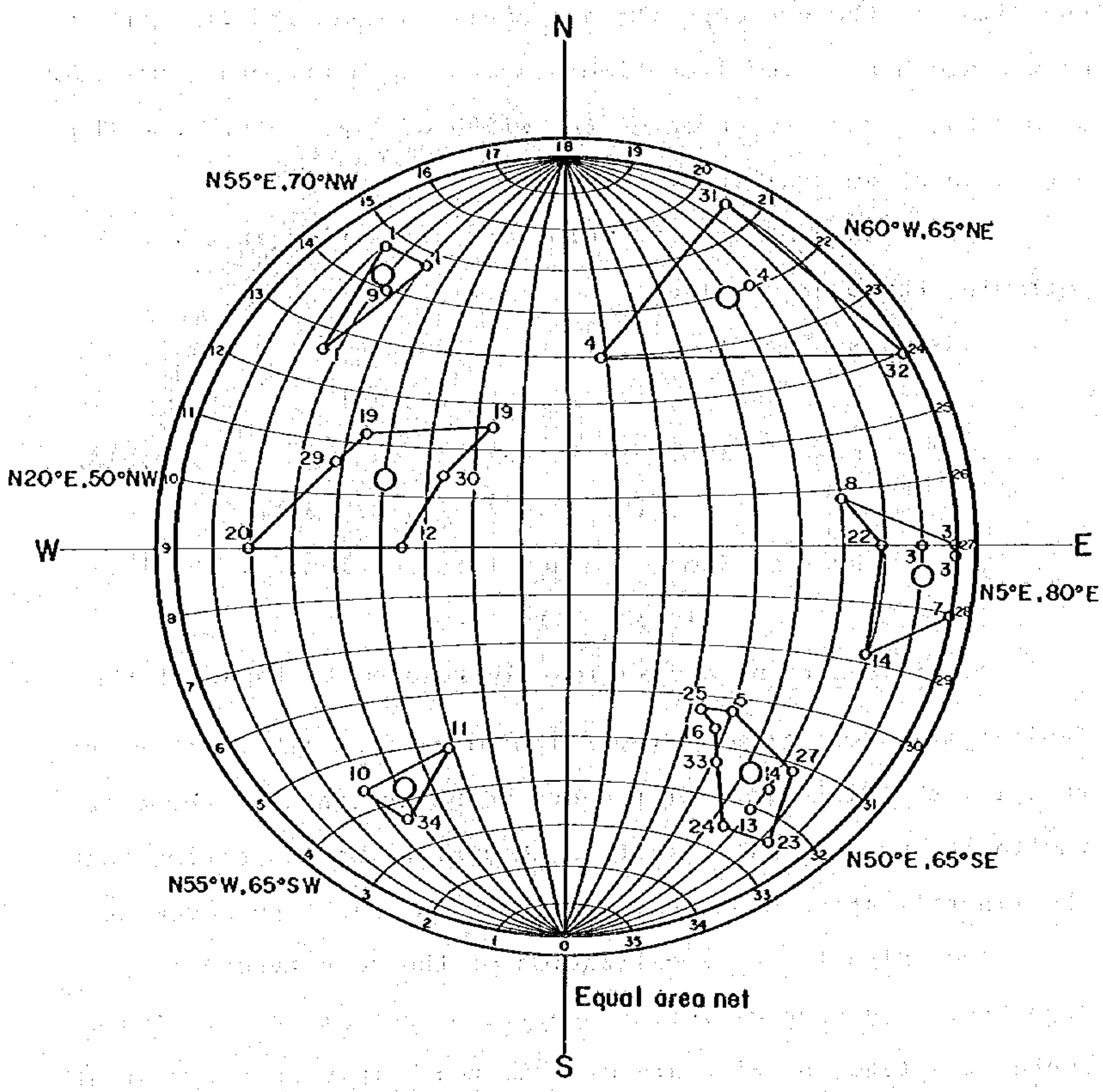


Fig. 7 Pole - projection of Mineralized Veins in Northern Area

Zn: 0.12 ∿ 48.29 % and Ag: 11 ∿ 540 g/t. However, the higher the ore grades are, the smaller the sizes of the ore deposits are, and the smallest ore deposits are in the form of thin lenses of horizontal extension of merely 1 meter or so.

(2) Skarn type ore deposits

The skarn type ore deposits have intimate relation with the Azegour granite which is located in the central northern part of the area. The Azegour mine, which is described in detail in the seprated paragraph, has skarn type replacement ore deposits and is recorded to have produced agout 900,000 tons of crude ores of copper, molybdenum and tungsten.

At about 5 km northwest of the Azegour village, skarnized zone is recognized to have been formed, and hematite ore deposits are found in this zone. The sizes of these ore deposits so far observed in the pits are the maximum width of 4 m, the extension of 15 meters and the vertical continuity of 20 meters (Table 2-(7)).

(3) Stratiform type ore deposits

There are stratiform type ore deposits of the marble deposit (Table 2-(18)), which is originated from the limestones in the Paleozoic formations, and the rock salt deposit (Table 2-(28)), which is contained in the red sandstone in the Triassic system of the Mesozoic group. Both of them are being worked at present.

Among the vein type ore deposits in the North Area, only the ore deposit of the Assif Al Mal mine (Pb, Zn, Ag) in the northwestern part of the area is recorded to have produced ores in the past. Also, it is only the barite ore deposits which are worked at present. Of the barite ore deposits, the SMIM barite mine has large scaled barite ore deposits characteristically associated with lead and zinc minerals. On the other hand, the indications of barite mineralization are comparatively well concentrated in the Areg village, although there is no record of the production from these indications in the past. The Medinat fault runs in east and west in the north side of this area, and the indications of barite mineralization are distributed along this fault. Outlines of the ore deposits of the Assif Al Mal mine, the SMIM mine and the indications of barite mineralization around the Areg village are described hereunder.

1) Assif Al Mal mine (Pb, Zn, Ag)

This mine is located on the right bank of the Assif Al Mal river in the northwestern part of the North Area. At present this mine is not operated, and as the equipments have been removed, it is only the surface part which is observable. The recorded production is only in 1950's as follows; monthly crude ore production 1,500 tons with the grades of Zn: 7%, Pb: 1% and Cu: 0.1 ∿ 0.2%; monthly zinc concentrate production 200 tons with the grade of Zn: 60% ∿ 61% monthly lead concentrate production 30 tons with the grade of Pb: 72% and Ag 550 g/t. However, total production and its grades from this ore deposit are not obvious.

The ore deposit is fissure filling vein type ore deposit trending in north and south, contained in the black schist.

There are three ore veins, known as the principal vein, No. 3 vein and No. 4 vein. As for the sizes of the principal vein, the horizontal extension is 150 m, and the vertical continuity is 110 m with the width of 15 cm ∿ 20 cm. The No.3 vein and the No.4 vein are in parallel with the principal vein, located at 200 meters and 250 meters east of the vein. The horizontal extensions are reported to be 70 meters and 90 meters, respectively.

The principal vein observed at the entrance of the working tunnel in the present survey has the strike of N30°W and the dip of 30° to the southwest. Lead-zinc mineralization is recognized in the vein of the width of 5 cm to 10 cm. The strike of the No.4 vein (820 m level) is north-south and the dip is about 70° to the east. It is a vein with the approximate width of 4 meters seated in a fractured zone. In the clay zone (50 cm in width) found in the hanging-wall side of this fractured zone, lead-zinc mineralization associated with quartz is recognized, while copper dissemination (malachite) is recognized in quartz vein of the width of about 20 cm seated along the footwall boundary plane of the fractured zone. Under microscope, sphalerite, galena, chalcopyrite and pyrite are recognized (Table 7-2, GN-156, GN-157).

There is an outcrop of a quartz vein with the width of 2 meters along a small stream at about 300 meters south of the principal vein. Gossans of limonite and small amount of malachite are recognized contained in it. The strike of this quartz vein is N10°E and the dip is 60° to the east. Relation of this quartz vein with the principal vein is not obvious.

2) SMIM mine (Ba)

This mine is located on the left bank of the middle-stream of the Nfis river. The mine's private road is there to the mine. The underground mining method is employed for the production in this mine. The width of the ore vein at the surface outcrop is 3 meters, and the strike of the vein is N30°E, with the gentle dip of 30° to the south. Observing the barite ores in the ore pile, lead-zinc mineralization is recognized. By the superintendent of the mine, the horizontal extension of this ore vein is a little more than 80 meters, and the vertical continuation is 110 meters with the maximum width of 22 meters.

3) Indications of mineralization around the Areg village (Cu, Pb, Zn)

The Areg village is located in the southwestern part of the North Area. It is in the upstream area of the Assif Al Mal river, and it is about one hour's walk on horseback from the Adassil village to this village.

There are five indications of mineralization around the Areg village. All of them are copper-lead-zinc ore veins emplaced in the pelitic schists in the Paleozoic formations. Remains of the pits and the exploration tunnels of the length of over 10 meters are observed. The most heavily mineralized indication of them was found in the Areg tunnel. The strike of this ore vein is north-south and the dip is 30° to the west. This ore deposit is in a form of pipe with the vertical continuity of 12 meters. The ore grades are Cu: 0.85%, Pb: 1.31%, Zn: 1.39% and Ag: 178 g/t. The ore minerals are chalcopyrite, galena and sphalerite. Under microscope, covellite and pyrite are recognized in addition to the above main ore minerals.

2-1-4 Discussion

In the North Area, many ore deposits and mineral indications had been reported. However, rarely consideration was given to them in relation to the geological structure in the surrounding areas. In the present investigation, the regional geological survey including the mapping of the individual mineral indications and the geochemical survey (elements for analysis: Cu, Pb, Zn, W, Mo) by stream sediments were carried out in order to clarify the geological structure of the North Area and to elucidate the relation between the mineralization and the geological structure. As the results of these surveys, the possibility for the emplacement of the ore deposits and the presence of the favorable area for further exploration were clarified by giving consideration on the geological structure and the relation between the geological structure and the mineralization.

The geology and the geological structure clarified through the present investigation are as follows.

The geology of this area is constituted by the basement of the Pre-Cambrian group and the Paleozoic group as well as by the Mesozoic group and the Cenozoic group overlying the basement. The Pre-Cambrian group is composed mainly of andesite and andesitic tuff, which are in contact with the Paleozoic formations by the fault in the south-eastern part of the subject area. The Paleozoic group is composed dominantly of pelitic schist distributed in the eastern part, of limestone in the central western part and of pelitic schist and green schist distributed in the western part. As a whole, folding structures with the axes in the NE-SW direction are developed. Blocking by the fault movement is also recognized to have been developed after the intrusion of the igneous rocks. The Mesozoic group is constituted by the Triassic system, the Jurassic system and the Cretaceous system. They are distributed, in almost horizontal but slightly inclined form, on the topographical rises and in the northern side of the fault in the northern margin of the subject area. As for the Cenozoic group, the beds belonging to the Tertiary Eocene series are overlying the Mesozoic formations in small scales and the alluvial deposits are distributed extensively in the area including the northern plain part.

As to the ore deposits in the subject area, there are three types of the ore deposits which are scatteringly found in the area where the Paleozoic formations are distributed; vein type ore deposits of copper, lead, zinc and barite, skarn type ore deposits of copper, molybdenum, tungsten and iron, and stratiform type deposits of marble. The rock salt deposits are also found in the Triassic system of the Mesozoic group. It has been clarified that the mineralization of the metal ore minerals including barite has the following three common factors in relation to the geology and the geological structure.

1. Condition of the period of the mineralization: the mineralization has been recognized in the Paleozoic formations and in the granitic rocks intruding the former in the periods of late Paleozoic Era. No mineralization has been recognized in the formations of the Mesozoic and later periods.

2. Structural control: The distribution of the indications of the mineralization is concentrated in such areas as along the faults and along the peripheral zone of the granitic rocks. The locations of the individual indications of the mineralization are controlled by the fissures of the three systems, that is, those in the directions of NNE-SSW, NE-SW and NW-SE.
3. Zonal distribution of the mineralization: Around the area in the central western part of the subject area, a zonal arrangement of the mineral assemblage of the ore minerals is recognized in the direction of east and west. In the center, ore minerals containing molybdenum, tungsten and copper are distributed, and in the surrounding area, ore minerals containing lead and zinc are recognized. In the outermost zone, barite ore deposits are distributed.

The above-mentioned fact is suggesting that the mineralization in this area has intimate relation to the granitic rocks (Azegour granite etc.) in the post-orogenic period of the Hercynian orogenic movement. The lithofacies of the granitic rocks in the subject area are quite similar to those of the batholithic granite body (Tichica granite), which is located about 30 km southwest off this area, and it is thought to be possible that they have been originated from a single magmatic source. Accordingly, the area between Azegour and Tichica, which is extending in the direction of northeast and southwest, especially the peripheral zone around the granitic rocks is noted as the possible favorable area for the emplacement of mineral deposits.

By the results of the geochemical survey, the distribution of copper anomalies reveals quite similar pattern to that of the molybdenum anomalies, and the distribution of lead anomalies reveals much similar pattern to that of zinc anomalies. It has been clarified that they are in high correlative relation. This is in good harmony with the facts that lead-zinc ore deposits and copper-molybdenum ore deposits are distributed in this area. Especially, the distributions of parts of the copper anomalies as well as those of the lead and the zinc anomalies are in good correspondence with the distributions of the known indications of mineralization. It can be said from this fact that the geochemical survey as carried out in the present investigation would be effective for the extraction of the unknown mineralization zones in the subject area.

It is exceptional that only molybdenum anomalies are not found around the known ore deposits and that they are distributed in harmony with the copper anomalies in the river basin of the Nfis river in the eastern part. This can be interpreted by the idea that the molybdenum minerals would have been transported in far distance flowing in water as they are easily foliated to small pieces. Therefore, copper-molybdenum ore deposits are expected to have been emplaced in the upstream area of the Nfis river (the area to be surveyed in the second phase of the program).

Of the ore deposits and the mineral indications in the North Area, it is only the Assif Al Mal mine in the northwestern part and the barite mine that have the records of the production in the past. Although the indications of the mineralization are concentrated around the Areg village or else, they are in as small scale as to have the width of under 30 cm and the horizontal extension of less than over ten meters. The mineralization in them are weak. Even in the Assif Al Mal mine, the mineralization is weak as far as observed on the surface outcrosp. It is necessary to repair old tunnels and to carry out detailed mapping in the tunnels for the information concerning sizes and grades of the ore deposits. In the SMIM mine, lead and zinc mineralization has been recognized associated with barite. As the zonal distribution is recognized in the mineralization in this area, the presence of lead-zinc mineralization is expected in the depth of the barite ore deposits. Accordingly, it is necessary to mark such ore deposits as to contain barite in future investigations.

2-2 Erdouz Sector (Refer to Fig. 12)

The Erdouz Sector is located in the south of the central part of the North Area and occupies an area of about 4 km in east and west and about 5 km in north and south. In the central part of this area, there is a range of the highest summits, which are composing watershed of the Atlas mountain range, of the altitude of more than 3,200 meters above sea level, crossing the subject area from the east-northeast to the west-southwest. Therefore, quite steep mountaneous features of the topography are the characteristics of this area.

Although four-wheel drive vehicle can reach to the old mine of the Erdouz North ore deposit (altitude: 2,650 meters above sea level) located on the north slope in this area, there is no other way but on foot, for the access to the subject area. It is noted to be difficult to make a return trip in a day to the southern slope, where the Erdouz South ore deposits are located. It is necessary to establish survey camp at the mountain foot of the southern slope.

2-2-1 Geology and Geological Structure

(1) Geology (Refer to PL.3, PL.4)

The subject area is underlain, geologically, by the metamorphic rocks originated from the sedimentary rocks and the volcanic rocks belonging to the Cambrian system of the Paleozoic group, and by the dyke rocks of granite and porphyrite intruding them.

The metamorphic rocks originated from the sedimentary rocks are psammitic schist, pelitic schist and crystalline limestone. The original sedimentary structures are left in these metamorphic rocks and the stratigraphical structures of the thickness of several meters to several ten meters can well traced. These rocks are distributed in the eastern and central part of this area. The block south of the fault running in east and west in the southern margin of this area, is underlain by the pelitic schist only.

The psammitic schist is generally pale green, hard and compact, having the remain of the original texture of aggregate of sandy grains. Schistosity is not remarkably developed. The pelitic schist is black or dark green in color, and such minerals as mica and chlorite are recognized, which are thought to have been formed after fine grained muddy materials. Schistosity

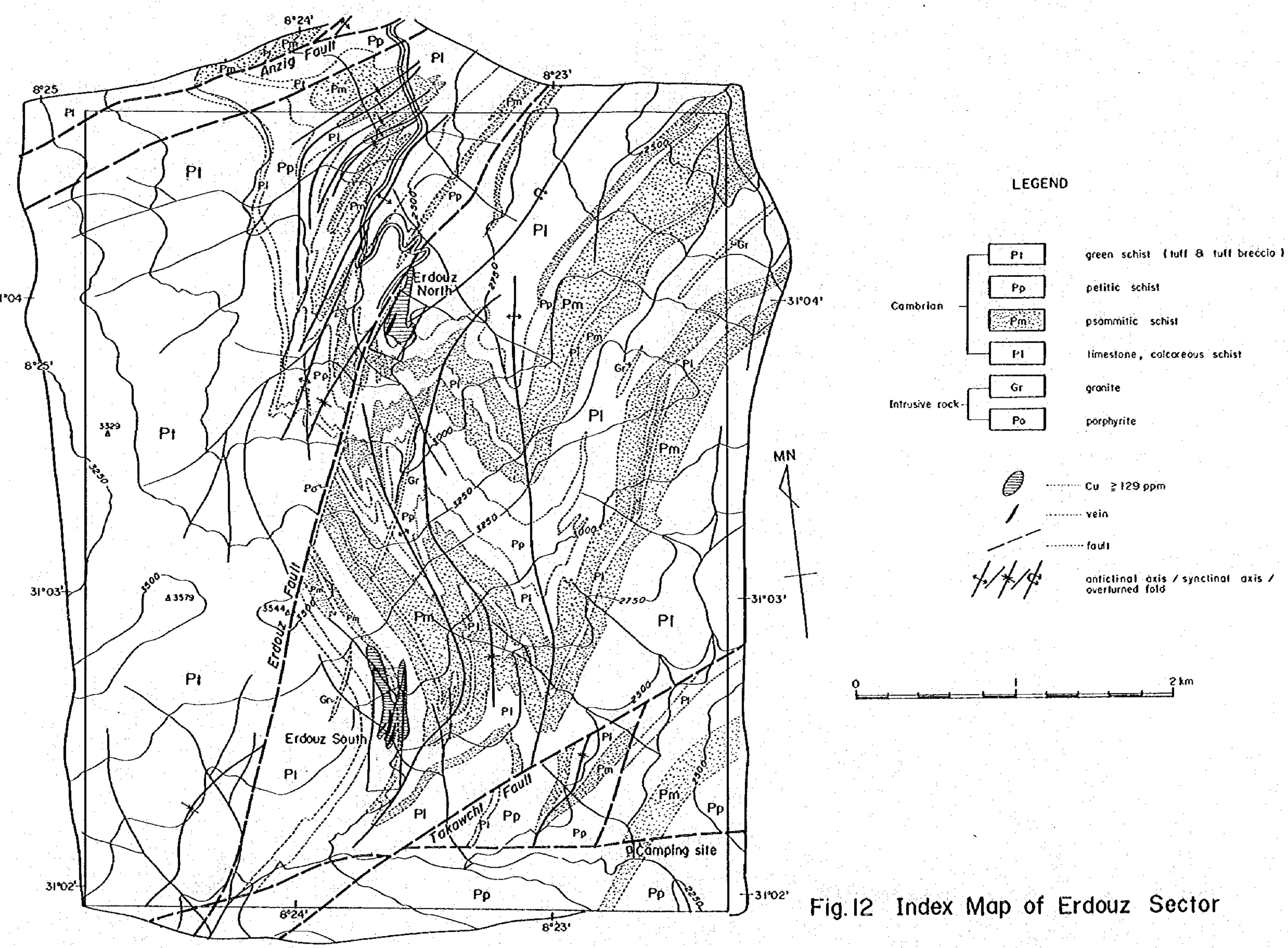


Fig.12 Index Map of Erdouz Sector

is well developed and the pelitic schist is phyllitic in some cases, and when weathered, it is easily broken to small pieces. The crystalline limestone is dark-colored or white. Hardly eroded, this rock composes steep cliffs in many cases. In general, the thickness of the limestone is more than several meters, but in some cases it is in the form of thin layers inserted in other beds. Especially the crystalline limestone forms characteristic lithology of the repetition with the pelitic schist, the thickness of which is several meters to several ten centimeters. In the outcrops, calcareous parts have been eroded out to form many narrow drains, having rugged features like a comb. This alternative rock is distinguished and is named to be calcareous schist in the present survey.

No fossil has been recognized in limestone in this geological survey, although there is a report (L. NELTNER, 1938) stating the presence of fossils in the limestone in the neighbouring area, to suggest the beds to be of the Cambrian system.

The metamorphic rocks originated from the volcanic rocks are mostly green schist, which is distributed extensively in the western part of the subject area and in further west beyond the border. The green schist is pale green to bluish green. Sometimes it is hard and compact but in other cases it is coarse grained, moderate to hard rock, having original brecciated texture. Many layers of limestone and pelitic schist of the thickness of several meters are inserted in this rock, where bedding planes are well developed. Under microscope, microcrystalline aggregates of albite, chlorite, epidote, calcite and sphene which had replaced the phenocrysts such as plagioclase and pyroxene are recognized. The matrix is also composed of microcrystals of chlorite, epidote etc. By the results of the microscopic observation, the original rocks of the green schist are thought to have been or andesitic volcanic rocks or pyroclastic rocks.

The granite dykes are as wide as several meters and they have intruded the above-stated rocks in many places in the subject area. The trends of the dykes are generally northeast and southwest. The intrusion is recognized to have been along the tectonic weak planes such as faults and the fissures. The rocks are in characteristic tone of the color of light carmine to carmine brown. Microcrystalline granuler texture is recognized, but under microscope, intense alteration is recognized after the intrusion, as the plagioclase has been completely albitized and the mafic mineral (probably hornblende) has been completely replaced by chlorite, epidote and sphene (Table 7-1: GR-11, GR-17, GN-61).

The porphyrite dykes are as wide as several meters, intruded along the faults of NE-SW system running in the central part of the subject area. The porphyrite is grey brown or dark grey in color, having porphyritic texture. Under microscope, are recognized pseudomorphs of hornblende replaced by chlorite, calcite, epidote and sphene and of plagioclase replaced by albite and chlorite (Table 7-1: GR-45).

(2) Geological structure

The geological structure in this area is characterized by the blocking of the strata by the faults and by the intense folding structures.

The principal faults in this area are Anzig fault and Takawcht fault running in east and west, respectively along the northern margin and along the southern margin of the subject area, in addition to the Erdouz fault running in northeast and southwest across the central part of the subject area. The blocks divided by these faults are different one another in the points of species of the component rocks and the folding structures. The component rocks of the block east of the Erdouz fault are those originated from sedimentary rocks such as psammitic schist, pelitic schist, limestone and alternation of limestone and pelitic schist. They form anticlinorium structure with the folding axes in the form of the letter 'S' from the northeast to the southwest in the western part of the subject area. In a part of the anticline, there is a overturned fold. In the block west of the Erdouz fault, the western half is composed of green schist while the northeastern part is composed of the schist originated from the sedimentary rocks. Generally they have monoclinic structure, trending north and south with the dip of 30°∿50° to the west, while in the northeastern part anticlines and synclines are recognized with axes of northeast and southwest. This green schist is in the upper part of the metamorphic rocks originated from the sedimentary rocks, viewing from the distribution and the structure.

The area south of the Takawcht fault is composed of black pelitic schist of phyllitic character. The strike is northeast and southwest, revealing with the dip of 60° or so to the east. The northern block of the Anzig fault is composed of pelitic schist, psammitic schist and alternation of limestone and pelitic schist. The trend of the beds is generally ENE-WSW, showing monoclinic structure with the dip toward the northwest.

2-2-2 Results of the Geochemical Survey

In the Erdouz Sector, geochemical survey was carried out, in parallel with the geological survey, by collecting soils (B layer) for the analysis of minor metal elements contained in them, for the purpose to clarify the sizes and the continuity of the extension of the known mineralization zones as well as to make an examination for the presence of undiscovered favorable ore deposits. The localities of the sampling points are shown in the PL-11 and the results of the analysis (three elements of Cu, Pb, and Zn) are listed in the Table 12-2. Total 126 samples collected around the ore deposits and around the area where indications of mineralization are distributed were analysed by Japan side, while the results of the analysis of the samples collected at total 103 points were supplied by B.R.P.M., who independently carried out the chemical analysis. Consideration was given on the analysis results of the samples at total 229 points including both of the above-stated.

Values of the chemical analysis were treated statistically, and the consideration was given on the characters of the population, the anomalies and the correlative relation among the elements. The anomalous values detected are shown in the PL.8-1, PL.8-2, PL.8-3, PL.14-1, PL.14-2 and the examination for the presence of the relation to the mineralization was completed.

level of G + 2σ value. Accordingly, the values under the bending point and those over the same point are belonging to different population, and the establishment of the above thresholds of the anomalous values is thought to fulfil the required conditions.

2) Pb: On the cumulative frequency distribution graph, there is a bending point between Pb 80 ppm and 120 ppm. This position is correspondent near to the level of the G value. The values over the bending point and the values under the same point are belonging to the different populations respectively, and the establishment of the above thresholds of the anomalous values is thought to fulfil the required condition.

3) Zn: On the cumulative frequency distribution graph, there is a bending point between Zn 200 ppm and 300 ppm. This position is correspondent roughly to the level of the G value, and it is thought that the values over this point and the values under this point are belonging to the different populations. Therefore the establishment of the above thresholds of the anomalous values is thought to fulfil the required conditions.

4) Mutual relation among the analysed elements: Consideration was given on the mutual relation of the analysed elements of Cu, Pb and Zn, and the results as shown in the Table 3-2 have been obtained. By this table, the correlative coefficient between Cu and Pb is as low as 0.32, and merely low correlation

(1) Statistic treatment

For the statistic treatment, logarithm of the analysis values, which show almost normal distribution, was employed for the consideration, as the distribution of the analysis values of each element had an extreme partiality for low grade side.

Statistical values of every element analysed and threshold for anomalous values are shown in the Table 3-1. The histograms of the logarithmic values of the elements of Cu, Pb and Zn are shown in the Fig. 8-1, Fig. 8-2 and Fig. 8-3. Cumulative frequency distribution of the every element is shown in the Fig. 8-4.

For the establishment of the anomalous values, statistic values of G, G+σ and G+2σ were employed as the standards of the classification. The indicated zone, the weakly anomalous zone and the remarkably anomalous zone are determined as follows, and the results are shown in the PL.8.

Strong anomaly zone	$\geq G + 2\sigma$
Weak anomaly zone	$G + 2\sigma > \sim \geq G + \sigma$
Indicated zone	$G + \sigma > \sim \geq G$

The characters of each population and the relation to the anomalous values as well as the correlative relation among the elements are described as follows.

1) Cu: On the cumulative frequency distribution graph, there are slight bending points at around Cu 120 ppm and at around Cu 370 ppm. Viewing the positions of these bending points, the former is correspondent roughly to the M value or the G+σ value, while the latter is correspondent almost to the

Table 3-1 Statistic Values and Threshold Values of Soil Samples in Erdouz Sector

Variable \ element	Cu	Pb	Zn
Number	229	229	229
Minimum value	10.000 ppm	7.000 ppm	26.000 ppm
Maximum value	2700.000 ppm	12600.000 ppm	22400.000 ppm
Arithmetic mean	96.004 ppm	343.197 ppm	870.131 ppm
Logarithmic mean (Lm)	1.692	1.880	2.358
Logarithmic standard deviation (SD)	0.419	0.639	0.565
$G = \log^{-1} Lm$	49.3 ppm	76 ppm	229 ppm
$G+\sigma = \log^{-1}(Lm+SD)$	129.1 ppm	331 ppm	838 ppm
$G+2\sigma = \log^{-1}(Lm+2SD)$	338.1 ppm	1439 ppm	3076 ppm
Skewness (SK)	(8.308)→0.948	(7.294)→0.903	(6.224)→1.315
Kurtosis (KU)	(79.471)→1.600	(62.362)→0.767	(41.354)→1.662
Classification of anomalies			
Strong anomaly (≧G+2σ)	Cu≧338 ppm	Pb≧1439 ppm	Zn≧3076 ppm
Weak anomaly (> ≧G+σ)	338ppm>Cu≧ 129ppm	1439ppm>Pb≧ 331ppm	3076ppm>Zn≧ 838ppm
Indication (> ≧G)	129ppm>Cu≧ 50ppm	331ppm>Pb≧ 76ppm	838ppm>Zn≧ 229ppm

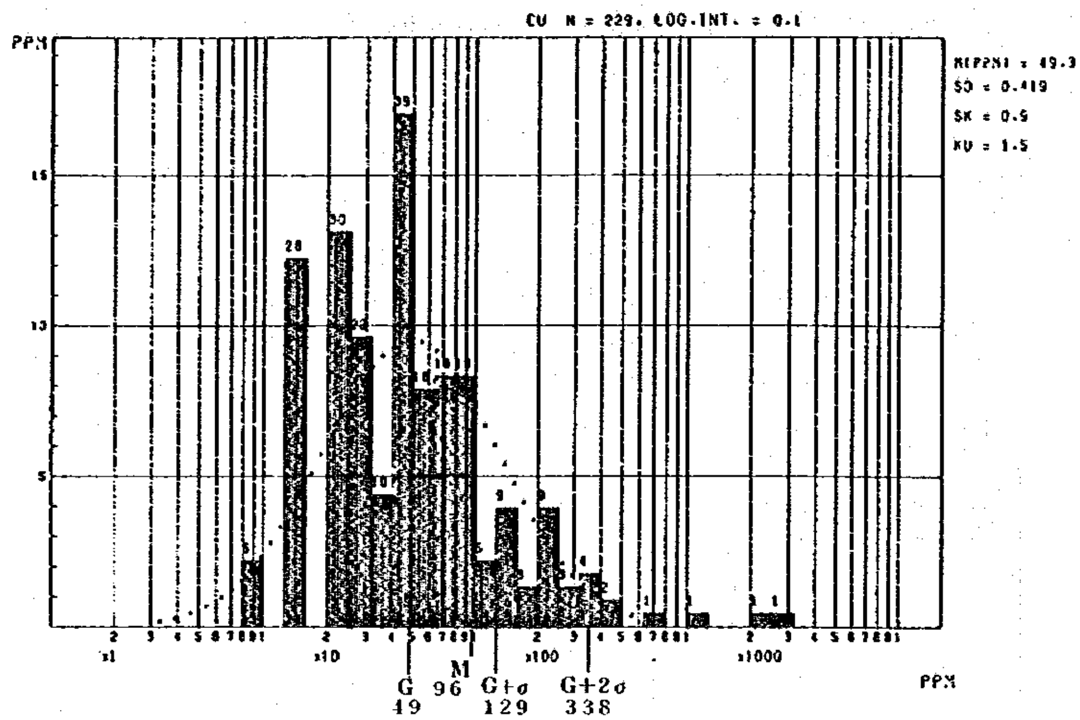


Fig. 8-1 Histogram for Cu of Soil Samples in Erdouz Sector

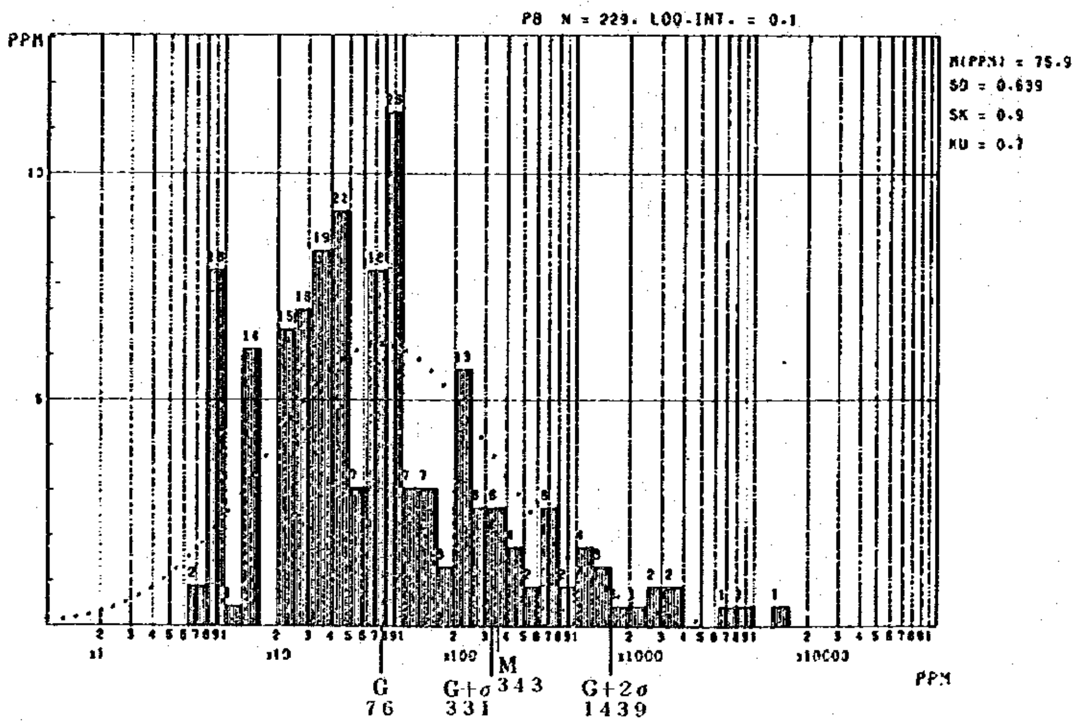


Fig. 8-2 Histogram for Pb of Soil Samples in Erdouz Sector

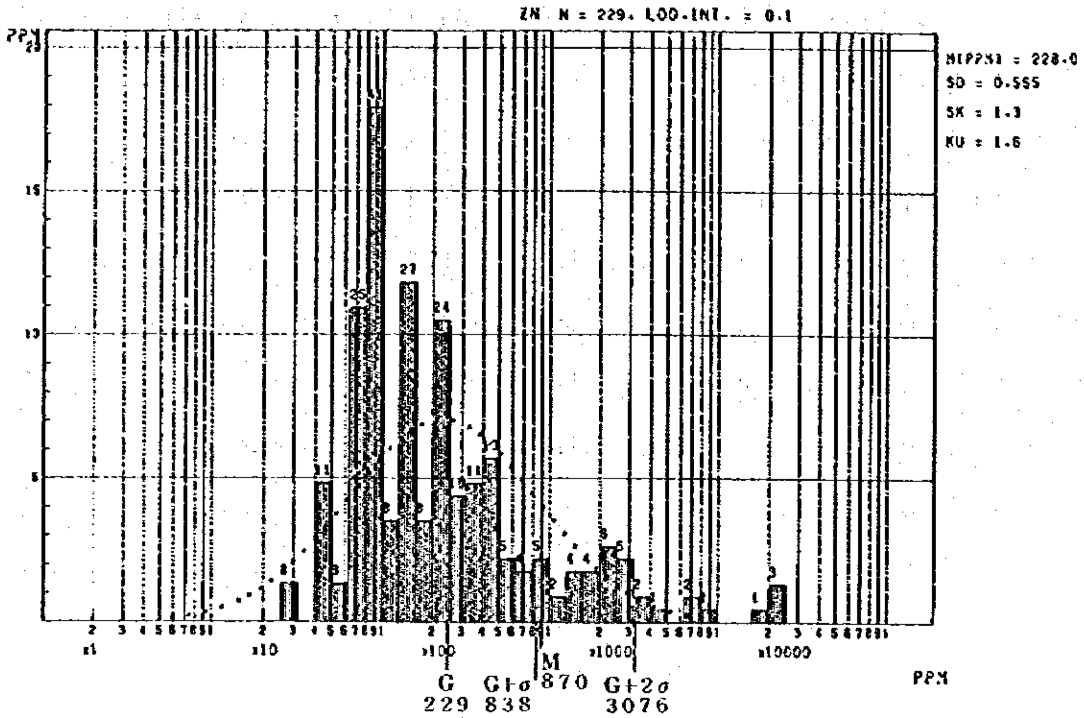


Fig. 8-3 Histogram for Zn of Soil Samples in Erdouz Sector

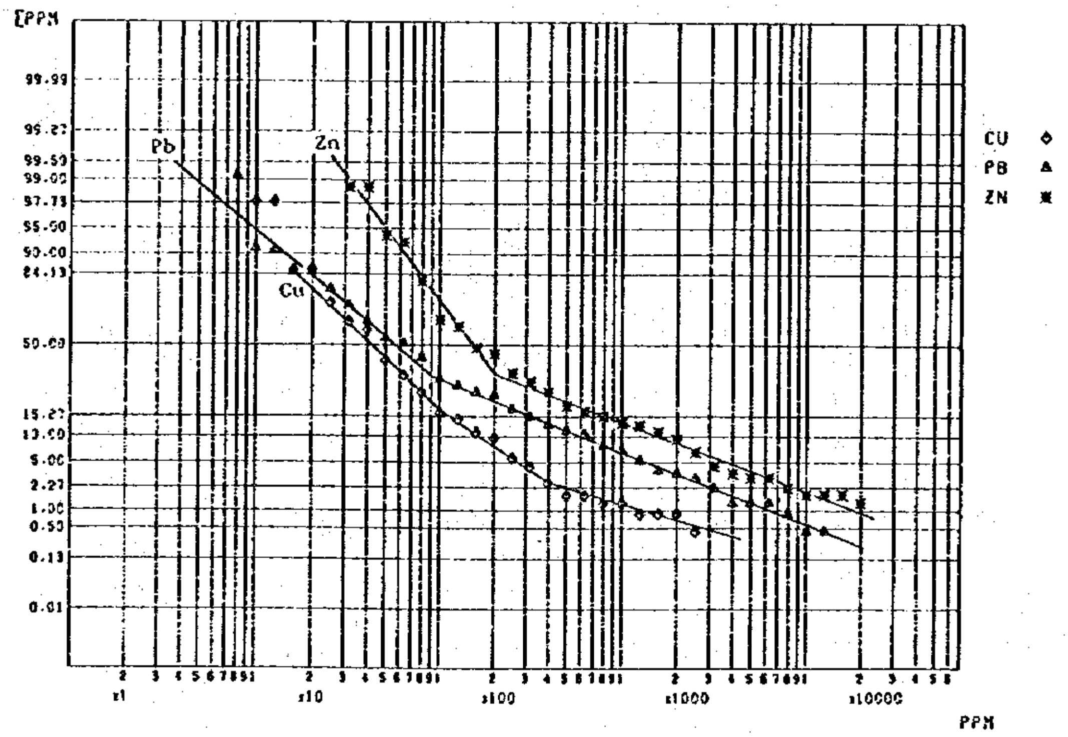


Fig. 8-4 Cumulative Frequency Distribution for Cu, Pb and Zn of Soil Samples in Erdouz Sector

can be recognized between them. Also, the correlative coefficient between Cu and Zn is 0.58 and is comparatively high. Therefore they have rather high correlative relation. Between Pb and Zn, the correlative coefficient is as high as 0.77. There is quite a high correlation between them. This fact is thought to reveal that the ore deposits in this area are mainly those containing lead and zinc, and that only less amount of copper ores are found in this area. Furthermore, this is thought to indicate that the genesis of part of the copper mineralization in this area could be different from the genesis of the lead and zinc mineralization.

Table 3-2 Correlation Coefficients of Soil Samples in Erdouz Sector

	CU	PB	ZN	NOTE
CU	1.00000 0.0000 229	0.31391 0.0001 229	0.58028 0.0001 229	CORRELATION COEFFICIENTS
PB	0.31391 0.0001 229	1.00000 0.0000 229	0.76660 0.0001 229	PROB > IRI UNDER HO:RHO=0
ZN	0.58028 0.0001 229	0.76660 0.0001 229	1.00000 0.0000 229	NUMBER OF OBSERVATIONS

(2) Consideration on the anomalous values

The results of the consideration on the extracted anomaly zones of each of the elements are as follows.

Cu: The strong anomalous values were recognized at 6 localities. Of them, 5 localities are distributed around the

Erdouz North ore deposit, and 1 locality is around the Erdouz South ore deposit. They are just on the exposure of the ore deposits. Especially, the anomalous values around the Erdouz North ore deposit are distributed along the extension of the ore veins in this area, estimated from the old records. The weak anomalies are also recognized only around these two ore deposits. They are found to be surrounding the strong anomaly zones, showing elongated shapes in the direction of NE-SW around the North ore deposit and in the direction of N-S around the South ore deposit. The indicated zones are distributed surrounding these two anomalous zones, stretching along the extension of the anomalies. That is, in the area around the Erdouz North ore deposit, the indicated zone is found along the Erdouz fault in the northeast extension of the anomaly, but no continuity has been recognized in the southwestern side of the ore deposit. In the area around the Erdouz South ore deposit, the indicated zone is stretching in the direction of north and south, which is coincident with the extension of the ore veins. The other indicated zones are distributed in the rather concentrated form in the northeastern middle-slope of the mountain range, and in the southeastern middle-slope. The former has no direct relation to indications of mineralization, but if anything, it is correspondent to the area where dykes of the granite are distributed. In the area where the latter zone is found, veinlets with lead-zinc mineralization have been recognized. Viewing from the facts as above-mentioned, it can be said that the Cu anomalies are distributed intimately related to the ore deposits in this area.

Pb: The strong anomalies extracted are at 10 localities. The 9 of them are around the Erdouz North ore deposit, while the other is distributed around the Erdouz South ore deposit. They are found to be distributed in correspondence with the outcrops of the ore deposits. The former anomalies have the tendency of extension in the direction of NE-SW, which is correspondent to the extension of the ore veins, as is the case of Cu anomalies. The weak anomalous zones are found in the surrounding areas of the above-stated strong anomalies and in the northeastern area. Especially, around the strong anomalies, the weak anomalies are revealing the tendency to indicate the extension of the ore deposits, remarkably. The indicated zones are found in two areas; in the rather broad area including the anomalies around the Erdouz North ore deposit in the northeastern part, and in the surrounding area of the anomalies around the Erdouz South ore deposit. Viewing from the above-stated facts, it can be said that the Pb anomalies are distributed in good correspondence with the area where the ore deposits are distributed.

Zn: The strong anomalies extracted are at 10 localities. The 7 of them are around the Erdouz North ore deposit, while the other 3 are distributed around the Erdouz South ore deposit. They are found to be distributed in correspondence with the outcrops of the ore deposits. The anomalies have the tendency of extension in the direction correspondent to the extension of the ore veins. The weak anomalous zones are found in the surrounding areas of the strong anomalies and in the mountainous area in the east. Those around the strong anomalies are revealing the tendency to indicate the extension of the ore deposits. That is, the weak anomalous zone around the Erdouz North ore deposit is stretching in the direction of northeast, while those around the Erdouz South ore deposit is stretching in the directions of north and in that of south. The indicated zones are distributed in the surrounding areas of the anomalies as well as in several other localities, scatteringly. The indicated zone around the Erdouz North ore deposit is distributed in a form spreading out like an unfolded fan in the area in its northeast, which is correspondent to the extension of the Erdouz fault. Viewing from the above-stated facts, it can be said that the Zn anomalies are distributed in good correspondence with the area where the ore deposits are distributed.

By the results of the geochemical survey by soil samples in this area, the anomalies of each of the three elements of Cu, Pb and Zn are revealing the distribution of the ore deposits or the indications of mineralization, remarkably. Especially, the values of Pb and Zn have high correlative coefficient and their distributions are well coincident each other. Taking the indicated zones into consideration, the values of Zn is indicating the mineralized areas more clearly, with higher capability of extraction, than the values of Pb. The values of Cu are also indicative of the area where the ore deposits are distributed, as the values of Pb and Zn. Especially, Cu anomalies are effective for the extraction of minor indications of mineraliza-