north of the central area. The maximum value is 85.41ppm.

(Hg) Anomalous samples distribut along northsouth trending fault in silicification zone and the north of the central area, and also along northeast trending fault in southwest area and on the ridge of southeast area. The maximum value is 1.761ppm.

(Mo) Anomalous samples almost coincide with the distribution of Hg. The northern part is a little bit wider. The maximum value is 6.881ppm.

(Pb) Anomalous samples almost coincide with the distribution of Au. The maximum value is 954.1ppm.

(Sb) Anomalous samples concentrate along northsouth trending fault in silicification zone in central area and along northeast trending fault from the silicification zone in the southwest area. The maximum value is 6.531ppm.

Principal components values were calculated by using the correlative determinant from logarithm value of soil analysis. The results are shown in TableII-4-4.

Eigenvalues was above 2 up to fourth principal components. The accumulated contribution ratio was 58% up to fourth principal components. The score distribution for first and second principal components are shown in Fig.II-4-30 to Fig.II-4-31.

(Z-01) About 20% of assay results can be explained by first principal components. For the elements related to first principal components, Pb, Hg, Au, Mo, Sb, and Bi show positive scores. The behavior of the elements indicates epithermal gold deposit. And Ba, Zn, Na, K, Ca, Co, Mn, and Mg show negative scores. The behavior of the elements indicates the rock faces. It seems that the area with positive scores of first principal components concentrates in silicification zone along faults in the central area and the north, and along northeast trending fault from the silicification zone in the southwest area.

(Z-02) About 15% of assay results can be explained by second principal components. For the elements relating to second principal components, V, Fe, Ti, Sn, and Ag show positive scores. The correlation is not found but Ag shows negative scores. It seems that the area with negative scores of second principal components distributs in silicification zone and argillization zone but the behavior of elements might not clearly indicate epitermal gold deposit.

The geochemical anomaly zone of each elements are superimposed in Fig.II-4-32. It seems that the anomaly distribution of epithermal gold deposit concentrates in silicification zones along northsouth trending fault in silicification zone and the north, along northeast trending fault from the silicification zone in the southwest area. The correlation between Au, and Ag, Hg, Mo, Pb, Sb, and Z-01 is high positive.

4-2-3 Binangkawan-Taktak Alteration Zone

(1) Geology

The area is underlain by the dacitic to andesitic lava flows and the pyroclastics units of Pliocene, Susungdalaga Volcanics, dated by the previous survey at ca. 4 Ma. The geological map is shown in FigII-4-33. The geological profile is shown in Fig.II-4-34.

The lava flows almost entirely cover the area but the windows of underlying pyroclastics present along Binangkawan River. The lava flows are plagiophyric, massive, and pale/light color and the groundmass is dark gray. The plagioclase phenocrysts ranging from a few millimeters to one centimeter were observed. Smaller phenocrysts of biotite, muscovite, and hornblende were also

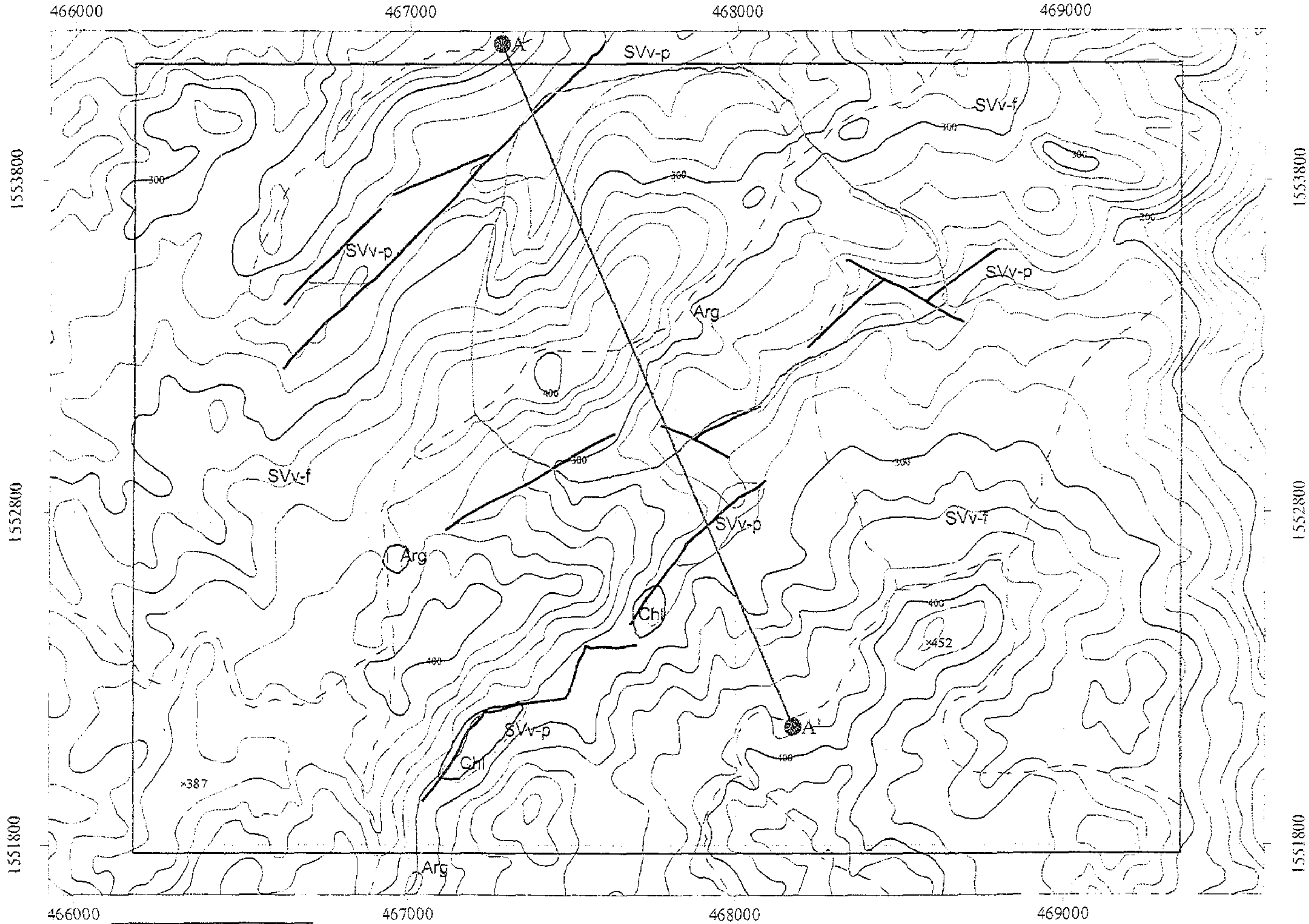
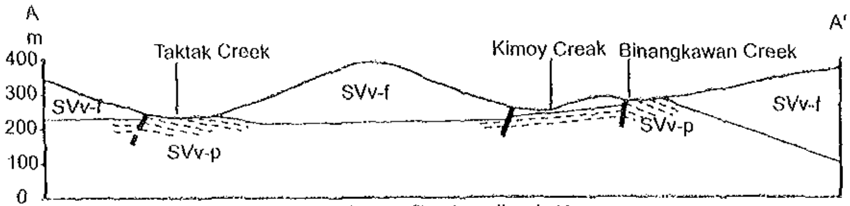


Fig.II-4-33 Geologic Map of the Binangkawan-Taktak Area



Interpretative Profile along line A-A'

Legend

	Q	*sand and gravel*
Susungdalaga Volcanics	SVv-f	Dacitic lava
	SVv-p	*Dacitic tuff and pyroclastics*
	SVd	Dacitic plug dome
Macogon F.	MF	Andestic pycroclastics and tuffaceous black shale with minor basaltic flow
Sta. Elena F.	SEF	Conglomerate, sandstone, shale *and minor limestone*
Universal F.	UF	Limestone, marl and calcareous shale

Arg	Argillization
Sil	SilicificationSil:
Prop	Prophylization
Chl	Chl:Chloritization
	Geologic boundary
	Fault
A A'	Profile

Fig. II-4-34 Geologic profile of the Binangkawan-Taktak Area observed. Pyroxene is also contained. (RBA-21, RBB-4, RBB-6)

The pyroclatic units is mostly composed of crystal tuff, lithic tuff with moderately sorted and sub-angylar fragments of dacitic materials. A mappable outcrop of steeply dipping beds of dacitic crystal tuff was observed along the downstream of Binangkawan River. Interbedded agglomerate is also present in some places. An outcrop of sandy tuff with some large phenocrysts was observed along the upstream of Binangkawan River.

(2) Geological Structure

Two sets of faults, northeast and west-south-west, were observed in the area. the former was observed as an echelon structure along Binangkawan River, and the latter was quite shorter. Both sets show steep dips of 70 to 90 degrees. And quartz vein was observed. The gouge zones are up to 60 cm thick.

The steep dipping bedded crystal tuff in northeast of Binangkawan River trends northeast. However, the northwest trending bed adjacent and south of the tuff unit is affected by the later right lateral northwest fault. Joints generally reflect the trend and dip of the major structures.

(3) Alteration and Mineralization

The zone with argillic alteration, quartz veinning, and narrow silicification covers approximately 1 sq.km located at the north half of the area. However, the argillization is not widely extended but unaltered dacitic rocks and quartz veins adjacent to argillization were observed. The alteration is limited to fractures or permiable zones and massive lava is not altered. Chlorite alteration zones with pyrite disseminations were observed along the upstream of Binangkawan River in the south of the area. The assay results of rock samples and the distribution of alteration zones are shown in Fig.II-4-35. The assay results of ore samples, XRD, and the homogenous temperature of fluid inclusion are shown in Fig.II-4-36.

In the south of the alteration zone along Binangkawan River, quartz veins with eastwest to west-north-west strike and 45 to 80 degrees dip to north. The veins/veinlets at Taktak River and the north have northeast strike and 65 degrees dip to northwest. A 1.5m quartz vein with Mn stains and drussy quartz crystals but almost barren of sulphides was observed at Kimoy Creek, the tributary of Binangkawan River. But the pyrite occurring in the silicified portion of vein which was a part of earlier alteration, was observed. Other quartz veinlets at Kimoy Creek contain open-space -filling drussy quartz. The sample (RBB-109) shows Au; 0.41ppm, Cu; 84ppm, Ag; 5.9ppm, Pb;11ppm, and Zn;32ppm.

Along Binangkawan River, white quartz veins are present but are barren of sulphides. The hanging wall of the white vein is about 80 cm thick, silicified, with pyrite disseminations and several quartz veinlets. The argillization is composed of kaolinite±mixed-layer mineral (RBA-1, RBA-6). The temperature of fluid inclusion is 235 to 252 degrees (RBB-3). The sample(RBB-10) shows Au;0.12ppm, Cu;86ppm, Ag;5,9ppm, Pb;8ppm, and Zn;31ppm.

At Takatak River, a quartz vein outcrop was traced 25m long and 30 cm thick. The vein containes drussy quartz texture and the silicified zone of the original pyroclastic dacite rock contain pyrite dissemination and pockets. The argillization is composed of kaolinite± mixed-layer mineral (RBH-1). The temperature of fluid inclusion is 288 to 305 degrees (RBJ-3).

The major faults are the main silicification zones. The faults are intensively silicified, with soft and white clayey gouge. The wallrocks contain fine pyrite dissemination. The center portion of the fault zone is occupied by barren white quartz that is massive to drussy and dog-toothed. The vein

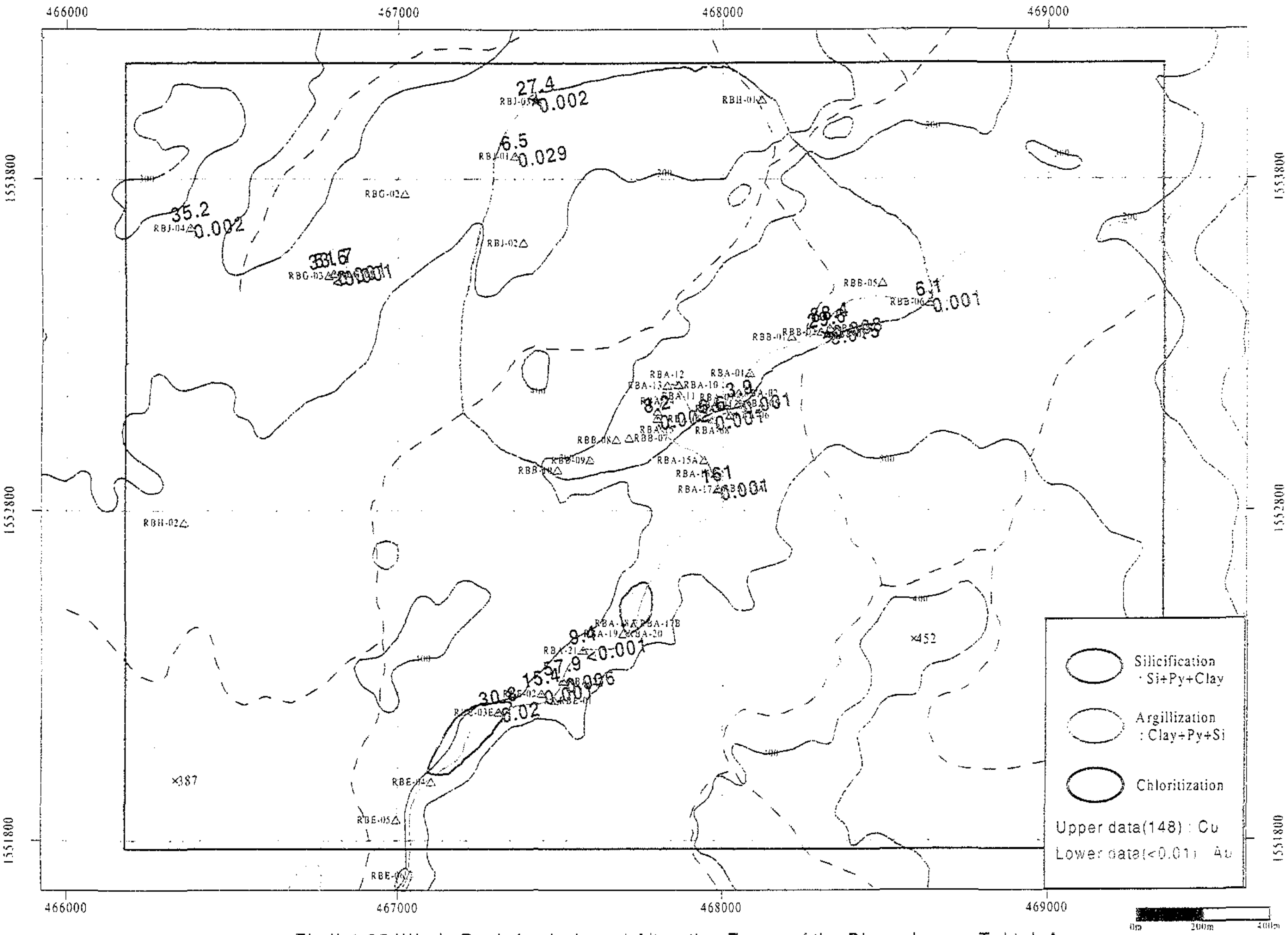


Fig.II-4-35 Whole Rock Analysis and Alteration Zones of the Binangkawan-Taktak Area.

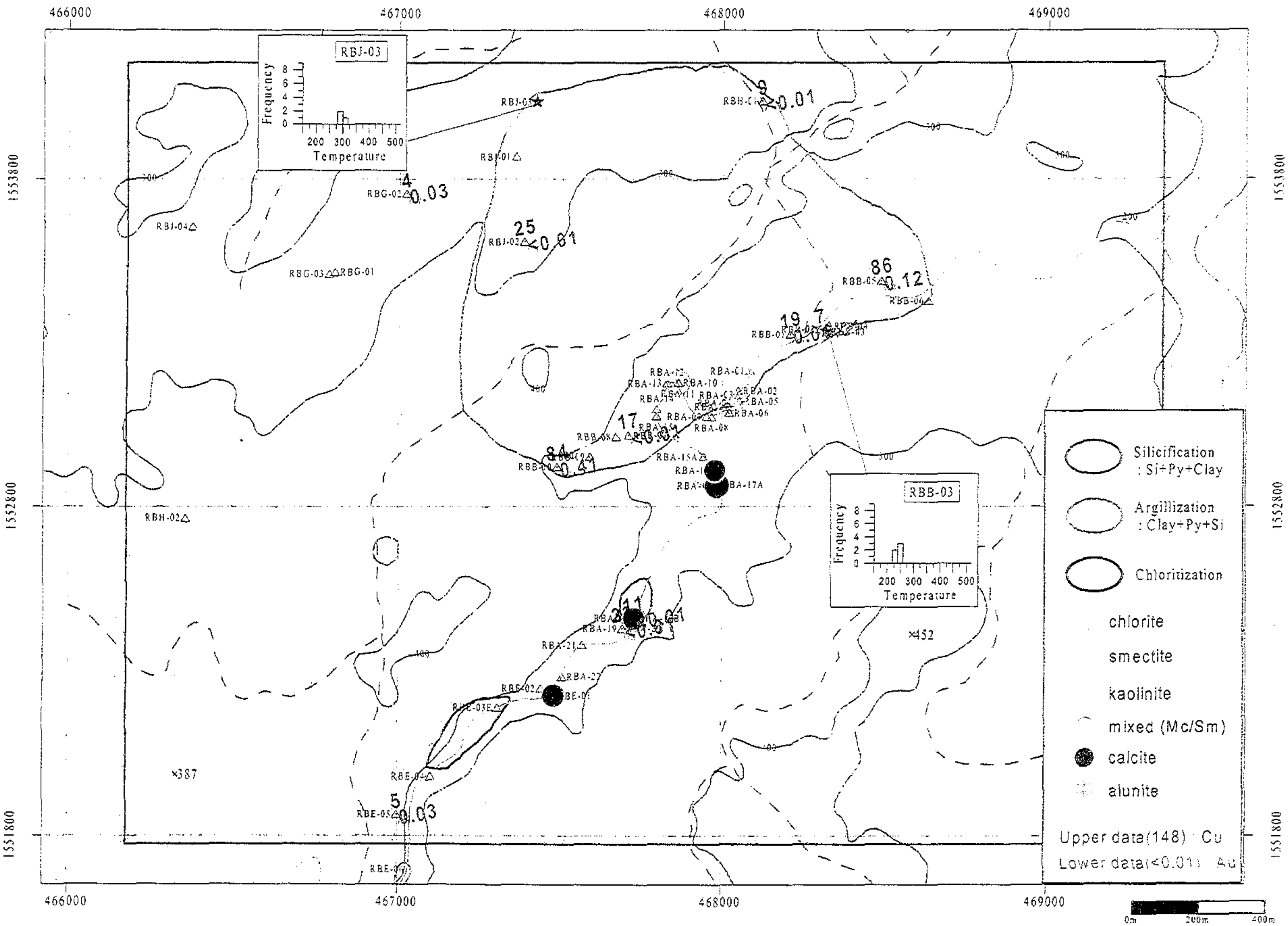


Fig.II-4-36 Ore Assay, XRD and Fluid Inclusion Result of the Binangkawan-Taktak Area.

being evidently brecciated in the further movement and a 20 to 30 cm quartz-pyrite vein were observed. As sulfied mineral, pyrite±arsenopyrite±Chalcopyrite (RBA-8, RBA-11) were observed.

Chloritization with pyrite dissemination was observed in both dacitic lava and pyroclastics in the area. The alteration type seems to be patches which occurred in the earlier alteration than the later argillization and quartz veinning. Calcite with chloritization of dark gray andesitic rocks was observed (RBA-17, RBA-17B, RBE-1). It was observed as the filling and in some portions of the groundmass and plagioclase phenocrysts. Relict chlorite remains in the argillization with clay-pyrite (RBA-10).

Compared to Magasawan-Bato Area, the area seems to be at deeper erosional level. Drussy quartz was observed in limited area. Alteration is not pervasive but patchy. Lava flows seem not to be hospitable hosts to the alteration. The presently limited outcrops of the underlying pyroclastics do not show special condition of alteraton and mineralization, but the presence of more favorable horizon beneath the lava flows is expected.

(4) Geochemical Survey on Soil

The correlative coefficients among main elements for geochemical survey are shown in TableII-4-5. For the stream sediments in Phase-II, the indicative elements of Au-Cu are Au, Ag, As, Cu, Hg, Mo, Pb, S, and Sb. Bi show high correlation with Cu. Twenty eight elements which are included above mentioned indicative elements were analysed. The indicative elements of Au are As and Sb. Ag, As, Bi, Co, Hg, Mo, Ni, Pb, Sc, Sn, and Sr show high correlation with Cu. Any correlation was not found between Au and Cu. The histogram and accumurated histogram distribution on probability are shown in Fig.II-4-37. The classification of histogram is 1/2 of standard deviation(σ). The threshold value of each element showing correlation is shown in Fig.II-4-37. In consideration of the detective elements in Phase-II, the distribution of Au, Ag, As, Cu, Mo, Pb, and Sb are shown (Fig.II-4-38 to II-4-44).

The distribution of anomaly of each element is mentioned below.

(Au) Anomalous samples seem to be concentrated along northeast trending fault along Binangkawan River and in the argillization zone of the northern side of faults. Some anomalous samples located also in chloritization zone with pyrite dissemination in the upstream of the southwest area. The maximum value is 0.3051ppm.

(Ag) Anomalous samples concentrate in argillization zone from Binangkawan River to Kimoy Creek. The maximum value is 0.2701ppm.

(As) Anomalous samples almost coincide with the distribution of Au. The maximum value is 1236ppm.

(Cu) Anomalous samples scatter on the ridge in west and south sides of area. The maximum value is 77.41ppm.

(Mo) Anomalous samples scatter on the ridge of west side and along northeast trending fault. The maximum value is 7.041ppm.

(Pb) Anomalous samples almost coincide with the distribution of Cu. The maximum value is 26.01ppm.

(Sb) Anomalous samples almost coincide with the distribution of Au. The maximum value is 14.7ppm.

Principal components values were calculated by using the correlative determinant from

TableII-4-5 Basic Statistics and Correlation Coefficient of Soil Samples in the Binangkawan-Taktak Area

Original Data Information		
	Number of Component	28
	Number of Sample	215

Result of Statistics (Logarithmic)

Elements	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
max_val	-0.5157	-0.5696	0.9031	3.0917	2.7482	-0.2518	-0.6576	1.9609	1.9542	1.8887	0.7566	0.5378	-0.9586	-0.1487	3.3263	0.8476	-2.0000	1.8621	2.9243	1.4150	-0.9586	1.1673	1.4579	-0.0458	2.0000	-0.6990	2.3345	1.7853
min_val	-3.3010	-2.3010	-2.3010	-1.3010	-1.0000	-2.3010	-2.3010	-1.3010	0.9542	-1.0000	0.0453	-2.3010	-2.3010	-1.6990	0.9542	-1.6021	-2.3010	-1.0000	1.6021	-1.0000	-2.3010	-1.6021	-1.3010	-1.0000	-1.0000	-2.3010	1.1761	0.0000
average	-2.7478	-1.7723	0.4321	0.2271	1.0586	-1.4564	-1.8771	0.4754	1.5221	1.0126	0.5284	-1.3204	-1.6629	-0.9278	2.1677	-0.4587	-2.2688	0.8281	2.3926	0.6623	-1.7023	-1.3614	0.6415	-0.5256	0.5095	-1.8112	1.8922	1.0903
std_dev	0.4752	0.4011	0.2520	0.9124	0.9839	0.5315	0.3051	0.7138	0.2020	0.6407	0.1122	0.5628	0.3626	0.3211	0.4436	0.5952	0.0930	0.7202	0.2559	0.6011	0.2045	0.5074	0.6219	0.2905	0.7374	0.4850	0.2249	0.3496

Cov_mat	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
Au	0.2258	0.0386	-0.0231	0.2248	0.0654	-0.0154	0.0101	-0.0357	-0.0276	-0.0062	-0.0167	0.0345	0.0566	-0.0399	-0.0268	0.0358	-0.0044	-0.0693	0.0343	-0.0079	0.0080	0.1841	-0.0497	-0.0361	0.0195	-0.0800	-0.0467	-0.0326
Ag	0.0386	0.1609	-0.0025	0.2069	0.1719	0.1005	0.0150	0.1579	-0.0075	0.1408	0.0060	0.1461	0.0089	0.0057	0.0223	0.1350	0.0072	0.1208	0.0302	0.1412	0.0107	0.0863	0.1216	0.0616	0.1663	0.0150	0.0059	0.0159
Al	-0.0231	-0.0025	0.0635	-0.0300	-0.0086	0.0258	-0.0026	0.0261	0.0180	0.0134	0.0107	0.0042	-0.0223	0.0298	0.0176	0.0008	0.0056	0.0350	-0.0004	0.0137	0.0085	-0.0308	0.0250	0.0180	0.0036	0.0390	0.0237	0.0177
As	0.2248	0.2069	-0.0300	0.8325	0.3131	0.2109	0.0095	0.2798	-0.0534	0.2923	-0.0110	0.3268	0.1175	-0.0678	-0.0103	0.3351	0.0033	0.1996	0.0851	0.3009	-0.0035	0.2988	0.2195	0.0790	0.3260	-0.1440	-0.0605	-0.0644
Ba	0.0654	0.1719	-0.0086	0.3131	0.9681	0.1694	0.0539	0.3094	-0.0268	0.2651	0.0074	0.2606	0.0509	0.0409	0.0798	0.2488	0.0245	0.2576	0.0704	0.2697	0.0156	0.1161	0.2684	0.1079	0.3825	0.0104	0.0068	0.0384
Bi	-0.0154	0.1005	0.0258	0.2109	0.1694	0.2825	-0.0065	0.2185	0.0109	0.2294	0.0233	0.1855	-0.0025	0.0104	-0.0097	0.2234	0.0071	0.1954	0.0087	0.2404	0.0097	0.0191	0.2312	0.1157	0.2416	0.0022	0.0339	-0.0241
Ca	0.0101	0.0150	-0.0026	0.0095	0.0539	-0.0065	0.0931	0.0300	-0.0063	0.0126	-0.0036	0.0136	0.0283	0.0326	0.0371	-0.0036	0.0043	-0.0076	0.0215	0.0051	0.0104	0.0121	-0.0167	-0.0016	0.0507	0.0016	-0.0077	0.0309
Co	-0.0357	0.1579	0.0261	0.2798	0.3094	0.2185	0.0300	0.5096	-0.0116	0.3264	0.0115	0.2461	0.0310	0.0642	0.1408	0.2654	0.0147	0.3427	0.0369	0.3304	-0.0189	0.0412	0.3129	0.1388	0.3389	0.0283	0.0279	0.0788
Cr	-0.0276	-0.0075	0.0180	-0.0534	-0.0268	0.0109	-0.0063	-0.0116	0.0408	-0.0099	0.0136	-0.0165	-0.0437	0.0159	-0.0038	-0.0207	0.0001	0.0131	-0.0092	-0.0093	0.0116	-0.0312	0.0031	0.0087	-0.0220	0.0424	0.0281	0.0062
Cu	-0.0062	0.1408	0.0134	0.2923	0.2651	0.2294	0.0126	0.3264	-0.0099	0.4105	0.0137	0.2622	0.0189	0.0026	0.0106	0.3069	0.0128	0.2902	0.0369	0.3273	-0.0087	0.0334	0.3027	0.1410	0.3302	-0.0337	0.0080	0.0042
Fe	-0.0167	0.0060	0.0107	-0.0110	0.0074	0.0233	-0.0036	0.0115	0.0136	0.0137	0.0126	0.0099	-0.0164	0.0069	0.0025	0.0100	0.0016	0.0176	0.0034	0.0134	0.0097	-0.0155	0.0190	0.0127	0.0060	0.0219	0.0176	0.0047
Hg	0.0345	0.1461	0.0042	0.3268	0.2606	0.1855	0.0136	0.2461	-0.0165	0.2622	0.0099	0.3168	0.0216	-0.0242	-0.0060	0.2700	0.0074	0.2144	0.0475	0.2669	0.0037	0.0915	0.2409	0.1082	0.2900	-0.0379	-0.0047	-0.0306
K	0.0566	0.0089	-0.0223	0.1175	0.0509	-0.0025	0.0283	0.0310	-0.0437	0.0189	-0.0164	0.0216	0.1315	0.0054	0.0281	0.0262	0.0044	-0.0350	0.0264	0.0061	-0.0116	0.0693	-0.0195	-0.0190	0.0398	-0.0754	-0.0381	-0.0083
Mg	-0.0399	0.0057	0.0298	-0.0678	0.0409	0.0104	0.0326	0.0642	0.0159	0.0026	0.0069	-0.0242	0.0054	0.1031	0.0846	-0.0333	0.0101	0.0210	0.0095	-0.0085	0.0054	-0.0480	0.0038	0.0101	0.0055	0.0498	0.0295	0.0685
Mn	-0.0258	0.0223	0.0176	-0.0103	0.0798	-0.0097	0.0371	0.1408	-0.0038	0.0106	0.0025	-0.0060	0.0281	0.0846	0.1968	-0.0323	0.0077	0.0525	0.0349	0.0001	0.0031	-0.0131	0.0018	-0.0035	0.0161	0.0433	0.0202	0.1021
Mo	0.0358	0.1350	0.0008	0.3351	0.2488	0.2234	-0.0036	0.2654	-0.0207	0.3069	0.0100	0.2700	0.0262	-0.0333	-0.0323	0.3542	0.0038	0.2546	0.0398	0.3057	0.0005	0.0784	0.2693	0.1218	0.3113	-0.0722	-0.0071	-0.0341
Na	-0.0044	0.0072	0.0056	0.0033	0.0245	0.0071	0.0043	0.0147	0.0001	0.0128	0.0016	0.0074	0.0044	0.0101	0.0077	0.0038	0.0087	0.0139	0.0011	0.0119	0.0003	-0.0030	0.0142	0.0081	0.0156	0.0139	0.0053	0.0077
Ni	-0.0693	0.1208	0.0350	0.1996	0.2576	0.1954	-0.0076	0.3427	0.0131	0.2902	0.0176	0.2144	-0.0350	0.0210	0.0525	0.2546	0.0139	0.5187	0.0055	0.3056	-0.0203	-0.0235	0.3125	0.1492	0.3167	0.0711	0.0425	0.0393
P	0.0343	0.0302	-0.0004	0.0851	0.0704	0.0087	0.0215	0.0369	-0.0092	0.0369	0.0034	0.0475	0.0264	0.0095	0.0349	0.0398	0.0011	0.0055	0.0655	0.0165	0.0172	0.0393	-0.0021	-0.0047	0.0411	-0.0436	-0.0158	0.0095
Pb	-0.0079	0.1412	0.0137	0.3009	0.2697	0.2404	0.0051	0.3304	-0.0093	0.3273	0.0134	0.2669	0.0061	-0.0085	0.0001	0.3057	0.0119	0.3056	0.0165	0.3613	-0.0111	0.0503	0.3216	0.1476	0.3426	0.0020	0.0181	-0.0160
S	0.0080	0.0107	0.0085	-0.0035	0.0156	0.0097	0.0104	-0.0189	0.0116	-0.0087	0.0097	0.0037	-0.0116	0.0054	0.0031	0.0005	0.0003	-0.0203	0.0172	-0.0111	0.0418	0.0100	-0.0126	-0.0050	-0.0015	0.0159	0.0107	0.0013
Sb	0.1841	0.0863	-0.0308	0.2988	0.1161	0.0191	0.0121	0.0412	-0.0312	0.0334	-0.0155	0.0915	0.0693	-0.0480	-0.0131	0.0784	-0.0030	-0.0235	0.0393	0.0503	0.0100	0.2574	0.0038	-0.0206	0.0695	-0.0713	-0.0506	-0.0348
Sc	-0.0497	0.1216	0.0250	0.2195	0.2684	0.2312	-0.0167	0.3129	0.0031	0.3027	0.0190	0.2409	-0.0195	0.0038	0.0018	0.2693	0.0142	0.3125	-0.0021	0.3216	-0.0126	0.0038	0.3867	0.1495	0.3071	0.0349	0.0379	-0.0082
Sn	-0.0361	0.0616	0.0180	0.0790	0.1079	0.1157	-0.0016	0.1388	0.0087	0.1410	0.0127	0.1082	-0.0190	0.0101	-0.0035	0.1218	0.0081	0.1492	-0.0047	0.1476	-0.0050	-0.0206	0.1495	0.0844	0.1401	0.0373	0.0284	0.0046
Sr	0.0195	0.1663	0.0036	0.3260	0.3825	0.2416	0.0507	0.3389	-0.0220	0.3302	0.0060	0.2900	0.0398	0.0055	0.0161	0.3113	0.0156	0.3167	0.0411	0.3426	-0.0015	0.0695	0.3071	0.1401	0.5438	0.0022	0.0027	0.0047
Ti	-0.0800	0.0150	0.0390	-0.1440	0.0104	0.0022	0.0016	0.0283	0.0424	-0.0337	0.0219	-0.0379	-0.0754	0.0498	0.0433	-0.0722	0.0139	0.0711	-0.0436	0.0020	0.0159	-0.0713	0.0349	0.0373	0.0022	0.2352	0.0801	0.0503
V	-0.0467	0.0059	0.0237	-0.0605	0.0068	0.0339	-0.0077	0.0279	0.0281	0.0080	0.0176	-0.0047	-0.0381	0.0295	0.0202	-0.0071	0.0053	0.0425	-0.0158	0.0181	0.0107	-0.0506	0.0379	0.0284	0.0027	0.0801	0.0506	0.0234
Zn	-0.0326	0.0159	0.0177	-0.0644	0.0384	-0.0241	0.0309	0.0788	0.0062	0.0042	0.0047	-0.0306	-0.0083	0.0685	0.1021	-0.0341	0.0077	0.0393	0.0095	-0.0160	0.0013	-0.0348	-0.0082	0.0046	0.0047	0.0503	0.0234	0.1222

Cor_mat	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
Au	1.0000	0.2027	-0.1926	0.5166	0.1399	-0.0610	0.0698	-0.1052	-0.2876	-0.0202	-0.3131	0.1289	0.3287	-0.2613	-0.1272	0.1266	-0.1002	-0.2026	0.2822	-0.0275	0.0823	0.7635	-0.1682	-0.2616	0.0558	-0.3472	-0.4369	-0.1963
Ag	0.2027	1.0000	-0.0251	0.5653	0.4355	0.4716	0.1227	0.5517	-0.0923	0.5481	0.1329	0.6473	0.0615	0.0443	0.1254	0.5656	0.1920	0.4183	0.2946	0.5856	0.1310	0.4242	0.4874	0.5283	0.5621	0.0769	0.0653	0.1131
Al	-0.1926	-0.0251	1.0000	-0.1305	-0.0347	0.1924	-0.0343	0.1449	0.3530	0.0828	0.3796	0.0298	-0.2439	0.3680	0.1572	0.0054	0.2396	0.1929	-0.0059	0.0901	0.1649	-0.2405	0.1595	0.2460	0.0196	0.3191	0.4177	0.2003
As	0.5186	0.5653	-0.1305	1.0000	0.3488	0.4349	0.0342	0.4296	-0.2899	0.4999	-0.1075	0.6363	0.3552	-0.2314	-0.0255	0.6170	0.0392	0.3037	0.3646	0.5487	-0.0185	0.6455	0.3869	0.2982	0.4845	-0.3254	-0.2951	-0.2019
Ba	0.1399	0.4355	-0.0347	0.3488	1.0000	0.3238	0.1797	0.4405	-0.1349	0.4205	0.0668	0.4707	0.1427	0.1294	0.1828	0.4249	0.2678	0.3635	0.2795	0.4561	0.0777	0.2326	0.4387	0.3775	0.5271	0.0218	0.0309	0.1117
Bi	-0.0610	0.4716	0.1924	0.4349	0.3238	1.0000	-0.0399	0.5758	0.1012	0.6734	0.3910	0.6199	-0.0130	0.0610	-0.0410	0.7061	0.1445	0.5103	0.0637	0.7524	0.0896	0.0706	0.6995	0.7490	0.6165	0.0086	0.2840	-0.1299
Ca	0.0698	0.1227	-0.0343	0.0342	0.1797	-0.0399	1.0000	0.1378	-0.1023	0.0645	-0.1056	0.0795	0.2559	0.3330	0.2742	-0.0199	0.1520	-0.0345	0.2751	0.0280	0.1669	0.0785	-0.0880	-0.0183	0.2252	0.0109	-0.1121	0.2895
Co	-0.1052	0.5517	0.1449	0.4296	0.4405	0.5758	0.1378	1.0000	-0.0808	0.7137	0.1434	0.6125	0.1197	0.2800	0.4445	0.6247	0.2211	0.6666	0.2020	0.7700	-0.1297	0.1138	0.7048	0.6694	0.6439	0.0818	0.1737	0.3158
Cr	-0.2876	-0.0923	0.3530	-0.2899	-0.1349	0.1012	-0.1023	-0.0808	1.0000	-0.0764	0.6001	-0.1454	-0.5966	0.2453	-0.0424	-0.1723	0.0030	0.0902	-0.1782	-0.0768	0.2817	-0.3043	0.0244	0.1483	-0.1477	0.4326	0.6196	0.0882
Cu	-0.0202	0.5481	0.0828	0.4999	0.4205	0.6734	0.0645	0.7137	-0.0764	1.0000	0.1910	0.7270	0.0813	0.0127	0.0371	0.8047	0.2145	0.6290	0.2252	0.8498	-0.0663	0.1027	0.7596	0.7574	0.6988	-0.1085	0.0555	0.0186
Fe	-0.3131	0.1329	0.3796	-0.1075	0.0668	0.3910	-0.1056	0.1434	0.6001	0.1910	1.0000	0.1571	-0.4038	0.1902	0.0495	0.1497	0.1575	0.2174	0.1172	0.1990	0.4210	-0.2727	0.2717	0.3895	0.0724	0.4016	0.6994	0.1204
Hg	0.1289	0.6473	0.0298	0.6363	0.4707	0.6199	0.0795	0.6125	-0.1454	0.7270	0.1571	1.0000	0.1057	-0.1338	-0.0242	0.8061	0.1407	0.5289	0.3295	0.7889	0.0318	0.3205	0.6883	0.6620	0.6987	-0.1388	-0.0372	-0.1554
K	0.3287	0.0615	-0.2439	0.3552	0.1427	-0.0130	0.2559	0.1197	-0.5966	0.0813	-0.4038	0.1057	1.0000	0.0466	0.1749	0.1215	0.1296	-0.1340	0.2844	0.0282	-0.1570	0.3769	-0.0866	-0.1807	0.1489	-0.4286	-0.4667	-0.0652
Mg	-0.2613	0.0443	0.3680	-0.2314	0.1294	0.0610	0.3330	0.2800	0.2453	0.0127	0.1902	-0.1338	0.0466	1.0000	0.5939	-0.1740	0.3373	0.0909	0.1150	-0.0438	0.0827	-0.2944	0.0188	0.1080	0.0234	0.3195	0.4089	0.6102
Mn	-0.1272	0.1254	0.1572	-0.0255	0.1828	-0.0410	0.2742	0.4445	-0.0424	0.0371	0.0495	-0.0242	0.1749	0.5939	1.0000	-0.1223	0.1856	0.1643	0.3076	0.0004	0.0346	-0.0581	0.0065	-0.0272	0.0491	0.2011	0.2029	0.6586
Mo	0.1266	0.5656	0.0054	0.6170	0.4249	0.7061	-0.0199	0.6247	-0.1723	0.8047	0.1497	0.8061	0.1215	-0.1740	-0.1223	1.0000	0.0680	0.5940	0.2610	0.8544	0.0038	0.2596	0.7276	0.7042	0.7093	-0.2501	-0.0527	-0.1640
Na	-0.1002	0.1920	0.2396	0.0392	0.2678	0.1445	0.1520	0.2211	0.0030	0.2145	0.1575	0.1407	0.1296	0.3373	0.1856	0.0680	1.0000	0.2076	0.0472	0.2128	0.0149	-0.0639	0.2449	0.2997	0.2280	0.3075	0.2552	0.2366
Ni	-0.2026	0.4183	0.1929	0.3037	0.3635	0.5103	-0.0345	0.6666	0.0902	0.6290	0.2174	0.5289	-0.1340	0.0909	0.1643	0.5940	0.2076	1.0000	0.0301	0.7058	-0.1381	-0.0644	0.6977	0.7130	0.5964	0.2037	0.2625	0.1562
P	0.2822	0.2946	-0.0059	0.3646	0.2795	0.0637	0.2751	0.2020	-0.1782	0.2252	0.1172	0.3295	0.2844	0.1150	0.3076	0.2610	0.0472	0.0301	1.0000	0.1071	0.3280	0.3029	-0.0133	-0.0635	0.2180	-0.3514	-0.2743	0.1066
Pb	-0.0275	0.5856	0.0901	0.5487	0.4561	0.7524	0.0280	0.7700	-0.0768	0.8498	0.1990	0.7889	0.0282	-0.0438	0.0004	0.8544	0.2128	0.7058	0.1071	1.0000	-0.0907	0.1650	0.8603	0.8450	0.7729	0.0067	0.1343	-0.0763
S	0.0823	0.1310	0.1649	-0.0185	0.0777	0.0896	0.1669	-0.1297	0.2817	-0.0663	0.4210	0.0318	-0.1570	0.0827	0.0346	0.0038	0.0149	-0.1381	0.3280	-0.0907	1.0000	0.0960	-0.0994	-0.0841	-0.0100	0.1603	0.2320	0.0179
Sb	0.7635	0.4242	-0.2405	0.6455	0.2326	0.0706	0.0785	0.1138	-0.3043	0.1027	-0.2727	0.3205	0.3769	-0.2944	-0.0581	0.2596	-0.0639	-0.0644	0.3029	0.1650	0.0960	1.0000	0.0121	-0.1398	0.1857	-0.2896	-0.4439	-0.1963
Sc	-0.1682	0.4874	0.1595	0.3869	0.4387	0.6995	-0.0880	0.7048	0.0244	0.7596	0.2717	0.6883	-0.0866	0.0188	0.0065	0.7276	0.2449	0.6977	-0.0133	0.8603	-0.0994	0.0121	1.0000	0.8273	0.6697	0.1158	0.2707	-0.0377
Sn	-0.2616	0.5283	0.2460	0.2982	0.3775	0.7490	-0.0183	0.6694	0.1483	0.7574	0.3895	0.6620	-0.1807	0.1080	-0.0272	0.7042	0.2997	0.7130	-0.0635	0.8450	-0.0841	-0.1398	0.8273	1.0000	0.6541	0.2645	0.4353	0.0453
Sr	0.0558	0.5621	0.0196	0.4845	0.5271	0.6165	0.2252	0.6439	-0.1477	0.6988	0.0724	0.6987	0.1489	0.0234	0.0491	0.7093	0.2280	0.5964	0.2180	0.7729	-0.0100	0.1857	0.6697	0.6541	1.0000	0.0062	0.0163	0.0182
Ti	-0.3472	0.0769	0.3191	-0.3254	0.0218	0.0086	0.0109	0.0818	0.4326	-0.1085	0.4016	-0.1388	-0.4286	0.3195	0.2011	-0.2501	0.3075	0.2037	-0.3514	0.0067	0.1603	-0.2896	0.1158	0.2645	0.0062	1.0000	0.7345	0.2968
V	-0.4369	0.0653	0.4177	-0.2951	0.0309	0.2840	-0.1121	0.1737	0.6196	0.0555	0.6994	-0.0372	-0.4667	0.4089	0.2029	-0.0527	0.2552	0.2625	-0.2743	0.1343	0.2320	-0.4439	0.2707	0.4353	0.0163	0.7345	1.0000	0.2971
Zn	-0.1963	0.1131	0.2003	-0.2019	0.1117	-0.1299	0.2895	0.3158	0.0882	0.0186	0.1204	-0.1554	-0.0652	0.6102	0.6586	-0.1640	0.2366	0.1562	0.1066	-0.0763	0.0179	-0.1963	-0.0377	0.0453	0.0182	0.2968	0.2971	1.0000

TableII-4-6 Principal Component Analysis of Soil Samples in the Binangkawan-Taktak Area

Result of PCA

No.	Eig_value	Eig_pct	Eig_sum
Z-01	8.6927	31.0453	31.0453
Z-02	5.1162	18.2721	49.3175
Z-03	2.9200	10.4285	59.7460
Z-04	*1.9868*	*7.0959*	*66.8419*
Z-05	1.1735	4.1910	71.0328
Z-06	1.0182	3.6364	74.6692
Z-07	0.9379	3.3497	78.0190
Z-08	0.7416	2.6486	80.6676
Z-09	0.6543	2.3368	83.0044
Z-10	0.5778	2.0637	85.0682

Fact_Id	Z-01	Z-02	Z-03	Z-04	Z-05	Z-06	Z-07	Z-08	Z-09	Z-10
Pb	**0.9413**	0.0177	-0.1530	-0.1079	-0.0066	0.0120	-0.0100	0.0612	0.0182	-0.0110
Cu	**0.8774**	0.0422	-0.0564	-0.0997	-0.1669	0.0213	0.0216	0.0257	-0.0261	-0.0628
Mo	**0.8710**	0.2319	-0.1955	0.0279	-0.1736	-0.0020	0.0190	0.0050	-0.0078	-0.0142
Sc	**0.8625**	-0.1574	-0.2096	-0.1599	0.0246	0.0109	0.0188	-0.0470	-0.0041	0.0572
Sn	**0.8542**	-0.3298	-0.2133	-0.1298	0.0322	0.0802	-0.0218	0.0580	0.0252	-0.0403
Hg	**0.8523**	0.2164	-0.0831	0.1140	-0.0683	0.0229	-0.0373	-0.0126	-0.0587	-0.0997
Sr	**0.8287**	0.1015	0.0603	-0.0673	0.0107	0.1548	-0.1874	0.0992	-0.0759	0.0484
Co	**0.8208**	-0.1035	0.2686	-0.2205	-0.0369	-0.2424	0.0328	0.0386	0.0770	0.0070
Bi	***0.7887***	*-0.1166*	*-0.2136*	*0.1043*	*-0.1181*	*0.0829*	*0.1324*	*0.1226*	*0.2884*	*0.1547*
Ni	**0.7441**	-0.2396	-0.0596	-0.2232	0.0266	-0.1861	-0.0349	-0.0180	-0.2149	-0.0367
Ag	**0.7086**	0.1269	0.1569	0.2357	0.2551	-0.1572	-0.1564	-0.0140	0.0684	-0.2595
As	**0.6121**	**0.5581**	0.0290	0.2064	0.1434	-0.1415	0.1700	0.0549	0.0784	-0.0278
Ba	**0.5717**	0.0931	0.2719	0.0727	0.1687	0.1423	-0.2358	-0.3568	-0.2380	0.5102
Sb	0.2107	**0.6878**	0.1362	0.3848	0.3911	-0.1790	0.0779	0.0985	0.0409	0.0200
Au	0.0168	**0.6755**	0.1245	0.4023	0.3459	-0.1129	0.1639	0.1565	-0.0816	0.1408
K	0.0725	**0.5920**	0.4302	-0.1968	-0.0377	0.2804	0.2566	-0.0302	0.3692	0.0815
Fe	0.2652	-0.6389	-0.1390	0.4960	-0.1854	0.0218	0.0607	-0.1749	0.1670	-0.0225
Cr	-0.0591	-0.6814	-0.2173	0.3987	-0.0112	-0.1243	-0.0208	0.1772	-0.0358	0.1670
Ti	0.0265	-0.7370	0.0508	0.0712	0.5075	0.0215	-0.1611	0.0146	0.0438	-0.1032
V	0.1697	-0.8671	-0.0574	0.1706	0.1753	-0.0219	0.0152	-0.0452	0.2269	0.0680
Mn	0.1105	-0.2540	0.7837	-0.1200	-0.0683	-0.3403	0.0666	-0.1198	0.1218	0.0175
Zn	0.0359	-0.4250	0.6882	-0.1507	0.0304	-0.2950	-0.0806	0.0012	-0.0849	-0.1095
Mg	0.0627	-0.5241	0.6597	-0.0743	-0.0652	0.0433	0.1500	0.1425	0.1077	0.2008
Ca	0.0856	0.0625	0.5991	0.0532	-0.1145	0.3624	-0.4087	0.4937	-0.0403	-0.0343
P	0.2479	0.3157	0.4819	0.4323	-0.4464	-0.0342	0.0510	-0.2416	-0.1596	-0.1312
S	-0.0014	-0.1685	0.1292	0.7977	-0.1575	0.1639	-0.1698	-0.0597	0.0573	-0.0653
Na	0.2836	-0.2645	0.3263	-0.0749	0.3617	0.5595	0.2654	-0.2514	-0.0939	-0.2372
Al	0.1361	-0.5316	0.0748	0.1726	-0.0648	0.0627	0.5826	0.2670	-0.3750	0.0231

Eig_vec	Z-01	Z-02	Z-03	Z-04	Z-05	Z-06	Z-07	Z-08	Z-09	Z-10
Pb	0.3193	0.0078	-0.0896	-0.0765	-0.0061	0.0119	-0.0103	0.0710	0.0225	-0.0144
Cu	0.2976	0.0187	-0.0330	-0.0707	-0.1541	0.0212	0.0223	0.0298	-0.0323	-0.0826
Mo	0.2954	0.1025	-0.1144	0.0198	-0.1603	-0.0020	0.0196	0.0058	-0.0097	-0.0187
Sc	0.2925	-0.0696	-0.1227	-0.1134	0.0227	0.0108	0.0194	-0.0545	-0.0051	0.0753
Sn	0.2897	-0.1458	-0.1248	-0.0921	0.0297	0.0795	-0.0225	0.0673	0.0311	-0.0530
Hg	0.2891	0.0957	-0.0486	0.0809	-0.0630	0.0227	-0.0385	-0.0146	-0.0726	-0.1312
Sr	0.2811	0.0449	0.0353	-0.0478	0.0099	0.1534	-0.1935	0.1151	-0.0939	0.0636
Co	0.2784	-0.0457	0.1572	-0.1564	-0.0341	-0.2403	0.0338	0.0449	0.0952	0.0092
Bi	0.2675	-0.0516	-0.1250	0.0740	-0.1090	0.0822	0.1367	0.1423	0.3565	0.2035
Ni	0.2524	-0.1059	-0.0349	-0.1584	0.0245	-0.1844	-0.0360	-0.0209	-0.2656	-0.0483
Ag	0.2403	0.0561	0.0918	0.1672	0.2355	-0.1558	-0.1615	-0.0163	0.0845	-0.3414
As	0.2076	0.2467	0.0170	0.1464	0.1324	-0.1402	0.1755	0.0638	0.0969	-0.0366
Ba	0.1939	0.0412	0.1591	0.0516	0.1558	0.1410	-0.2435	-0.4143	-0.2942	0.6712
Sb	0.0715	0.3041	0.0797	0.2730	0.3610	-0.1774	0.0804	0.1144	0.0506	0.0263
Au	0.0057	0.2987	0.0729	0.2854	0.3193	-0.1119	0.1693	0.1818	-0.1009	0.1852
K	0.0246	0.2617	0.2518	-0.1396	-0.0348	0.2779	0.2649	-0.0351	0.4564	0.1072
Fe	0.0899	-0.2825	-0.0813	0.3519	-0.1712	0.0216	0.0627	-0.2031	0.2064	-0.0297
Cr	-0.0200	-0.3013	-0.1271	0.2828	-0.0103	-0.1232	-0.0215	0.2058	-0.0443	0.2197
Ti	0.0090	-0.3259	0.0297	0.0505	0.4685	0.0213	-0.1663	0.0170	0.0542	-0.1358
V	0.0575	-0.3833	-0.0336	0.1211	0.1618	-0.0217	0.0157	-0.0525	0.2806	0.0895
Mn	0.0375	-0.1123	0.4586	-0.0851	-0.0631	-0.3372	0.0687	-0.1391	0.1506	0.0230
Zn	0.0122	-0.1879	0.4027	-0.1069	0.0281	-0.2924	-0.0832	0.0015	-0.1050	-0.1440
Mg	0.0213	-0.2317	0.3861	-0.0527	-0.0602	0.0429	0.1549	0.1655	0.1332	0.2642
Ca	0.0290	0.0276	0.3506	0.0377	-0.1057	0.3591	-0.4220	0.5733	-0.0499	-0.0451
P	0.0841	0.1396	0.2820	0.3067	-0.4121	-0.0339	0.0526	-0.2806	-0.1973	-0.1726
S	-0.0005	-0.0745	0.0756	0.5659	-0.1454	0.1624	-0.1753	-0.0694	0.0709	-0.0858
Na	0.0962	-0.1169	0.1910	-0.0531	0.3339	0.5545	0.2741	-0.2919	-0.1160	-0.3121
Al	0.0461	-0.2350	0.0437	0.1225	-0.0598	0.0621	0.6016	0.3101	-0.4636	0.0304

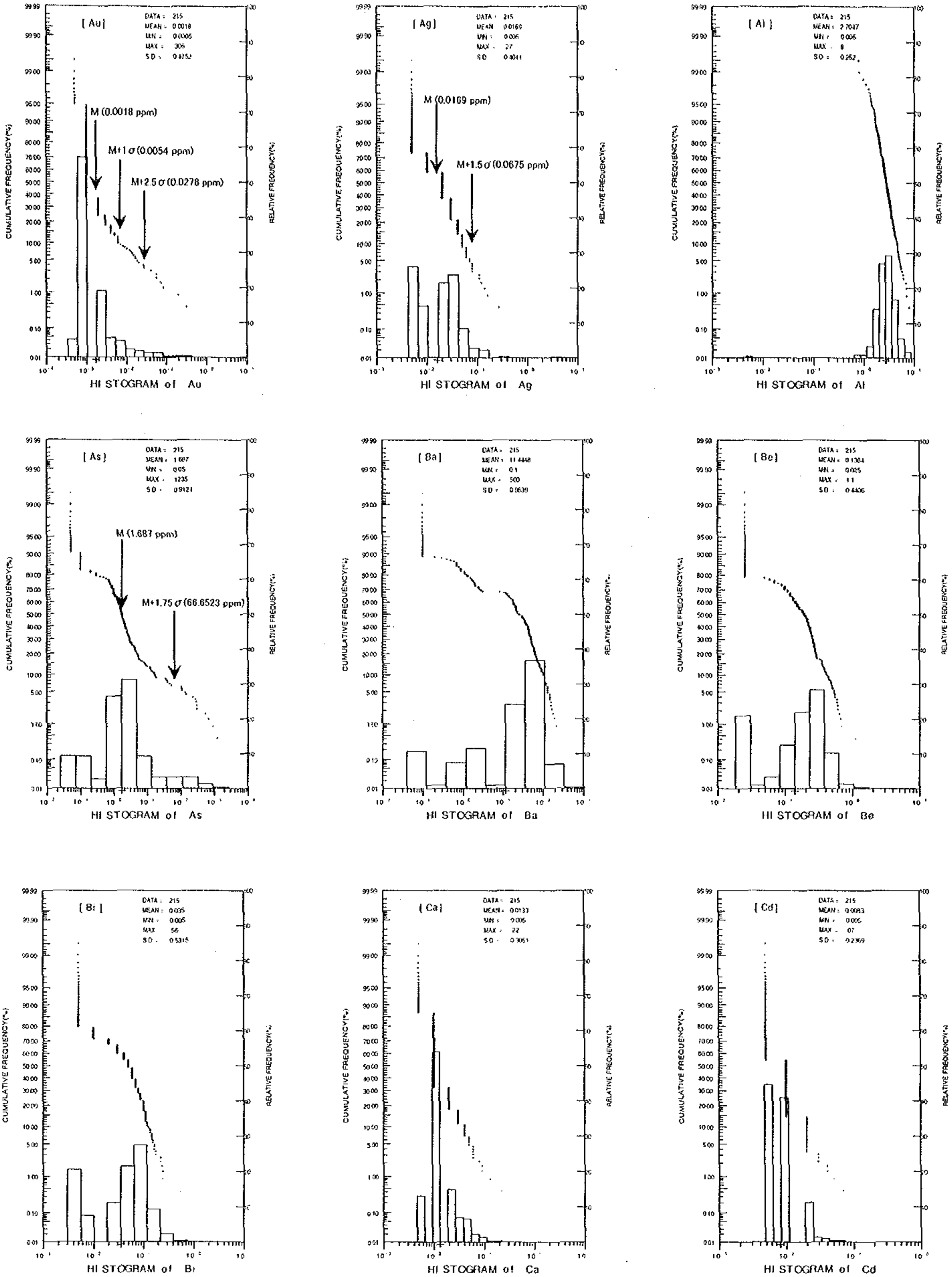


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (1)

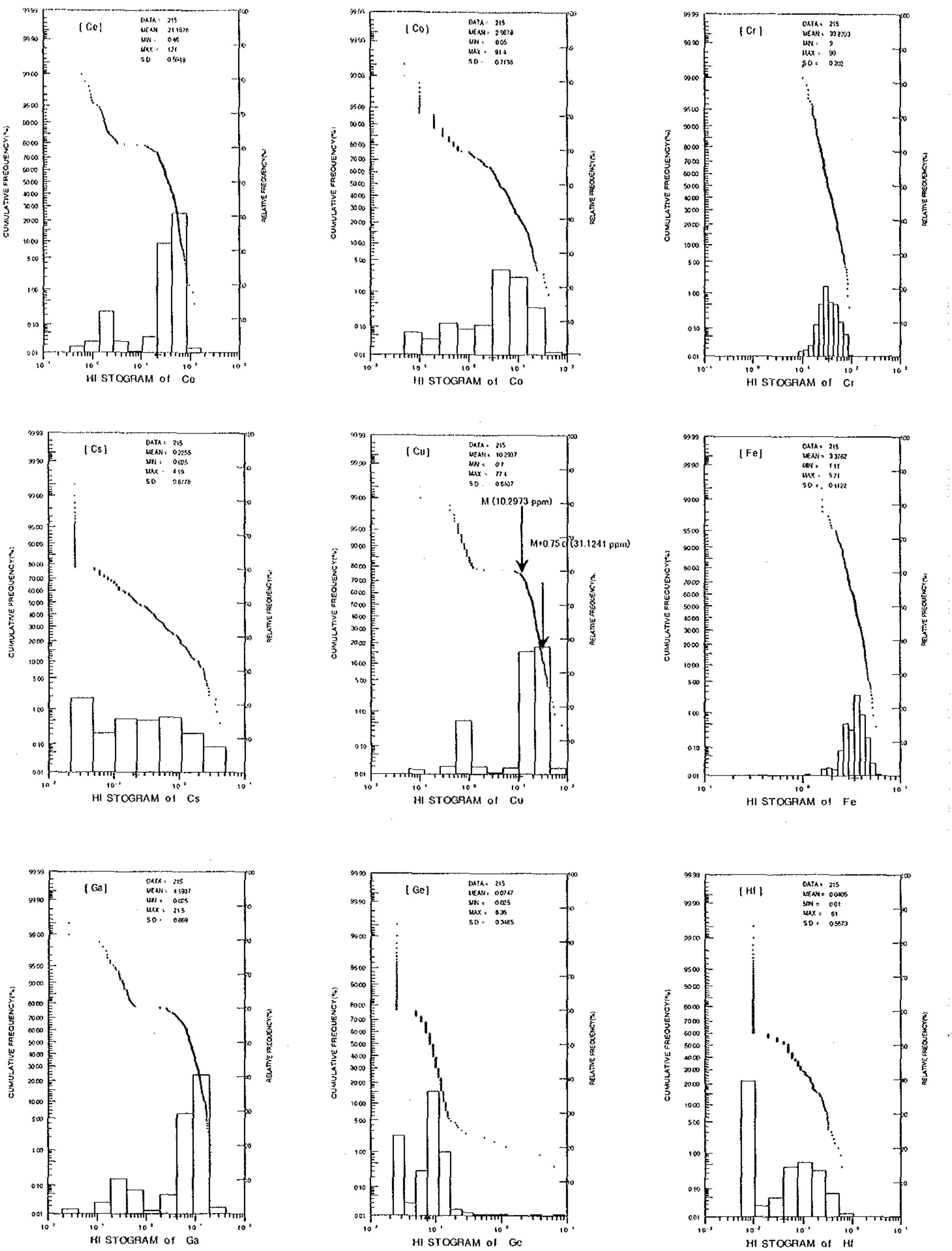


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (2)

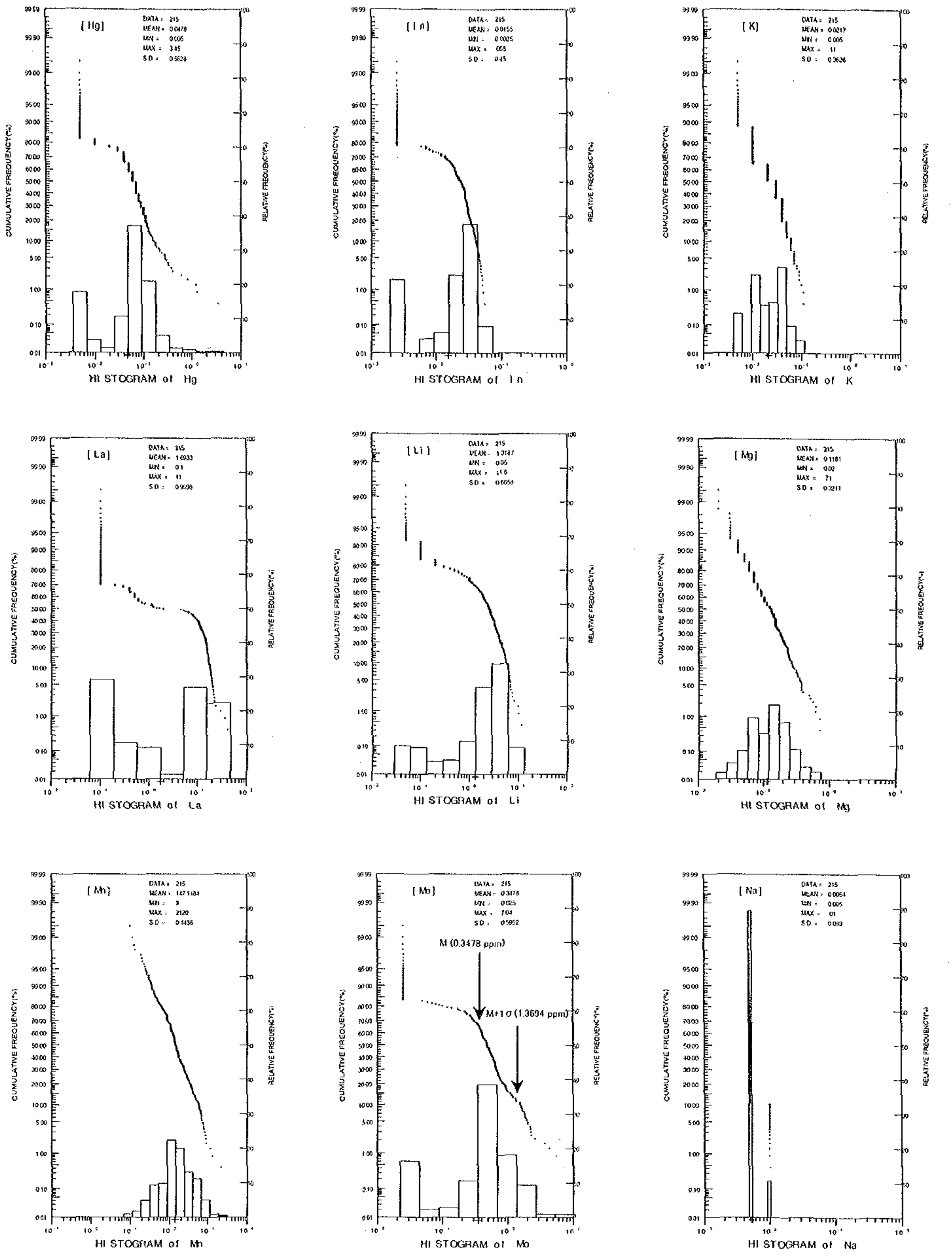


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (3)

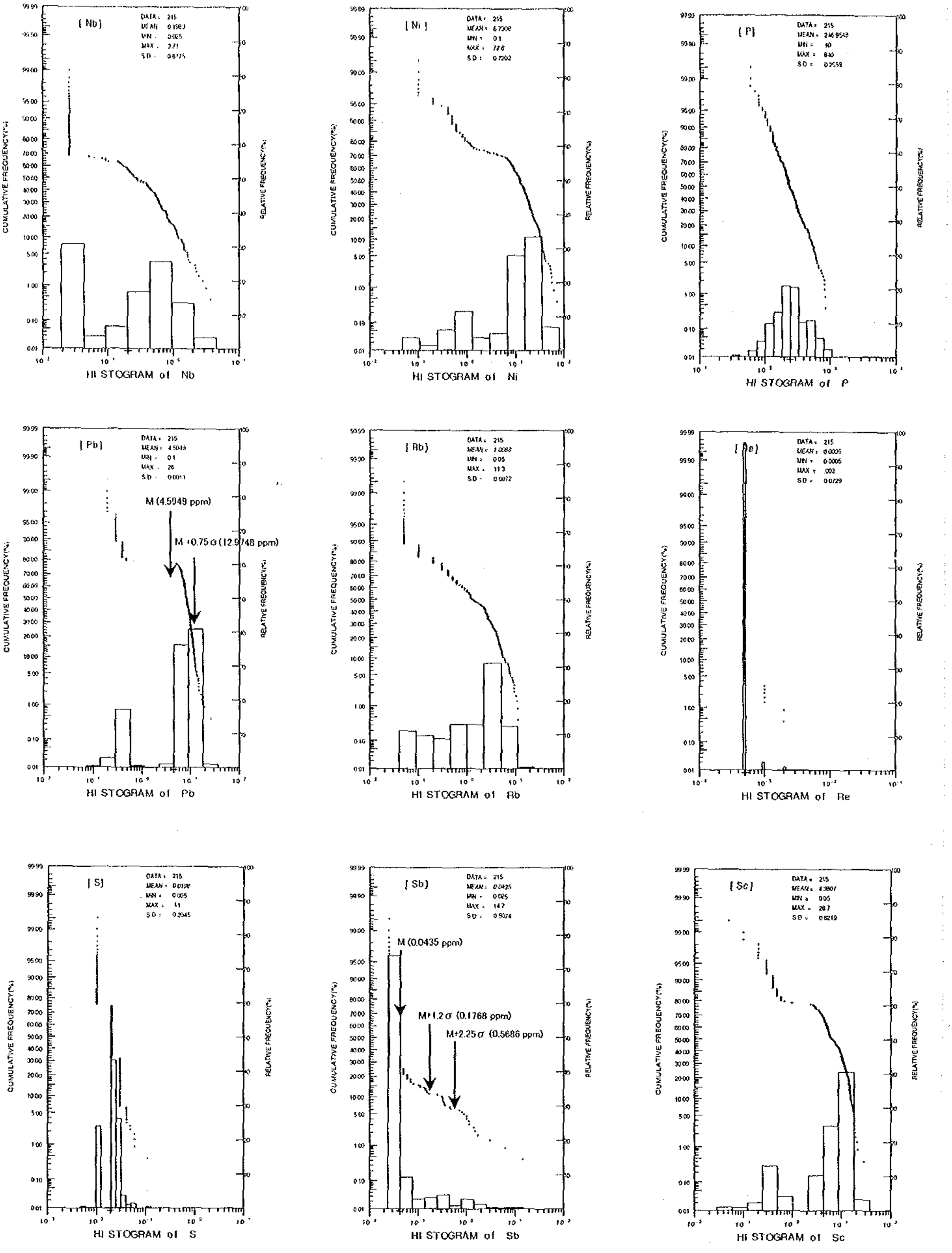


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (4)

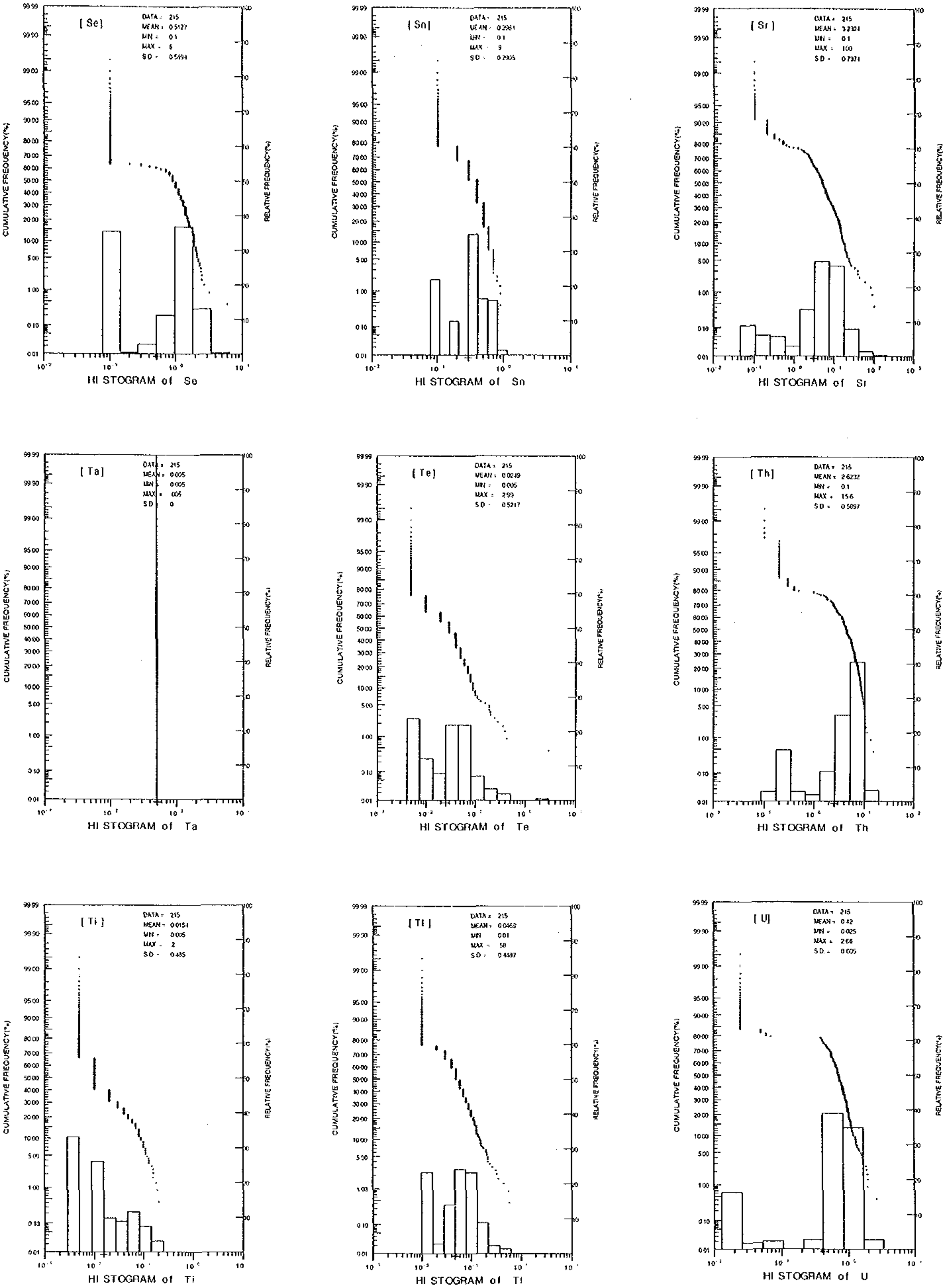


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (5)

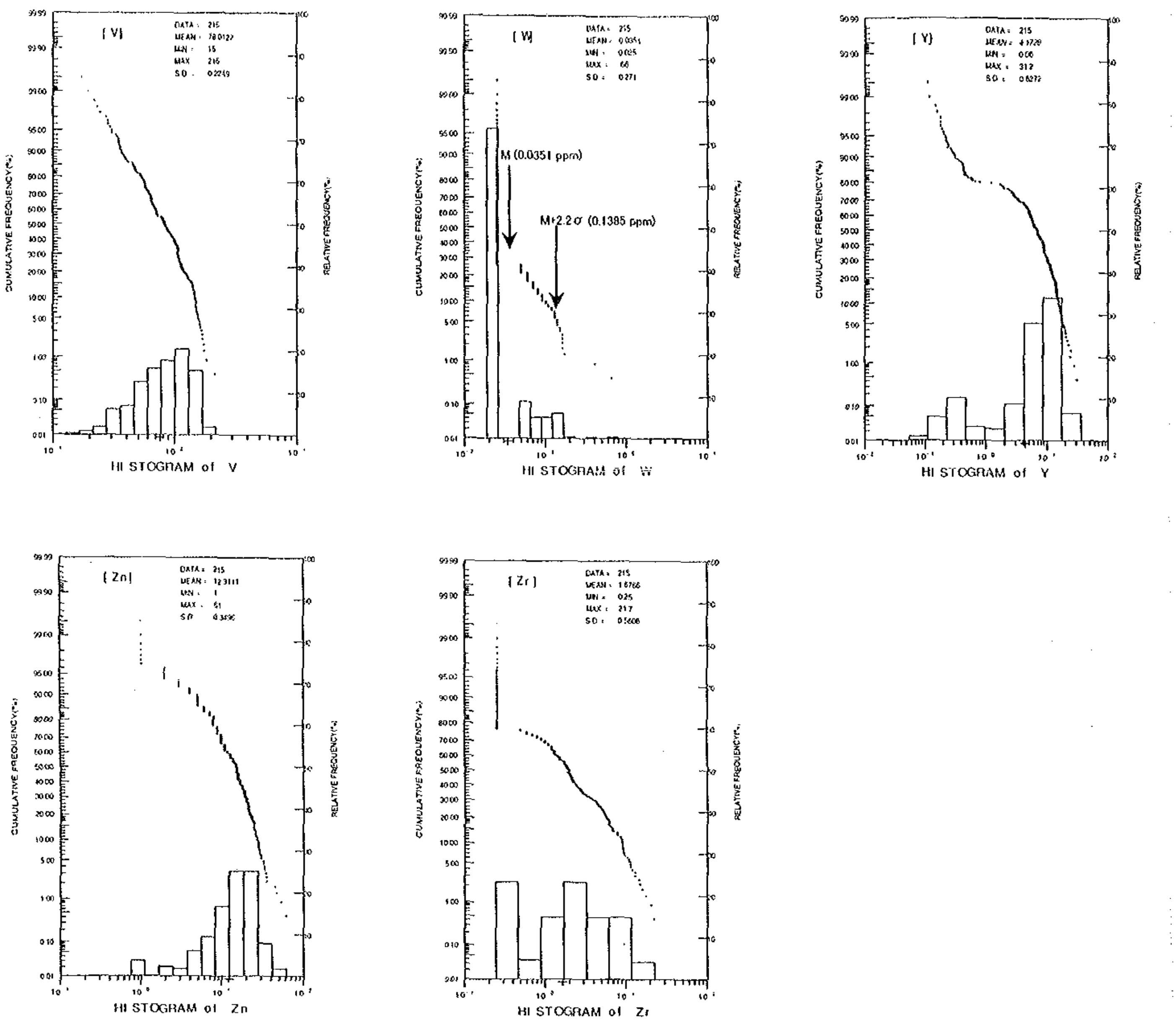


Fig. II-4-37. Probability Plot of Soil Samples in Binangkawan-Taktak Area (6)

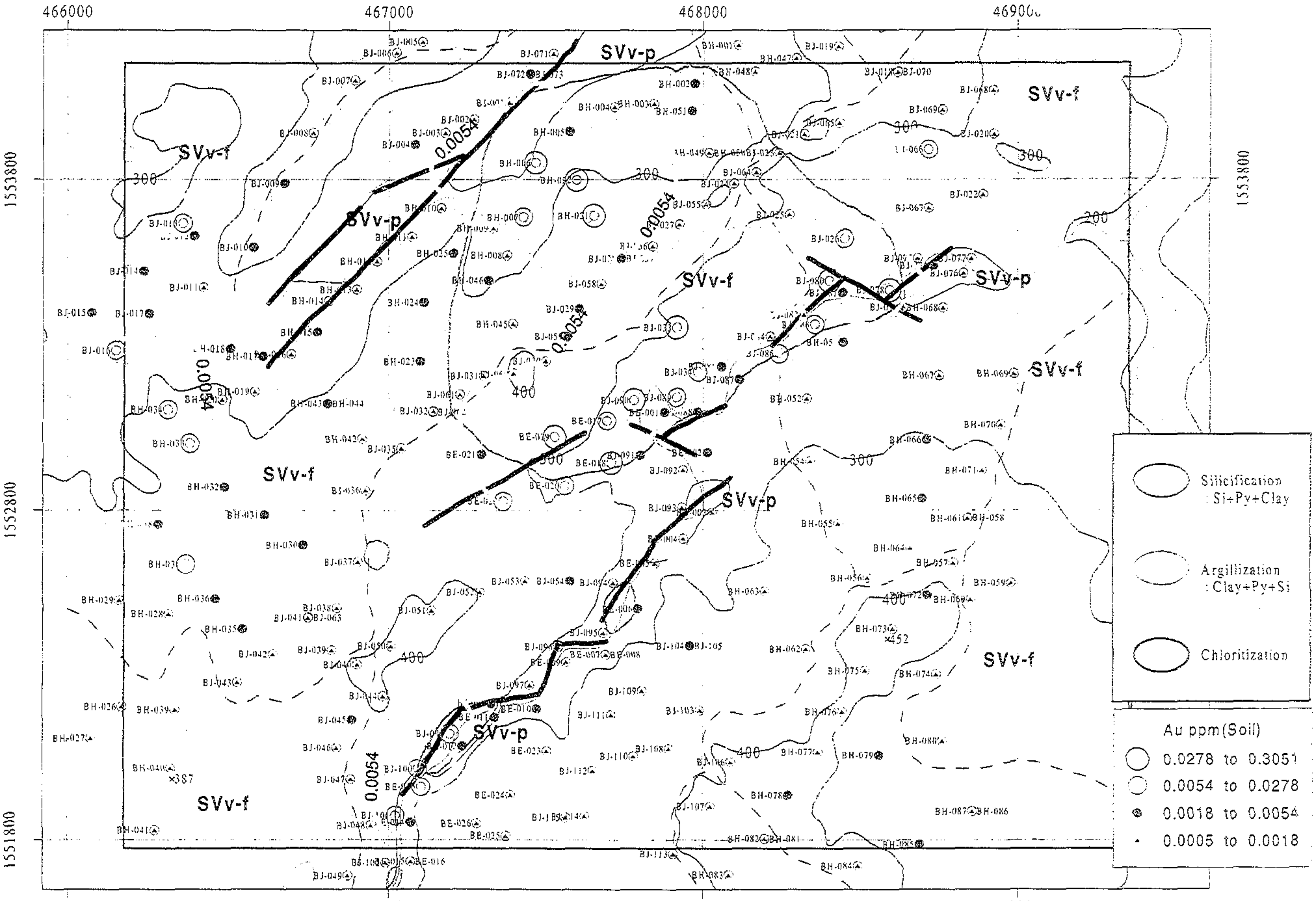


Fig.II-4-38 Au Content of Soil Samples in the Binangkawan-Taktak Area.

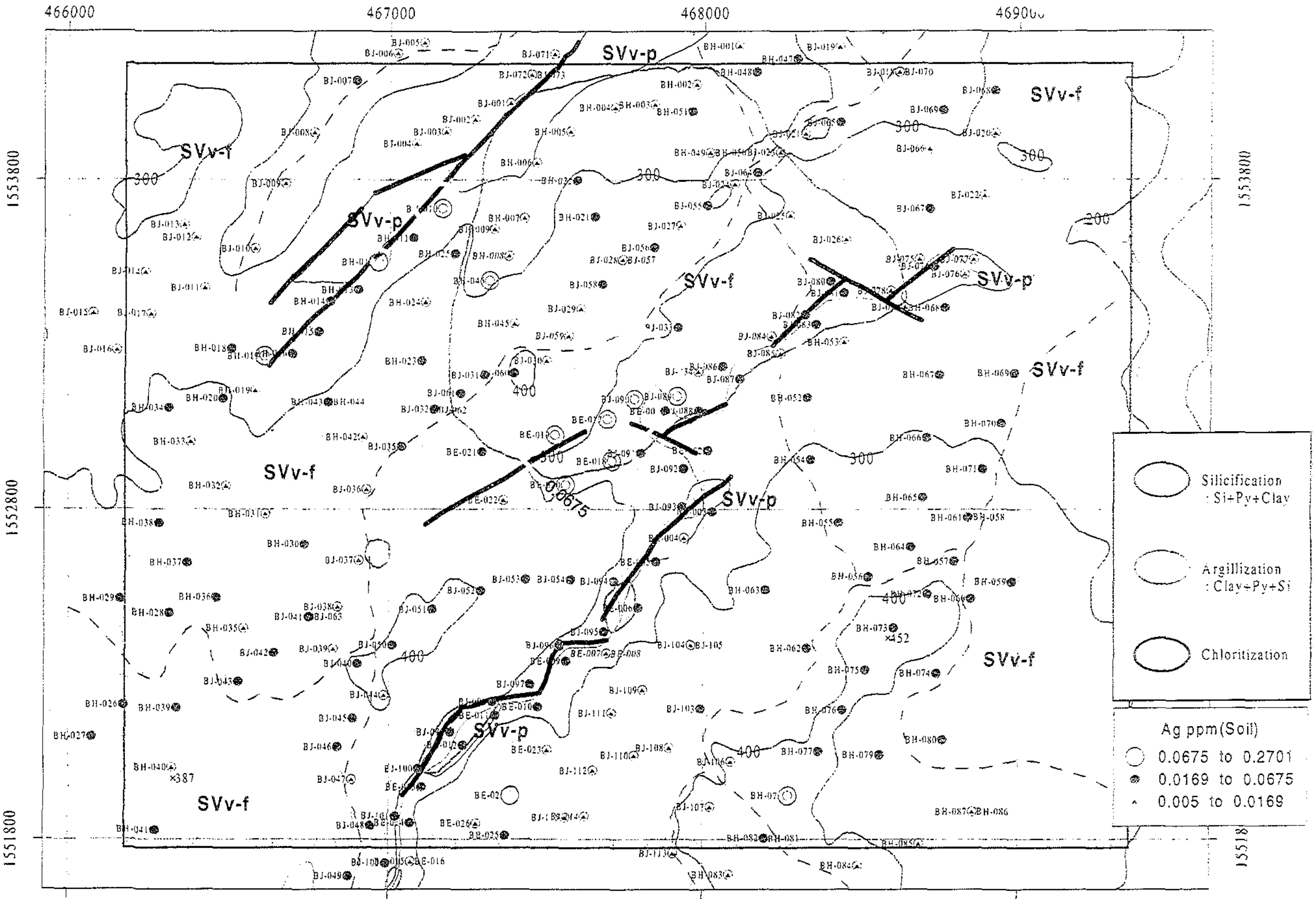


Fig.II-4-39 Ag Content of Soil Samples in the Binangkawan-Taktak Area.

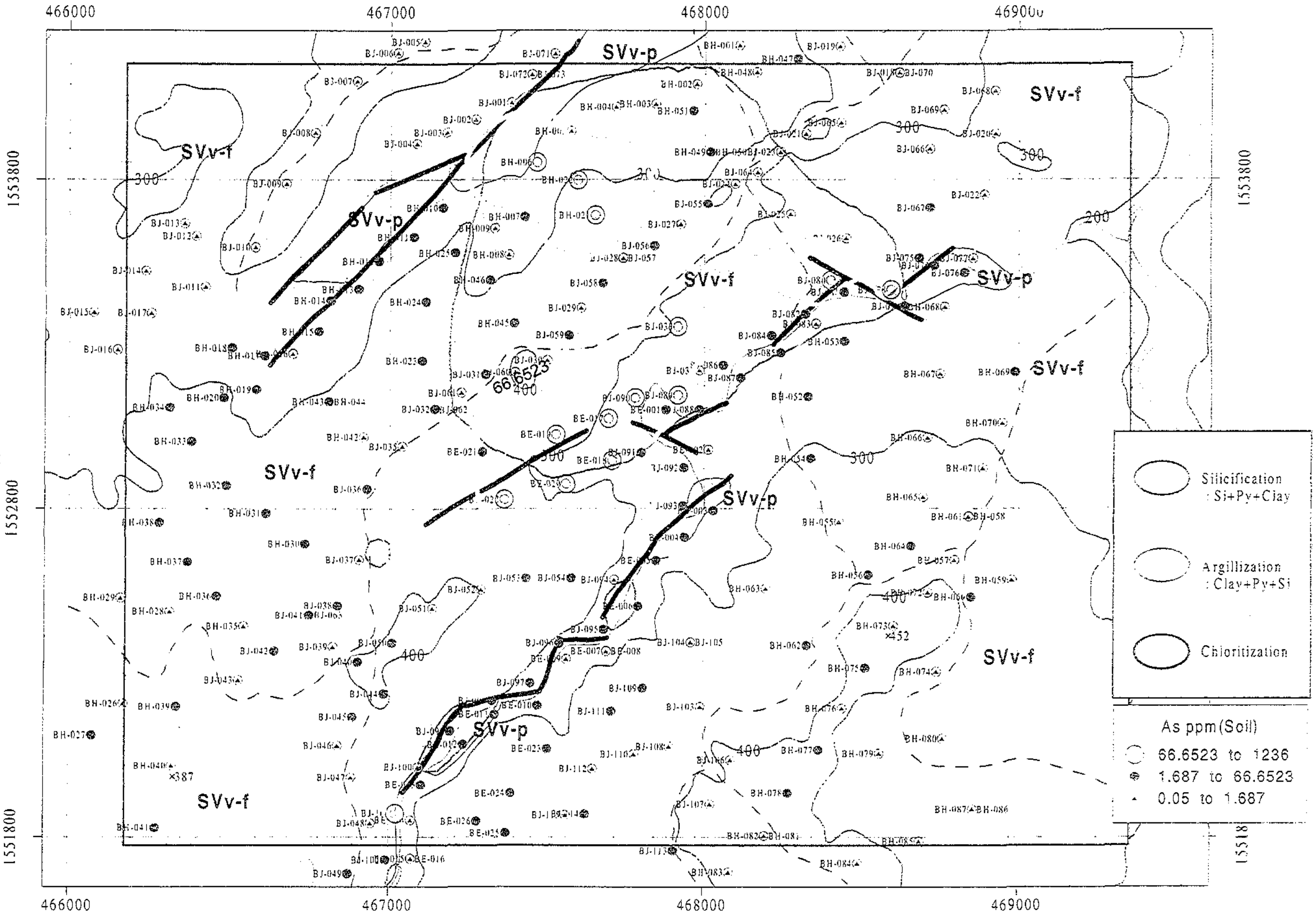


Fig.II-4-40 As Content of Soil Samples in the Binangkawan-Taktak Area.

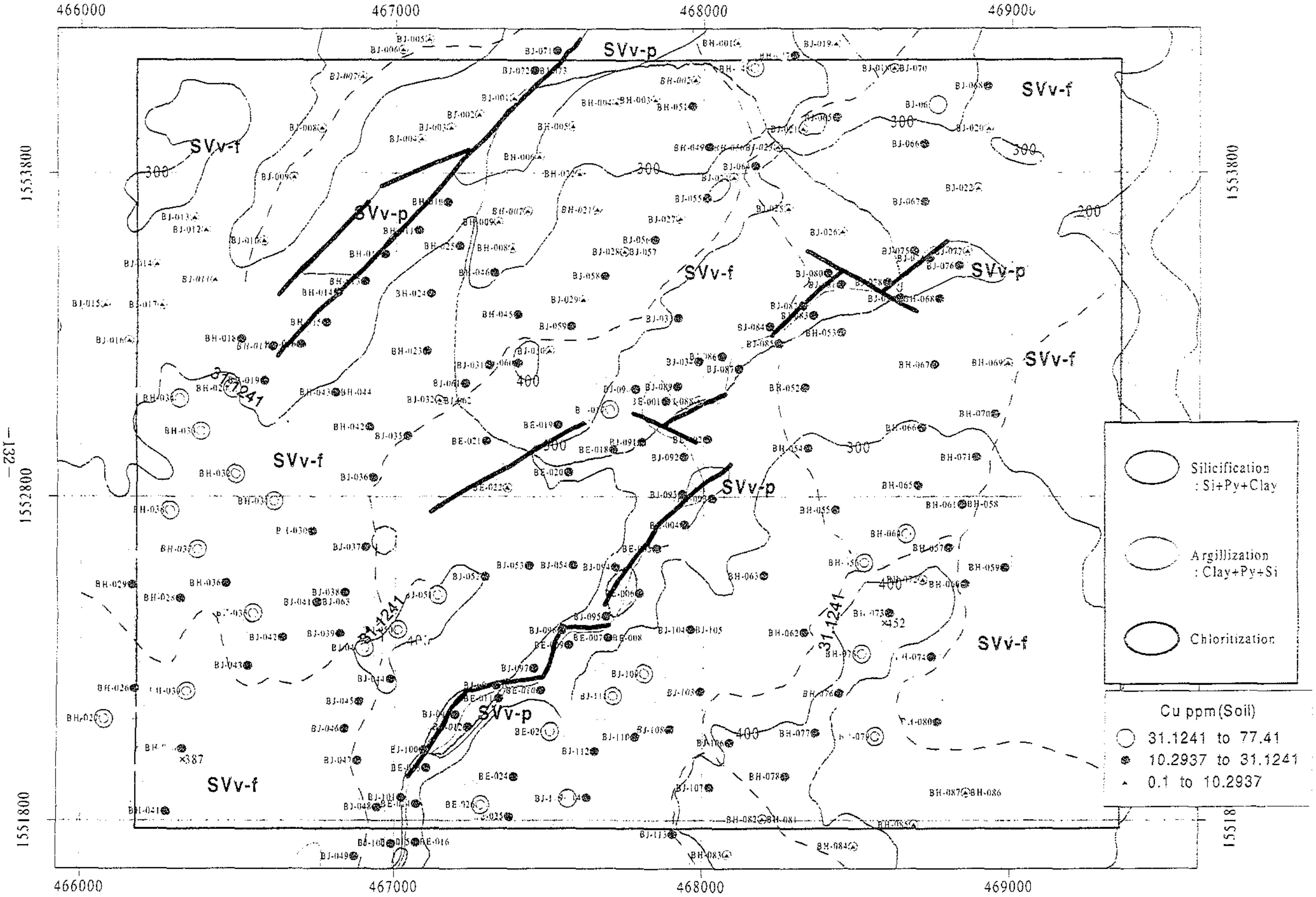


Fig.II-4-41 Cu Content of Soil Samples in the Binangkawan-Taktak Area.

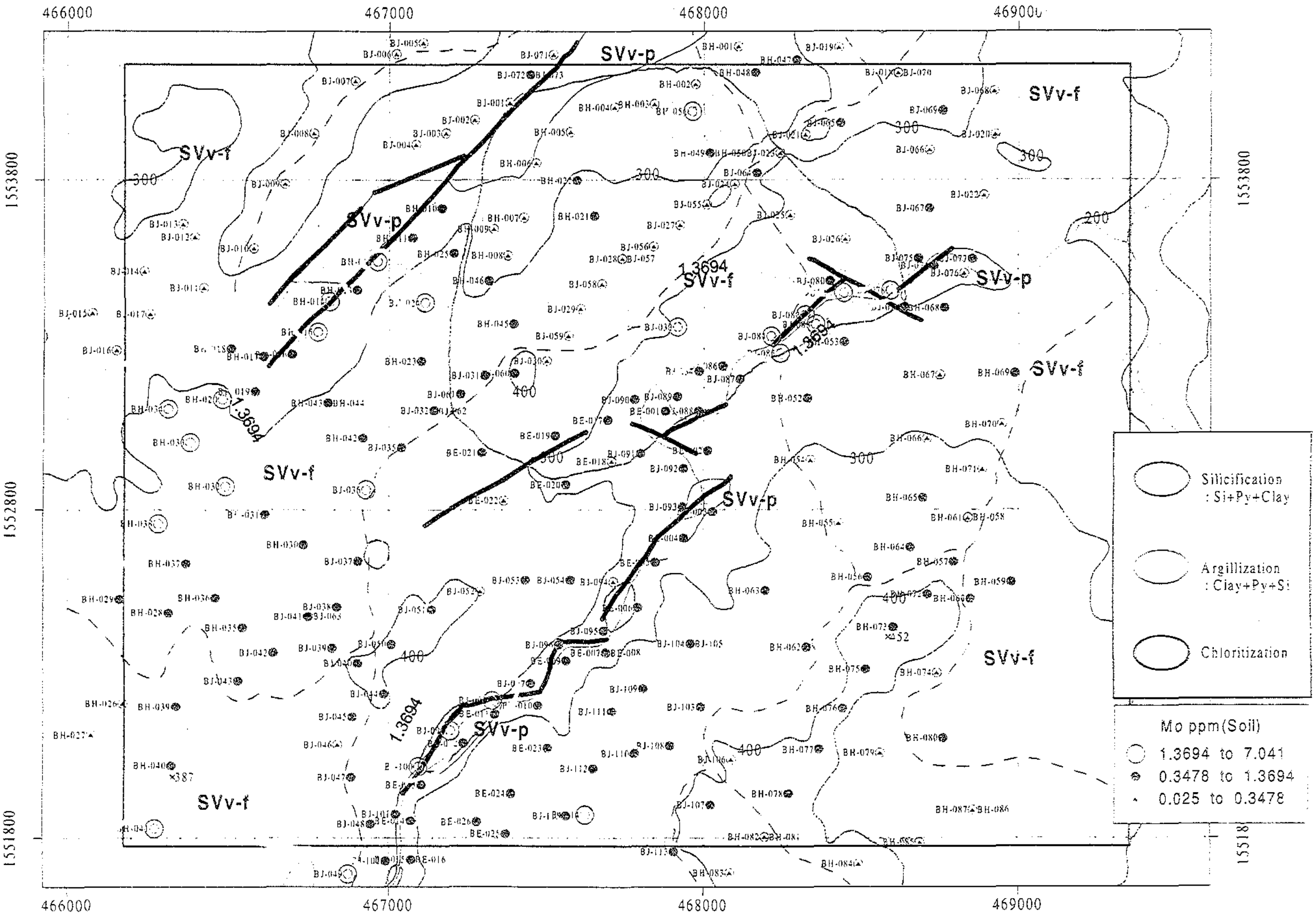


Fig.II-4-42 Mo Content of Soil Samples in the Binangkawan-Taktak Area.

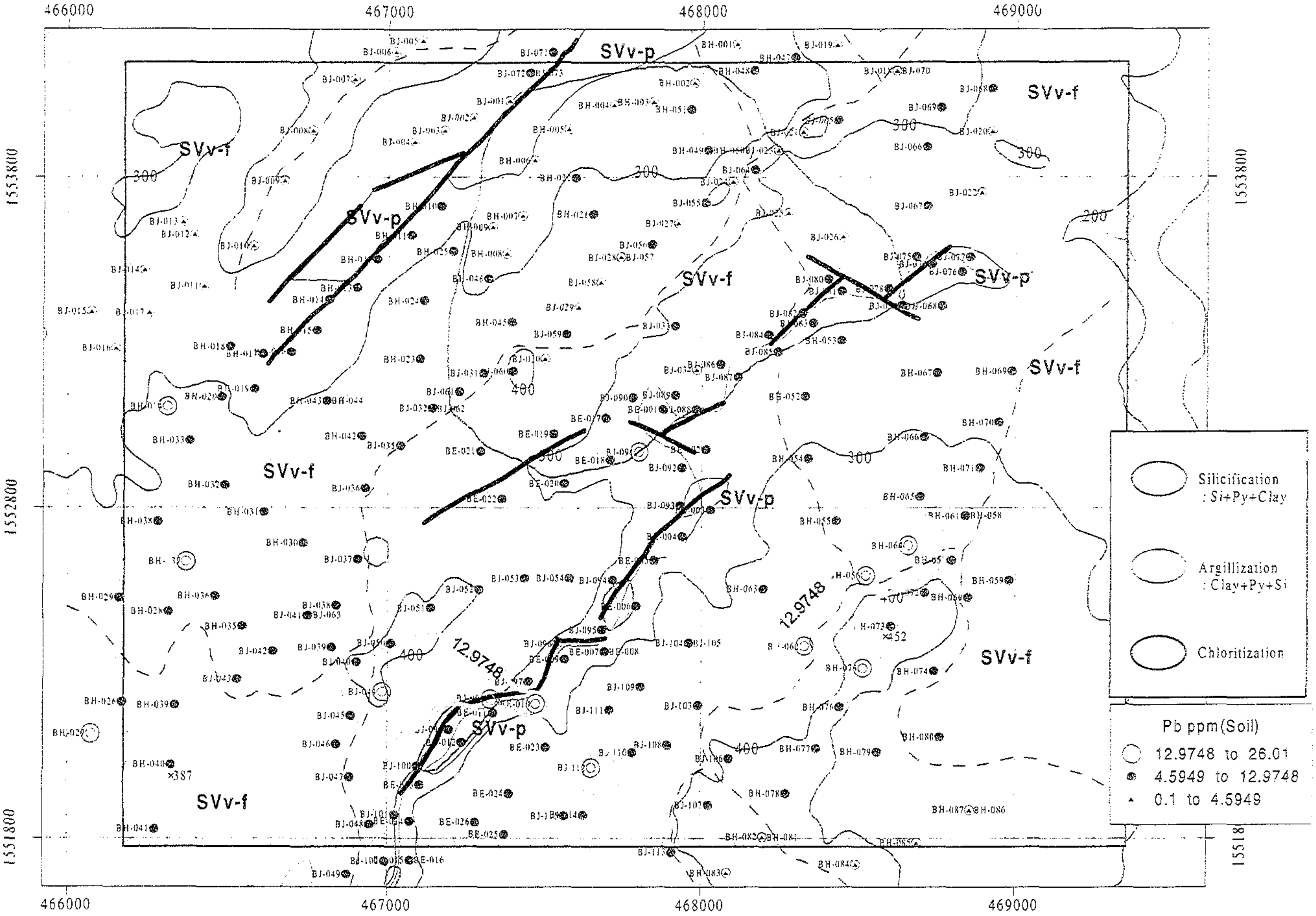


Fig.II-4-43 Pb Content of Soil Samples in the Binangkawan-Taktak Area.

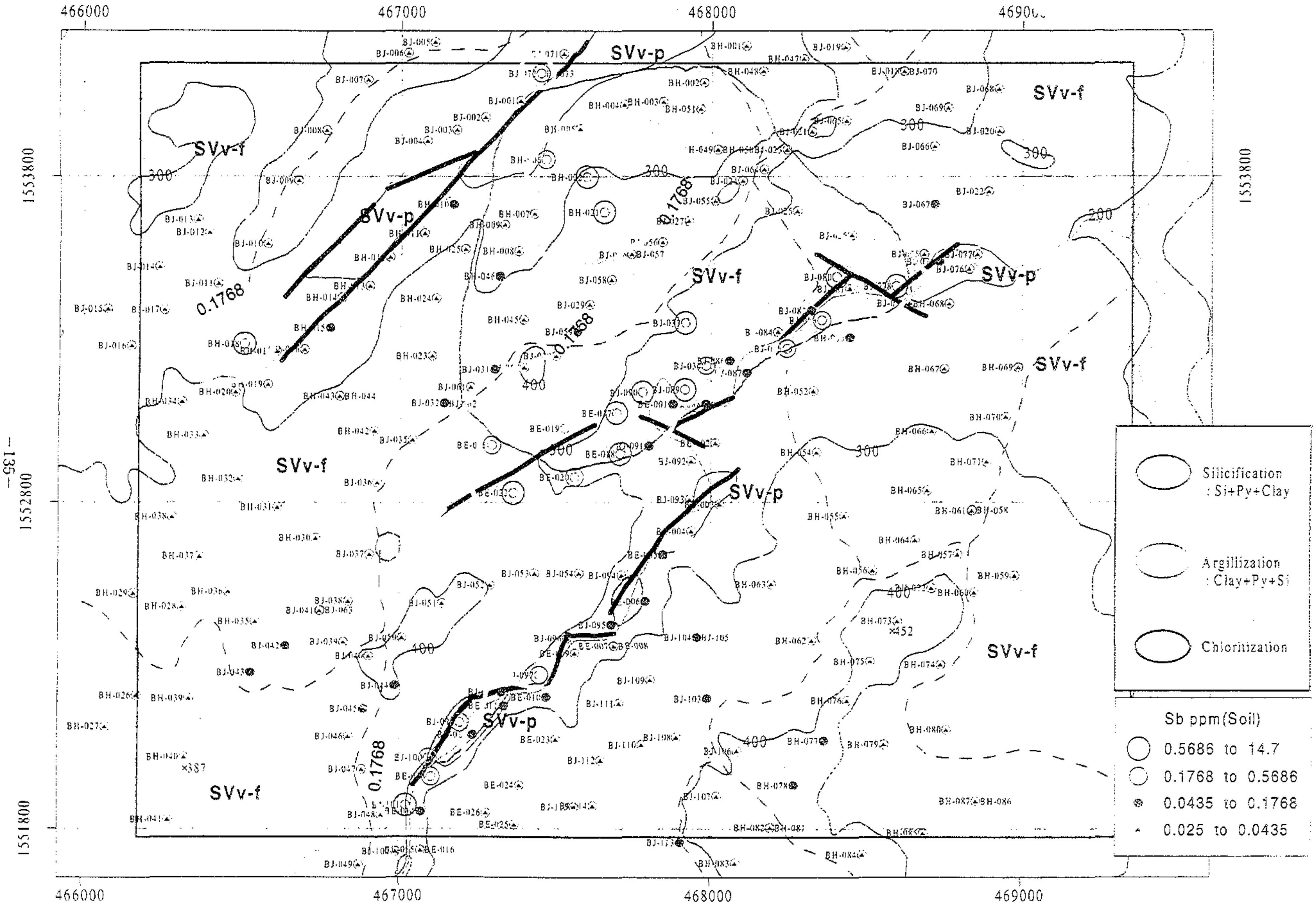


Fig.II-4-44 Sb Content of Soil Samples in the Binangkawan-Taktak Area.

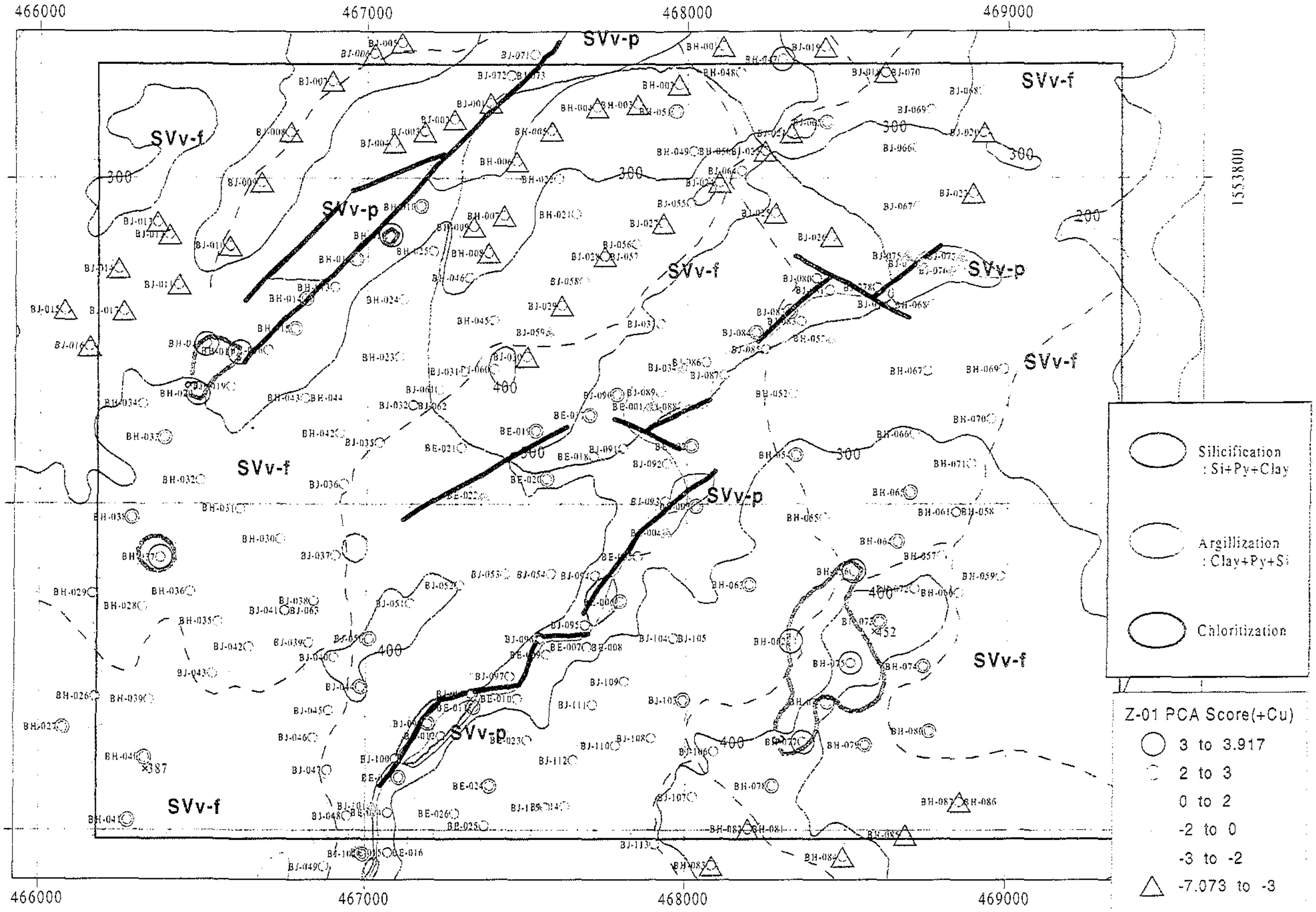


Fig.II-4-45 Z-01 PCA Score of Soil Samples in the Binangkawan-Taktak Area.

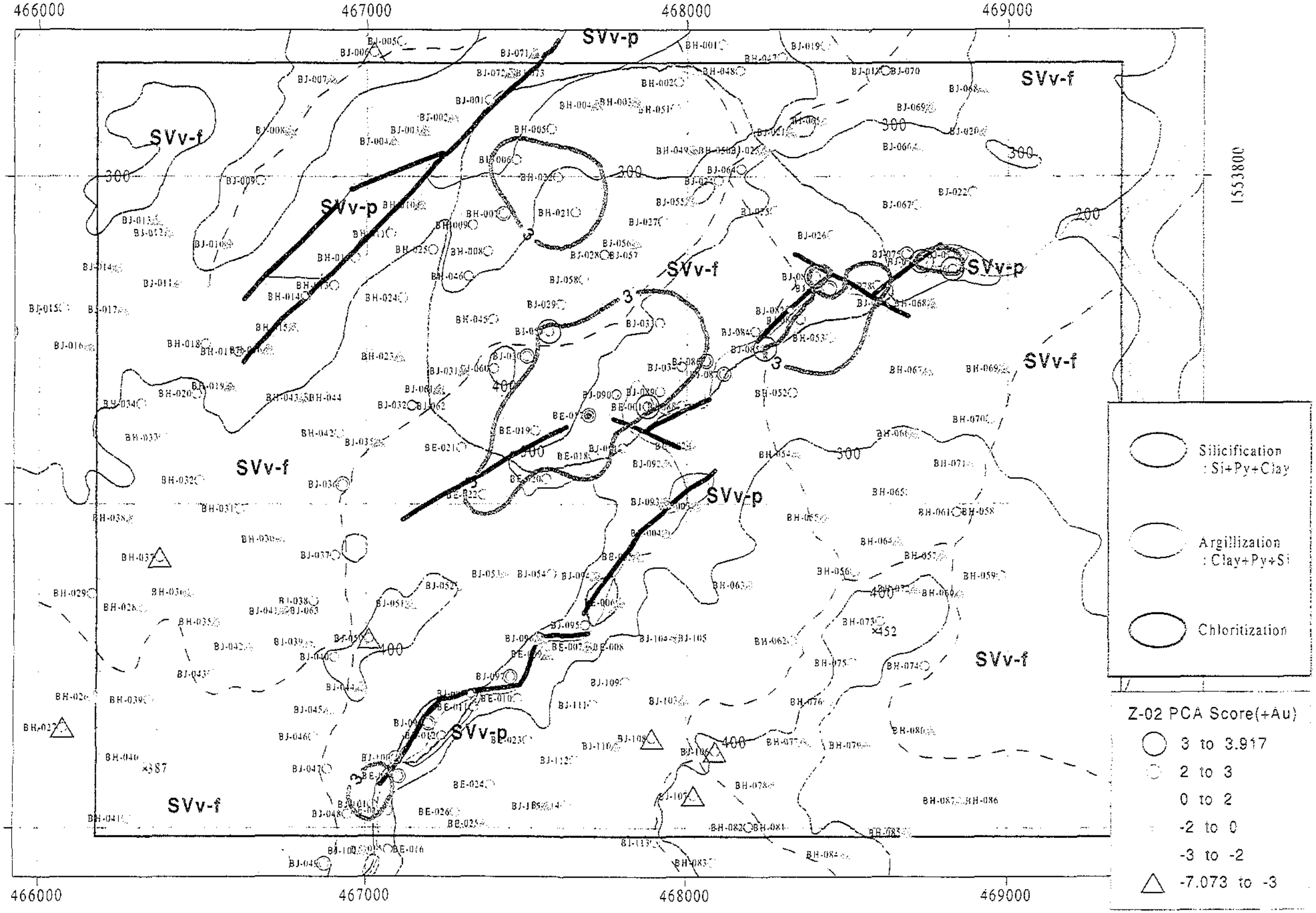


Fig.II-4-46 Z-02 PCA Score of Soil Samples in the Binangkawan-Taktak Area.

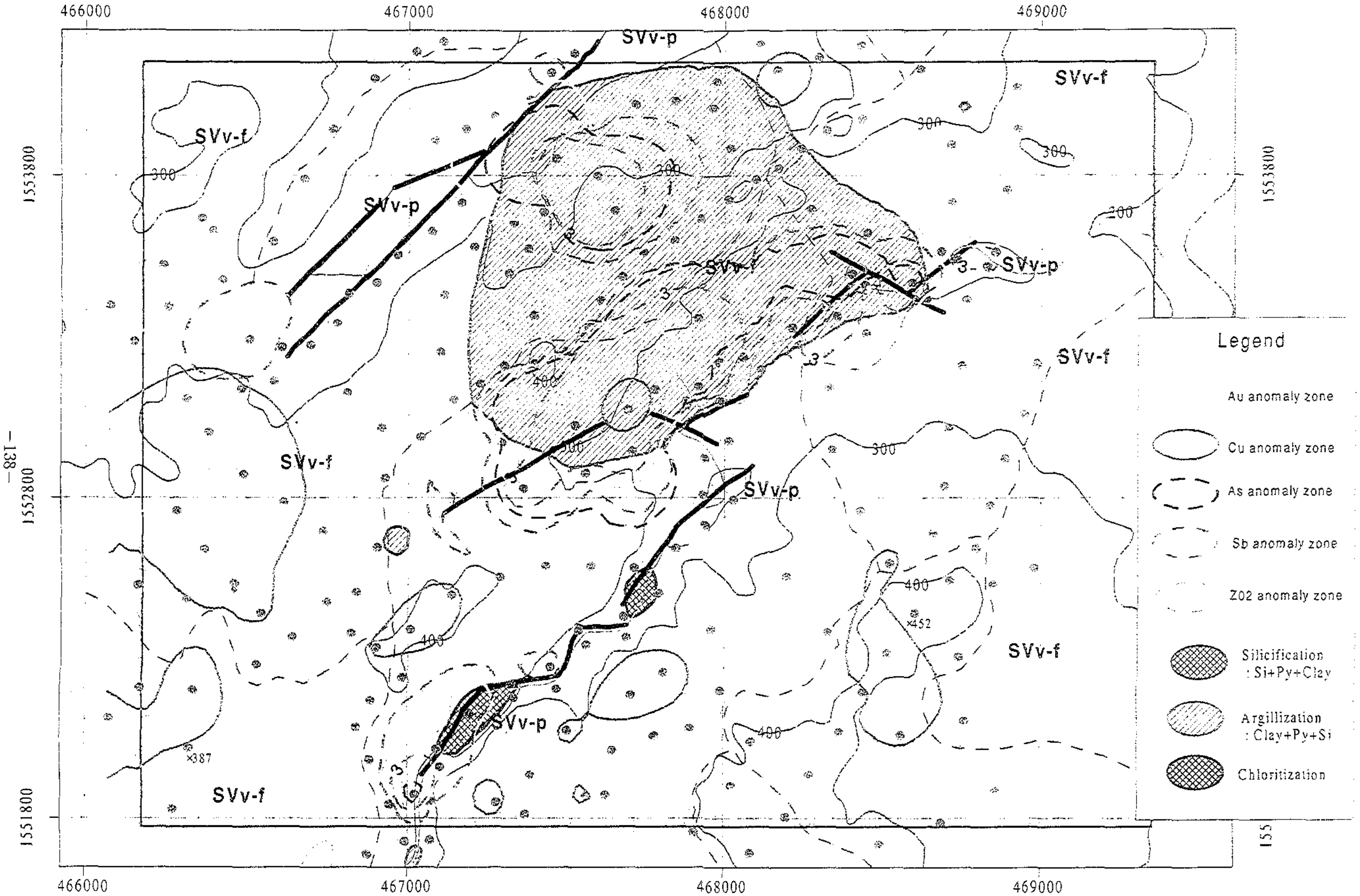


Fig.II-4-47 Geochemical Anomaly of Soil Samples in the Binangkawan-Taktak Area.

logarithm value of soil analysis. The results are shown in TableII-4-6.

Eigenvalues was above 2 up to third principal components. The accumulated contribution ratio was 59% up to third principal components. The score distribution for first and second principal components are shown in Fig.II-4-45 to Fig.II-4-46.

(Z-01) About 31% of assay results can be explained by first principal components. For the elements related to first principal components, Pb, Cu, Mo, Sc, Sn, Hg, Sr, Co, Bi, Ni, Ag, As, and Ba. show positive scores. The behavior of the elements is related to Cu. And Cr and S show negative scores. It seems that the areas with positive scores of first principal components scatter on the ridges of the west and the south area. It seems to be related with Cu-mineralization.

(Z-02) About 15% of assay results can be explained by second principal components. For the elements relating to second principal components, As, Sb, Au, and K show positive scores. Fe, Cr, Ti, V, and Mg show negative scores. It seems that the areas with positive scores of second principal components distribut along north-east trending fault along Binangkawan River and argillization zone. The behavior of elements might indicate epitermal gold deposit.

The geochemical anomaly zone of each elements are superimposed in Fig.II-4-47. It seems that the anomaly distribution of epithermal gold deposit concentrates in silicification zones along northsouth trending fault in silicification zone in center of the area and the north, and along northeast trending fault from the silicification zone in the southwest area.The correlation between Au, and As, Sb, and Z-02 is high positive.

4-2-4 Exciban-Larap Occurences

(1) Geology

The area is underlained by interbeds of sandstone, shale and basalt of Eocene, Universal Formation. The geological map of the area is shown in Fig.II-4-48. The geological profile is shown in Fig.II-4-49. The interbeds are dark gray to greenish gray in color. The shales are thin and laminated. The sandstones were observed to be generally coarse grained, equigranular and highly indurated with quartz locking the grains tightly. The main minerals consist of altered plagioclase and mafic mineral. It became tuffacious (REC-01, REC-10) with the fragments of andesite to basalt. Euhedral grains and veinlets of chlorite and epidote were observed and greenish. Weathered pyrite dissemination, and veinlets were dark brownish on the surface.

The basalt occurs as amygdaloidal and fine grained. It was found as a thin lava flow in sandstone beds. At higher elevation, large boulders of fine-grained black to dark gray basalt were found on the slopes embedded in soil derived from weathered sandstone and shale.

(2) Geological Structure

The beds of Universal Formation generally strike north-north-east with southeast dip. The dip angles range from 10 to 85 degrees although gentle dips are common. The area has a assymetrical anticline structure with the eastrn part having a generally steeply dipping limb. The area has lots of faults and joints without any trends in several directions. Structural observation in old tunnels reveals mostly normal faults. Some horizontal components were also observed in some faults. The fauls commonly produce gouge with 50 cm thick, gray and white gouge. The gouge is composed of breccia and clay with pyrite dissemination.

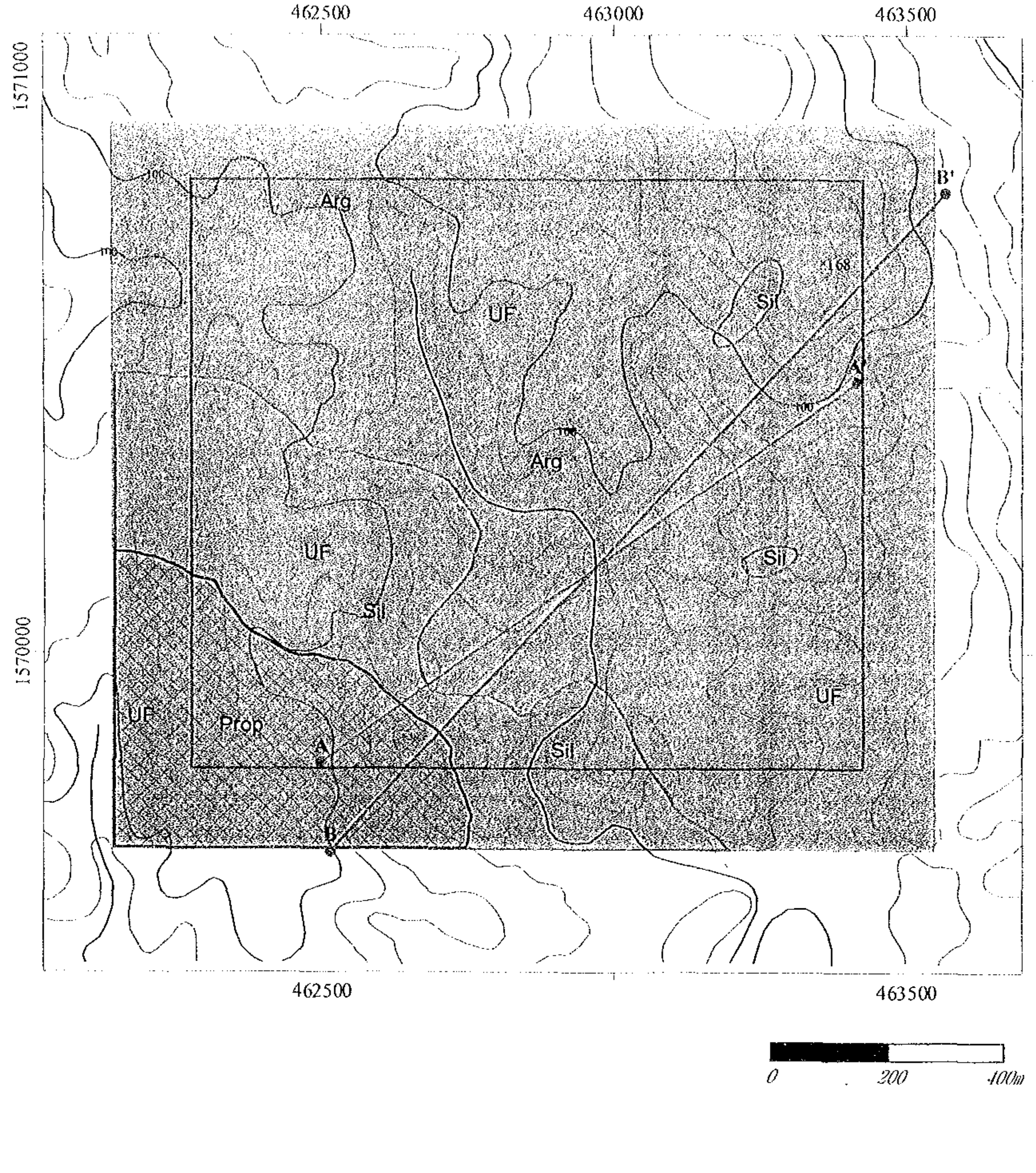


Fig.II-4-48 Geologic Map of the Exciban-Larap Area.

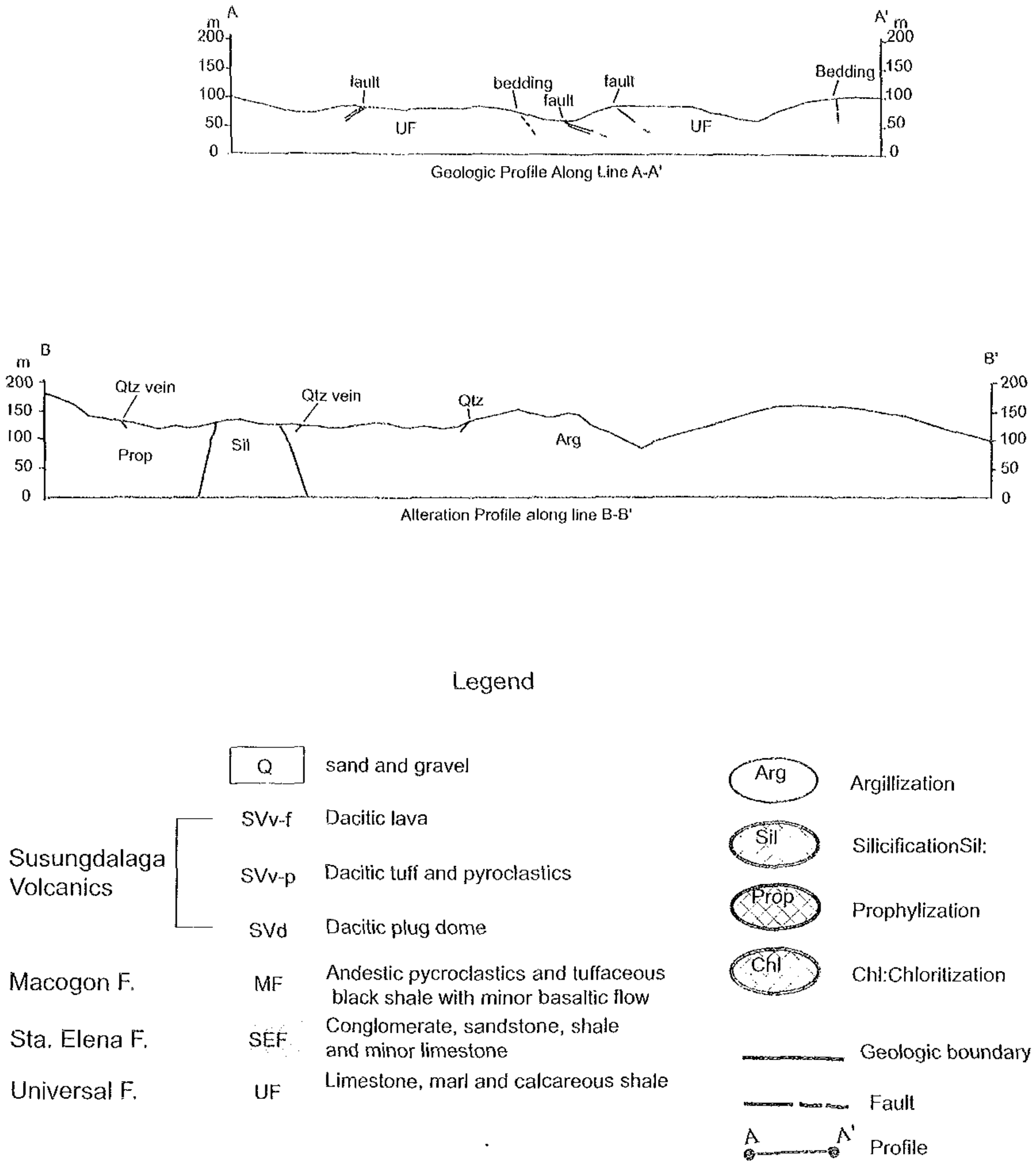


Fig. II-4-49 Geologic profile of the Exciban-Larap Area

(3) Alteration and Mineralization

The alteration in the area is not so obvious as its in typical epithermal deposit. But zonation of alteration was observed. A strong epidote-chlorite-pyrite assemblage was observed in the southwest corner of the area. In the prophyllitization zone (REC-10), the sandstones shows greenish with strong indyration. Aside from dissemination, the assemblage was found as hairline veinlets. At one outcrop, pyrite veinlets were found cutting prophylite. In the northeast of the zone, silicification zone with assemblage of quartz-pyrite-clay was observed. It is weakly to moderately silicified zone with mainly quartz, pyrite dissemination and clay. The clay is composed of mica mineral±chlorite (REK-5). The sample shows Au; 0.55ppm, Cu; 205ppm, Ag; 0.2ppm, PB;7ppm and Zn;24ppm. The sample (REK-4) nearby shows Au; 19.55ppm, Cu; 5.07%, Ag;26.6ppm, Pb;55ppm and Zn;45ppm as high grade of a gold vein. A lot of mine operations and exploration adits were located in the silicification zone. Pockets of weak silicification of sandstones were observed in the northeast of the area. Argillization zone with clay-pyrite-quartz was found in the northeast of the area. The zone is generally overprinted with oxdized zone by weathering. The alteration is generally weak. However, a small outcrop of strong argillization characterized by white clay (kaolinite?) with a lot of pyrite dissemination was observed. The sample (REC-22) shows Au; 0.34ppm, Cu;171ppm, Ag;0.3ppm, Pb;9ppm, and Zn;34ppm.

The assay results of rock samples and the distribution of alteration zones are shown in Fig.II-4-50. The assay results and XRD are shown in Fig.II-4-51.

The long history of mining in the area has presently left few traces of the highly minaralized veins. The adits are mostly unsafe to enter, so only the following observations could be provided.

A small stockpile of ore materials in Lawaan tunnel shows massive sulfide dominated by pyrite with small amount of chalcocite and chalcopyrite (REK-3, REK-4). REK-4 shows high gold content of Au; 19.55ppm.

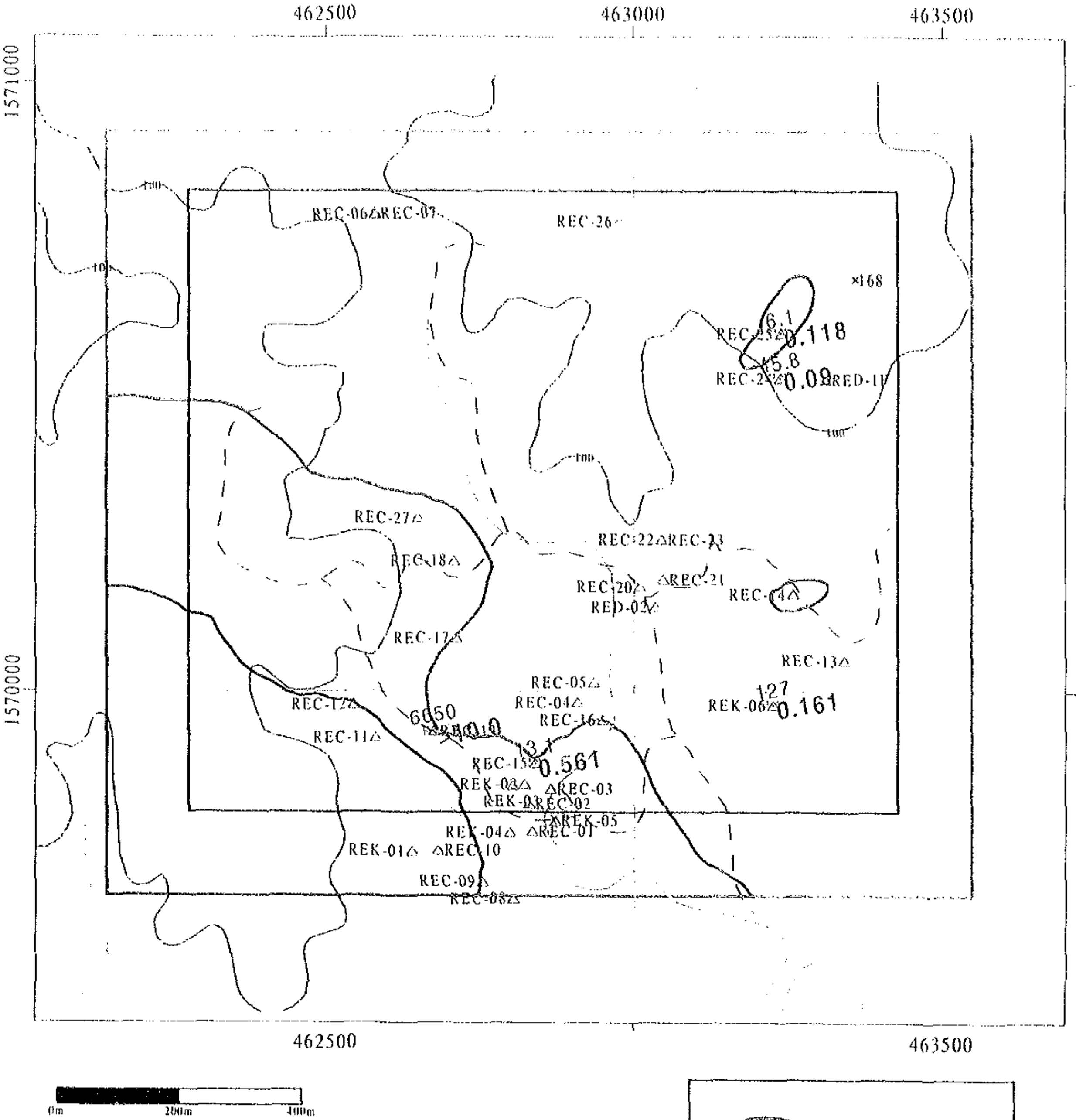
The breccia float (REC-9) found near the tunnel at Yakalan Creek may confirm the reported presence of the rock type in the drill holes made by BHP. It has pebble-size silicified rock and gray quartz vein in white to gray clay-quartz matrix. Some sulfide disseminaions mostly pyrite and a small amount of chalcopyrite were observed.

Several veins encountered were gossanous with large cavities and boxworks. These are set in clay-quartz narrow zone. Another vein shows gray quartz material with large sulfide grains. the gray quartz are set in a narrow vein of mainly kaolinite.

The mined-out veins in Lawaan and Yakal Creeks were observed to be undulating with pronounced pinchs and swells. These are terminated by either pinching out or by faulting. Resulting from it, the orebodies with short strike , just a few meters.might be formed.

(4) Geochemical Survey on Soil

The correlative coefficients among main elements of geochemical survey are shown in TableII-4-7. For the stream sediments in Phase-II, the indicative elements of Au-Cu are Au, Ag, As, Cu, Hg, Mo, Pb, S, and Sb. Bi show high correlation with Cu. Twenty eight elements which are included above mentioned indicative elements were analysed. The indicative elements of Ag, As, Ba, Bi, Cu, Mo, and Sb. Bi, Mo, Sn, and others show high correlation with Cu. The correlation is found between Au and Cu. The histogram and the accumurated histogram distribution on probability is shown in Fig.II-4-52. The classification of histogram is 1/2 of standard deviation(σ). The threshold value of each element showing correlation is shown in Fig.II-4-52. In consideration of the detective



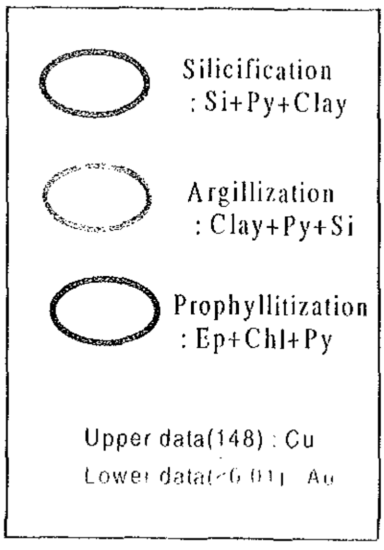


Fig.II-4-50 Whole Rock Analysis and Alteration Zones of the Exciban-Larap Area.

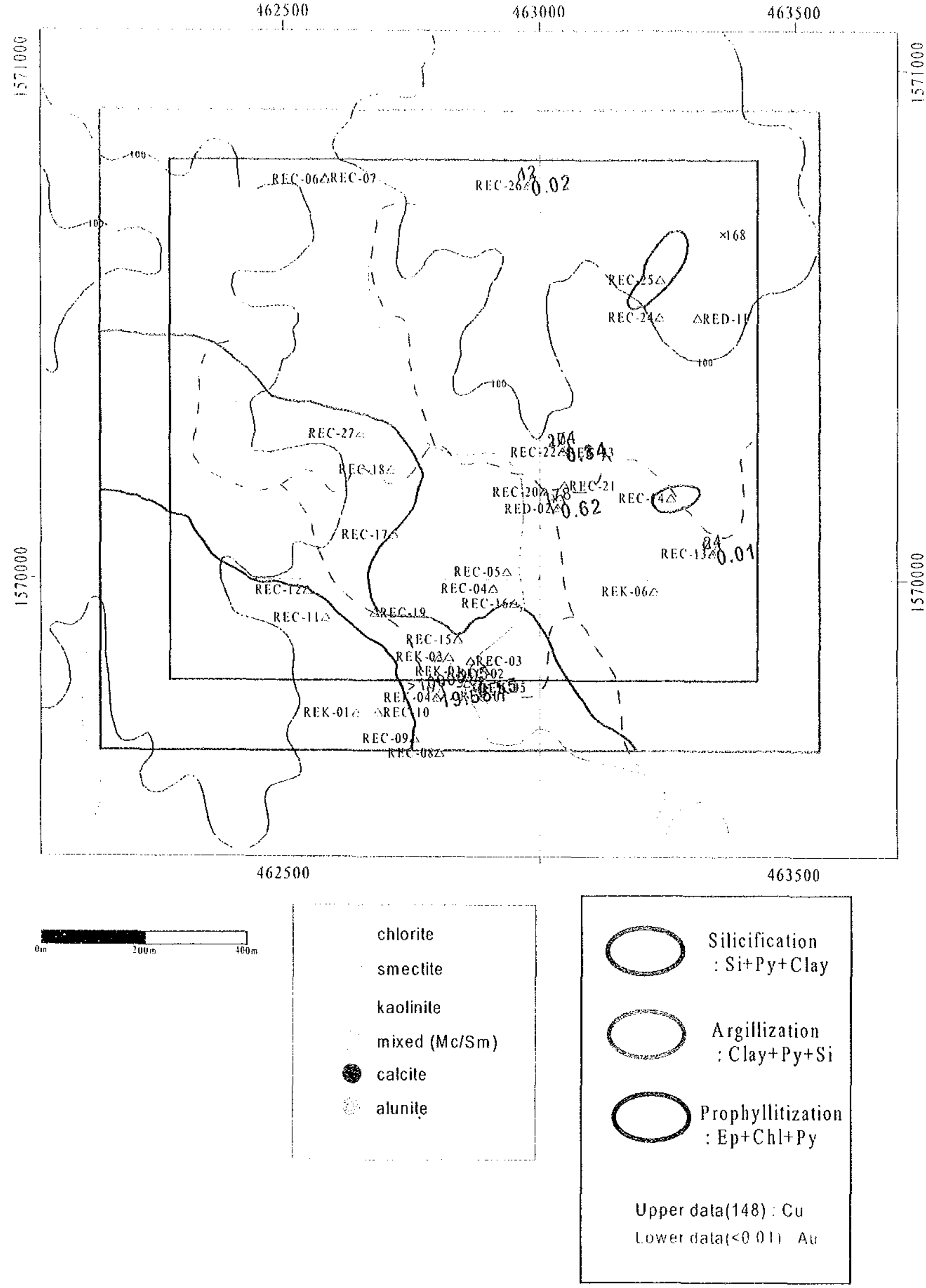


Fig.II-4-51 Ore Assay and XRD Results of the Exciban-Larap Area.

TableⅡ-4-7 Basic Statistics and Correlation Coefficient of Soil Samples in the Exiciban–Larap Area

Original Data Information — Number of Component: 28; Number of Sample: 66

Result of Statistics (Logarithmic)

Elements	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
max_val	0.8779	-0.2291	0.8388	1.0492	2.2304	0.7177	-0.8239	1.4116	1.7709	2.3464	0.8965	-1.0000	-0.3098	-0.0915	3.3892	0.3243	-2.0000	1.2380	2.9494	1.4487	-1.2218	-0.8861	1.4362	0.2304	1.4829	-0.8239	2.4997	2.2672
min_val	-3.0000	-2.3010	0.4265	-1.0000	-0.1549	-2.3010	-2.0000	-1.3010	-0.3010	-0.0969	0.4265	-2.3010	-2.0000	-1.6990	1.4624	-1.6021	-2.3010	-1.0000	2.3979	-0.6990	-2.0000	-1.6021	-0.5229	-1.0000	-1.0000	-2.3010	1.6435	0.7782
average	-1.9303	-1.6073	0.6184	0.0814	1.3072	-1.2290	-1.4917	0.3756	0.4200	1.0896	0.6442	-1.6473	-1.1839	-0.5471	2.7144	-0.6056	-2.2281	-0.1817	2.6252	0.3301	-1.6293	-1.5159	0.5093	-0.4853	0.3247	-1.5688	1.9515	1.5819
std dev	0.6883	0.6795	0.0841	0.7141	0.8165	0.8247	0.3413	0.7403	0.5413	0.7835	0.0937	0.5497	0.4208	0.3380	0.3831	0.7402	0.1290	0.6854	0.1144	0.6097	0.1537	0.1747	0.6553	0.4429	0.8222	0.3692	0.1660	0.3007

Cov mat	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
Au	0.4737	0.0603	0.0065	0.1705	0.1301	0.3157	-0.0014	0.0317	0.0177	0.2241	0.0115	0.0897	0.1146	-0.0248	-0.1382	0.1868	0.0162	0.0945	-0.0002	0.0631	0.0083	0.0381	0.1183	0.0927	0.0892	0.0349	-0.0149	-0.1119
Ag	0.0603	0.4618	-0.0170	0.3780	0.4253	0.3440	0.1390	0.3957	0.0387	0.3749	-0.0240	0.2988	0.1242	0.0758	0.0234	0.3717	0.0319	0.3731	0.0088	0.3262	-0.0417	0.0588	0.3121	0.2176	0.4565	0.0083	-0.0280	0.0020
Al	0.0065	-0.0170	0.0071	-0.0085	-0.0040	-0.0004	-0.0088	-0.0060	-0.0018	-0.0036	0.0030	-0.0044	0.0002	0.0015	-0.0085	-0.0026	-0.0017	-0.0077	0.0002	-0.0081	0.0042	-0.0013	0.0010	-0.0014	-0.0118	0.0071	0.0026	-0.0033
As	0.1705	0.3780	-0.0085	0.5100	0.4807	0.5383	0.1011	0.4309	-0.0242	0.4590	-0.0233	0.3659	0.1541	0.0494	-0.0542	0.4898	0.0174	0.3981	0.0153	0.4029	-0.0335	0.0643	0.4142	0.2799	0.5281	-0.0024	-0.0385	-0.0659
Ba	0.1301	0.4253	-0.0040	0.4807	0.6667	0.5245	0.1564	0.4903	-0.0351	0.5037	-0.0351	0.3906	0.1997	0.1058	-0.0285	0.5251	0.0260	0.4481	0.0161	0.4120	-0.0534	0.0518	0.4322	0.3041	0.5887	0.0540	-0.0594	-0.0251
Bi	0.3157	0.3440	-0.0004	0.5383	0.5245	0.6802	0.0823	0.4360	-0.0140	0.5472	-0.0176	0.3988	0.2210	0.0420	-0.1396	0.5669	0.0168	0.4308	0.0099	0.4080	-0.0274	0.0656	0.4725	0.3283	0.5496	0.0519	-0.0411	-0.1317
Ca	-0.0014	0.1390	-0.0088	0.1011	0.1564	0.0823	0.1165	0.1560	0.0324	0.1123	-0.0099	0.0950	0.0413	0.0525	0.0538	0.0968	0.0246	0.1456	0.0135	0.1094	-0.0239	0.0113	0.0912	0.0669	0.1830	0.0020	-0.0059	0.0290
Co	0.0317	0.3957	-0.0060	0.4309	0.4903	0.4360	0.1560	0.5480	0.0207	0.4433	-0.0277	0.3725	0.1862	0.1451	0.0478	0.4499	0.0363	0.4607	0.0157	0.3944	-0.0597	0.0470	0.4291	0.2893	0.5622	0.0536	-0.0173	-0.0063
Cr	0.0177	0.0387	-0.0018	-0.0242	-0.0351	-0.0140	0.0324	0.0207	0.2930	0.0521	0.0258	-0.0049	-0.0281	-0.0028	-0.0131	-0.0545	0.0180	0.1163	-0.0216	0.0089	0.0161	0.0029	0.0359	0.0082	0.0100	0.0733	0.0639	0.0033
Cu	0.2241	0.3749	-0.0036	0.4590	0.5037	0.5472	0.1123	0.4433	0.0521	0.6138	-0.0125	0.3579	0.2031	0.0660	-0.0895	0.4953	0.0292	0.4478	0.0040	0.3893	-0.0415	0.0452	0.4309	0.3007	0.5181	0.0690	-0.0209	-0.0804
Fe	0.0115	-0.0240	0.0030	-0.0233	-0.0351	-0.0176	-0.0099	-0.0277	0.0258	-0.0125	0.0088	-0.0205	-0.0157	-0.0124	-0.0097	-0.0259	0.0007	-0.0131	-0.0018	-0.0189	0.0087	-0.0005	-0.0127	-0.0124	-0.0323	0.0085	0.0118	-0.0056
Hg	0.0897	0.2988	-0.0044	0.3659	0.3906	0.3988	0.0950	0.3725	-0.0049	0.3579	-0.0205	0.3022	0.1435	0.0708	-0.0266	0.3878	0.0181	0.3396	0.0107	0.3072	-0.0317	0.0427	0.3409	0.2319	0.4317	0.0355	-0.0245	-0.0453
K	0.1146	0.1242	0.0002	0.1541	0.1997	0.2210	0.0413	0.1862	-0.0281	0.2031	-0.0157	0.1435	0.1771	0.0849	-0.0283	0.1948	0.0165	0.1588	0.0008	0.1120	-0.0341	0.0124	0.1641	0.1266	0.2016	0.0625	-0.0203	-0.0353
Mg	-0.0248	0.0758	0.0015	0.0494	0.1058	0.0420	0.0525	0.1451	-0.0028	0.0660	-0.0124	0.0708	0.0849	0.1142	0.0563	0.0585	0.0163	0.1000	0.0065	0.0533	-0.0338	0.0068	0.0755	0.0567	0.1217	0.0335	-0.0028	0.0427
Mn	-0.1382	0.0234	-0.0065	-0.0542	-0.0285	-0.1396	0.0538	0.0478	-0.0131	-0.0895	-0.0097	-0.0266	-0.0283	0.0583	0.1467	-0.0771	0.0141	-0.0078	0.0186	-0.0215	-0.0179	-0.0042	-0.0640	-0.0429	-0.0098	-0.0451	-0.0016	0.0834
Mo	0.1868	0.3717	-0.0026	0.4898	0.5251	0.5669	0.0968	0.4499	-0.0545	0.4953	-0.0259	0.3878	0.1948	0.0585	-0.0771	0.5479	0.0168	0.4114	0.0157	0.3886	-0.0348	0.0550	0.4387	0.3040	0.5352	0.0376	-0.0460	-0.0946
Na	0.0162	0.0319	-0.0017	0.0174	0.0260	0.0168	0.0246	0.0363	0.0180	0.0292	0.0007	0.0181	0.0165	0.0163	0.0141	0.0168	0.0166	0.0349	0.0023	0.0176	-0.0068	0.0015	0.0208	0.0158	0.0352	0.0078	0.0036	0.0049
Ni	0.0945	0.3731	-0.0077	0.3981	0.4481	0.4308	0.1456	0.4607	0.1163	0.4478	-0.0131	0.3396	0.1588	0.1000	-0.0078	0.4114	0.0349	0.4698	0.0037	0.3562	-0.0411	0.0479	0.4020	0.2707	0.5085	0.0790	0.0009	-0.0332
P	-0.0002	0.0088	0.0002	0.0153	0.0161	0.0099	0.0135	0.0157	-0.0216	0.0040	-0.0018	0.0107	0.0008	0.0065	0.0186	0.0157	0.0023	0.0037	0.0131	0.0088	-0.0004	0.0040	-0.0001	0.0026	0.0142	-0.0159	-0.0063	0.0039
Pb	0.0631	0.3262	-0.0081	0.4029	0.4120	0.4080	0.1094	0.3944	0.0089	0.3893	-0.0189	0.3072	0.1120	0.0533	-0.0215	0.3886	0.0176	0.3562	0.0088	0.3717	-0.0319	0.0436	0.3579	0.2364	0.4666	0.0220	-0.0227	-0.0216
S	0.0083	-0.0417	0.0042	-0.0335	-0.0534	-0.0274	-0.0239	-0.0597	0.0161	-0.0415	0.0087	-0.0317	-0.0341	-0.0338	-0.0179	-0.0348	-0.0068	-0.0411	-0.0004	-0.0319	0.0236	-0.0025	-0.0307	-0.0262	-0.0587	-0.0040	0.0079	-0.0137
Sb	0.0381	0.0588	-0.0013	0.0643	0.0518	0.0656	0.0113	0.0470	0.0029	0.0452	-0.0005	0.0427	0.0124	0.0068	-0.0042	0.0550	0.0015	0.0479	0.0040	0.0436	-0.0025	0.0305	0.0435	0.0306	0.0586	-0.0040	-0.0030	-0.0059
Sc	0.1183	0.3121	0.0010	0.4142	0.4322	0.4725	0.0912	0.4291	0.0359	0.4309	-0.0127	0.3409	0.1641	0.0755	-0.0640	0.4387	0.0208	0.4020	-0.0001	0.3579	-0.0307	0.0435	0.4294	0.2803	0.4929	0.0821	-0.0070	-0.0682
Sn	0.0927	0.2176	-0.0014	0.2799	0.3041	0.3283	0.0669	0.2893	0.0082	0.3007	-0.0124	0.2319	0.1266	0.0567	-0.0429	0.3040	0.0158	0.2707	0.0026	0.2364	-0.0262	0.0306	0.2803	0.1962	0.3354	0.0501	-0.0129	-0.0495
Sr	0.0892	0.4565	-0.0118	0.5281	0.5887	0.5496	0.1830	0.5622	0.0100	0.5181	-0.0323	0.4317	0.2016	0.1217	-0.0098	0.5352	0.0352	0.5085	0.0142	0.4666	-0.0587	0.0586	0.4929	0.3354	0.6760	0.0462	-0.0322	-0.0279
Ti	0.0349	0.0083	0.0071	-0.0024	0.0540	0.0519	0.0020	0.0536	0.0733	0.0690	0.0085	0.0355	0.0625	0.0335	-0.0451	0.0376	0.0078	0.0790	-0.0159	0.0220	-0.0040	-0.0040	0.0821	0.0501	0.0462	0.1363	0.0266	-0.0275
V	-0.0149	-0.0280	0.0026	-0.0385	-0.0594	-0.0411	-0.0059	-0.0173	0.0639	-0.0209	0.0118	-0.0245	-0.0203	-0.0028	-0.0016	-0.0460	0.0036	0.0009	-0.0063	-0.0227	0.0079	-0.0030	-0.0070	-0.0129	-0.0322	0.0266	0.0276	-0.0007
Zn	-0.1119	0.0020	-0.0033	-0.0659	-0.0251	-0.1317	0.0290	-0.0063	0.0033	-0.0804	-0.0056	-0.0453	-0.0353	0.0427	0.0834	-0.0946	0.0049	-0.0332	0.0039	-0.0216	-0.0137	-0.0059	-0.0682	-0.0495	-0.0279	-0.0275	-0.0007	0.0904

Cor mat	Au	Ag	Al	As	Ba	Bi	Ca	Co	Cr	Cu	Fe	Hg	K	Mg	Mn	Mo	Na	Ni	P	Pb	S	Sb	Sc	Sn	Sr	Ti	V	Zn
Au	1.0000	0.1290	0.1118	0.3468	0.2315	0.5562	-0.0061	0.0622	0.0475	0.4155	0.1787	0.2370	0.3955	-0.1068	-0.5242	0.3666	0.1827	0.2003	-0.0019	0.1503	0.0787	0.3171	0.2623	0.3040	0.1577	0.1375	-0.1303	-0.5410
Ag	0.1290	1.0000	-0.2978	0.7789	0.7666	0.6139	0.5994	0.7866	0.1051	0.7042	-0.3777	0.7999	0.4342	0.3299	0.0897	0.7390	0.3643	0.8011	0.1128	0.7873	-0.3990	0.4953	0.7009	0.7230	0.8171	0.0329	-0.2478	0.0097
Al	0.1118	-0.2978	1.0000	-0.1407	-0.0580	-0.0065	-0.3077	-0.0965	-0.0299	-0.0545	0.3795	-0.0949	0.0066	0.0532	-0.2018	-0.0418	-0.1564	-0.1334	0.0172	-0.1584	0.3212	-0.0517	0.0180	-0.0364	-0.1705	0.2277	0.1865	-0.1315
As	0.3468	0.7789	-0.1407	1.0000	0.8243	0.9140	0.4147	0.8151	-0.0625	0.8203	-0.3476	0.9322	0.5128	0.2047	-0.1982	0.9265	0.1892	0.8133	0.1878	0.9253	-0.3054	0.5152	0.8850	0.8849	0.8994	-0.0093	-0.3244	-0.3070
Ba	0.2315	0.7666	-0.0580	0.8243	1.0000	0.7789	0.5612	0.8111	-0.0793	0.7874	-0.4595	0.8702	0.5813	0.3833	-0.0910	0.8688	0.2471	0.8007	0.1729	0.8277	-0.4254	0.3633	0.8078	0.8407	0.8770	0.1791	-0.4384	-0.1022
Bi	0.5562	0.6139	-0.0065	0.9140	0.7789	1.0000	0.2925	0.7142	-0.0313	0.8468	-0.2275	0.8796	0.6368	0.1506	-0.4418	0.9287	0.1578	0.7622	0.1050	0.8114	-0.2161	0.4556	0.8743	0.8986	0.8105	0.1704	-0.3002	-0.5313
Ca	-0.0061	0.5994	-0.3077	0.4147	0.5612	0.2925	1.0000	0.6173	0.1755	0.4198	-0.3093	0.5061	0.2877	0.4548	0.4118	0.3832	0.5580	0.6223	0.3452	0.5256	-0.4561	0.1894	0.4077	0.4428	0.6521	0.0159	-0.1036	0.2829
Co	0.0622	0.7866	-0.0965	0.8151	0.8111	0.7142	0.6173	1.0000	0.0515	0.7644	-0.3988	0.9153	0.5976	0.5800	0.1686	0.8210	0.3800	0.9080	0.1851	0.8737	-0.5248	0.3630	0.8845	0.8822	0.9236	0.1962	-0.1406	-0.0281
Cr	0.0475	0.1051	-0.0299	-0.0625	-0.0793	-0.0313	0.1755	0.0515	1.0000	0.1229	0.5080	-0.0166	-0.1235	-0.0153	-0.0632	-0.1360	0.2575	0.3136	-0.3489	0.0268	0.1933	0.0305	0.1011	0.0344	0.0225	0.3669	0.7108	0.0201
Cu	0.4155	0.7042	-0.0545	0.8203	0.7874	0.8468	0.4198	0.7644	0.1229	1.0000	-0.1699	0.8311	0.6160	0.2493	-0.2982	0.8542	0.2887	0.8339	0.0447	0.8149	-0.3443	0.3301	0.8393	0.8665	0.8043	0.2385	-0.1604	-0.3415
Fe	0.1787	-0.3777	0.3795	-0.3476	-0.4595	-0.2275	-0.3093	-0.3988	0.5080	-0.1699	1.0000	-0.3990	-0.3986	-0.3906	-0.2692	-0.3742	0.0589	-0.2033	-0.1716	-0.3303	0.6070	-0.0305	-0.2062	-0.2993	-0.4196	0.2447	0.7608	-0.1985
Hg	0.2370	0.7999	-0.0949	0.9322	0.8702	0.8796	0.5061	0.9153	-0.0166	0.8311	-0.3990	1.0000	0.6202	0.3810	-0.1264	0.9531	0.2546	0.9014	0.1707	0.9167	-0.3755	0.4449	0.9465	0.9526	0.9553	0.1751	-0.2685	-0.2741
K	0.3955	0.4342	0.0066	0.5128	0.5813	0.6368	0.2877	0.5976	-0.1235	0.6160	-0.3986	0.6202	1.0000	0.5968	-0.1757	0.6252	0.3044	0.5505	0.0158	0.4365	-0.5272	0.1692	0.5950	0.6792	0.5626	0.4020	-0.2913	-0.2790
Mg	-0.1068	0.3299	0.0532	0.2047	0.3833	0.1506	0.4548	0.5800	-0.0153	0.2493	-0.3906	0.3810	0.5968	1.0000	0.4499	0.2337	0.3746	0.4318	0.1681	0.2586	-0.6508	0.1149	0.3410	0.3790	0.4381	0.2686	-0.0497	0.4206
Mn	-0.5242	0.0897	-0.2018	-0.1982	-0.0910	-0.4418	0.4118	0.1686	-0.0632	-0.2982	-0.2692	-0.1264	-0.1757	0.4499	1.0000	-0.2719	0.2853	-0.0298	0.4249	-0.0919	-0.3033	-0.0626	-0.2551	-0.2525	-0.0311	-0.3186	-0.0246	0.7245
Mo	0.3666	0.7390	-0.0418	0.9265	0.8688	0.9287	0.3832	0.8210	-0.1360	0.8542	-0.3742	0.9531	0.6252	0.2337	-0.2719	1.0000	0.1754	0.8109	0.1850	0.8611	-0.3063	0.4250	0.9044	0.9271	0.8794	0.1376	-0.3740	-0.4251
Na	0.1827	0.3643	-0.1564	0.1892	0.2471	0.1578	0.5580	0.3800	0.2575	0.2887	0.0589	0.2546	0.3044	0.3746	0.2853	0.1754	1.0000	0.3951	0.1570	0.2237	-0.3425	0.0646	0.2455	0.2764	0.3320	0.1641	0.1703	0.1252
Ni	0.2003	0.8011	-0.1334	0.8133	0.8007	0.7622	0.6223	0.9080	0.3136	0.8339	-0.2033	0.9014	0.5505	0.4318	-0.0298	0.8109	0.3951	1.0000	0.0469	0.8524	-0.3900	0.4000	0.8950	0.8917	0.9024	0.3120	0.0079	-0.1613
P	-0.0019	0.1128	0.0172	0.1878	0.1729	0.1050	0.3452	0.1851	-0.3489	0.0447	-0.1716	0.1707	0.0158	0.1681	0.4249	0.1850	0.1570	0.0469	1.0000	0.1256	-0.0217	0.1993	-0.0019	0.0510	0.1507	-0.3768	-0.3336	0.1129
Pb	0.1503	0.7873	-0.1584	0.9253	0.8277	0.8114	0.5256	0.8737	0.0268	0.8149	-0.3303	0.9167	0.4365	0.2586	-0.0919	0.8611	0.2237	0.8524	0.1256	1.0000	-0.3406	0.4093	0.8958	0.8754	0.9307	0.0978	-0.2245	-0.1179
S	0.0787	-0.3990	0.3212	-0.3054	-0.4254	-0.2161	-0.4561	-0.5248	0.1933	-0.3443	0.6070	-0.3755	-0.5272	-0.6508	-0.3033	-0.3063	-0.3425	-0.3900	-0.0217	-0.3406	1.0000	-0.0919	-0.3052	-0.3849	-0.4644	-0.0712	0.3105	-0.2966
Sb	0.3171	0.4953	-0.0917	0.5152	0.3633	0.4556	0.1894	0.3630	0.0305	0.3301	-0.0305	0.4449	0.1692	0.1149	-0.0626	0.4250	0.0646	0.4000	0.1993	0.4093	-0.0919	1.0000	0.3798	0.3959	0.4080	-0.0621	-0.1048	-0.1122
Sc	0.2623	0.7009	0.0180	0.8850	0.8078	0.8743	0.4077	0.8845	0.1011	0.8393	-0.2062	0.9465	0.5950	0.3410	-0.2551	0.9044	0.2455	0.8950	-0.0019	0.8958	-0.3052	0.3798	1.0000	0.9657	0.9149	0.3393	-0.0640	-0.3464
Sn	0.3040	0.7230	-0.0364	0.8849	0.8407	0.8986	0.4428	0.8822	0.0344	0.8665	-0.2993	0.9526	0.6792	0.3790	-0.2525	0.9271	0.2764	0.8917	0.0510	0.8754	-0.3849	0.3959	0.9657	1.0000	0.9211	0.3064	-0.1760	-0.3715
Sr	0.1577	0.8171	-0.1705	0.8994	0.8770	0.8105	0.6521	0.9236	0.0225	0.8043	-0.4196	0.9553	0.5626	0.4381	-0.0311	0.8794	0.3320	0.9024	0.1507	0.9307	-0.4644	0.4080	0.9149	0.9211	1.0000	0.1523	-0.2360	-0.1130
Ti	0.1375	0.0329	0.2277	-0.0093	0.1791	0.1704	0.0159	0.1962	0.3669	0.2385	0.2447	0.1751	0.4020	0.2686	-0.3186	0.1376	0.1641	0.3120	-0.3768	0.0978	-0.0712	-0.0621	0.3393	0.3064	0.1523	1.0000	0.4341	-0.2481
V	-0.1303	-0.2478	0.1865	-0.3244	-0.4384	-0.3002	-0.1036	-0.1406	0.7108	-0.1604	0.7608	-0.2685	-0.2913	-0.0497	-0.0246	-0.3740	0.1703	0.0079	-0.3336	-0.2245	0.3105	-0.1048	-0.0640	-0.1760	-0.2360	0.4341	1.0000	-0.0146
Zn	-0.5410	0.0097	-0.1315	-0.3070	-0.1022	-0.5313	0.2829	-0.0281	0.0201	-0.3415	-0.1985	-0.2741	-0.2790	0.4206	0.7245	-0.4251	0.1252	-0.1613	0.1129	-0.1179	-0.2966	-0.1122	-0.3464	-0.3715	-0.1130	-0.2481	-0.0146	1.0000

TableII-4-8 Principal Component Analysis of Soil Samples in the Exiciban-Larap Area

Result of PCA

No.	Eig_value	Eig_pct	Eig_sum
Z-01	13.0684	46.6729	46.6729
Z-02	3.9225	14.0090	60.6819
Z-03	2.8325	10.1160	70.7978
Z-04	1.7582	6.2794	77.0772
Z-05	1.3356	4.7701	81.8473
Z-06	1.1990	4.2820	86.1293
Z-07	0.8176	2.9198	89.0491
Z-08	0.5540	1.9787	91.0279
Z-09	0.4607	1.6453	92.6732
Z-10	0.3792	1.3544	94.0276

Fact_ld	Z-01	Z-02	Z-03	Z-04	Z-05	Z-06	Z-07	Z-08	Z-09	Z-10
Hg	**0.9758**	-0.0379	-0.0429	-0.0474	-0.0342	0.1206	-0.0234	0.0730	0.0068	0.0055
Sr	**0.9652**	0.0917	0.0544	-0.0700	-0.0802	0.0786	-0.0458	-0.0055	-0.0017	-0.0198
Sn	**0.9588**	-0.1685	0.0263	0.0739	-0.0328	0.0789	-0.0344	0.0788	0.0489	-0.0041
Mo	**0.9409**	-0.1629	-0.2197	-0.0212	0.0165	0.0710	-0.0674	0.0387	0.0093	-0.0279
Sc	**0.9320**	-0.2205	0.0996	0.0178	-0.0717	0.1602	-0.0346	0.0611	0.0834	-0.0143
As	**0.9284**	-0.1013	-0.1873	-0.2026	-0.0383	0.0384	0.0256	-0.0075	0.1134	0.0441
Co	**0.9255**	0.1888	0.1778	0.0023	-0.0042	0.1754	-0.0165	0.0796	0.0902	0.0411
Ni	**0.9182**	-0.0381	0.3059	-0.0989	-0.0692	0.0399	-0.0152	0.0153	-0.0383	0.0773
Pb	**0.9159**	0.0008	-0.0074	-0.2012	-0.1590	0.1525	-0.0528	-0.0608	0.0611	-0.0331
Ba	**0.9060**	0.0731	-0.0954	0.0309	-0.0111	0.0822	-0.0451	-0.2181	-0.1897	-0.1236
Bi	**0.8877**	-0.3489	-0.2076	-0.0190	0.0688	-0.0445	-0.0094	-0.0019	0.0276	0.0880
Cu	**0.8816**	-0.2250	0.0386	-0.0039	-0.0043	-0.0641	-0.0910	-0.1206	0.0580	0.1014
Ag	**0.8306**	0.1774	0.0786	-0.2451	-0.1355	-0.0820	0.1126	-0.1098	-0.0374	-0.1341
K	**0.6863**	-0.0309	-0.0181	0.5829	0.1878	-0.1961	0.0493	0.0952	-0.0411	0.1185
Ca	**0.5772**	0.4792	0.3230	-0.2151	0.1212	-0.1763	-0.2058	-0.0998	-0.2689	-0.0126
Mn	-0.1116	**0.8615**	0.2477	-0.1660	0.1653	0.1187	-0.0028	0.1050	0.0480	0.0597
Zn	-0.2294	**0.7838**	0.2835	-0.0582	-0.0578	0.1499	0.1869	-0.3406	-0.0068	-0.0042
Mg	0.4359	**0.5154**	0.3490	0.4678	0.2454	0.1231	0.2298	0.0368	0.0077	0.1603
Au	0.3060	-0.5437	-0.1789	0.0377	0.4215	-0.5022	0.1189	-0.2164	-0.0292	0.1348
S	-0.4761	-0.5554	-0.0690	-0.4272	0.1141	0.2399	-0.1339	-0.0138	-0.2056	-0.0081
Fe	-0.4066	-0.6007	0.4699	-0.2857	0.2666	0.0587	0.0020	-0.0209	0.1140	-0.0516
V	-0.2866	-0.3554	0.8111	-0.1323	-0.0130	0.1197	0.0297	0.2033	0.1406	0.0557
Cr	0.0046	-0.2985	0.7892	-0.2611	-0.1617	-0.1254	0.0456	-0.1123	-0.1564	0.2758
Ti	0.2026	-0.4055	0.5395	0.5170	-0.0251	0.0618	0.0226	0.1497	-0.3260	-0.2532
Na	0.3425	0.2238	0.5118	-0.0406	0.3687	-0.4397	-0.2360	-0.0416	0.2511	-0.2810
P	0.1549	0.4037	-0.2800	-0.3381	0.6449	0.1288	-0.1815	0.2557	-0.1701	0.0803
Al	-0.1347	-0.3683	0.0490	0.2567	0.5011	0.6123	0.0266	-0.3125	0.0799	-0.0398
Sb	0.4556	-0.0803	-0.0915	-0.3950	0.1849	-0.0683	0.7235	0.1296	-0.0465	-0.1455

Eig_vec	Z-01	Z-02	Z-03	Z-04	Z-05	Z-06	Z-07	Z-08	Z-09	Z-10
Hg	0.2699	-0.0191	-0.0255	-0.0358	-0.0296	0.1101	-0.0258	0.0981	0.0100	0.0089
Sr	0.2670	0.0463	0.0324	-0.0528	-0.0694	0.0718	-0.0506	-0.0075	-0.0025	-0.0322
Sn	0.2652	-0.0851	0.0156	0.0557	-0.0284	0.0720	-0.0381	0.1058	0.0720	-0.0067
Mo	0.2603	-0.0823	-0.1305	-0.0160	0.0143	0.0649	-0.0745	0.0519	0.0137	-0.0454
Sc	0.2578	-0.1113	0.0592	0.0134	-0.0620	0.1646	-0.0383	0.0820	0.1229	-0.0232
As	0.2568	-0.0512	-0.1113	-0.1528	-0.0331	0.0351	0.0283	-0.0101	0.1670	0.0717
Co	0.2560	0.0953	0.1057	0.0017	-0.0037	0.1602	-0.0183	0.1069	0.1329	0.0667
Ni	0.2540	-0.0192	0.1818	-0.0746	-0.0599	0.0365	-0.0168	0.0206	-0.0565	0.1256
Pb	0.2534	0.0004	-0.0044	-0.1518	-0.1376	0.1393	-0.0584	-0.0816	0.0900	-0.0538
Ba	0.2506	0.0369	-0.0567	0.0233	-0.0096	0.0751	-0.0498	-0.2930	-0.2795	-0.2007
Bi	0.2456	-0.1762	-0.1233	-0.0143	0.0595	-0.0406	-0.0103	-0.0025	0.0407	0.1429
Cu	0.2439	-0.1136	0.0230	-0.0029	-0.0037	-0.0585	-0.1007	-0.1620	0.0855	0.1647
Ag	0.2298	0.0896	0.0467	-0.1848	-0.1173	-0.0749	0.1245	-0.1475	-0.0551	-0.2177
K	0.1899	-0.0156	-0.0108	0.4396	0.1625	-0.1791	0.0545	0.1278	-0.0606	0.1924
Ca	0.1597	0.2420	0.1919	-0.1622	0.1049	-0.1610	-0.2276	-0.1341	-0.3962	-0.0204
Mn	-0.0309	0.4350	0.1472	-0.1252	0.1430	0.1084	-0.0030	0.1411	0.0707	0.0969
Zn	-0.0634	0.3957	0.1684	-0.0439	-0.0500	0.1369	0.2068	-0.4575	-0.0100	-0.0068
Mg	0.1206	0.2602	0.2074	0.3528	0.2124	0.1124	0.2541	0.0495	0.0114	0.2604
Au	0.0847	-0.2745	-0.1063	0.0284	0.3647	-0.4587	0.1315	-0.2908	-0.0431	0.2189
S	-0.1317	-0.2804	-0.0410	-0.3221	0.0988	0.2191	-0.1481	-0.0185	-0.3029	-0.0131
Fe	-0.1125	-0.3033	0.2792	-0.2154	0.2307	0.0536	0.0022	-0.0280	0.1680	-0.0837
V	-0.0793	-0.1794	0.4819	-0.0998	-0.0112	0.1093	0.0329	0.2731	0.2071	0.0904
Cr	0.0013	-0.1507	0.4689	-0.1969	-0.1399	-0.1146	0.0504	-0.1509	-0.2305	0.4478
Ti	0.0560	-0.2047	0.3206	0.3899	-0.0217	0.0565	0.0250	0.2012	-0.4802	-0.4111
Na	0.0947	0.1130	0.3041	-0.0307	0.3190	-0.4016	-0.2611	-0.0559	0.3699	-0.4563
P	0.0428	0.2038	-0.1664	-0.2550	0.5580	0.1176	-0.2007	0.3435	-0.2506	0.1304
Al	-0.0373	-0.1860	0.0291	0.1936	0.4336	0.5592	0.0295	-0.4198	0.1177	-0.0646
Sb	0.1260	-0.0406	-0.0544	-0.2979	0.1600	-0.0624	0.8002	0.1741	-0.0686	-0.2363

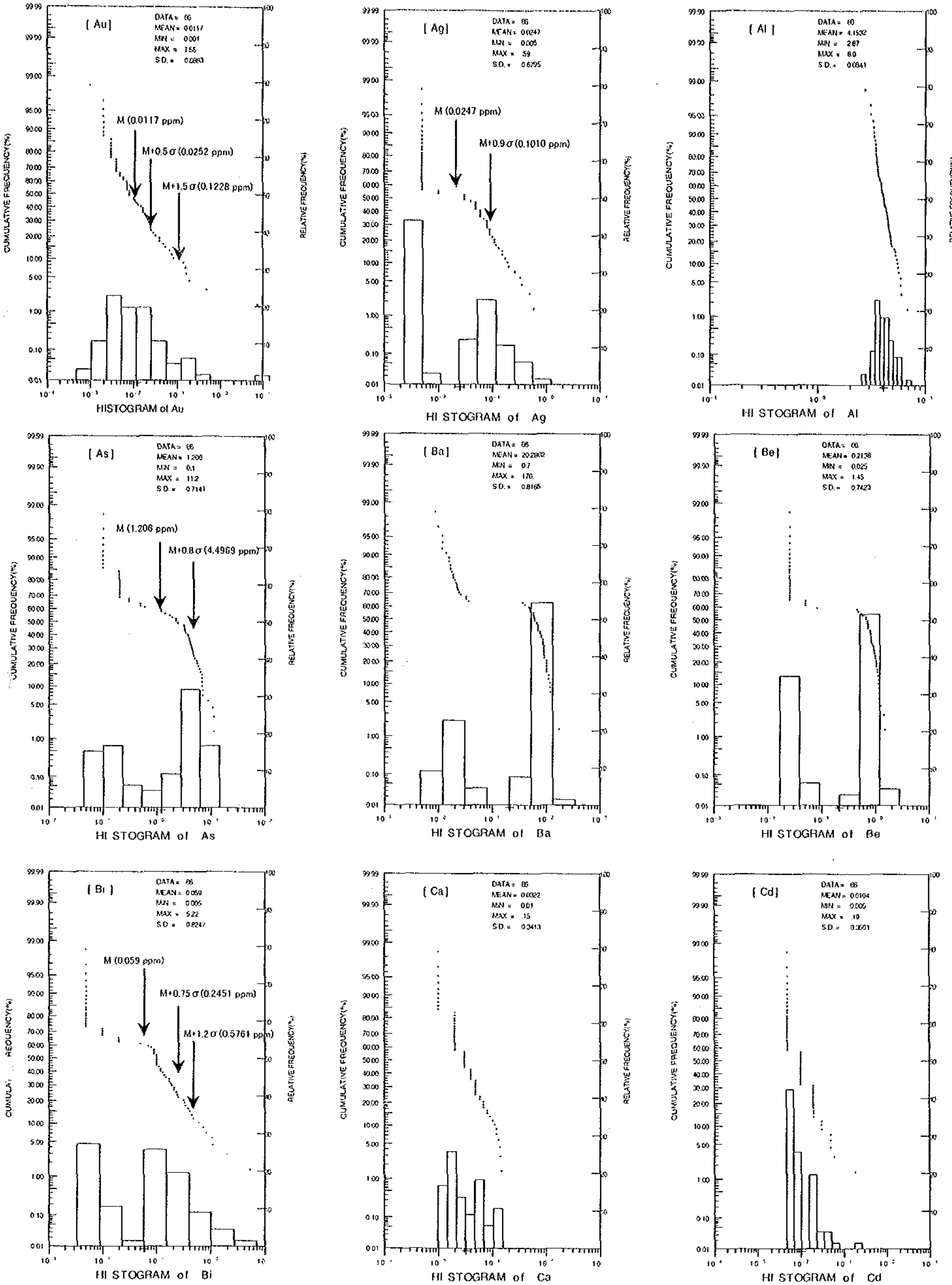


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (1)

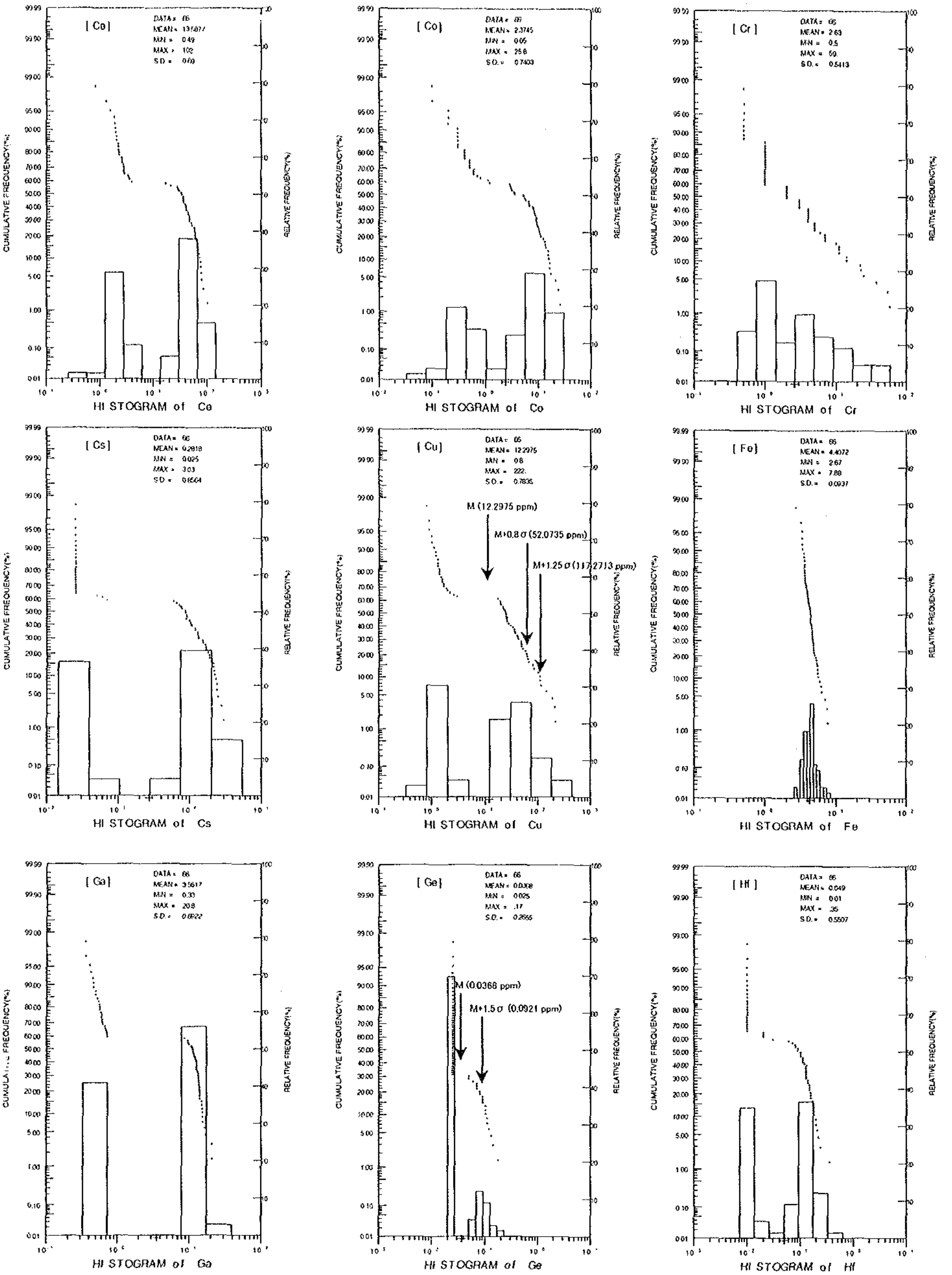


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (2)

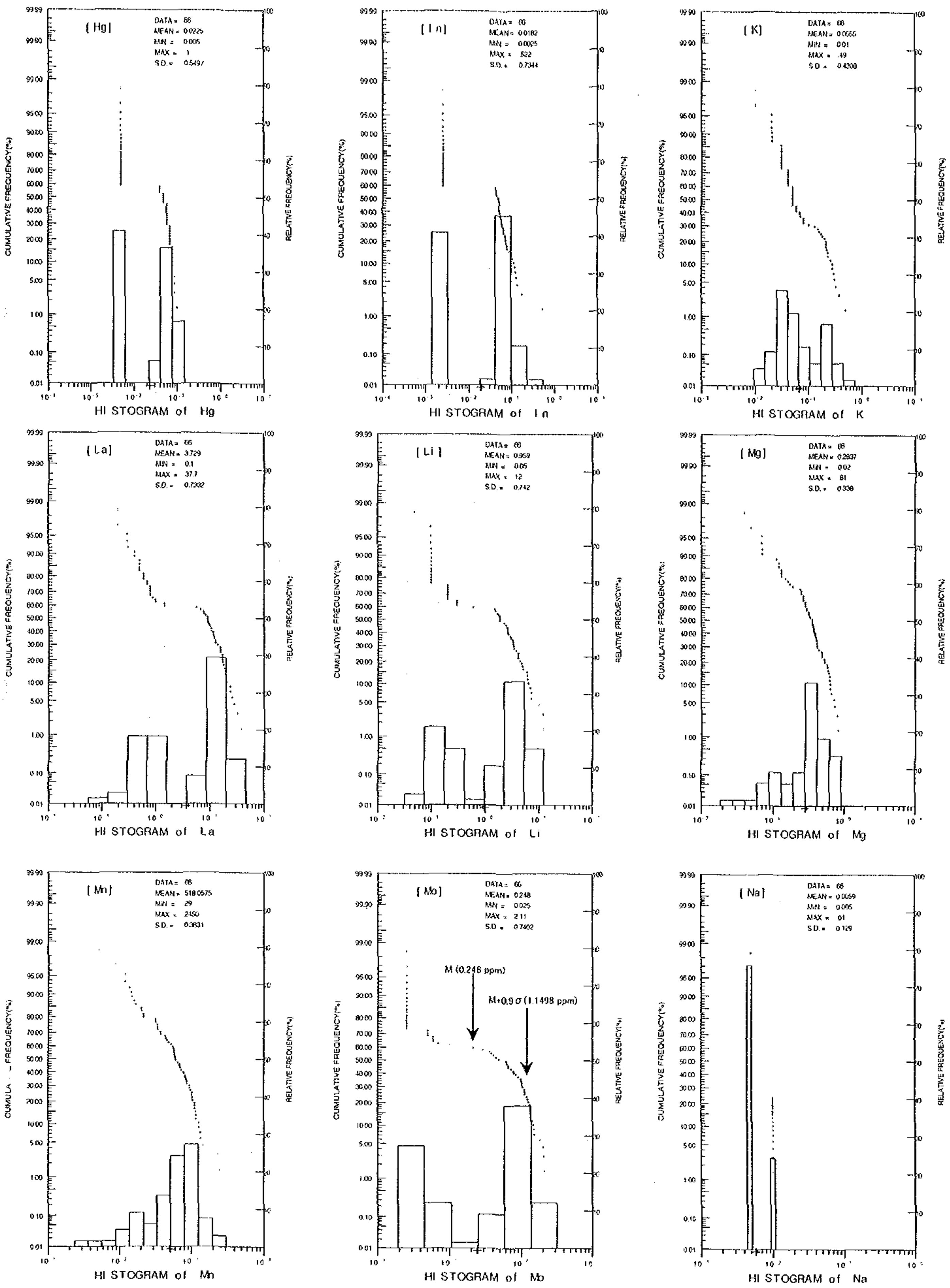


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (3)

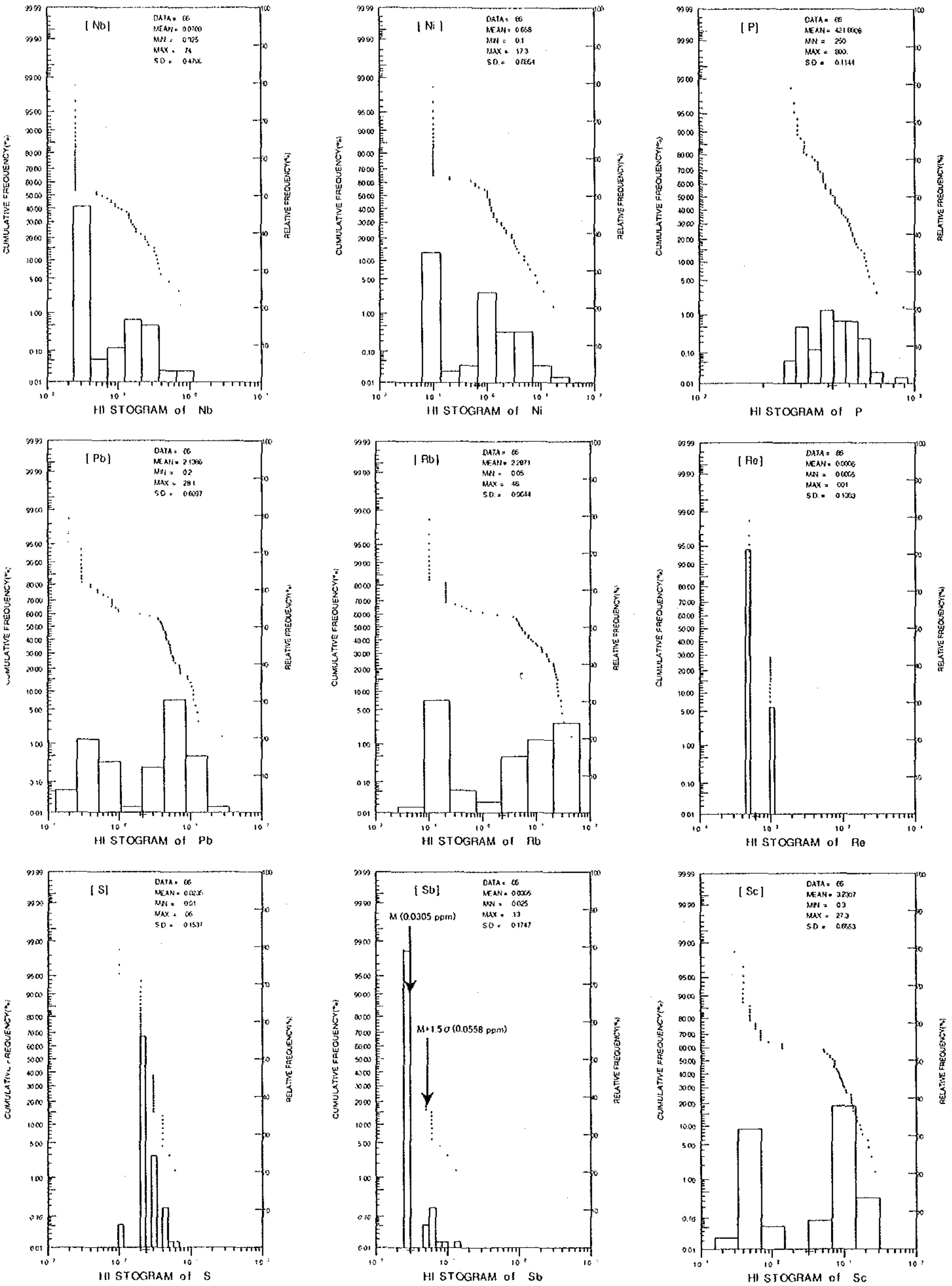


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (4)

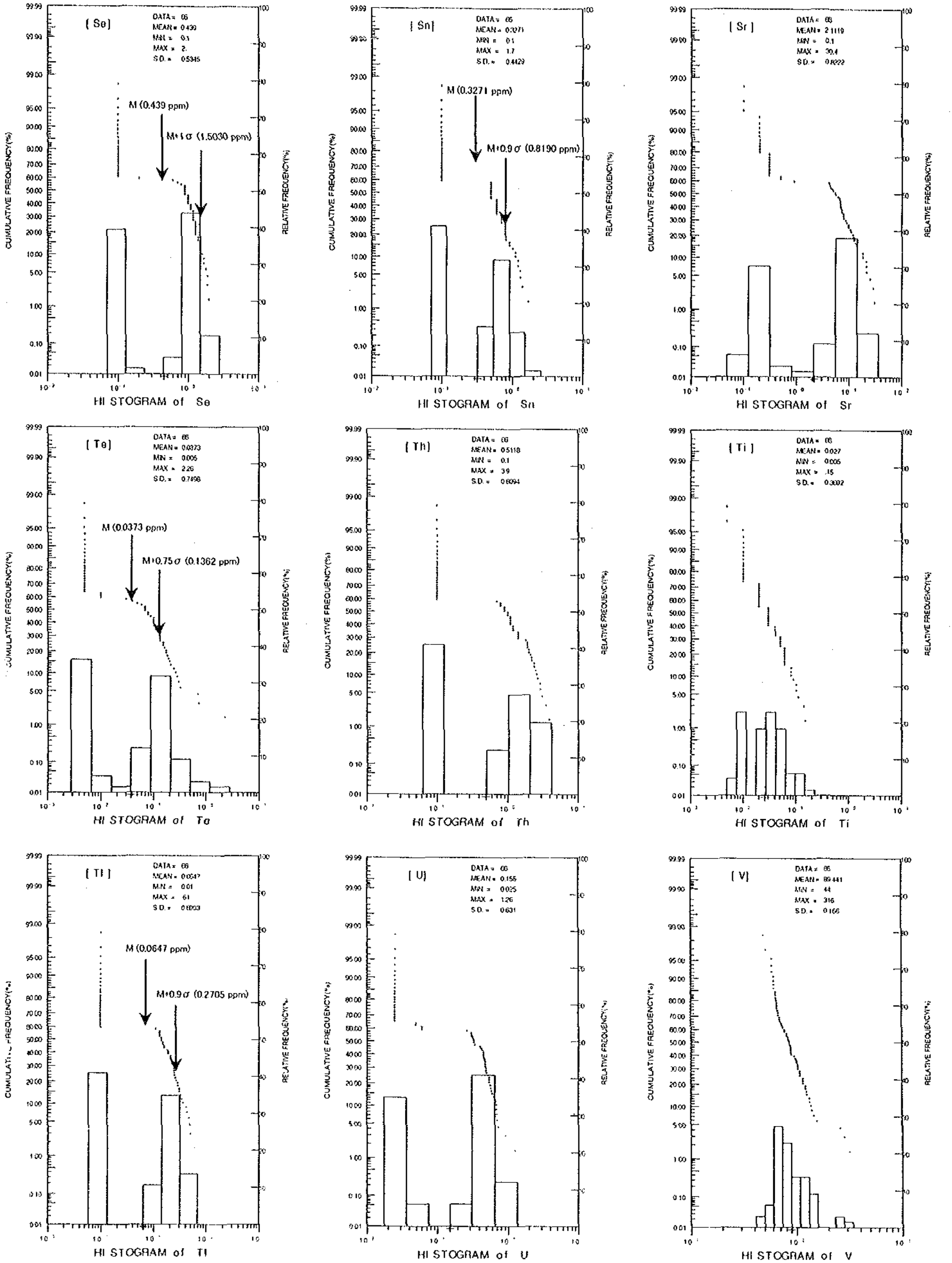


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (5)

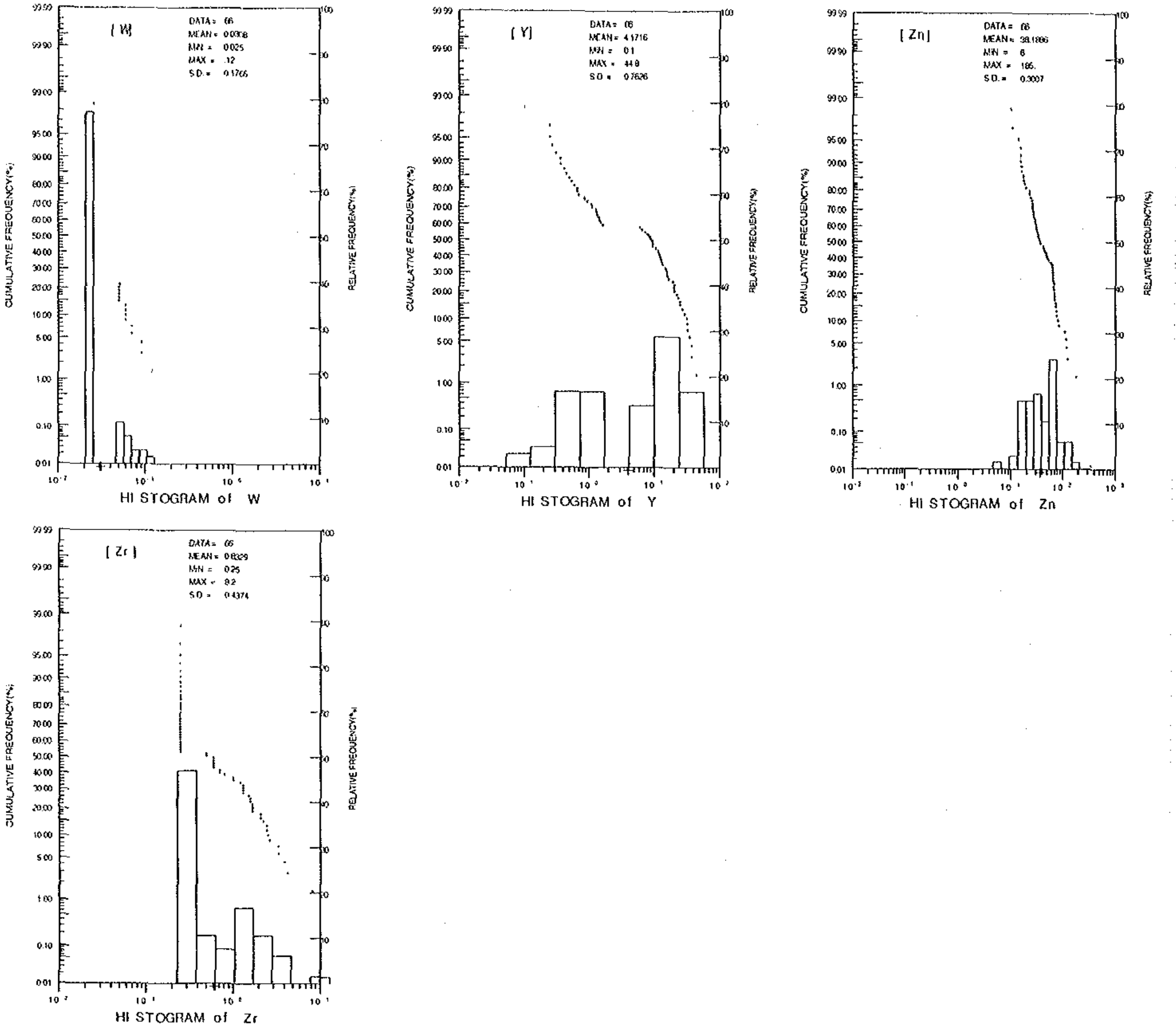


Fig. II-4-52. Probability Plot of Soil Samples in the Exciban-Larap Area (6)

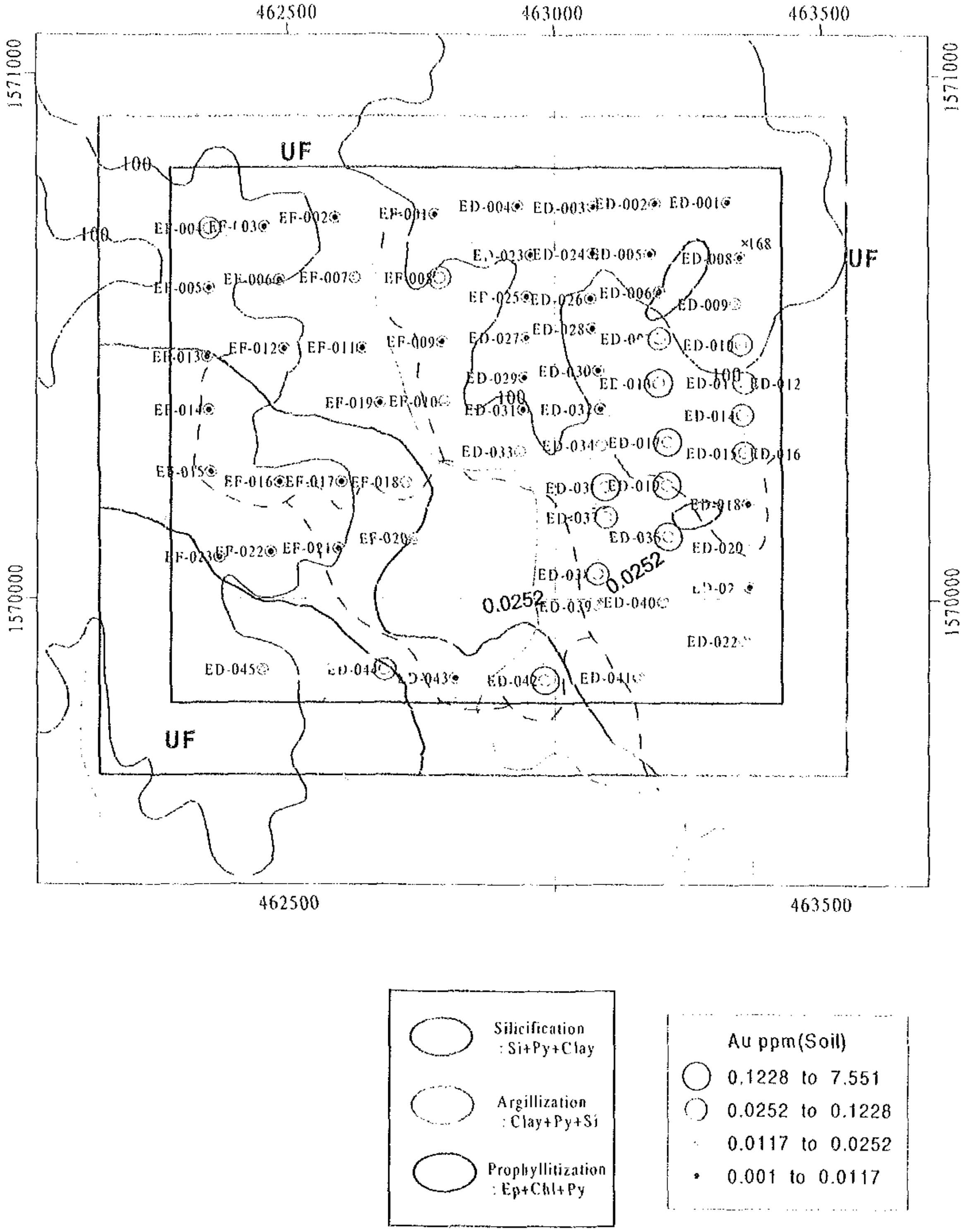


Fig.II-4-53 Au Content of Soil Samples in the Exciban-Larap Area.

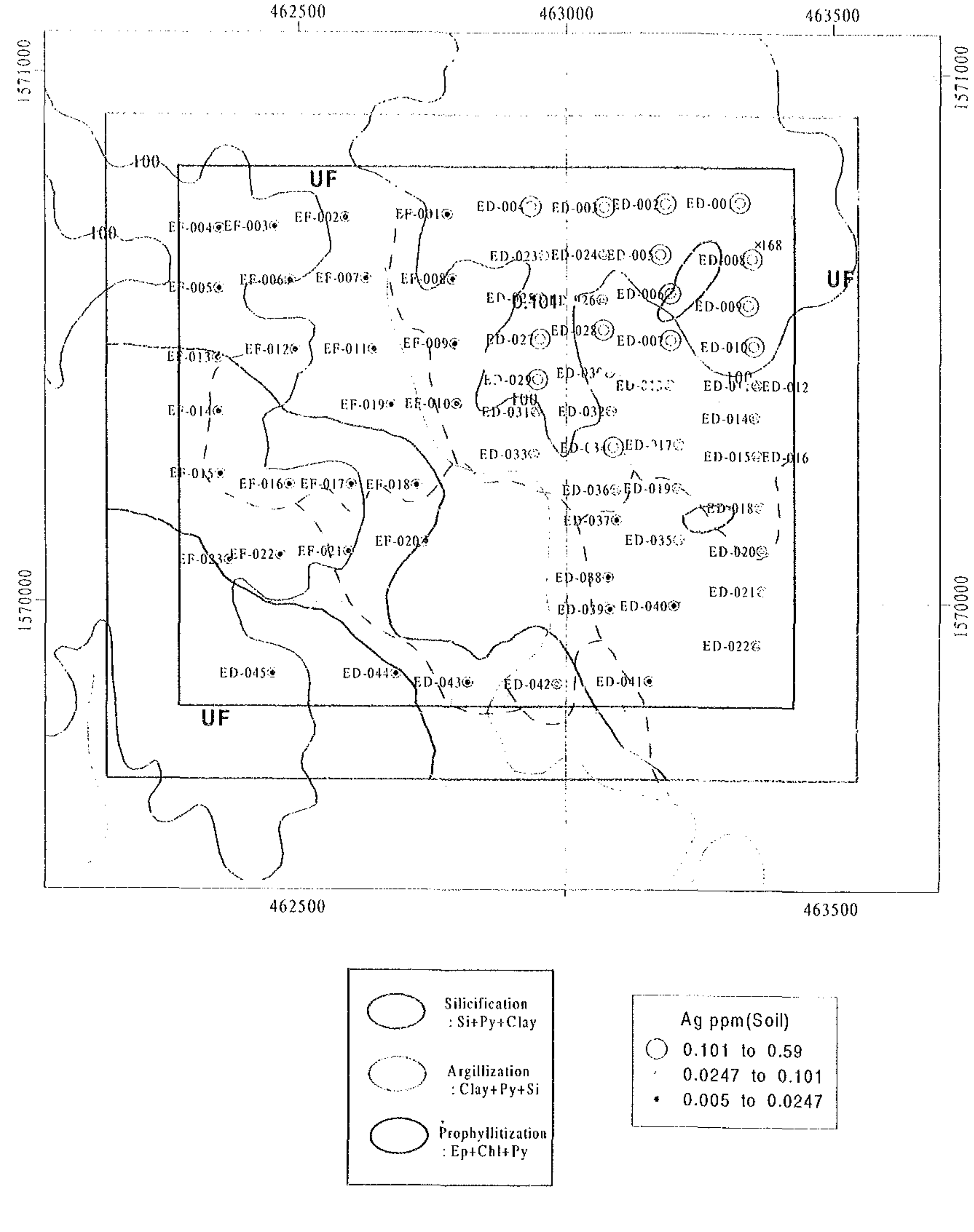


Fig.II-4-54 Ag Content of Soil Samples in the Exciban-Larap Area.

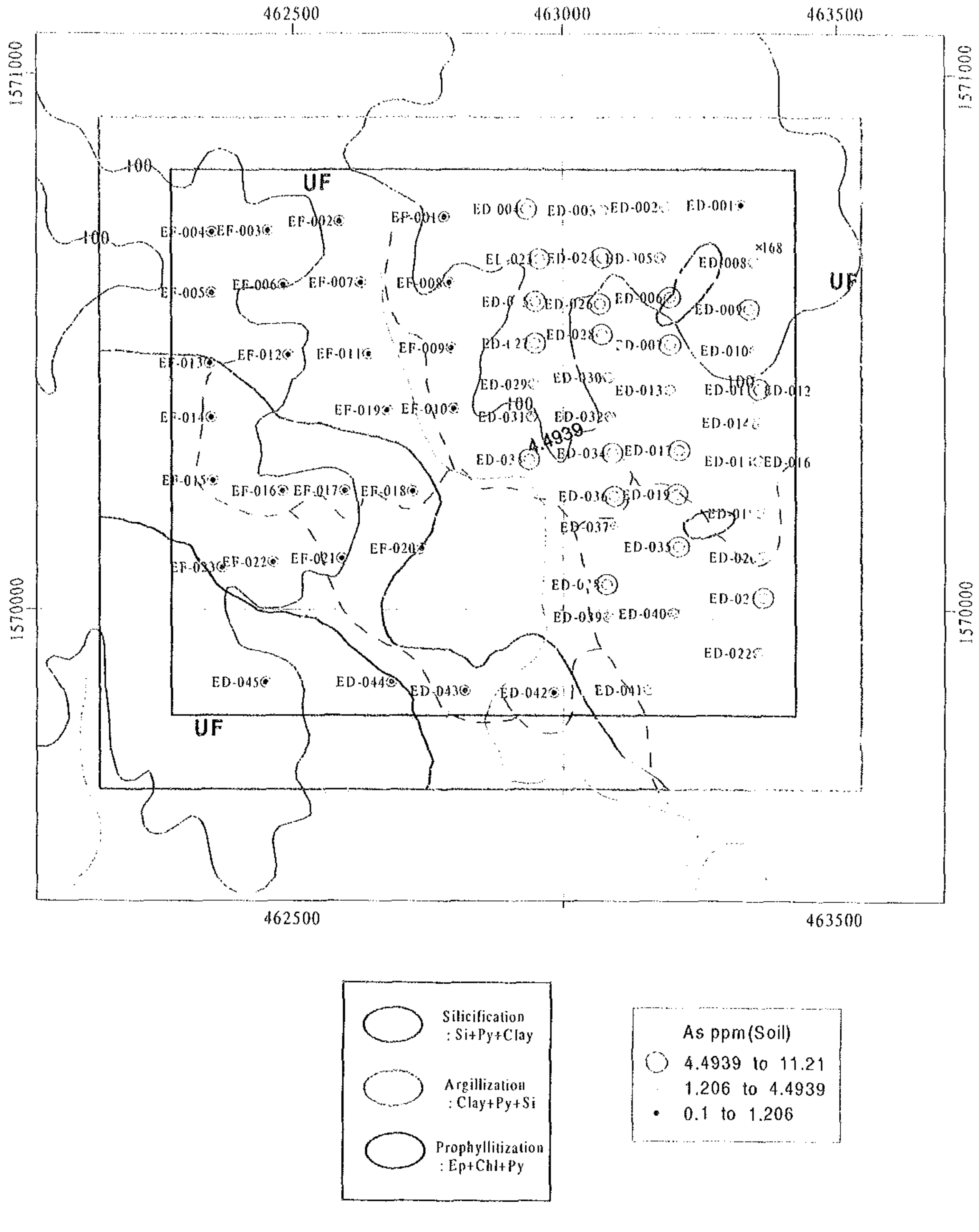


Fig.II-4-55 As Content of Soil Samples in the Exciban-Larap Area.

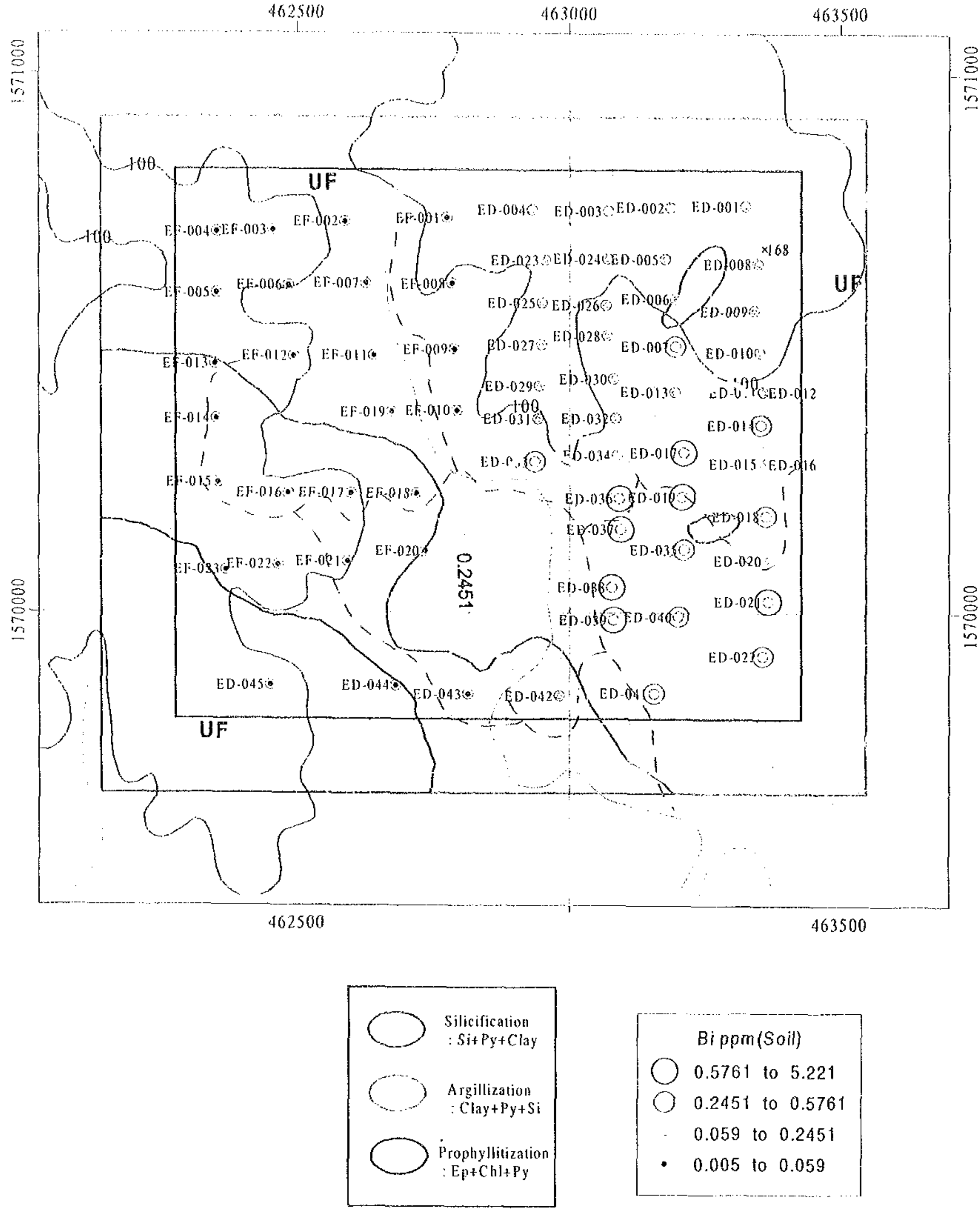


Fig.II-4-56 Bi Content of Soil Samples in the Exciban-Larap Area.

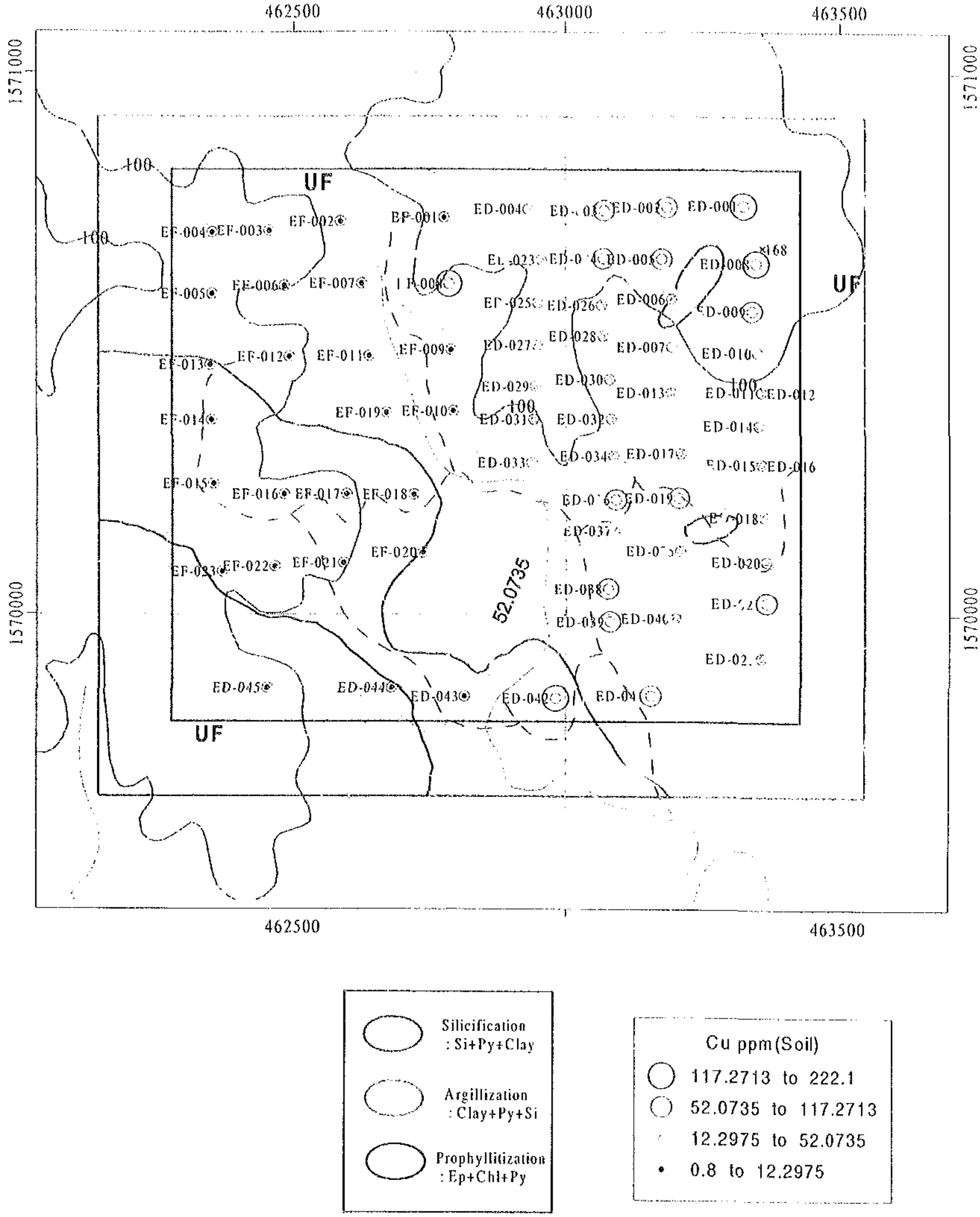


Fig.II-4-57 Cu Content of Soil Samples in the Exciban-Larap Area.

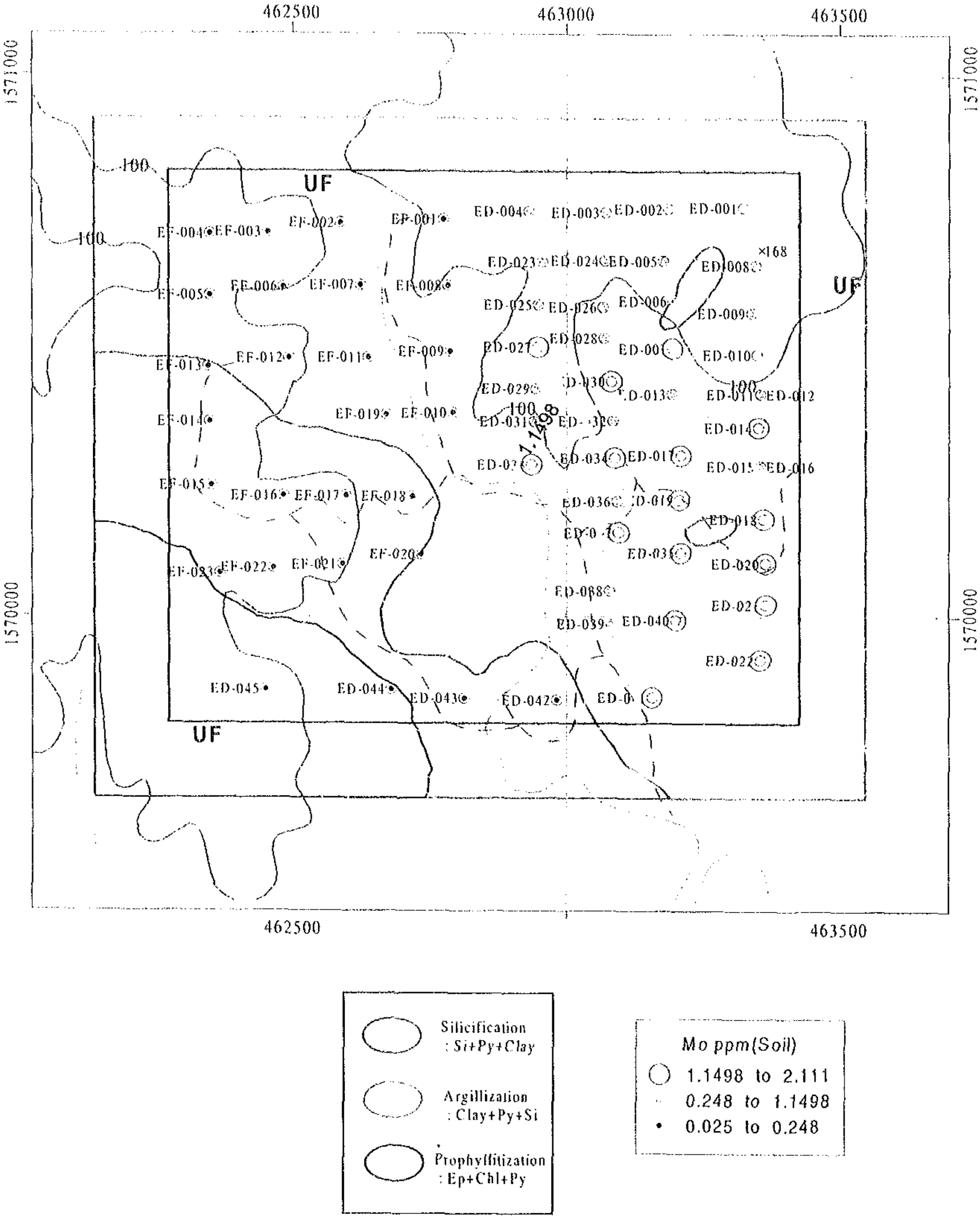


Fig.II-4-58 Mo Content of Soil Samples in the Exciban-Larap Area.

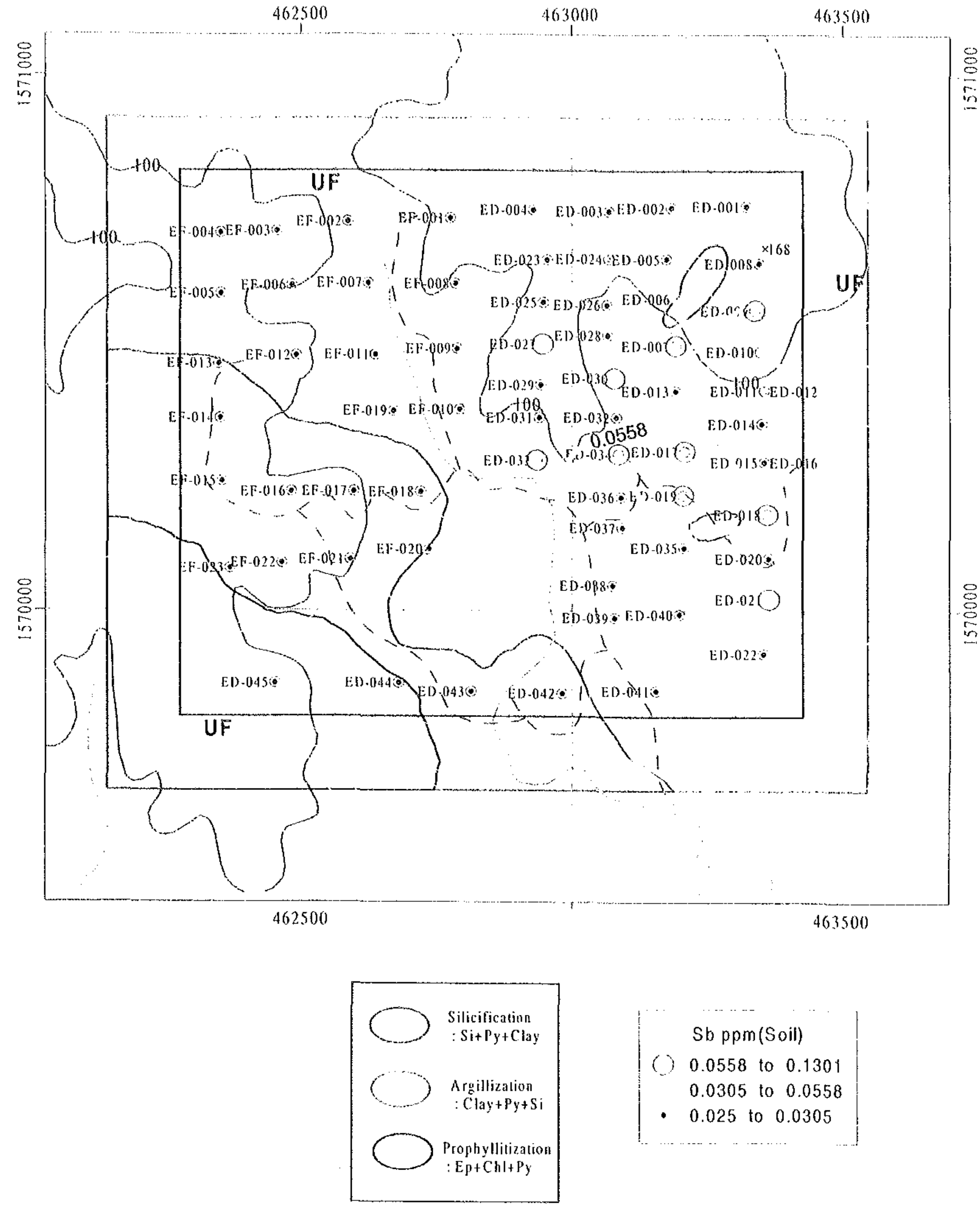


Fig.II-4-59 Sb Content of Soil Samples in the Exciban-Larap Area.

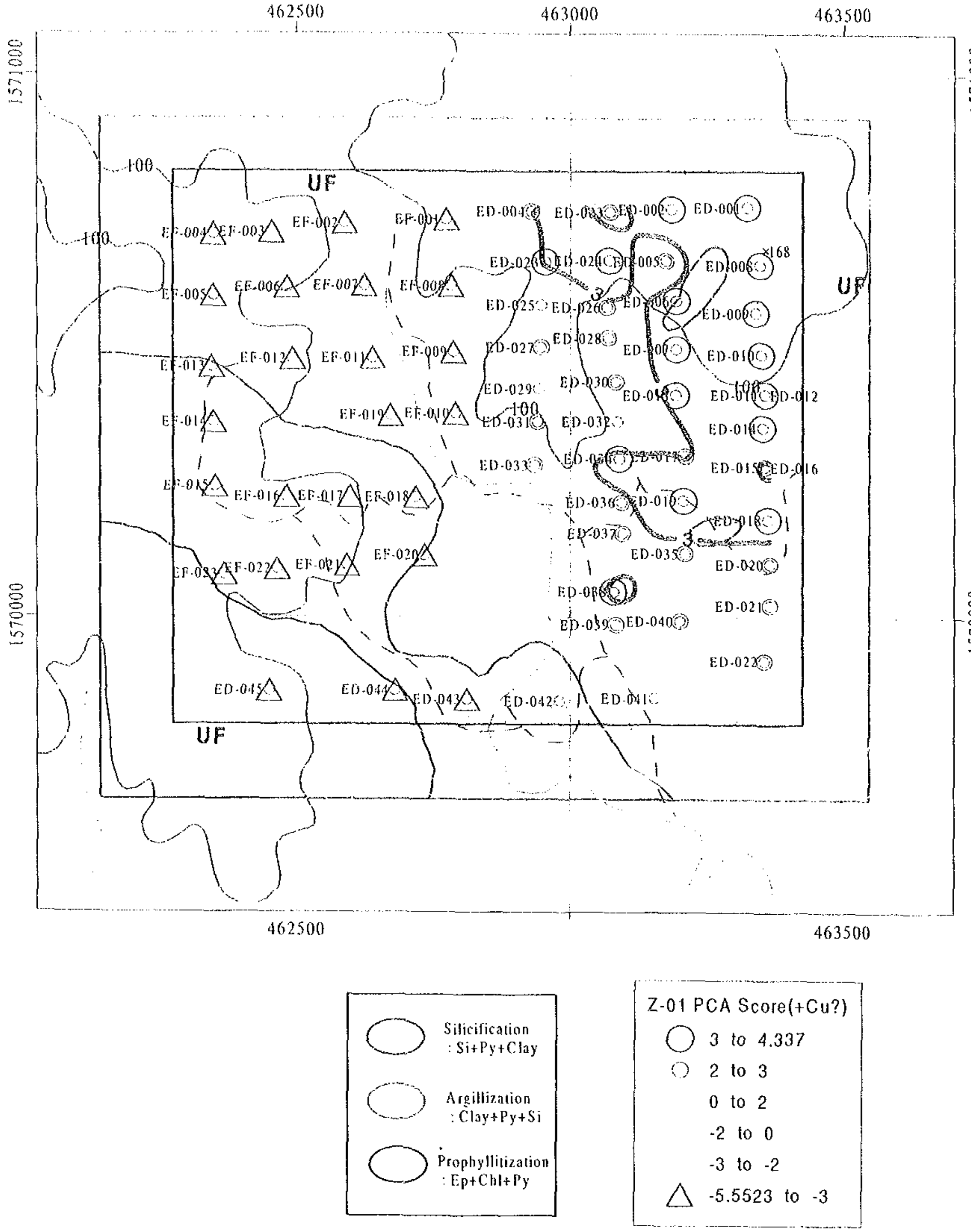


Fig.II-4-60 Z-01 PCA Score of Soil Samples in the Exciban-Larap Area.

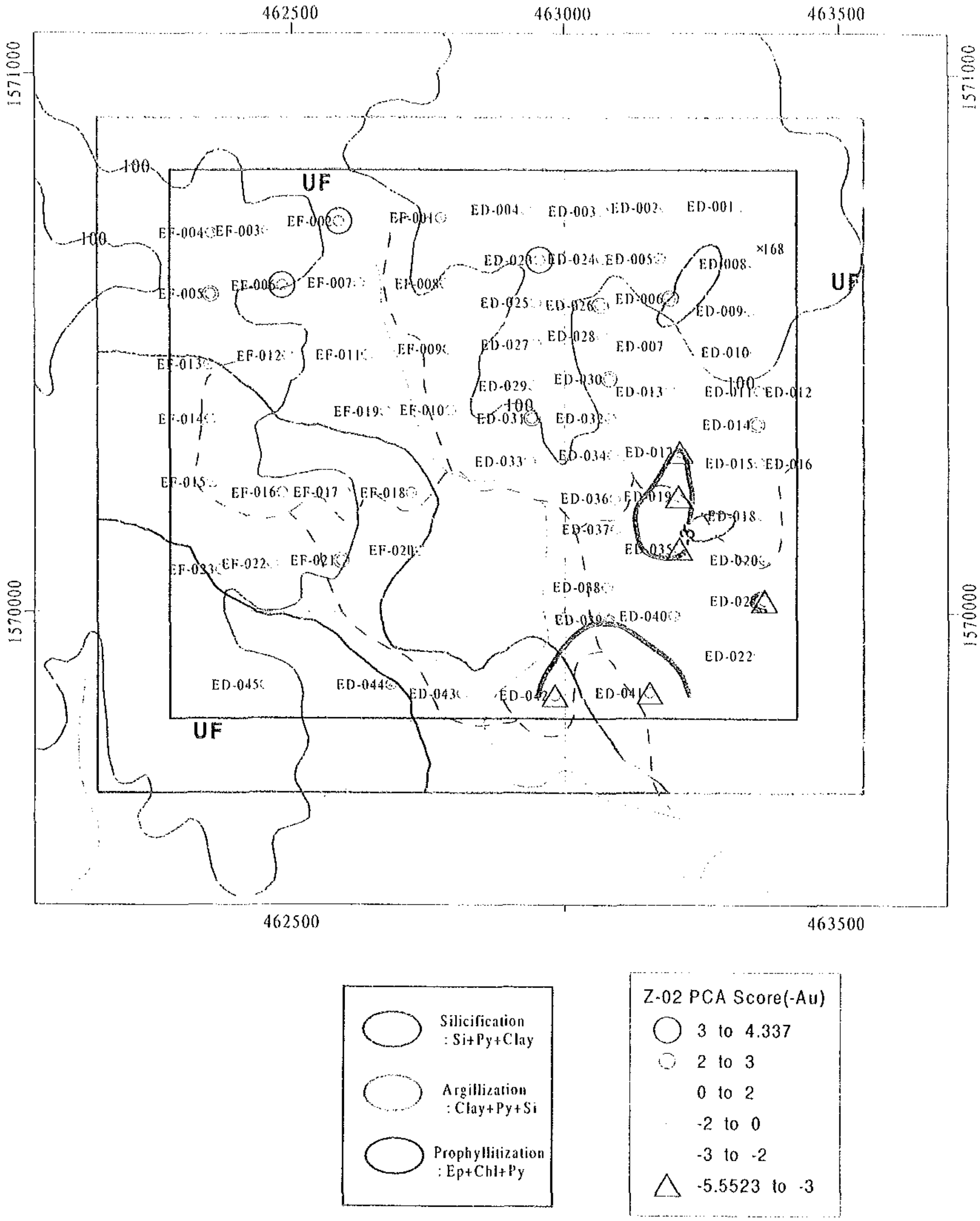
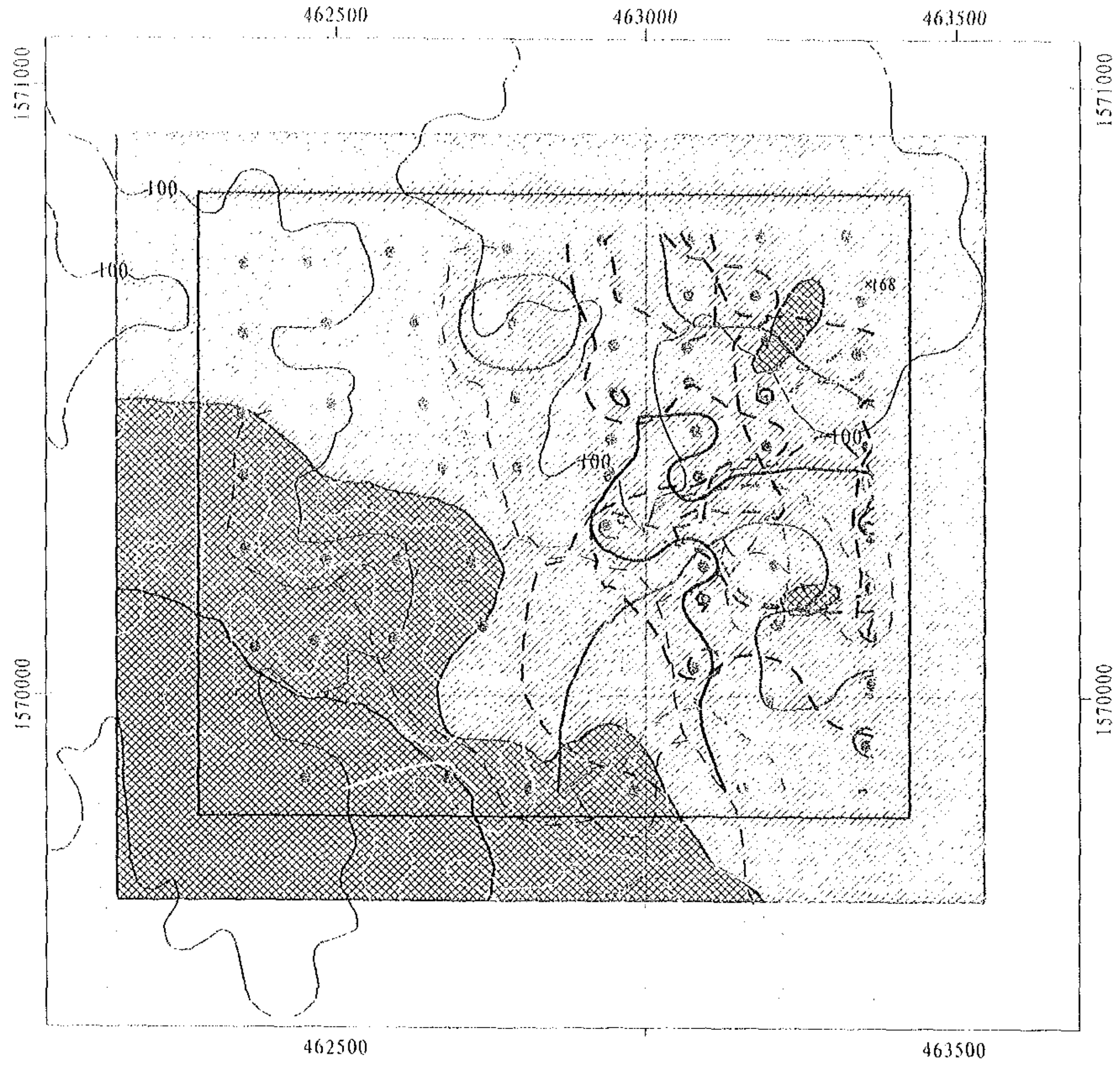


Fig.II-4-61 Z-02 PCA Score of Soil Samples in the Exciban-Larap Area.



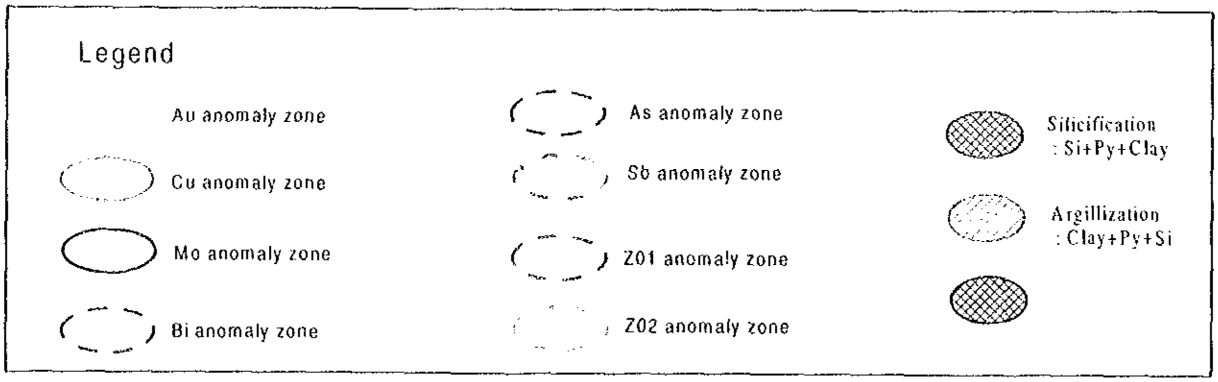


Fig.II-4-62 Geochemical Anomaly of Soil Samples in the Exciban-Larap Area.

elements in Phase-II, the distribution of Au, Ag, As, Bi, Cu, Mo, and Sb are shown (Fig.II-4-53 to II-4-59).

The distribution of anomaly of each element is mentioned below.

(Au) Anomalous samples seem to be concentrated in the area from silicification zone with adits in the south area to pocket shaped silicification zone in the east area. The maximum value is high as 7.551ppm. It is expected that it might be contaminated by mining acivities.

(Ag) Anomalous samples concentrate in pocket shaped silicification zone. The maximum value is 0.59ppm.

(As) Anomalous samples concentrate in pocket shaped silicification zone in the east to the northeast area. The maximum value is 11.21ppm.

(Bi) Anomalous samples seem to be concentrated in the area from silicification zone with adits in the south area to pocket shaped silicification zone in the east area. The maximum value is 5.221ppm.

(Cu) Anomalous samples almost coincide with the distribution of Au. The distribution becomes narrower. The maximum value is 222.1ppm.

(Mo) Anomalous samples almost coincide with the distribution of Bi. The maximum value is 2.111ppm.

(Sb) Anomalous samples cocentrate in pocket shaped silicification zone in the east to the northeast area. The maximum value is 0.1301ppm.

Principal components values were calculated by using the correlative determinant from logarithm value of soil analysis. The results are shown in TableII-4-8.

Eigenvalues was above 2 up to third principal components. The accumulated contribution ratio was 70% up to third principal components. The score distribution for first and second principal components are shown in Fig.II-4-60 to Fig.II-4-61.

(Z-01) About 46% of assay results can be explained by first principal components. For the elements relating to first principal components, Hg, Sr, Sn, Mo, Sc, As, Co, Ni, Pb, Ba, Bi, Cu, Ag, K, and Ca show positive scores. The behavior of the elements is related to Cu. And S and Fe show negative scores. It seems that the areas with positive scores of first principal components scatter on the ridges of west and south area. It seems to relate with Cu-mineralization.

(Z-02) About 15% of assay results can be explained by second principal components. For the elements related to second principal components, As, Sb, Au, and K show positive scores. Fe, Cr, Ti, V, and Mg show negative scores. It seems that the areas with negative scores of first principal components distribute in the small areas from silicification zone in the south area to pocket shaped silicification zone in the east area. The behavior of elements might indicate gold-copper deposit.

The geochemical anomaly zone of each elements are superimposed in Fig.II-4-62. It seems that the anomaly distribution of gold-copper deposit concentrates in the area from silicification zone with adits in the south area to pocket shaped silicification zone in the east area. The correlation between Au-Cu, and Bi, Mo, and Sb is shown.

4-3 Summary

The survey was conducted in four areas which were selected based on the available data. The areas are Salubosogin-Yakalan, Magasawan-Bato, Binangkawan-Taktak, and Exciban-Larap. The summary in each areas is mentioned below.

(Salubosogin-Yakalan Alteration zone)

In the center of the alteration zone, silicification zone, and argillization zone probably surrounding alteration zone are found along fault cutting Macogon Formation as Nalesbitan. Quartz vein with sulfide ore fills in shear zone. High-sulfidation–type gold mineralization with silicified breccia same as Nalesbiten is expected. Au-anomaly was found in silicification zone along fauls. Au is correlated with As, Hg, Mo, and Sb. The distribution of geochemical anomalies for epithermal gold deposit seem to be concentrated in the silicification zones both side of the fault in the center of the area. The eyeball is devided into two in the east and the center.

The mineralization in the brecciated portion in silicification zone along fault will be the target for the future survey. It is expected that the center of the mineralization may not be exposed. Therefore, it might be shallower than Nalesbitan.

The distribution of anomalies is shown in Fig.II-4-15.

(Magasawan-Bato Alteration zone)

Susungdalaga Volucanics are widely distributed in the center of the area.

In the north of the area, the sedimentary rocks of Sta. Elena Formation (Upper Miocene) is limitedly distributed as the form of window. Northeast to east-north-east and northsouth trending faults were observed. In the southwest of the area, the intrusion of plug is expected by airborne survey.

The mineralization was observed along mainly east-north-east stractural line and pyrite dissemination was observed in gouge. The distribution of alteration zone was found in wider area than its expected in Phase-II. Under geochemical survey, the gold anormaly is widely distributed along the fault trending northsouth and the east-north-east direction in silicification zones. Au is correlated with Ag, Hg, Mo, Pb, Sb, and Z-01. High sulfidation epithermal deposit may be expected. But the area might not be well eroded and the only shallow portion of geothermal alteration may be exposed. Sta. Elena Formation is distributed in the north of the area. The gold anomaly by soil geochemical survey condacted in the southwest of the area where the intrusion of plug is expected, may be higher potential, because Susungdalaga Volcanics may be thin.

The distribution of anomalies is shown in Fig.II-4-15.

(Binangkawan-Taktak Alteration zone)

In the area, northeast and northwest to west-south-west trends are dominant. Susungdalaga Volcanics is widely distributed in the area. In the northeast of the area, the intrusion of plug is expected under airborne survey.

The area along Taktak River is silicified, and silicification and argillization were observed in the limited zone along faults. Drussy quartz was also observed. The pocket and pyrite dissemination were observed in the silicified zone of dacitic pyroclastics. At north side of northeast trending fault, gold anomaly is detected under geochemical survey. Au is correlated with As, Sb, and Z-02. Because arsenopyrite was also observed, high-sulfidation-type epithermal mineralization is expected.

The distribution of anomalies is shown in Fig.II-4-47.

(Exciban-Larap Occurences)

In the area, northsouth trend is dominant. Eocene, Universal Formation is distributed. The area is underlained by bedding of sandstone and shale, and basalt. The fauls and joints with various directions were minutely observed. The gouge with pyrite was observed. The zones are cut every a few meters. The zonation of geothermal alteration was observed and massive suifide with dominantly pyrite are distributed. The sulfide is associated with a small amount of chalcopyrite and chalcocite, which shows high value of Au; 19.55ppm. The phenocrysts and veinlets of quartz, chlorite and epidote were observed and veinlet of pyrite dissemination was observed. The geochemical anomalies of Au-Cu deposit are concentrated from the silicification zone in the south of the area, mining adits are located, to the pocket-shaped silicification zone in the east to northeast of the area. Au-Cu is correlated with Bi, Mo, and SB. And diorite is distributed nearby. Therefore, porphyry-type copper deposit or mesothermal vein-type deposit are expected.

The distribution of anomalies is shown in Fig.II-4-62.