# CHAPTER 4 SOIL GEOCHEMICAL PROSPECTING

## 4-1 Survey area

The soil geochemical prospecting was carried out on the same survey area concurrently with the geological survey. The northern part of the San Jose area was additionally appointed as the survey area in the latter half of the field survey, because the area had a potential for greenston distribution.

## 4-2 Methodology

### 4-2-1 Sampling

Taken samples were weathering and pedologic soil of paleostream sediment, which forms the hinterland of the current river bed (Fig. II-4-1). Sampling points were selected using aerial photographs and topographical maps, so as to allow the catchment area of each drainage basin to be approximately equal. The sampling density was basically planned about 1 sample/$km^2$, and it was changed depending on the field condition such as geological features and soil developing conditions. This method was employed because it had been the most effective approach in past geochemical prospecting carried out for gold ore deposits in Uruguay (according to internal information).

Samples were taken from the soil of the B-layer, after digging down 10cm in. The weight of the soil sample was 2kg and the description of each sample is listed (Appendix 2). The positional information of the sampling point was obtained using GPS. The number of soil samples collected is 2,020. The location map of soil sample is shown in Fig. II-4-2. The breakdown by area is made up of 1,515 from the main part of the San Jose area, 161 from the western part of the San Jose area, 52 from the northern part of the San Jose area and 293 from the Arroyo Grande area.

### 4-2-2 Sample preparation

Preparation of soil sample was carried out at DINAMIGE laboratory. The samples were subjected to the analysis after being dried, crushed and sieved (80 mesh).

### 4-2-3 Chemical analysis

Elemental analysis was carried out for the 34 elements; Al, Sb, As, Ba, Be, Bi, B, Cd, Ca, Co, Cu, Ga, Fe, La, Pb, Mg, Mn, Hg, Mo, Ni, P, K, Sc, Ag, Na, Sr, S, Tl, Ti, W, U, V, Zn and Au. It is generally considered that among the above, Au Ag, Cu, Pb, Zn, Fe, As, Sb and Hg, are associated with gold mineralization. As for the methodology, the fire assay-ICP was employed for Au, and ICP analysis for the other elements, respectively.

The detection limit is shown in the list of statistics. The chemical analysis was carried out at the Lakefield Geosol Ltda, located in Belo Horizonte, Minas Gerais province, Brasil. The result of the soil analysis is shown in Appendix 3.

### 4-3 Analysis methodology

Statistical work was performed for all sample data. Based on the result of the chemical analysis implemented on the samples for geochemical prospecting, the data was fed into a computer for statistical analysis. The bivariate and multivariate analyses were implemented, after statistically processing the data to obtain the key statistics. For bivariate analysis, a histogram and a cumulative frequency graph of each element were made, as well as statistics of each element were obtained. In case that the data obtained was under detection limit, the half value of the detection limit was employed for calculation. The calculated mean value stands for a geometric average.

The relation between elements was discussed based on the calculated correlation coefficient. The EDA (Exploratory Data Analysis, Kurzl H.; 1988) was adopted to extract the anormalies of each element. This is a method to extract a threshold (i.e. anormaly) based on the statistic numerical process, irrespective of the distribution type of each element.

The factor analysis, which is an approach to extract a concerned factor based on the cluster analysis and the correlation between the elements, was adopted for multivariate analyses.

The geological features of the survey area are key factors for the analysis, and the result of the geological survey carried out in this fiscal year was used for that.

### 4-4 Result of analysis

#### 4-4-1 Result of statistical work

The statistical work was implemented using the analysis data obtained from all samples, after the result was fed into a computer. The result of statistical work is shown in Tab. II-4-1 to Tab. II-4-3. The maximum value of Au was indicated as 111ppb. Among the 34 elements adopted for this survey, most data of Au, Sb, Hg, Tl, Ag, Be, Bi, Cd, Mo, Sn and W were under the detection limit.

The correlation coefficient was calculated in order to figure out the relation between the elements (Tab. II-4-2). The result was a high positive correlation recognized for each of Co, Cr, Cu, Fe, Mg, Ni, V and Zn. No element was recognized, which has a high correlation with Au.

#### 4-4-2 Result of bivariate analysis

After examining the result of statistical work for each element, the value of the Upper Fence was determined as a threshold, based on the statistics of data (Tab. II-4-1), the result of EDA (Tab. II-4-3) and the cumulative frequency graph (Fig. II-4-3(1) to (9)). The distribution maps of anomalies for each of Au, As, Cu, Pb and Zn were prepared as shown in Fig. II-4-4 ~Fig. II-4-8, based on the above-mentioned threshold and the value of the Upper Wisker as a complementary threshold. According to the distribution maps, the distributional tendency of each element is summarized below.

Au : The threshold was determined as 5ppb, and the values over that as the anormaly. The anormalies were extracted from the south part of the mineral showing H in the southeast part of the main part of the San Jose area, and the mineral showing L in the west part of the Arroyo Grande area.

Additionally the anormalies were dotted in the west to middle part of the main part of the San Jose area.

As : The threshold was determined as 21.7ppm, the complementary threshold as 10.0ppm, and the values over that as the anormaly. The anormalies were extracted from the west and middle parts of the main part of the San Jose area, the east part of the western part of the San Jose area and the Arroyo Grande area. As contrasted with mineral showings, the distribution corresponds to the mineral showings B, E, G, in the north of G, H, I, in the east of K, L and M.

Cu : The threshold was determined as 55.4ppm, the complementary threshold as 37.0ppm, and the values over that as the anormaly. The anormalies were recognized over the whole survey area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, B, C, E, in the west of E, G, in the northeast of G, J, K, L and M.

Pb : The threshold was determined as 73.4ppm, the complementary threshold as 60.0ppm, and the values over that as the anormaly. The anormalies were recognized over the whole survey area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, B, C, D, E, G, in the north of G, I, in the northeast of I, J, K, L and M.

Zn : The threshold was determined as 140.3ppm, the complementary threshold as 85.0ppm, and the values over that as the anormaly. The anormalies were recognized over the whole survey area, except a dotted distribution in the middle part of the area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, B, C, in the south of C, D, G, in the east of G, K, L and M.

### 4-4-3 Result of multivariate analysis

The cluster analysis and the factor analysis were adopted for multivariate analysis, in order to examine the relevance of the elements to the mineralization or to the property of wall rock, based on the analysis data of each sample.

The cluster dendrogram of cluster analysis was produced (Fig. II-4-9). It proves that Au and As, Pb and Al, and Cu and Zn have close relation. As for the factor analysis, 8 factors were extracted by the Varimax method (Tab. II-4-4). Among them, regarding the 4 major contributing factors which have high contribution ratio, the factor score diagrams were prepared (Fig. II-4-10). The elements, which have high absolute value of a factor loading, are shown by factors as below.

Factor1 : Co, Cr, Cu, Fe, Mg and Ni

Factor2 : Ga, Al, Fe, K, Li, Pb, Y and Zn

Factor3 : Ca, Na and Sr

Factor4 : Au, As, K and V

The distribution maps of factor scores were prepared (Fig. II-4-11~Fig. II-4-14), plotting the samples whose absolute value of a factor score is not lower than 1, to examine the relation between the geological features and mineralization.

**Factor 1** : The high factor score is distributed in the west to the middle part of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. The geological features of these high score area, consist of pCCcb, pCCps and pCCag. As contrasted with the mineral showings, the distribution corresponds to the mineral showings B, between B and C, in the north of the area between A and E, in the northeast of I and M.

**Factor 2** : The high factor score is distributed in the west and middle parts of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. The geological features of these high score areas, consist of pCCcb, pCCsjo, pCCps, pCCsj, pCCag and pCCG. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, C, D, in the south part of G, in the north of G, K and M.

**Factor 3** : The high factor score is distributed in the west and east parts of the main part of the San Jose area, the western part of the San Jose area and the west part of the Arroyo Grande area. The geological features of these high score areas, consist of pCCcb, pCCsjo, pCCps, pCCag and pCCG. As contrasted with the mineral showings, the distribution corresponds on the southeast part of the mineral showing A, between the mineral showings B and C, the C, G, in the east of G～in the north of I, J, L and M.

**Factor 4** : The high factor score is distributed in the west and middle parts of the main part of the San Jose area and the Arroyo Grande area. The geological features of these high score areas, consist of pCCsjo, pCCps, and pCCag. As contrasted with the mineral showings, the distribution corresponds on the mineral showings A, the south part of B, E, G, H, I and L.

### 4-4-4 Discussion

Based on the result of factor analysis, the following is estimated. Factor 1 is considered to be a factor that reflects the petrographic character of so-called mafic rock. As contrasted with the geological features, the factor score tends to be high in the distribution area of pCCps and pCCag, as both include green rocks. Factor 2 may be a factor that is associated with the petrographic character of granites.

Factor 3 may be a factor that gives non-mafic rocks a distinction or is associated with clay minerals. The factor score tends to be high in the distribution area of pCCsjo, pCCps and pCCag, which constitute the so-called greenstone zone. Factor 4 is considered to be a factor that is related to the gold mineralization. Examining the geochemical anormaly in the relation with mineral showings, the mineral showings A, B, E, G, H and L can be extracted as the place where the Au and As anormalies and high score of Factor4 correspond.

From the result of soil geochemical prospecting, any significant relation between the anormalies and the fracture zones could not be realized. However, the Au geochemical anormalies along the fracture zone were extracted based on the results of the rock geochemical prospecting mentioned below. As a result of this fiscal year's survey, the possibility of bearing a potential gold ore deposit is sufficiently recognized.

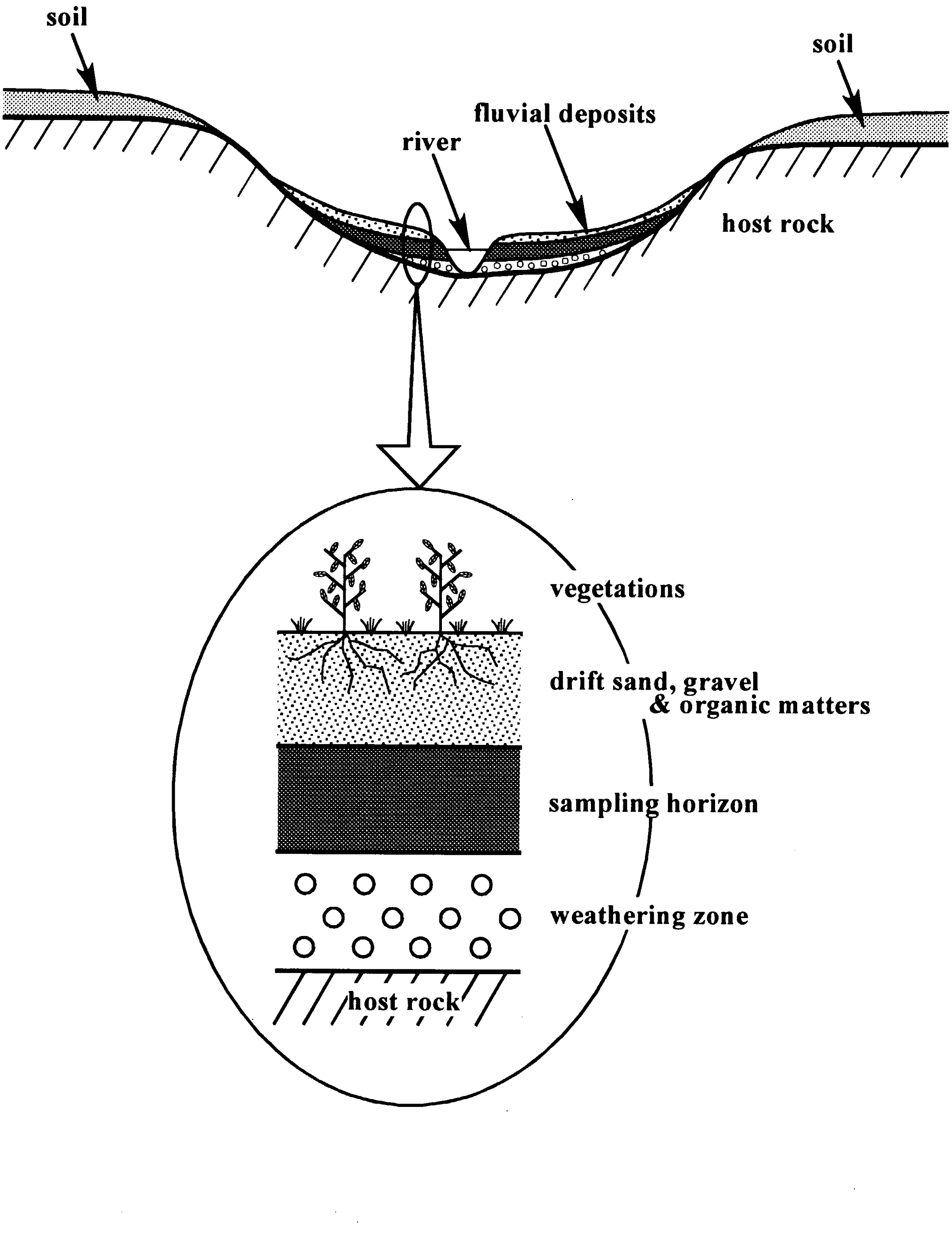



Fig.II-4-1 Schematic cross section of fluvial system showing the sampling horizon for soil geochemical survey

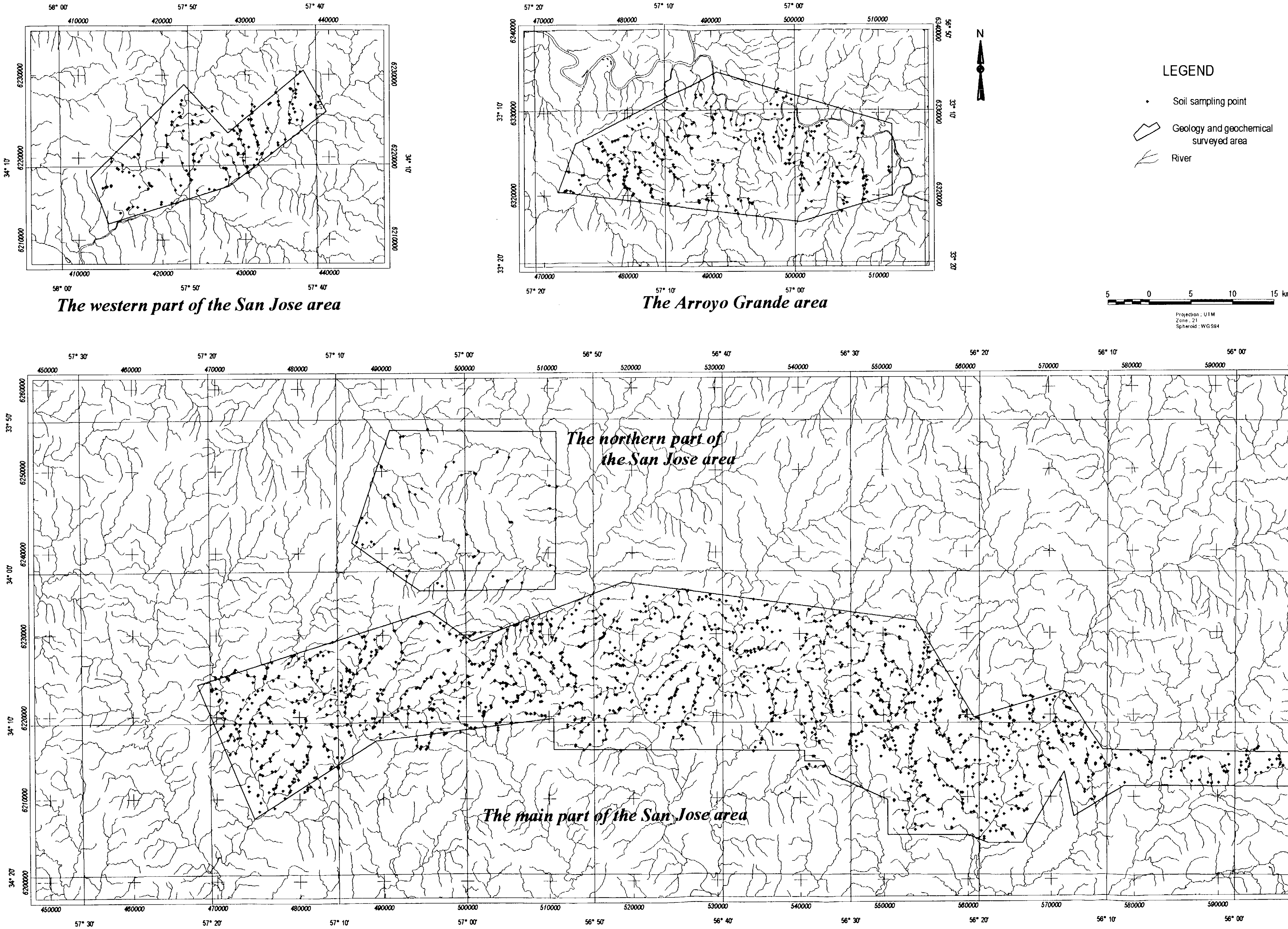



Fig.II-4-2 Location map of soil samples

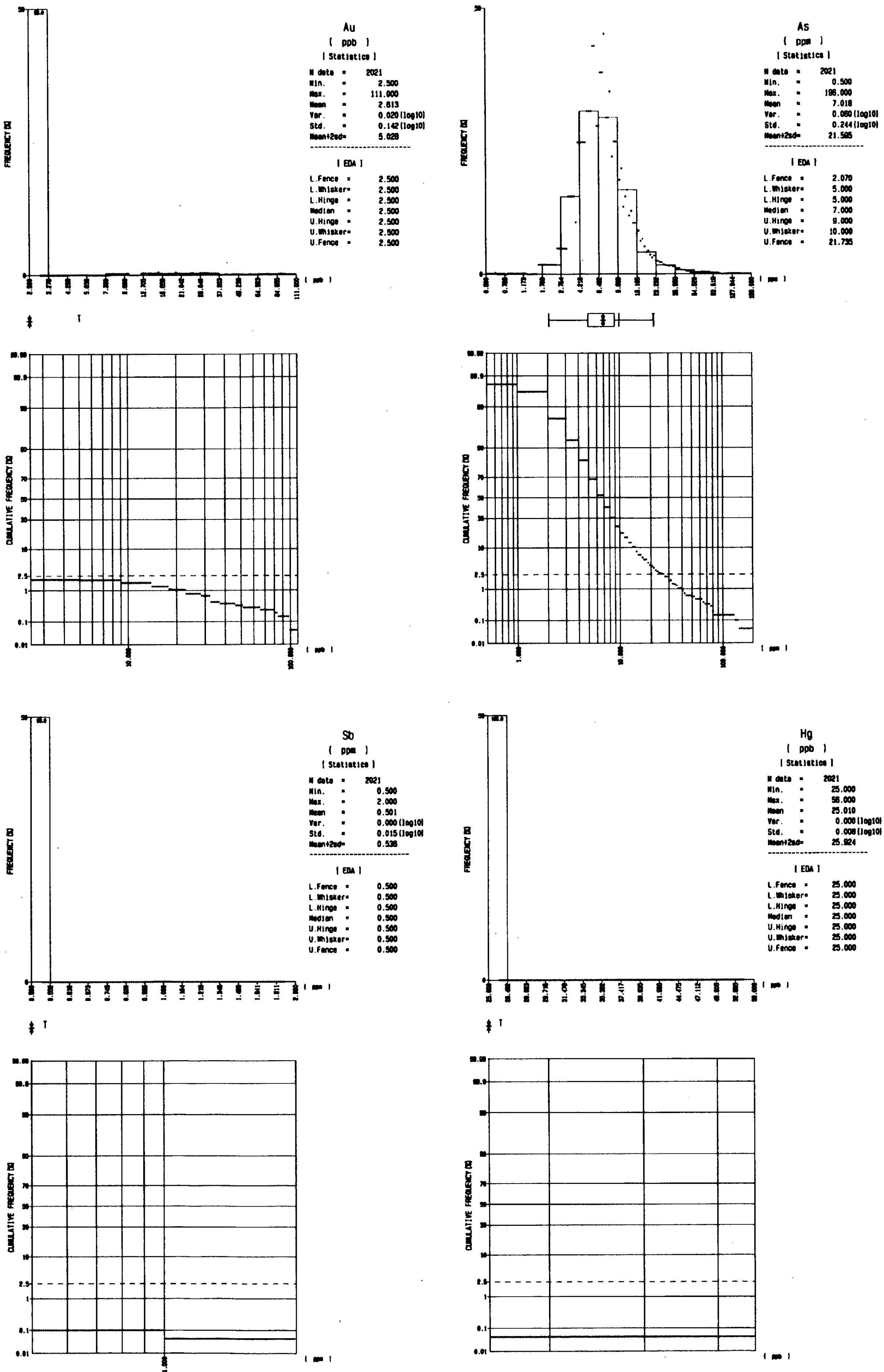



Fig.II-4-3(1) Histogram, EDA and cumulative frequency of each element of soil samples

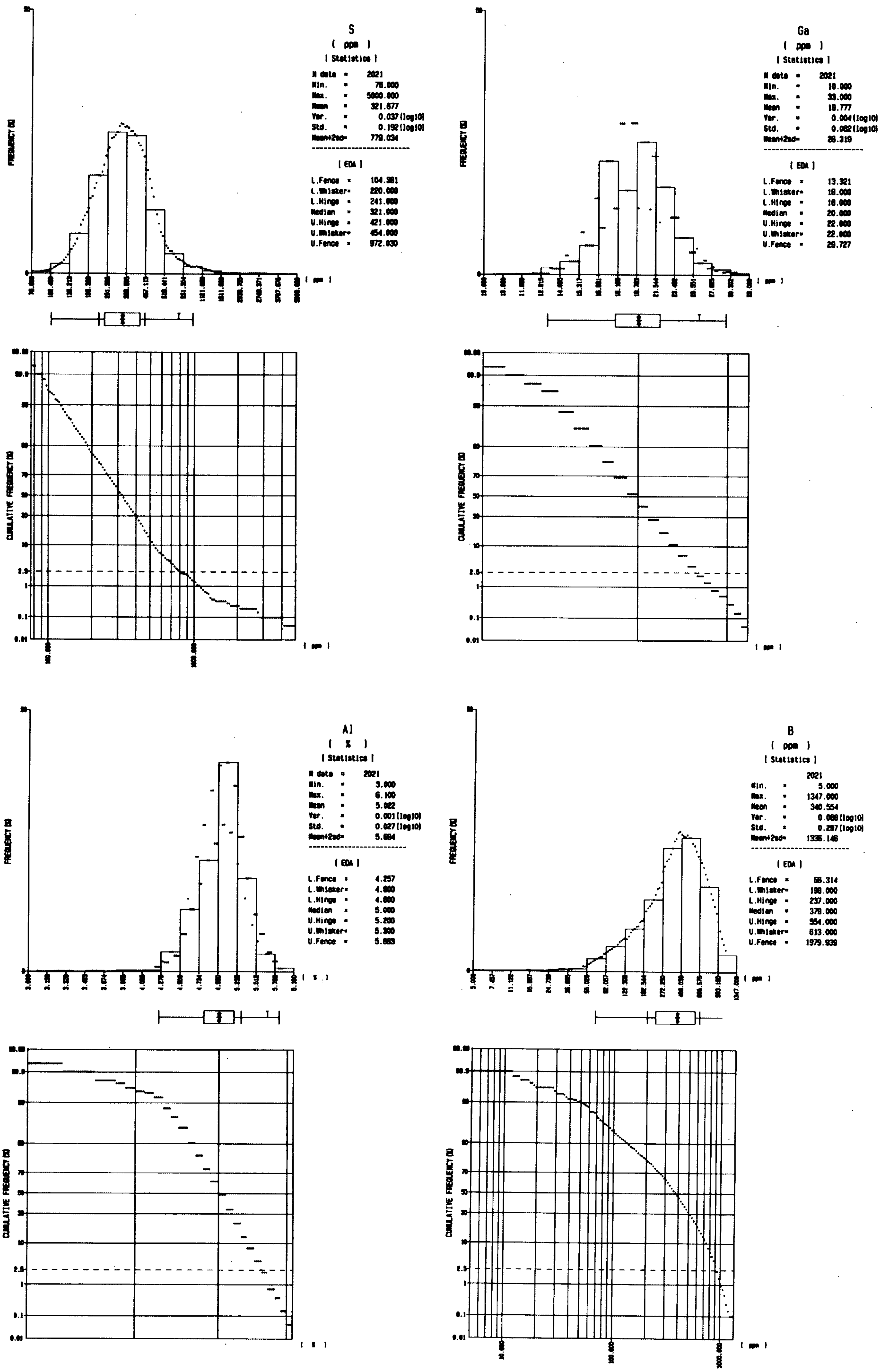



Fig.II-4-3(2) Histogram, EDA and cumulative frequency of each element of soil samples

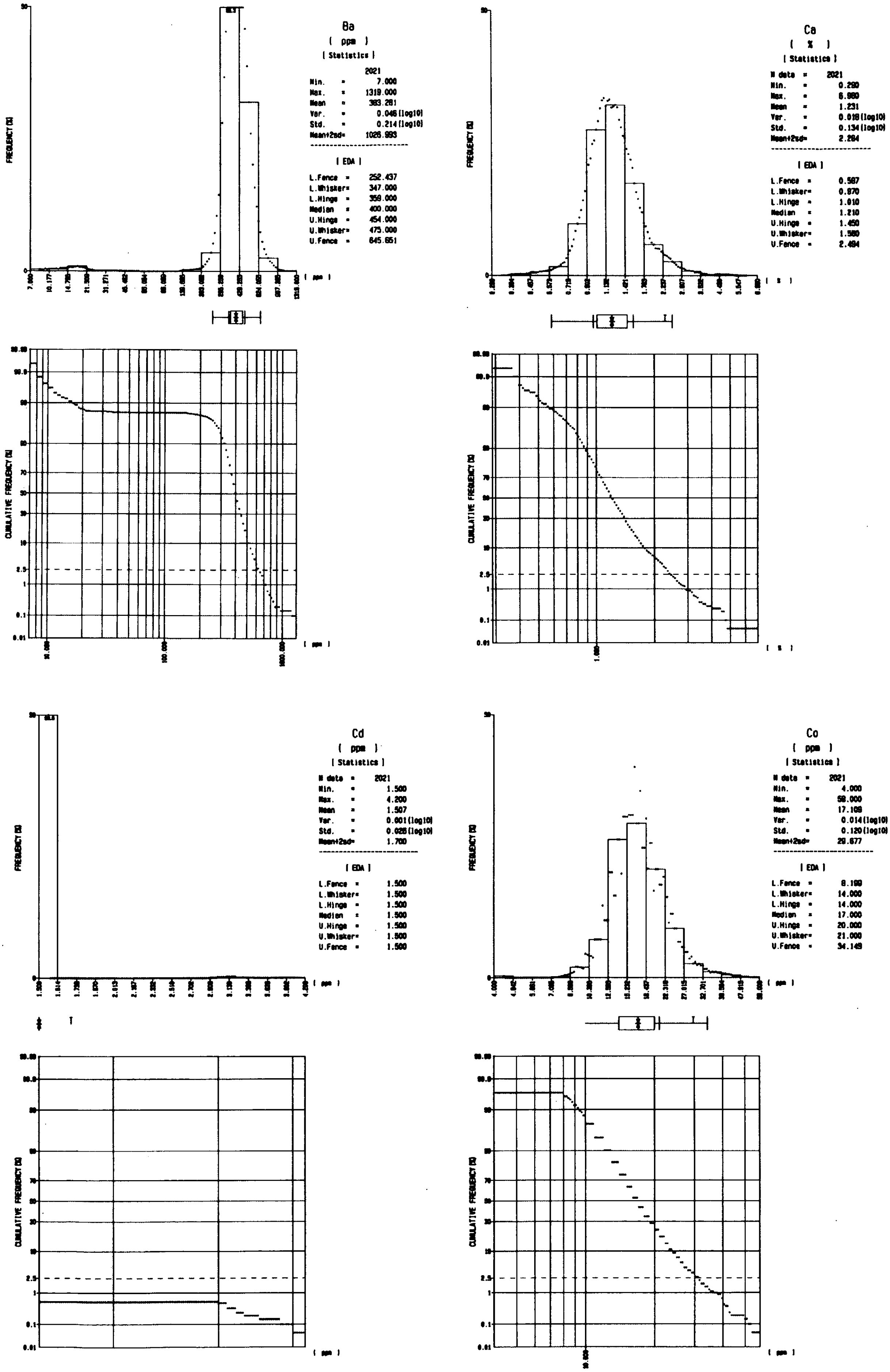



Fig.II-4-3(3) Histogram, EDA and cumulative frequency of each element of soil samples

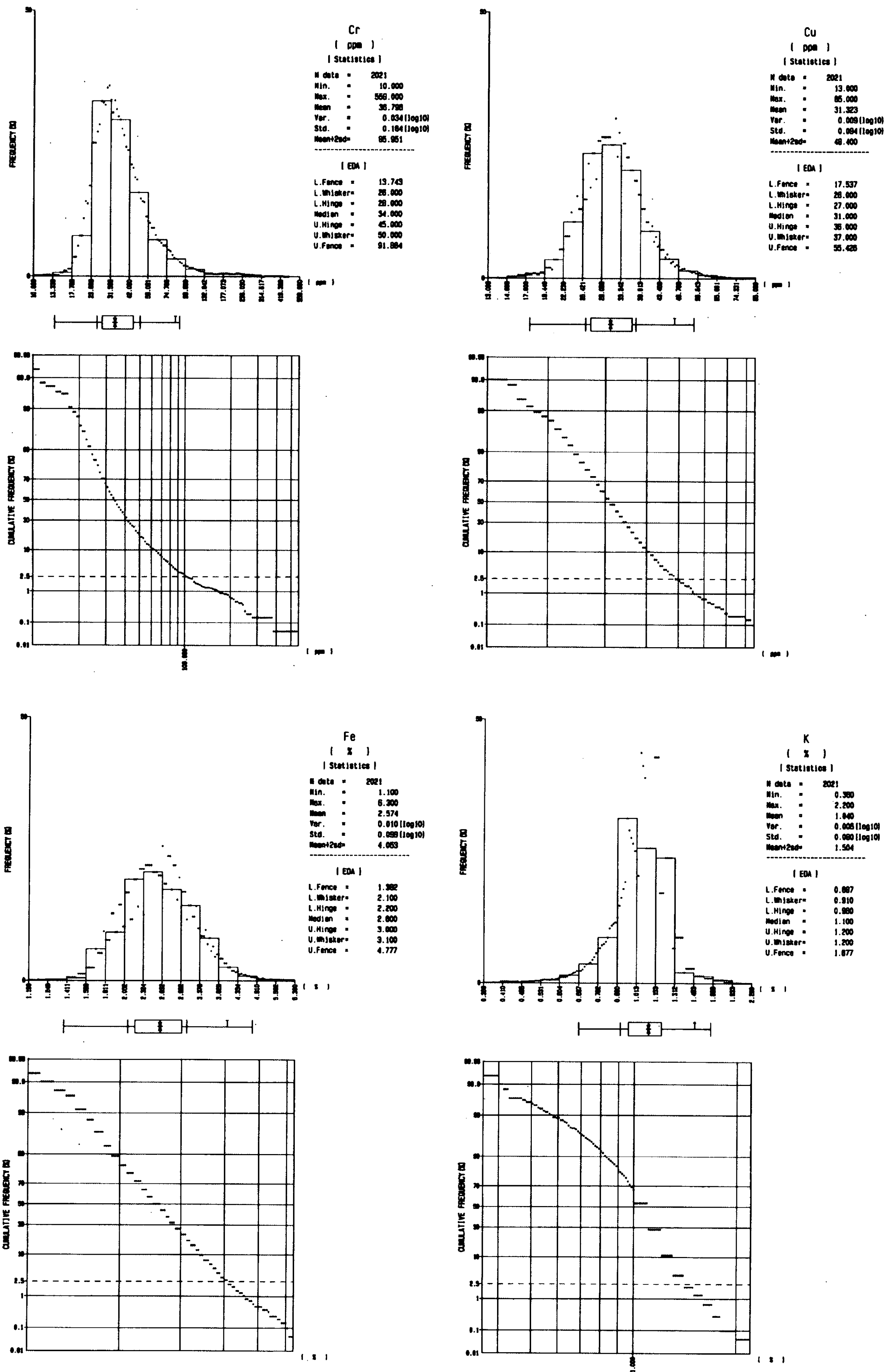



Fig.II-4-3(4) Histogram, EDA and cumulative frequency of each element of soil samples

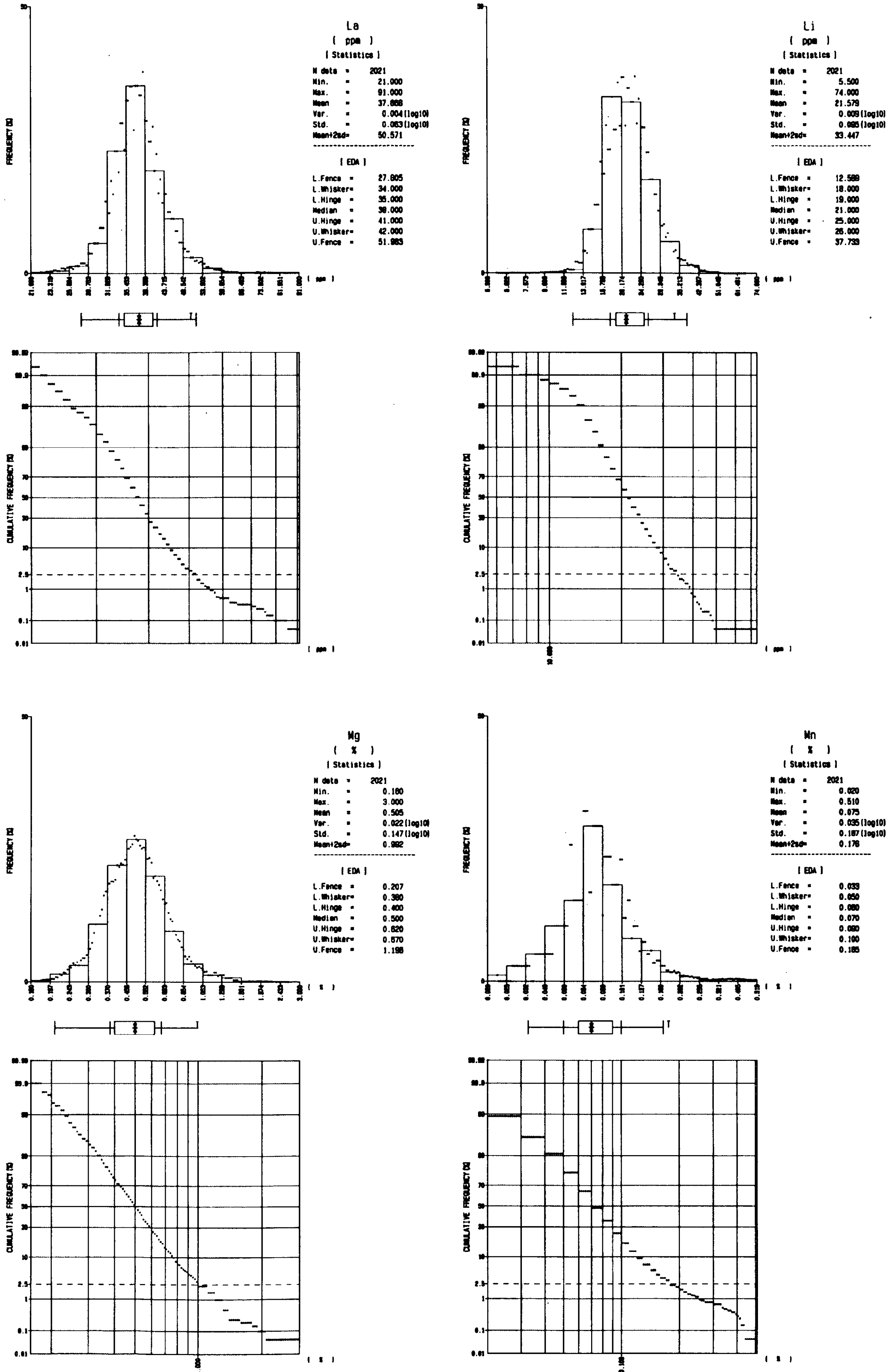
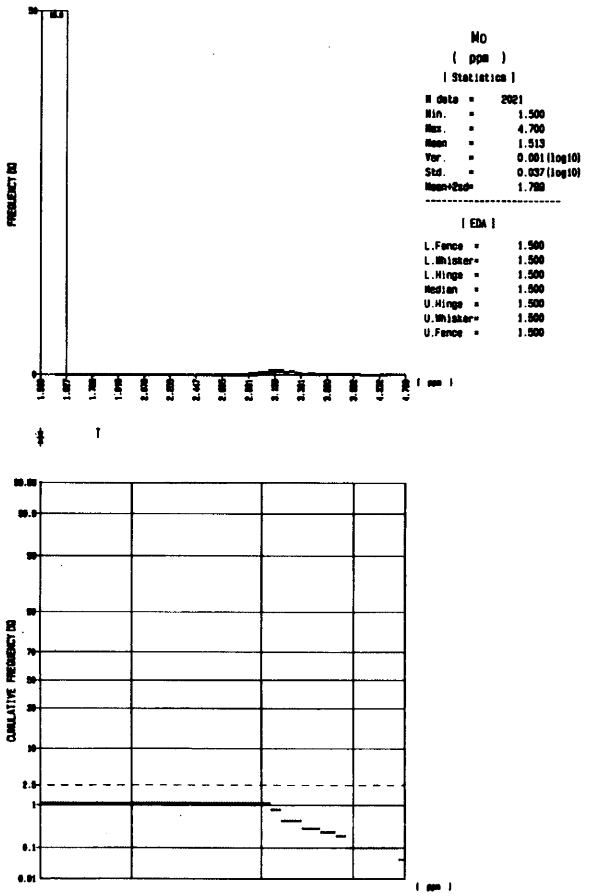
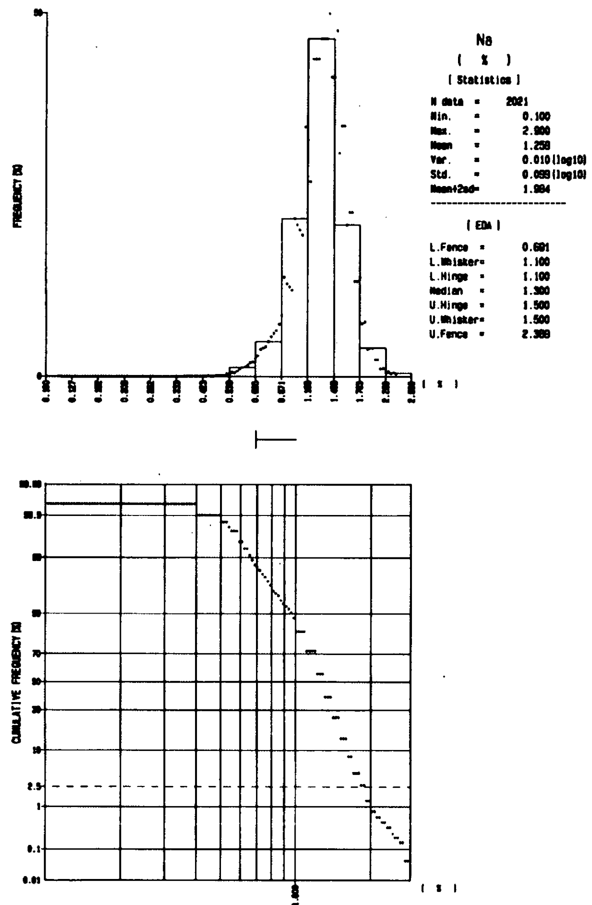
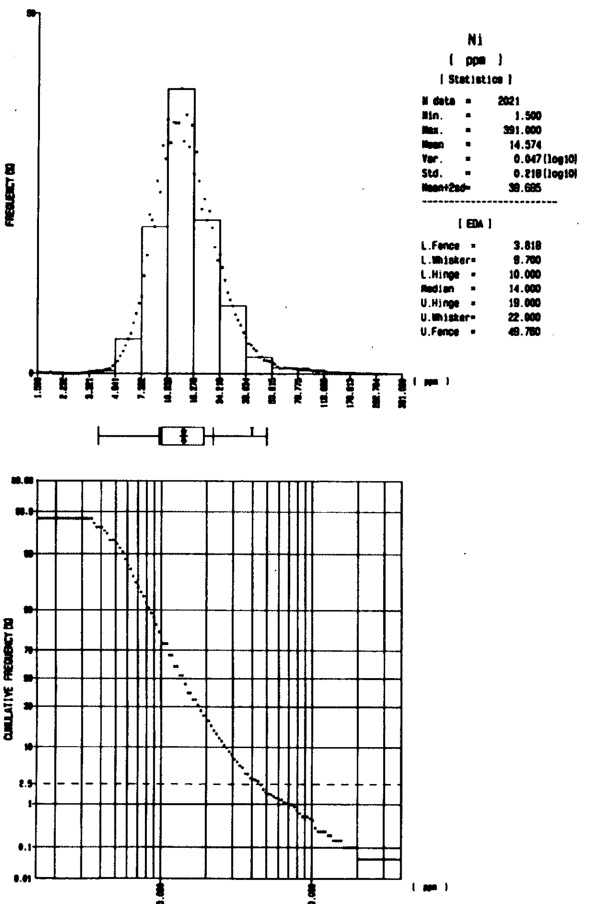



Fig.II-4-3(5) Histogram, EDA and cumulative frequency of each element of soil samples



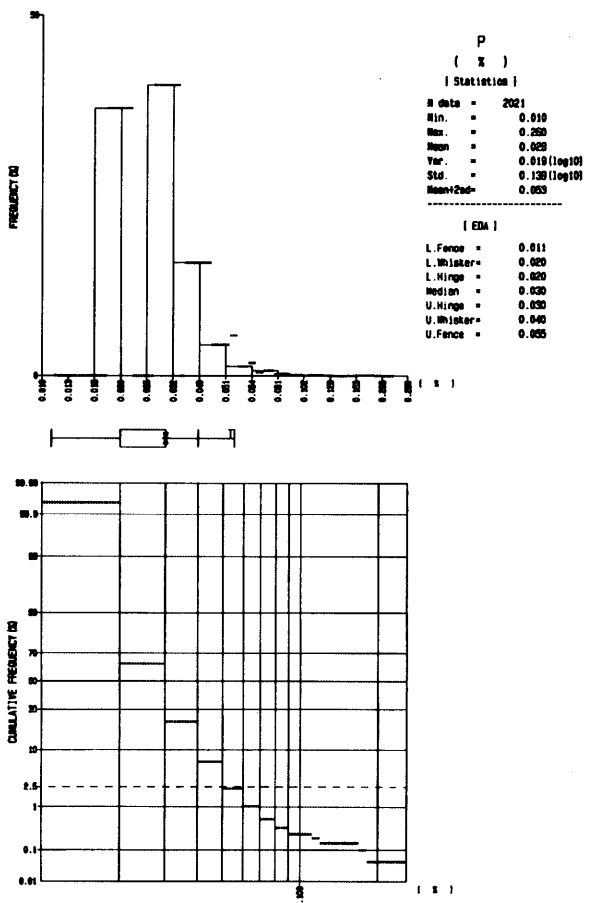
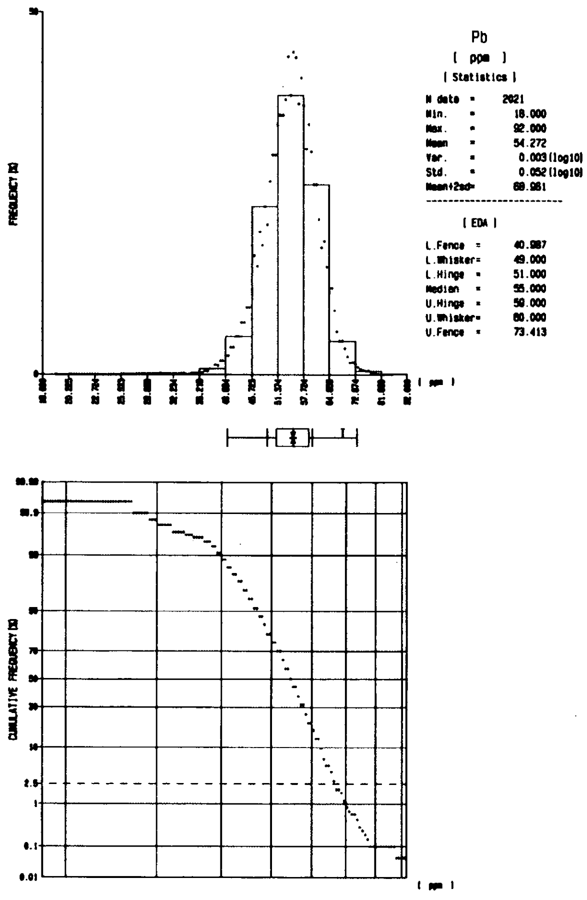
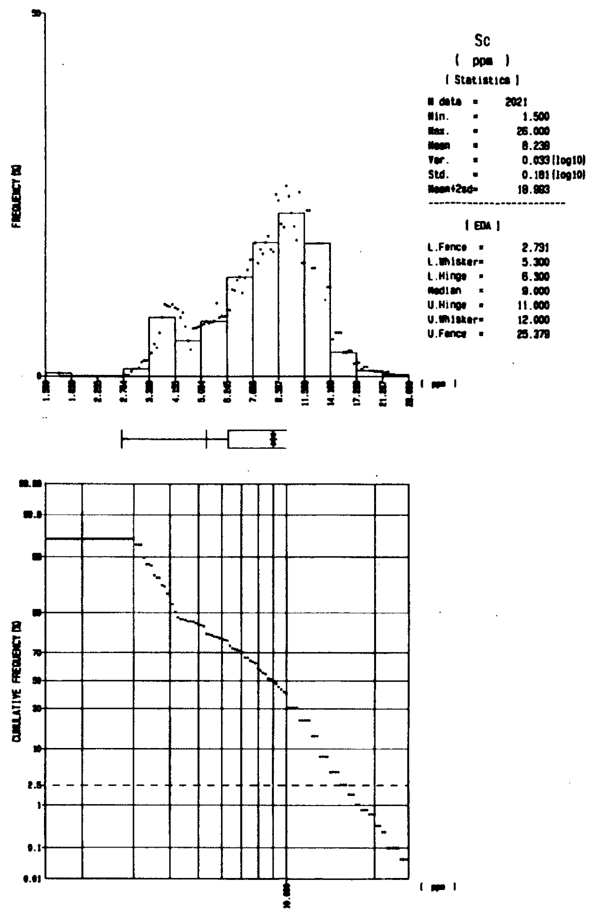
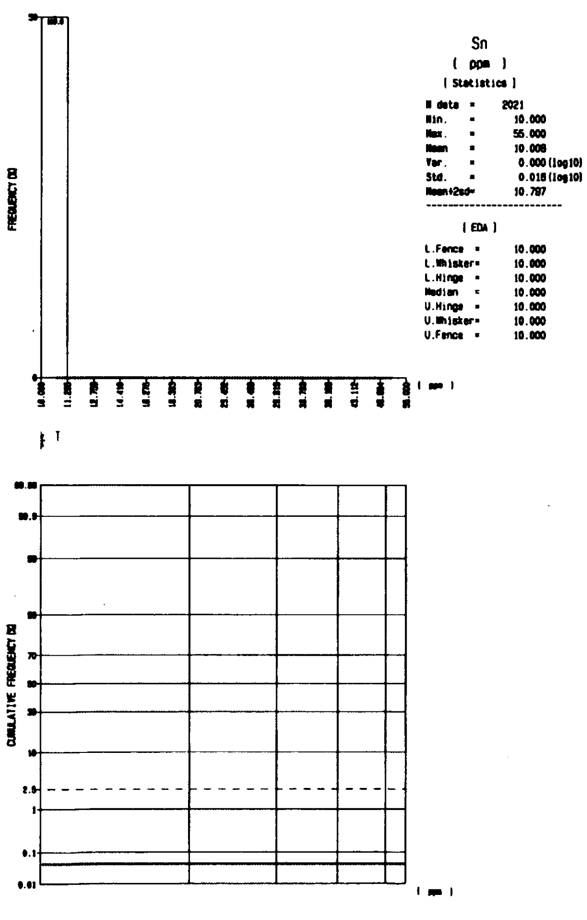




Fig.II-4-3(6) Histogram, EDA and cumulative frequency of each element of soil samples



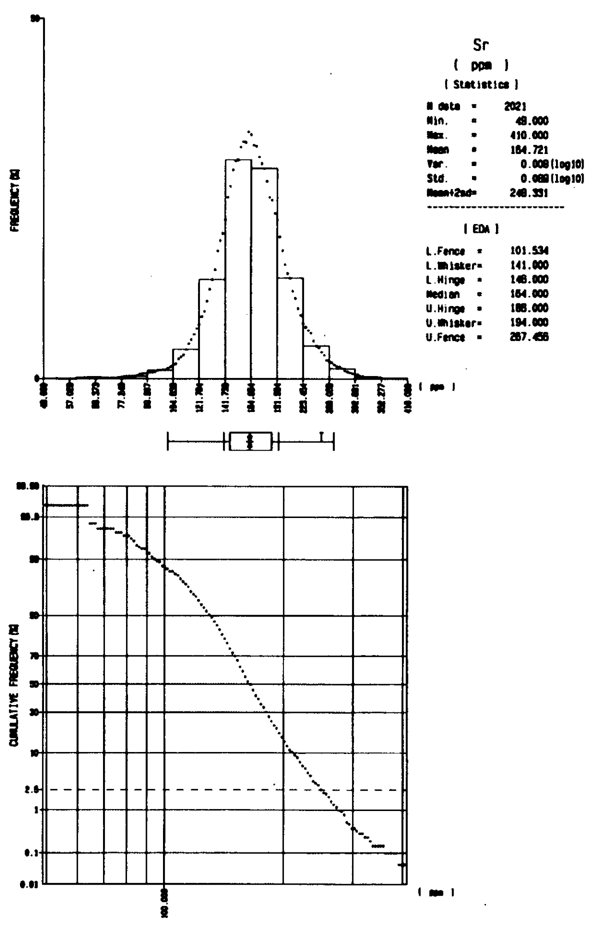




Fig.II-4-3(7) Histogram, EDA and cumulative frequency of each element of soil samples

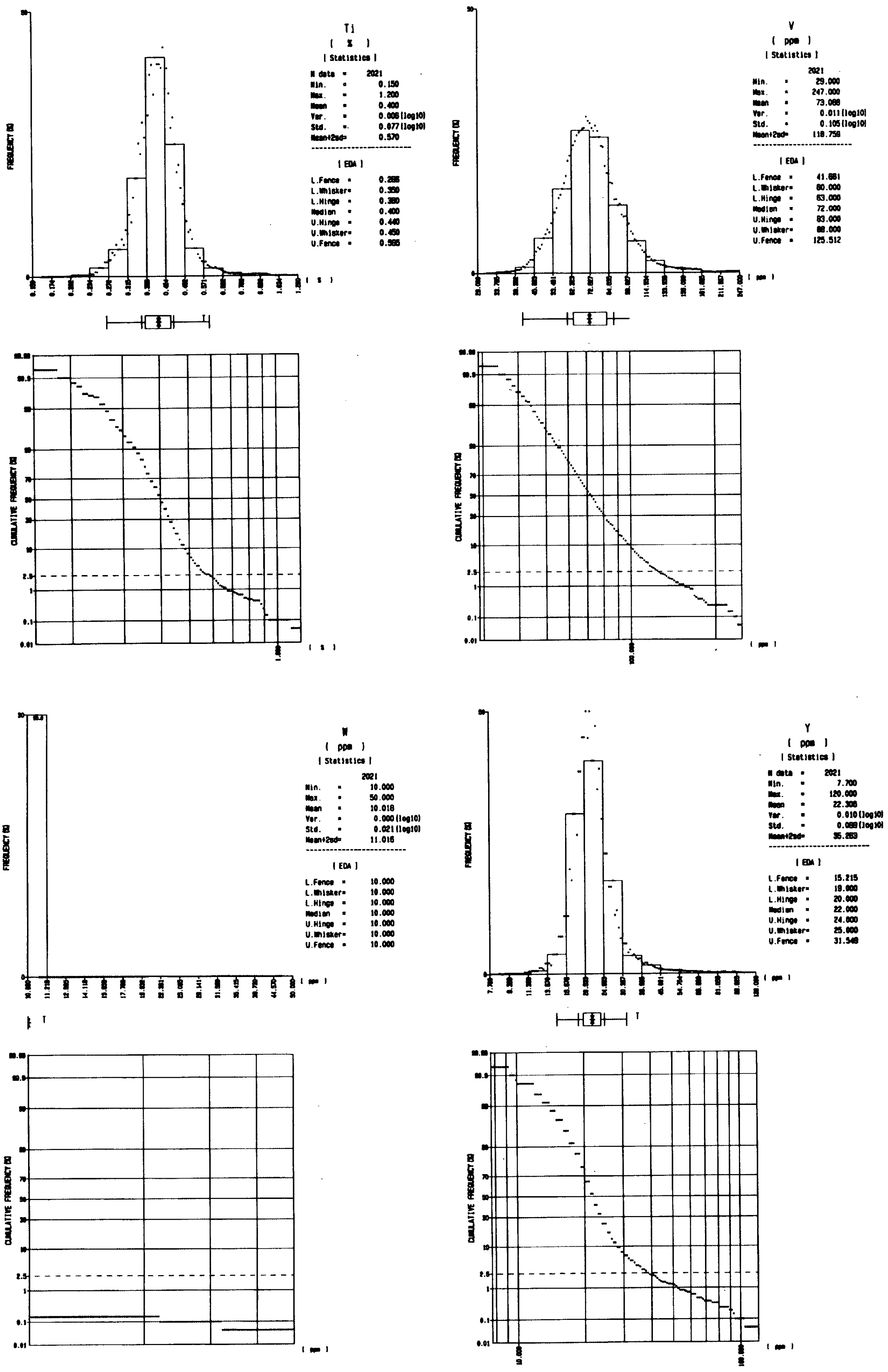



Fig.II-4-3(8) Histogram, EDA and cumulative frequency of each element of soil samples

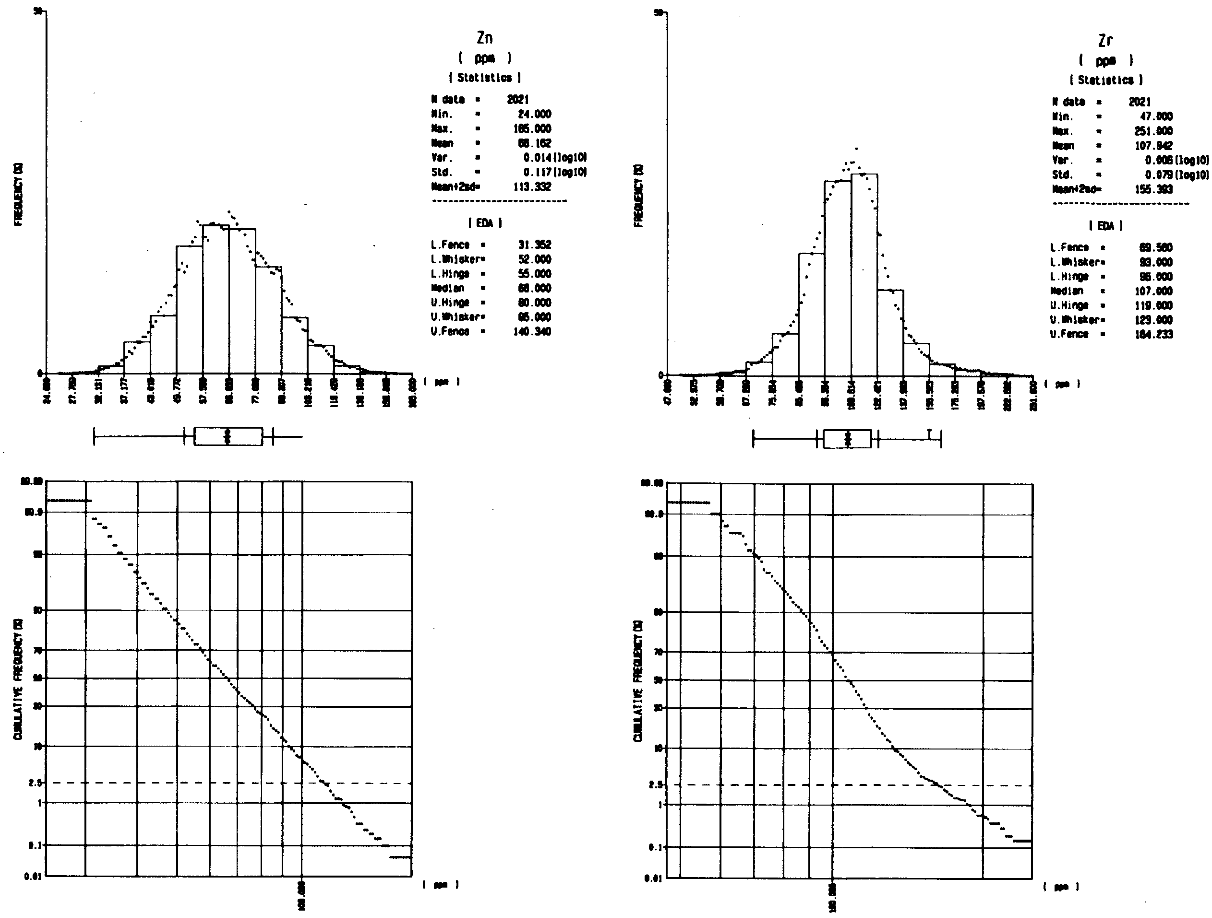



Fig.II-4-3(9) Histogram, EDA and cumulative frequency of each element of soil samples

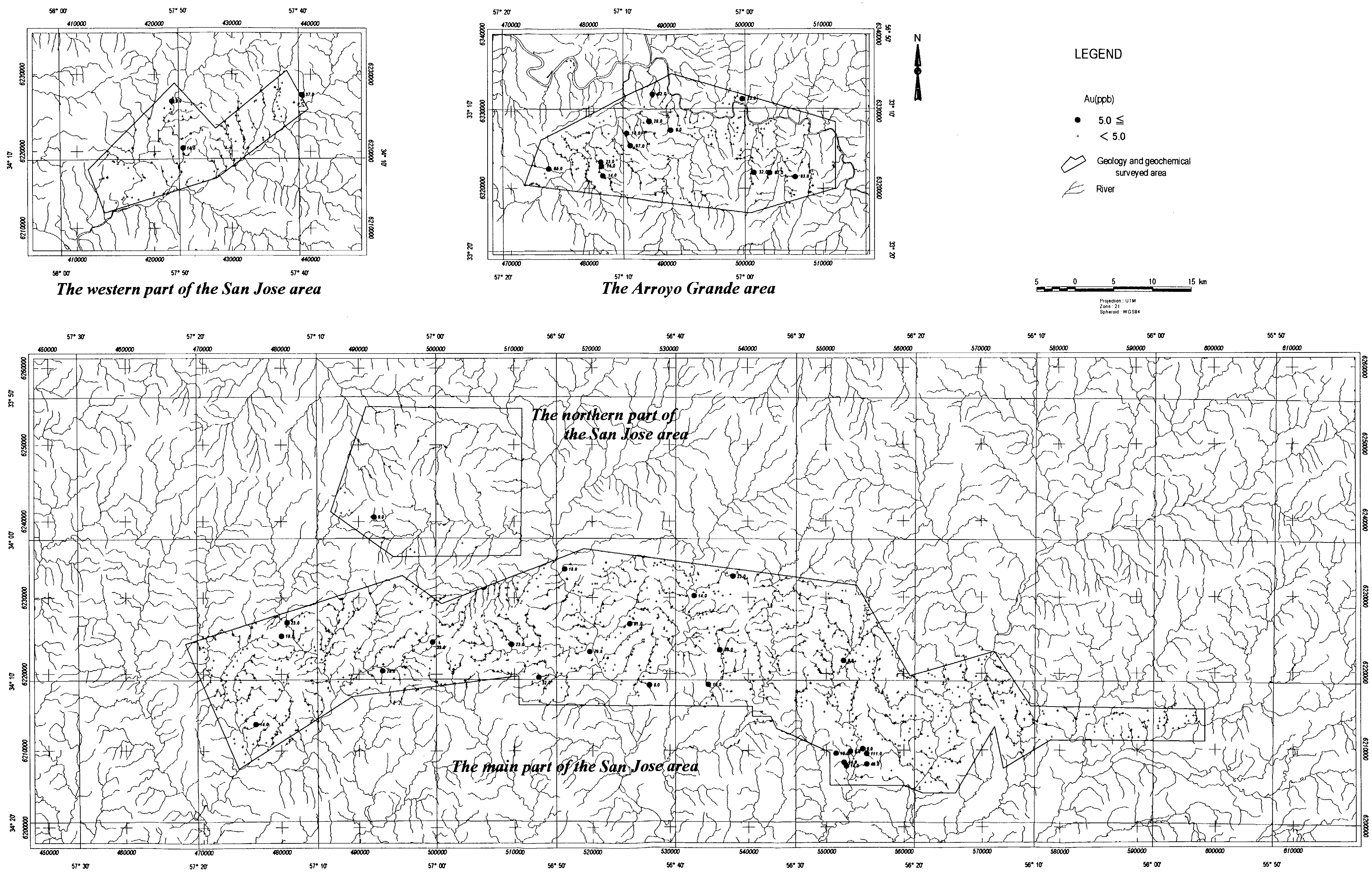



Fig.II-4-4 Distribution map of Au anomalies of soil samples

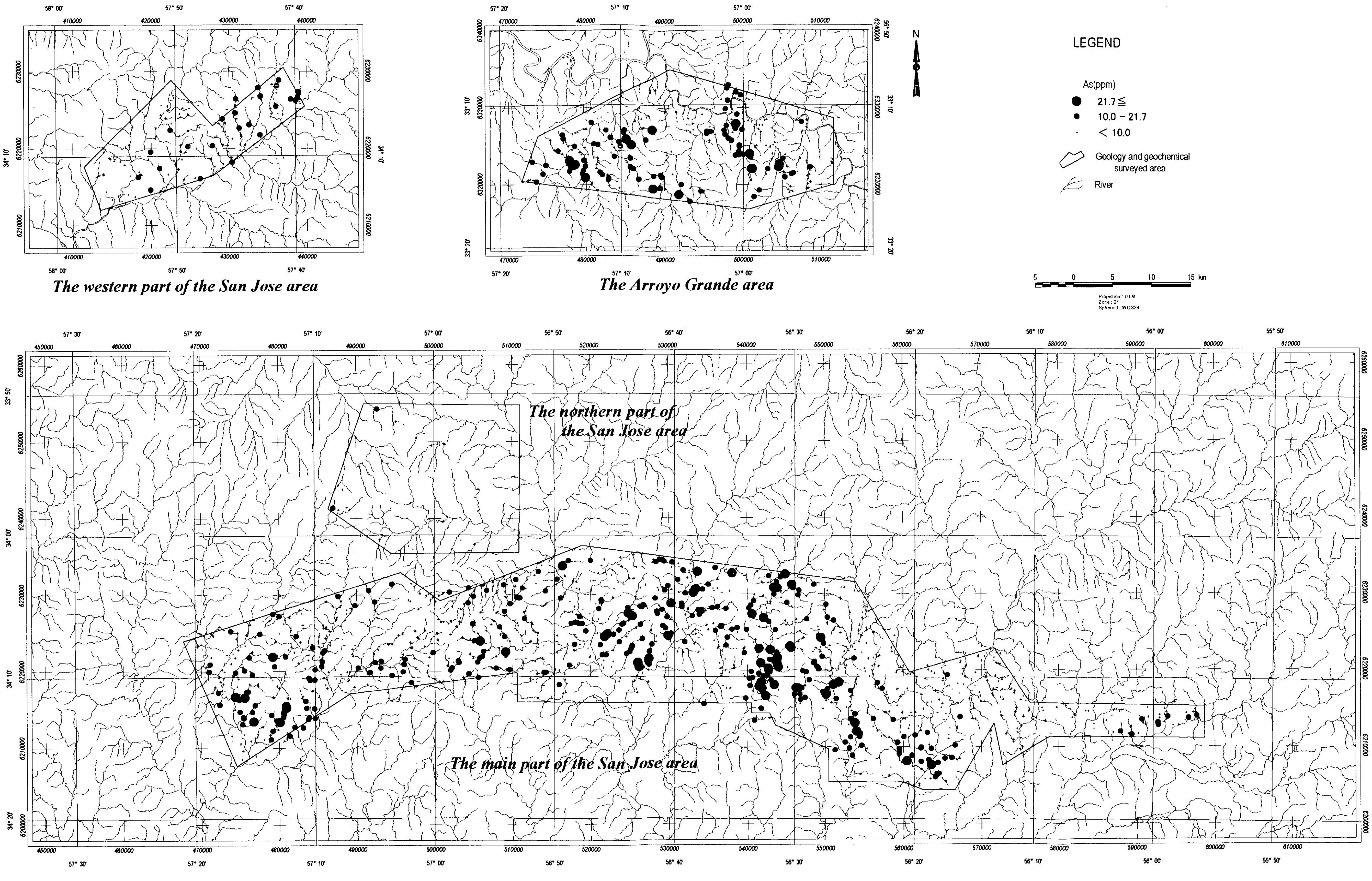



Fig.II-4-5 Distribution map of As anomalies of soil samples

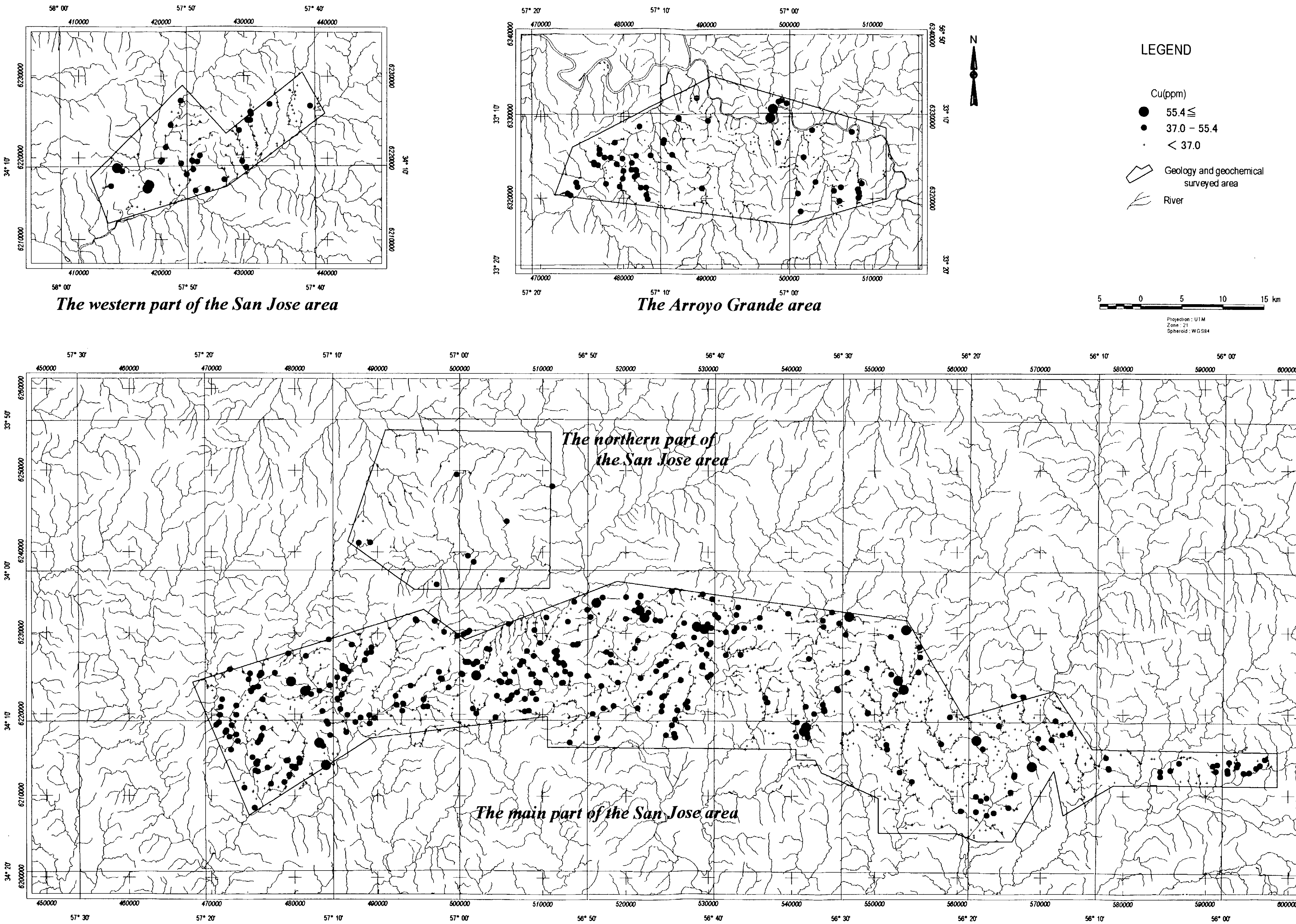



Fig.II-4-6 Distribution map of Cu anomalies of soil samples

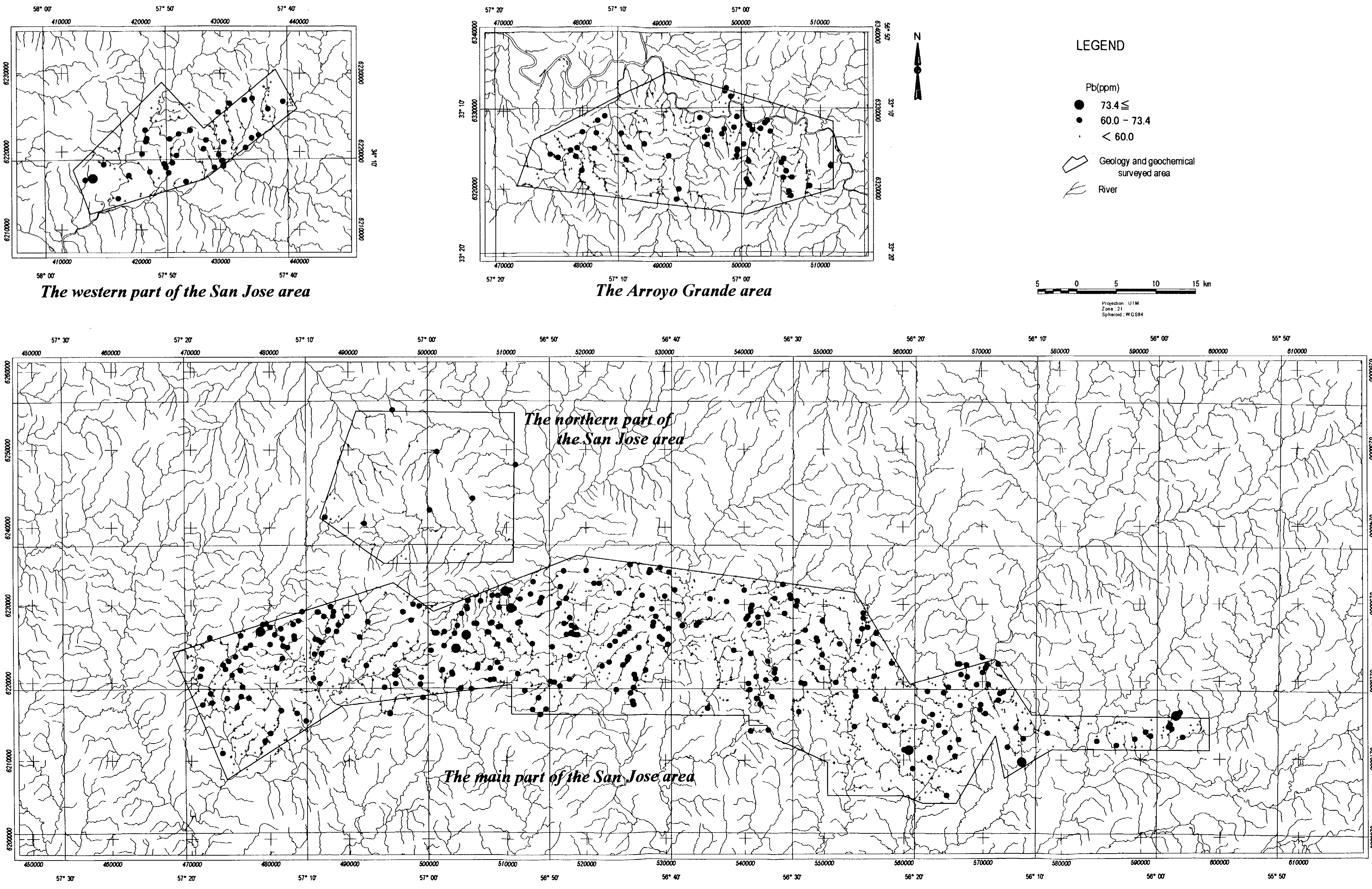



Fig.II-4-7 Distribution map of Pb anomalies of soil samples

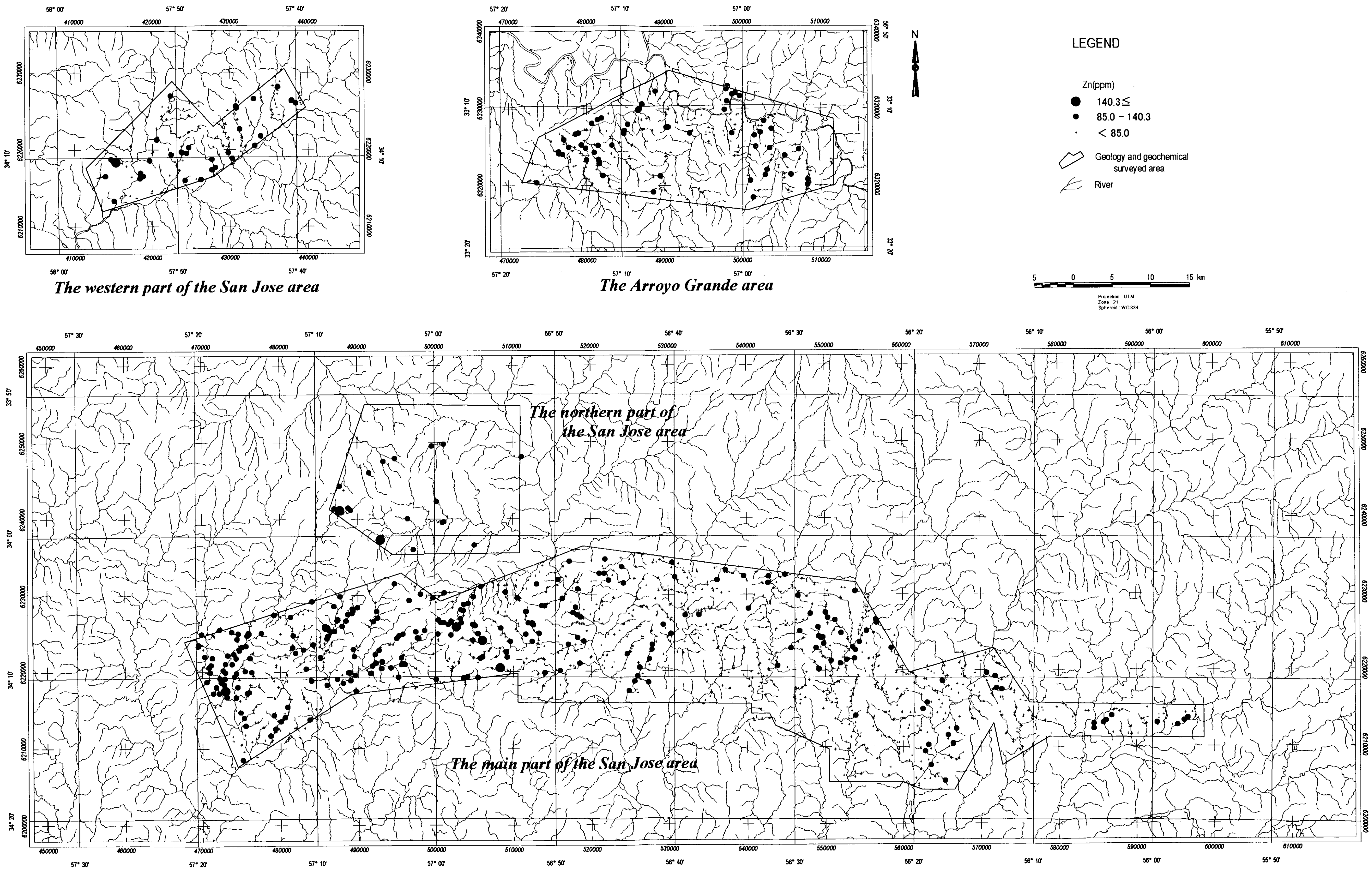



Fig.II-4-8 Distribution map of Zn anomalies of soil samples

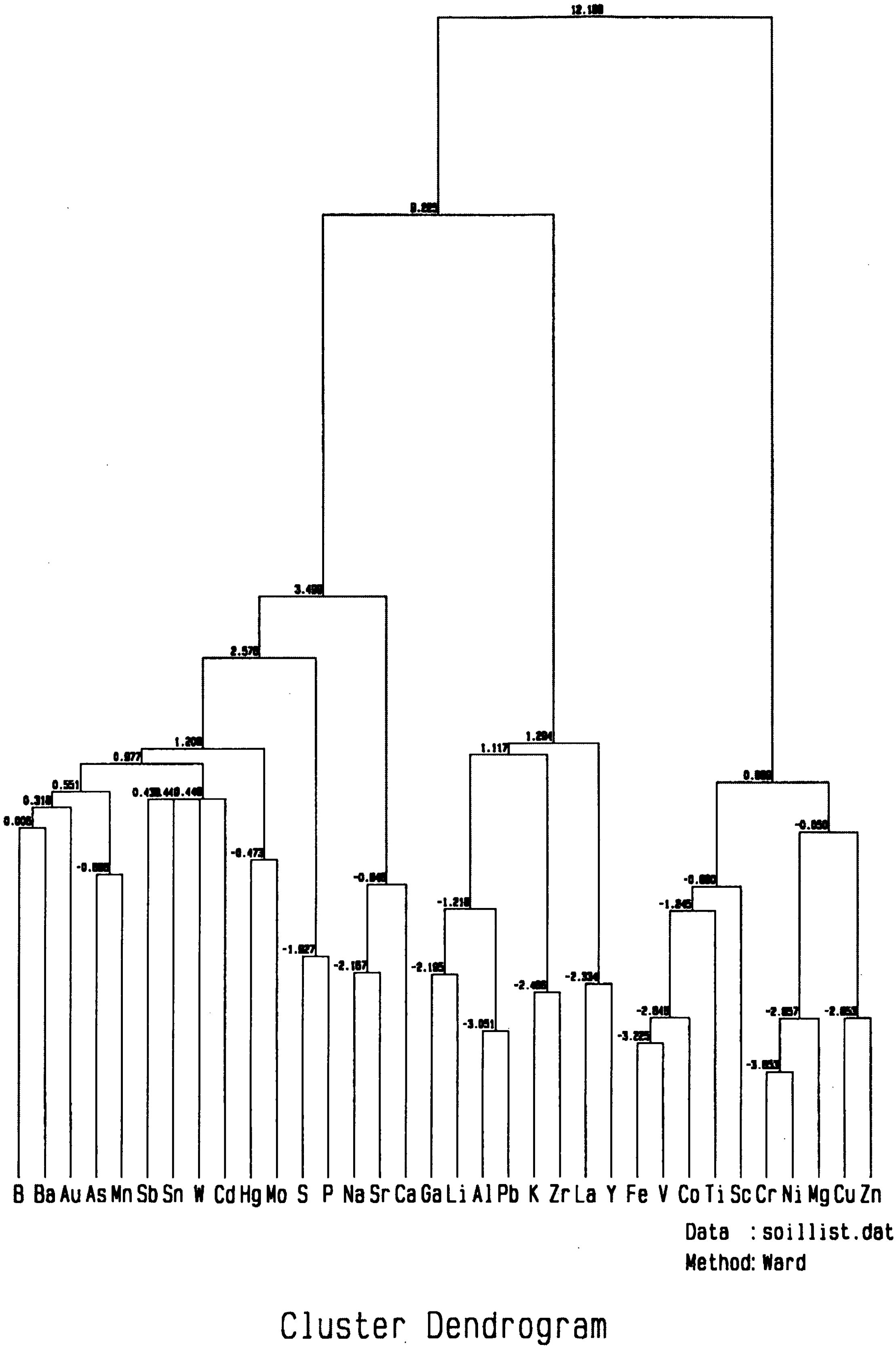



Fig.II-4-9 Dendrogram of cluster analysis of soil samples

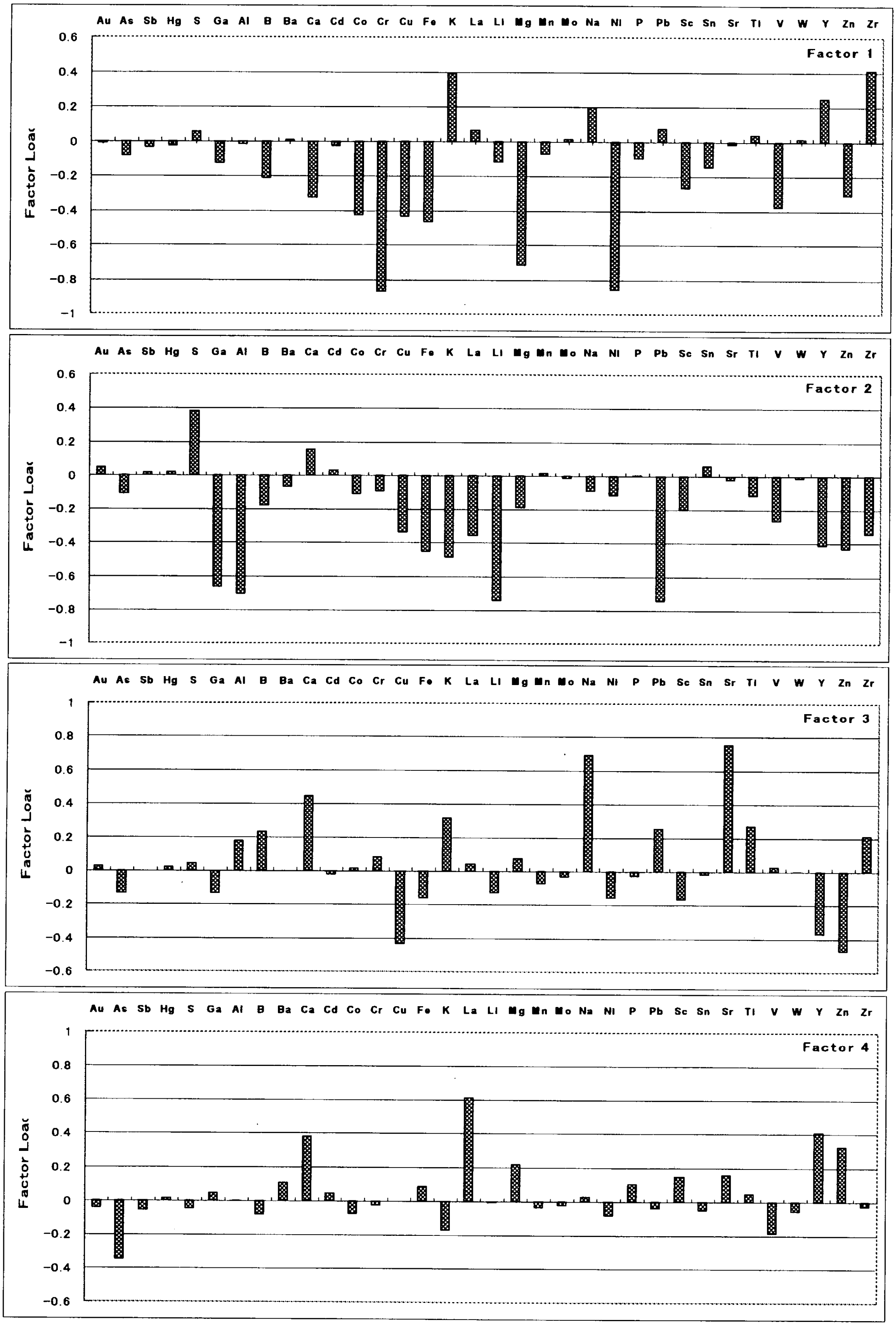



Fig.II-4-10 Factor score diagram of Factor 1 to Factor 4

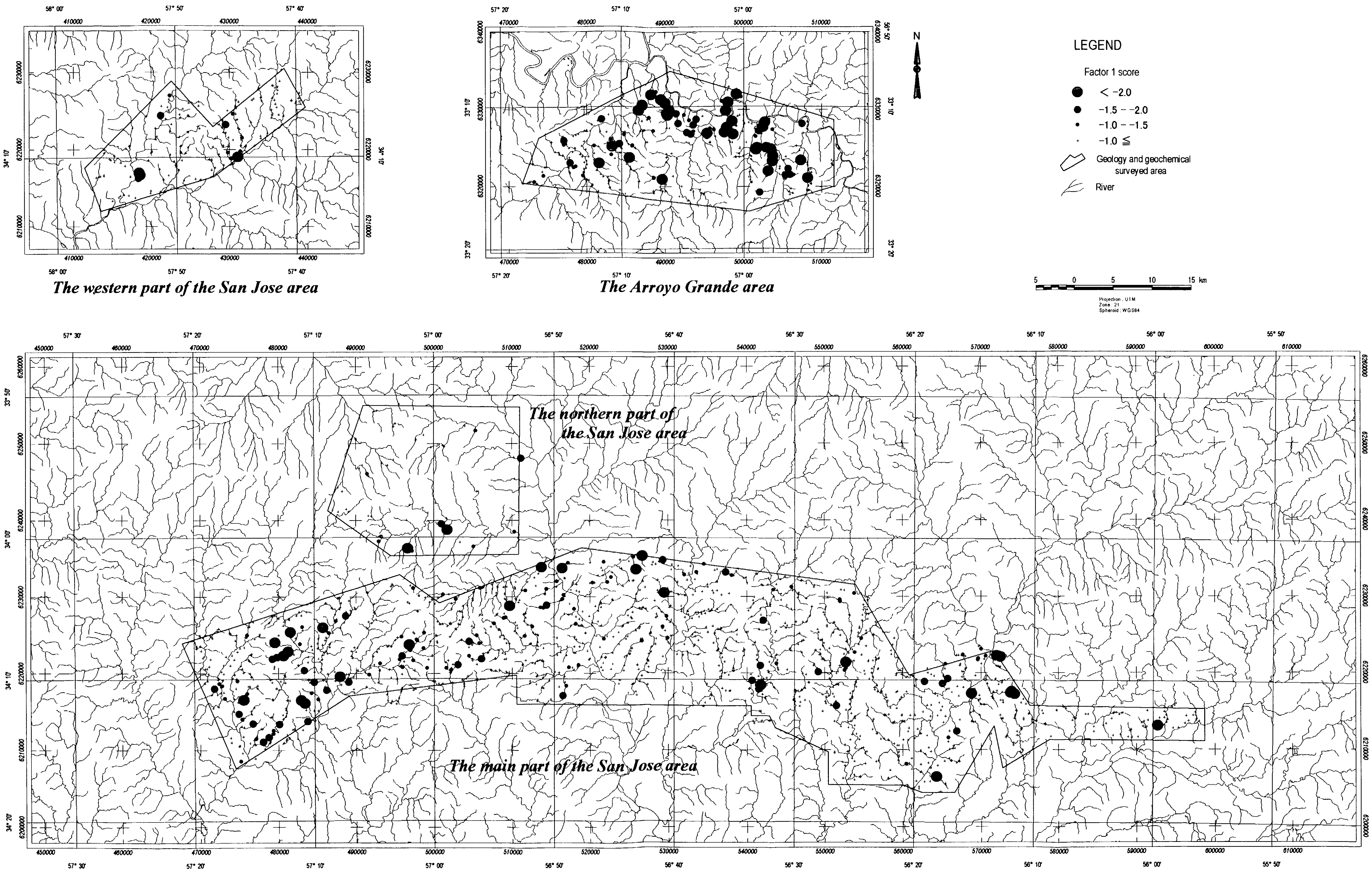



Fig.II-4-11 Distribution map of factor1 scores of soil samples

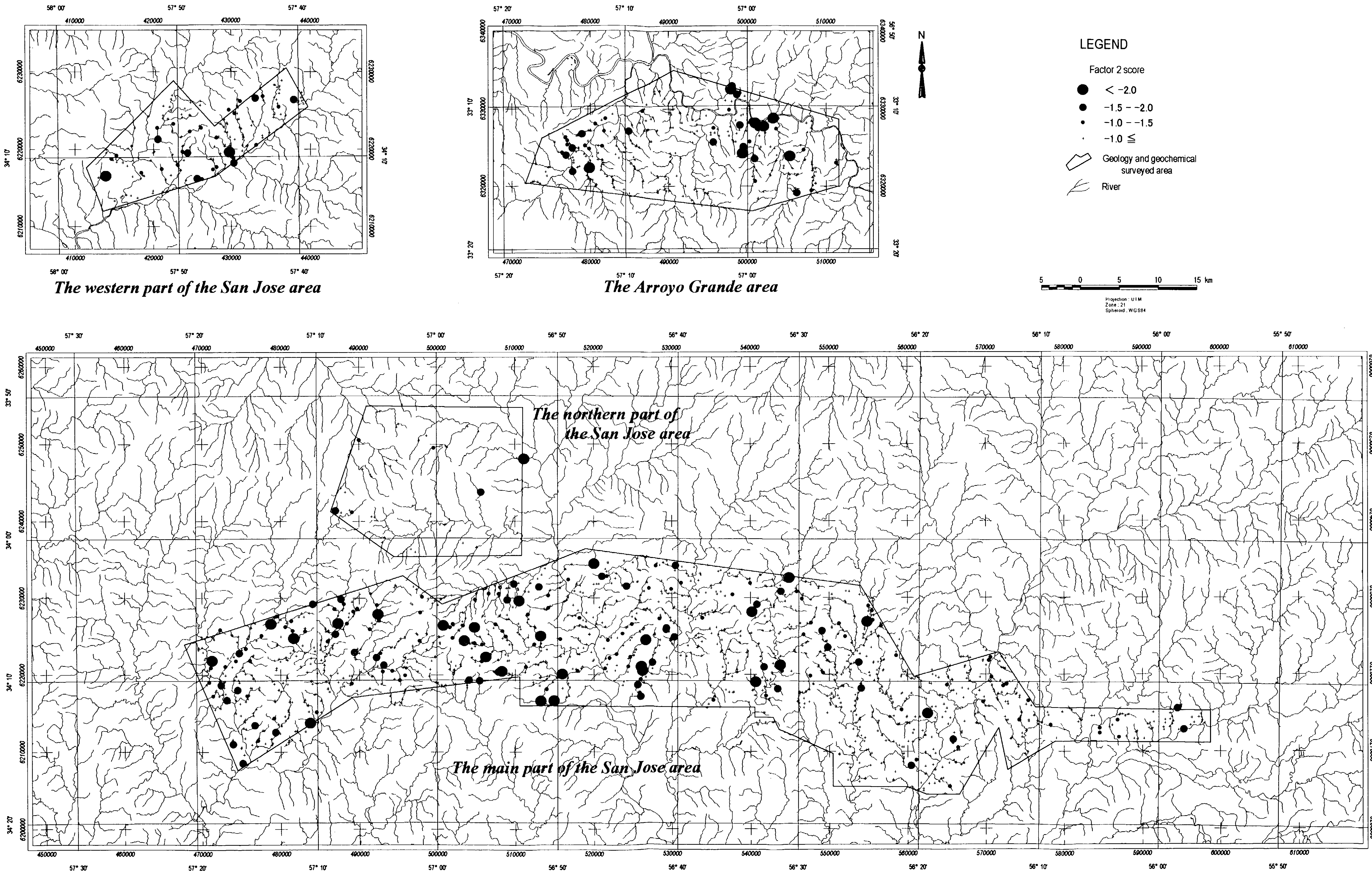



Fig.II-4-12 Distribution map of factor2 scores of soil samples

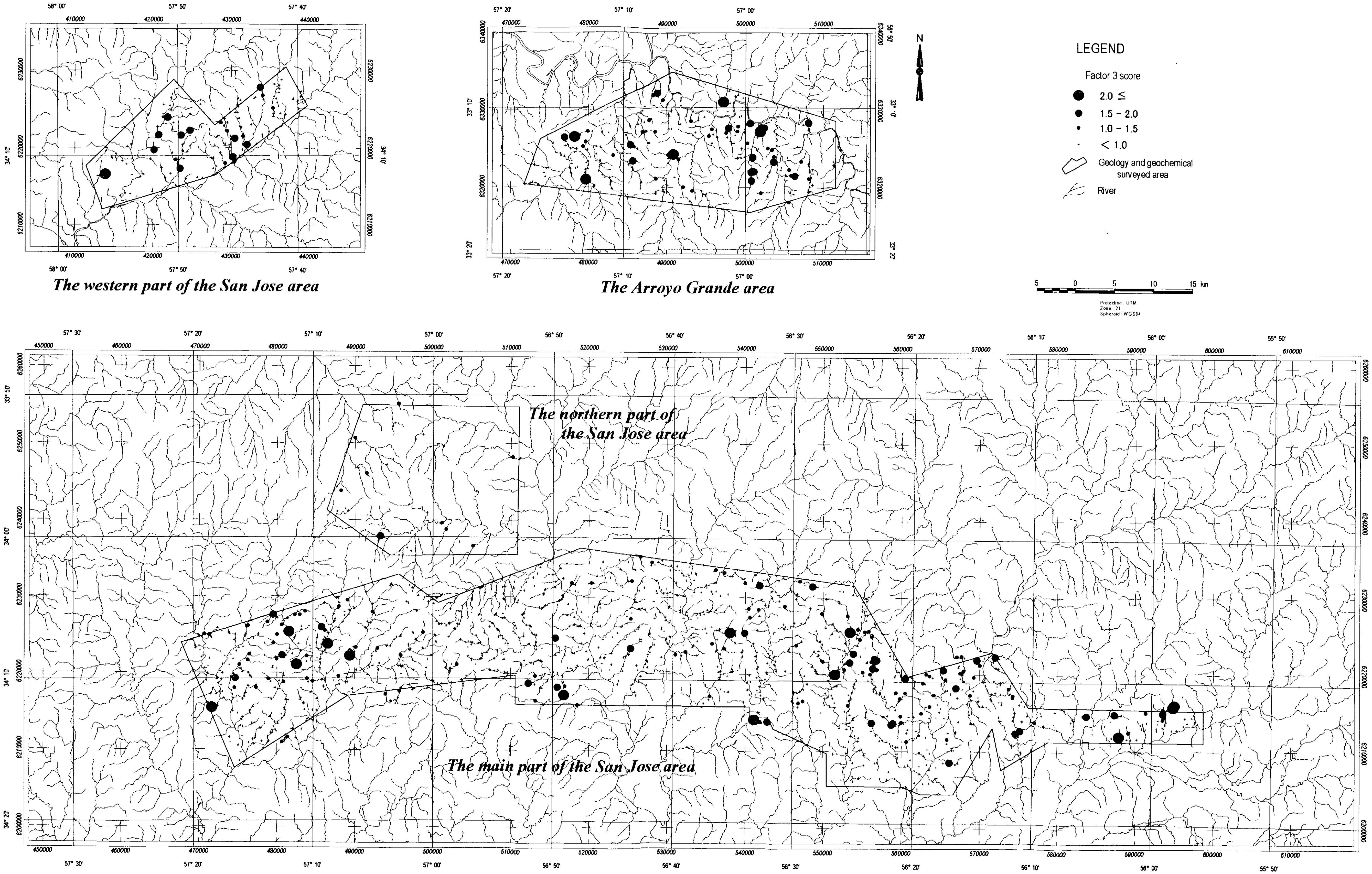



Fig.II-4-13 Distribution map of factor3 scores of soil samples

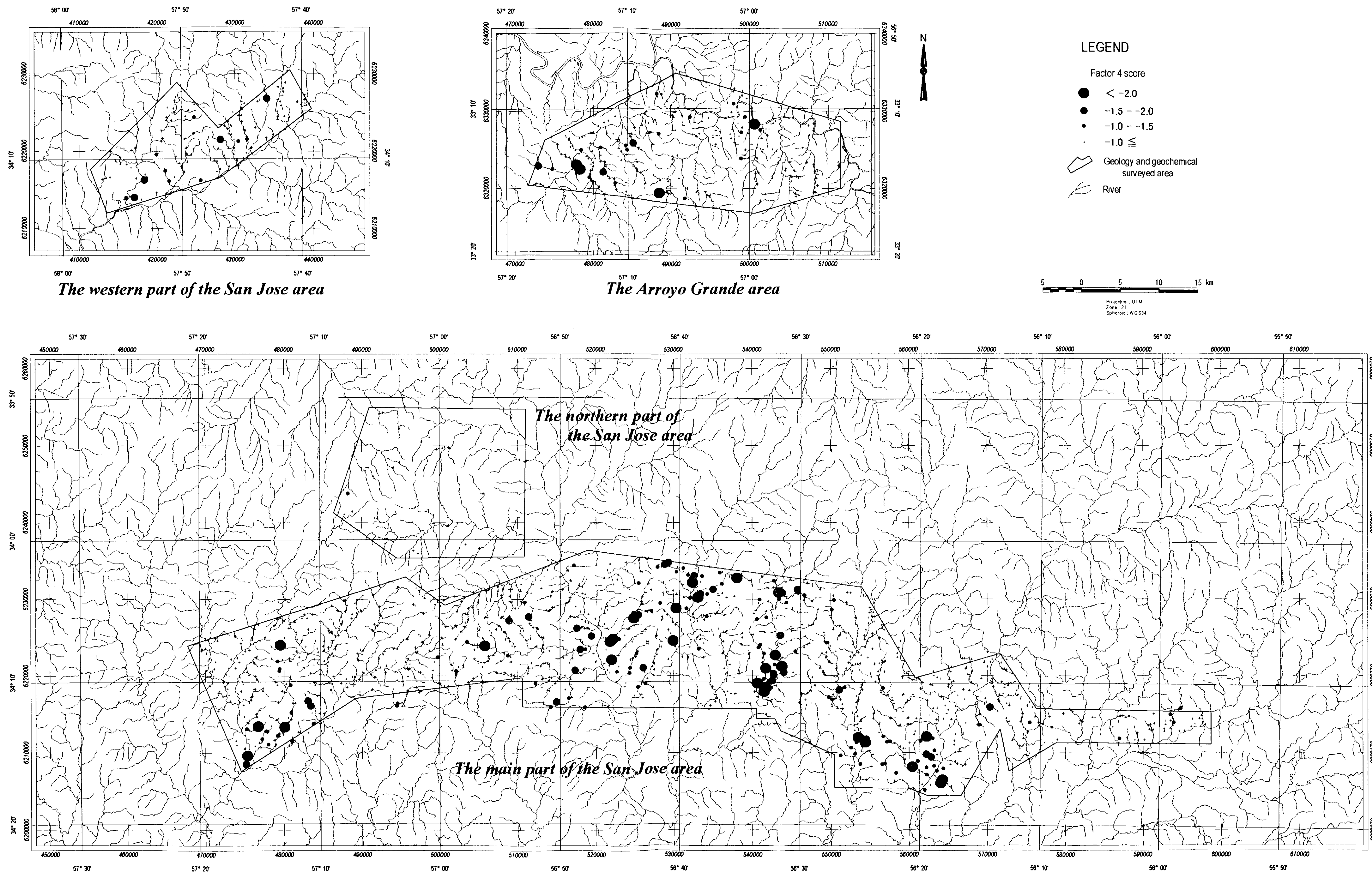



Fig.II-4-14 Distribution map of factor4 scores of soil samples

Tab. II-4-1 Statistics of soil geochemical data

| Elements | Mean | Var. | S.D. | Min | Max | Mean+2SD | D.L. | B.D.L.(%) |
|---|---|---|---|---|---|---|---|---|
| Au (ppb) | 2.6 | 0.020* | 0.142* | 2.5 | 111.0 | 5.0 | 5 | 98.0 |
| As (ppm) | 7.0 | 0.060* | 0.244* | 0.5 | 196.0 | 21.6 | 1 | 0.2 |
| Sb (ppm) | 0.5 | 0.000* | 0.015* | 0.5 | 2.0 | 0.5 | 1 | 99.9 |
| Hg (ppb) | 25.0 | 0.000* | 0.008* | 25.0 | 56.0 | 25.9 | 50 | 100.0 |
| S (ppm) | 321.7 | 0.037* | 0.192* | 76.0 | 5000.0 | 779.0 | 50 | 0.0 |
| Ga (ppm) | 19.8 | 0.004* | 0.062* | 10.0 | 33.0 | 26.3 | 5 | 0.0 |
| Tl (ppm) | 0.5 | 0.000* | 0.000* | 0.5 | 0.5 | 0.5 | 1 | 100.0 |
| Ag (ppm) | 1.5 | 0.000* | 0.000* | 1.5 | 1.5 | 1.5 | 3.0 | 100.0 |
| Al (%) | 5.022 | 0.001* | 0.027* | 3.000 | 6.100 | 5.684 | 0.01 | 0.0 |
| B (ppm) | 340.6 | 0.088* | 0.297* | 5.0 | 1347.0 | 1336.1 | 10 | 0.1 |
| Ba (ppm) | 383.3 | 0.046* | 0.214* | 7.0 | 1319.0 | 1027.0 | 3 | 0.0 |
| Be (ppm) | 1.5 | 0.000* | 0.000* | 1.5 | 1.5 | 1.5 | 3.0 | 100.0 |
| Bi (ppm) | 10.0 | 0.000* | 0.000* | 10.0 | 10.0 | 10.0 | 20 | 100.0 |
| Ca (%) | 1.231 | 0.018* | 0.134* | 0.290 | 6.960 | 2.284 | 0.01 | 0.0 |
| Cd (ppm) | 1.5 | 0.001* | 0.026* | 1.5 | 4.2 | 1.7 | 3.0 | 99.5 |
| Co (ppm) | 17.1 | 0.014* | 0.120* | 4.0 | 58.0 | 29.7 | 8.0 | 0.3 |
| Cr (ppm) | 36.8 | 0.034* | 0.184* | 10.0 | 559.0 | 86.0 | 3 | 0.0 |
| Cu (ppm) | 31.3 | 0.009* | 0.094* | 13.0 | 85.0 | 48.4 | 3 | 0.0 |
| Fe (%) | 2.574 | 0.010* | 0.099* | 1.100 | 6.300 | 4.053 | 0.01 | 0.0 |
| K (%) | 1.040 | 0.006* | 0.080* | 0.360 | 2.200 | 1.504 | 0.01 | 0.0 |
| La (ppm) | 37.9 | 0.004* | 0.063* | 21.0 | 91.0 | 50.6 | 20 | 0.0 |
| Li (ppm) | 21.6 | 0.009* | 0.095* | 5.5 | 74.0 | 33.4 | 3 | 0.0 |
| Mg (%) | 0.505 | 0.022* | 0.147* | 0.160 | 3.000 | 0.992 | 0.01 | 0.0 |
| Mn (%) | 0.075 | 0.035* | 0.187* | 0.020 | 0.510 | 0.176 | 0.01 | 0.0 |
| Mo (ppm) | 1.5 | 0.001* | 0.037* | 1.5 | 4.7 | 1.8 | 3.0 | 98.9 |
| Na (%) | 1.259 | 0.010* | 0.099* | 0.100 | 2.900 | 1.984 | 0.01 | 0.0 |
| Ni (ppm) | 14.6 | 0.047* | 0.218* | 1.5 | 391.0 | 39.7 | 3.0 | 0.1 |
| P (%) | 0.028 | 0.019* | 0.139* | 0.010 | 0.260 | 0.053 | 0.01 | 0.0 |
| Pb (ppm) | 54.3 | 0.003* | 0.052* | 18.0 | 92.0 | 69.0 | 8 | 0.0 |
| Sc (ppm) | 8.2 | 0.033* | 0.181* | 1.5 | 26.0 | 19.0 | 3.0 | 0.4 |
| Sn (ppm) | 10.0 | 0.000* | 0.016* | 10.0 | 55.0 | 10.8 | 20 | 100.0 |
| Sr (ppm) | 164.7 | 0.008* | 0.089* | 49.0 | 410.0 | 248.3 | 3 | 0.0 |
| Ti (%) | 0.400 | 0.006* | 0.077* | 0.150 | 1.200 | 0.570 | 0.01 | 0.0 |
| V (ppm) | 73.1 | 0.011* | 0.105* | 29.0 | 247.0 | 118.8 | 8 | 0.0 |
| W (ppm) | 10.0 | 0.000* | 0.021* | 10.0 | 50.0 | 11.0 | 20 | 99.9 |
| Y (ppm) | 22.3 | 0.010* | 0.099* | 7.7 | 120.0 | 35.3 | 3.0 | 0.0 |
| Zn (ppm) | 66.2 | 0.014* | 0.117* | 24.0 | 185.0 | 113.3 | 3 | 0.0 |
| Zr (ppm) | 107.9 | 0.006* | 0.079* | 47.0 | 251.0 | 155.4 | 3 | 0.0 |

## Tab. II-4-2 Correlation coefficient of each sample of soil geochemical data

| | Au | As | Sb | Hg | S | Ga | Al | B | Ba | Ca | Cd | Co | Cr | Cu | Fe | K | La | Li | Mg | Mn | Mo | Na | Ni | P | Pb | Sc | Sn | Sr | Ti | V | W | Y | Zn | Zr |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Au | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| As | 0.057 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sb | -0.004 | 0.075 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hg | -0.003 | 0.005 | -0.001 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| S | -0.004 | -0.069 | 0.011 | 0.010 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ga | -0.068 | 0.124 | -0.001 | -0.015 | -0.270 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Al | -0.048 | 0.091 | -0.013 | -0.002 | -0.416 | 0.484 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 0.055 | 0.051 | 0.009 | 0.013 | -0.045 | 0.075 | 0.049 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ba | 0.024 | 0.015 | 0.004 | 0.005 | -0.057 | 0.079 | -0.089 | 0.087 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ca | 0.031 | -0.095 | 0.009 | 0.011 | 0.188 | -0.114 | -0.056 | 0.227 | 0.003 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | | |
| Cd | -0.010 | -0.003 | -0.002 | -0.002 | -0.046 | 0.044 | 0.077 | -0.050 | -0.018 | 0.077 | 1.000 | | | | | | | | | | | | | | | | | | | | | | | |
| Co | 0.015 | 0.266 | 0.003 | -0.001 | -0.217 | 0.135 | 0.202 | 0.198 | 0.046 | 0.369 | 0.167 | 1.000 | | | | | | | | | | | | | | | | | | | | | | |
| Cr | 0.013 | 0.117 | 0.019 | -0.006 | -0.173 | 0.179 | 0.204 | 0.193 | -0.024 | 0.292 | 0.090 | 0.530 | 1.000 | | | | | | | | | | | | | | | | | | | | | |
| Cu | -0.011 | 0.164 | -0.018 | -0.011 | -0.236 | 0.268 | 0.199 | 0.148 | -0.036 | 0.061 | 0.079 | 0.497 | 0.416 | 1.000 | | | | | | | | | | | | | | | | | | | | |
| Fe | -0.014 | 0.198 | 0.024 | -0.011 | -0.324 | 0.490 | 0.432 | 0.184 | 0.004 | 0.280 | 0.174 | 0.717 | 0.572 | 0.694 | 1.000 | | | | | | | | | | | | | | | | | | | |
| K | -0.031 | 0.001 | -0.006 | 0.017 | -0.187 | 0.148 | 0.356 | 0.071 | 0.094 | -0.310 | -0.102 | -0.243 | -0.276 | -0.233 | -0.209 | 1.000 | | | | | | | | | | | | | | | | | | |
| La | -0.019 | -0.065 | -0.031 | 0.008 | -0.118 | 0.204 | 0.237 | 0.043 | 0.160 | 0.369 | 0.013 | 0.158 | -0.021 | 0.111 | 0.249 | 0.096 | 1.000 | | | | | | | | | | | | | | | | | |
| Li | 0.002 | 0.135 | -0.017 | -0.037 | -0.307 | 0.636 | 0.466 | 0.217 | 0.067 | -0.107 | -0.044 | 0.144 | 0.143 | 0.398 | 0.388 | 0.310 | 0.313 | 1.000 | | | | | | | | | | | | | | | | |
| Mg | -0.007 | 0.040 | 0.027 | -0.001 | -0.103 | 0.225 | 0.178 | 0.250 | 0.009 | 0.610 | 0.126 | 0.609 | 0.710 | 0.544 | 0.706 | -0.339 | 0.230 | 0.267 | 1.000 | | | | | | | | | | | | | | | |
| Mn | 0.029 | 0.230 | 0.004 | -0.021 | -0.034 | -0.016 | 0.007 | 0.078 | 0.168 | 0.195 | 0.057 | 0.598 | 0.085 | 0.208 | 0.258 | -0.140 | 0.215 | 0.068 | 0.227 | 1.000 | | | | | | | | | | | | | | |
| Mo | -0.014 | 0.032 | -0.003 | 0.185 | 0.013 | -0.009 | -0.002 | 0.018 | 0.047 | -0.054 | 0.047 | 0.012 | -0.025 | -0.013 | -0.026 | 0.054 | 0.025 | 0.017 | -0.038 | 0.051 | 1.000 | | | | | | | | | | | | | |
| Na | -0.004 | -0.125 | 0.009 | 0.023 | -0.060 | 0.007 | 0.314 | 0.087 | -0.037 | 0.186 | 0.026 | -0.032 | -0.024 | -0.387 | -0.068 | 0.387 | 0.021 | -0.196 | -0.109 | -0.143 | -0.003 | 1.000 | | | | | | | | | | | | |
| Ni | 0.009 | 0.204 | 0.024 | -0.017 | -0.161 | 0.192 | 0.135 | 0.173 | -0.033 | 0.229 | 0.079 | 0.608 | 0.833 | 0.613 | 0.619 | -0.360 | -0.010 | 0.200 | 0.712 | 0.243 | -0.034 | -0.237 | 1.000 | | | | | | | | | | | |
| P | -0.017 | -0.036 | 0.006 | 0.004 | 0.481 | 0.007 | -0.072 | 0.050 | -0.017 | 0.243 | 0.061 | 0.071 | 0.059 | 0.081 | 0.124 | -0.105 | 0.156 | -0.038 | 0.210 | 0.093 | 0.038 | -0.052 | 0.076 | 1.000 | | | | | | | | | | |
| Pb | -0.035 | 0.095 | -0.024 | 0.002 | -0.388 | 0.466 | 0.710 | 0.143 | 0.020 | -0.034 | 0.045 | 0.284 | 0.113 | 0.201 | 0.425 | 0.466 | 0.294 | 0.503 | 0.150 | 0.100 | 0.034 | 0.375 | 0.069 | -0.093 | 1.000 | | | | | | | | | |
| Sc | -0.022 | 0.080 | 0.000 | 0.010 | -0.180 | 0.225 | 0.238 | 0.056 | -0.031 | 0.138 | 0.099 | 0.367 | 0.333 | 0.402 | 0.528 | -0.167 | 0.131 | 0.170 | 0.403 | 0.091 | -0.004 | -0.055 | 0.327 | 0.082 | 0.162 | 1.000 | | | | | | | | |
| Sn | -0.003 | -0.006 | -0.001 | 0.000 | 0.056 | -0.024 | -0.064 | 0.026 | -0.020 | 0.022 | -0.002 | 0.051 | 0.122 | 0.063 | 0.012 | -0.077 | -0.077 | -0.013 | 0.094 | 0.020 | -0.002 | -0.048 | 0.099 | 0.040 | -0.061 | 0.010 | 1.000 | | | | | | | |
| Sr | 0.012 | -0.141 | -0.023 | 0.024 | 0.021 | -0.064 | 0.125 | 0.196 | 0.060 | 0.470 | -0.029 | 0.023 | 0.041 | -0.292 | -0.124 | 0.206 | 0.186 | -0.049 | 0.142 | 0.001 | -0.035 | 0.630 | -0.109 | 0.023 | 0.171 | -0.090 | -0.027 | 1.000 | | | | | | |
| Ti | -0.007 | 0.012 | -0.043 | 0.020 | -0.210 | 0.038 | 0.296 | 0.052 | -0.121 | 0.252 | 0.217 | 0.460 | 0.192 | 0.191 | 0.452 | 0.060 | 0.118 | -0.001 | 0.209 | 0.098 | 0.001 | 0.396 | 0.045 | 0.020 | 0.354 | 0.245 | -0.017 | 0.179 | 1.000 | | | | | |
| V | -0.014 | 0.268 | 0.028 | 0.002 | -0.228 | 0.250 | 0.332 | 0.187 | -0.040 | 0.250 | 0.151 | 0.659 | 0.509 | 0.493 | 0.746 | -0.113 | 0.049 | 0.223 | 0.542 | 0.151 | -0.004 | 0.048 | 0.503 | 0.033 | 0.352 | 0.407 | 0.022 | -0.033 | 0.479 | 1.000 | | | | |
| W | -0.005 | 0.027 | -0.001 | -0.001 | -0.003 | -0.003 | 0.046 | 0.023 | -0.002 | -0.034 | -0.003 | 0.004 | -0.015 | -0.004 | -0.018 | 0.017 | -0.030 | -0.001 | -0.027 | 0.002 | -0.004 | -0.013 | 0.001 | -0.014 | 0.007 | 0.011 | -0.001 | -0.009 | -0.008 | -0.007 | 1.000 | | | |
| Y | -0.053 | 0.019 | -0.026 | 0.011 | -0.230 | 0.342 | 0.286 | -0.118 | 0.120 | -0.189 | 0.013 | 0.026 | -0.144 | 0.207 | 0.281 | 0.123 | 0.564 | 0.258 | -0.053 | 0.071 | 0.067 | -0.024 | -0.098 | 0.030 | 0.311 | 0.206 | -0.060 | -0.323 | 0.152 | 0.045 | -0.014 | 1.000 | | |
| Zn | -0.035 | 0.021 | -0.013 | -0.009 | -0.167 | 0.402 | 0.177 | 0.085 | 0.088 | 0.115 | 0.095 | 0.345 | 0.238 | 0.670 | 0.697 | -0.208 | 0.400 | 0.462 | 0.517 | 0.254 | 0.006 | -0.436 | 0.426 | 0.286 | 0.167 | 0.332 | 0.003 | -0.234 | -0.035 | 0.239 | -0.019 | 0.401 | 1.000 | |
| Zr | -0.039 | 0.035 | -0.035 | 0.023 | -0.165 | 0.169 | 0.350 | -0.032 | 0.004 | -0.237 | -0.017 | -0.093 | -0.181 | -0.201 | -0.012 | 0.591 | 0.144 | 0.086 | -0.285 | -0.085 | 0.057 | 0.489 | -0.315 | -0.116 | 0.463 | -0.048 | -0.048 | 0.022 | 0.380 | 0.027 | 0.012 | 0.417 | -0.212 | 1.000 |

Tab. II-4-3 Results of the EDA analysis of soil geochemical data

| Elements | L.Fence | L.Wisker | L.Hinge | Median | U.Hinge | U.Wisker | U.Fence |
|---|---|---|---|---|---|---|---|
| Au (ppb) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| As (ppm) | 2.1 | 5.0 | 5.0 | 7.0 | 9.0 | 10.0 | 21.7 |
| Sb (ppm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Hg (ppb) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| S (ppm) | 104.4 | 220.0 | 241.0 | 321.0 | 421.0 | 454.0 | 972.0 |
| Ga (ppm) | 13.3 | 18.0 | 18.0 | 20.0 | 22.0 | 22.0 | 29.7 |
| Tl (ppm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Ag (ppm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Al (%) | 4.257 | 4.800 | 4.800 | 5.000 | 5.200 | 5.300 | 5.863 |
| B (ppm) | 66.3 | 198.0 | 237.0 | 379.0 | 554.0 | 613.0 | 1979.9 |
| Ba (ppm) | 252.4 | 347.0 | 359.0 | 400.0 | 454.0 | 475.0 | 645.7 |
| Be (ppm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Bi (ppm) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Ca (%) | 0.587 | 0.970 | 1.010 | 1.210 | 1.450 | 1.560 | 2.494 |
| Cd (ppm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Co (ppm) | 8.2 | 14.0 | 14.0 | 17.0 | 20.0 | 21.0 | 34.1 |
| Cr (ppm) | 13.7 | 26.0 | 28.0 | 34.0 | 45.0 | 50.0 | 91.7 |
| Cu (ppm) | 17.5 | 26.0 | 27.0 | 31.0 | 36.0 | 37.0 | 55.4 |
| Fe (%) | 1.382 | 2.100 | 2.200 | 2.600 | 3.000 | 3.100 | 4.777 |
| K (%) | 0.687 | 0.910 | 0.960 | 1.100 | 1.200 | 1.200 | 1.677 |
| La (ppm) | 27.6 | 34.0 | 35.0 | 38.0 | 41.0 | 42.0 | 52.0 |
| Li (ppm) | 12.6 | 18.0 | 19.0 | 21.0 | 25.0 | 26.0 | 37.7 |
| Mg (%) | 0.207 | 0.380 | 0.400 | 0.500 | 0.620 | 0.670 | 1.196 |
| Mn (%) | 0.033 | 0.050 | 0.060 | 0.070 | 0.090 | 0.100 | 0.165 |
| Mo (ppm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 |
| Na (%) | 0.691 | 1.100 | 1.100 | 1.300 | 1.500 | 1.500 | 2.389 |
| Ni (ppm) | 3.8 | 9.7 | 10.0 | 14.0 | 19.0 | 22.0 | 49.8 |
| P (%) | 0.011 | 0.020 | 0.020 | 0.030 | 0.030 | 0.040 | 0.055 |
| Pb (ppm) | 41.0 | 49.0 | 51.0 | 55.0 | 59.0 | 60.0 | 73.4 |
| Sc (ppm) | 2.7 | 5.3 | 6.3 | 9.0 | 11.0 | 12.0 | 25.4 |
| Sn (ppm) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Sr (ppm) | 101.5 | 141.0 | 146.0 | 164.0 | 186.0 | 194.0 | 267.5 |
| Ti (%) | 0.266 | 0.350 | 0.360 | 0.400 | 0.440 | 0.450 | 0.595 |
| V (ppm) | 41.7 | 60.0 | 63.0 | 72.0 | 83.0 | 88.0 | 125.5 |
| W (ppm) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Y (ppm) | 15.2 | 19.0 | 20.0 | 22.0 | 24.0 | 25.0 | 31.5 |
| Zn (ppm) | 31.4 | 52.0 | 55.0 | 66.0 | 80.0 | 85.0 | 140.3 |
| Zr (ppm) | 69.6 | 93.0 | 96.0 | 107.0 | 119.0 | 123.0 | 164.2 |

## Tab.II-4-4 Results of factor analysis of soil geochemical data

| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 7 | Factor 8 | Communarity |
|---|---|---|---|---|---|---|---|---|---|
| Au | −0.015 | 0.047 | 0.029 | −0.045 | −0.023 | 0.080 | −0.022 | −0.034 | 0.014 |
| As | −0.086 | −0.111 | −0.137 | −0.348 | 0.125 | 0.236 | −0.036 | 0.091 | 0.240 |
| Sb | −0.037 | 0.013 | −0.001 | −0.062 | −0.010 | 0.012 | 0.018 | 0.011 | 0.006 |
| Hg | −0.028 | 0.020 | 0.019 | 0.016 | −0.007 | −0.002 | 0.017 | 0.156 | 0.026 |
| S | 0.056 | 0.383 | 0.044 | −0.051 | −0.158 | −0.069 | 0.610 | 0.070 | 0.560 |
| Ga | −0.130 | −0.667 | −0.134 | 0.048 | 0.063 | −0.057 | −0.016 | 0.008 | 0.490 |
| Al | −0.020 | −0.710 | 0.180 | −0.005 | 0.265 | −0.109 | −0.178 | 0.055 | 0.654 |
| B | −0.215 | −0.186 | 0.234 | −0.087 | −0.016 | 0.180 | 0.093 | −0.101 | 0.195 |
| Ba | 0.005 | −0.072 | −0.003 | 0.105 | −0.159 | 0.283 | −0.036 | 0.104 | 0.133 |
| Ca | −0.330 | 0.154 | 0.445 | 0.380 | 0.257 | 0.245 | 0.295 | −0.188 | 0.724 |
| Cd | −0.030 | 0.031 | −0.026 | 0.046 | 0.284 | −0.022 | 0.020 | −0.010 | 0.087 |
| Co | −0.429 | −0.111 | 0.017 | −0.076 | 0.608 | 0.504 | −0.027 | 0.004 | 0.826 |
| Cr | −0.873 | −0.098 | 0.084 | −0.028 | 0.240 | −0.032 | −0.097 | 0.090 | 0.856 |
| Cu | −0.435 | −0.340 | −0.438 | −0.003 | 0.355 | 0.150 | 0.041 | −0.202 | 0.688 |
| Fe | −0.468 | −0.453 | −0.165 | 0.088 | 0.625 | 0.151 | 0.024 | −0.073 | 0.878 |
| K | 0.391 | −0.488 | 0.318 | −0.172 | −0.190 | −0.064 | −0.113 | 0.246 | 0.635 |
| La | 0.066 | −0.360 | 0.042 | 0.614 | 0.072 | 0.315 | 0.119 | 0.103 | 0.643 |
| Li | −0.122 | −0.744 | −0.133 | −0.010 | −0.077 | 0.139 | −0.014 | −0.130 | 0.629 |
| Mg | −0.721 | −0.191 | 0.074 | 0.218 | 0.331 | 0.185 | 0.167 | −0.192 | 0.818 |
| Mn | −0.077 | 0.013 | −0.074 | −0.037 | 0.204 | 0.731 | 0.056 | 0.090 | 0.600 |
| Mo | 0.013 | −0.016 | −0.036 | −0.026 | −0.021 | 0.068 | 0.044 | 0.230 | 0.063 |
| Na | 0.198 | −0.092 | 0.692 | 0.027 | 0.202 | −0.182 | −0.098 | 0.234 | 0.666 |
| Ni | −0.860 | −0.115 | −0.159 | −0.086 | 0.208 | 0.148 | −0.044 | −0.013 | 0.854 |
| P | −0.100 | 0.001 | −0.027 | 0.101 | 0.080 | 0.006 | 0.703 | 0.106 | 0.533 |
| Pb | 0.072 | −0.744 | 0.253 | −0.042 | 0.270 | 0.071 | −0.150 | 0.121 | 0.740 |
| Sc | −0.269 | −0.199 | −0.169 | 0.145 | 0.441 | −0.042 | 0.001 | −0.066 | 0.362 |
| Sn | −0.148 | 0.060 | −0.021 | −0.055 | −0.014 | −0.019 | 0.049 | 0.046 | 0.034 |
| Sr | −0.022 | −0.025 | 0.755 | 0.157 | −0.052 | 0.097 | 0.051 | −0.115 | 0.624 |
| Ti | 0.036 | −0.115 | 0.269 | 0.046 | 0.690 | −0.009 | −0.077 | 0.108 | 0.583 |
| V | −0.381 | −0.266 | 0.028 | −0.188 | 0.666 | 0.085 | −0.015 | −0.065 | 0.707 |
| W | 0.015 | −0.015 | −0.003 | −0.061 | −0.004 | 0.002 | −0.009 | −0.006 | 0.004 |
| Y | 0.247 | −0.416 | −0.372 | 0.410 | 0.186 | 0.049 | −0.058 | 0.327 | 0.688 |
| Zn | −0.312 | −0.433 | −0.477 | 0.324 | 0.128 | 0.233 | 0.229 | −0.149 | 0.763 |
| Zr | 0.411 | −0.349 | 0.209 | −0.030 | 0.193 | −0.142 | −0.164 | 0.494 | 0.664 |

# CHPTER 5 ROCK GEOCHEMICAL PROSPECTING

## 5-1 Survey area

The rock geochemical prospecting was carried out on the same survey area concurrently with the geological survey. Equally in the case of the soil geochemical prospecting, the northern part of the San Jose area was additionally appointed as the survey area.

## 5-2 Methodology

### 5-2-1 Sampling

Quartz veins and the wall rock were targeted as samples. However occurrence of wall rock samples near the quartz vein if at all, rarely happened. The location of the sampling point and sample number are indicated on the geological map, along with the items of laboratory analyses experimented on the sample. The rock samples were selected weighed about 1kg, an approximate channel sampling, so as to represent each outcrop. The positional information of the sampling point was obtained by using GPS.

The number of rock samples collected is 607. The location maps of rock sample are shown in Plate II-3-1～Plate II-3-4. The location map of quartz vein zones and wall rock with location of geochemical rock samples is also shown in Fig. II-3-7. The breakdown of the samples by area is 364 from the main part of the San Jose area, 55 from the western part of the San Jose area, 16 from the northern part of the San Jose area and 172 from the Arroyo Grande area.

### 5-2-2 Sample preparation

The breakdown of the samples by rock type is made up of 262 of vein quartz, 114 green rocks, 131 granites, and 100 other metamorphic rocks and silicious rocks of sedimentary rock origin. Preparation of rock sample was carried out at DINAMIGE laboratory. The samples were subjected to the analysis after being dried, smashed and roughly crushed.

### 5-2-3 Chemical analysis

Elemental analysis was carried out for Au, Ag, Cu, Pb, Zn, As, Sb and Hg. As for the methodology, the fire assay-ICP was employed for Au, and ICP analysis for the other elements, respectively. The detection limit is shown in the list of statistics. The chemical analysis was carried out at the Lakefield Geosol Ltda, located in Belo Horizonte, Minas Gerais province, Brasil. The result of the rock analysis is shown in Appendix 4.

## 5-3 Analysis methodology

Statistical work was performed for all sample data. Based on the result of the chemical analysis implemented on the samples for geochemical prospecting, the data was fed into a computer for statistical analysis. The bivariate and multivariate analyses were implemented, after statistically processing the data to obtain the key statistics.

For bivariate analysis, a histogram and a cumulative frequency graph of each element were made. The statistics of each element were obtained. In case that the data obtained was under detection limit, the half value of the detection limit was employed for calculation. The calculated mean value stands for a geometric average.

The relation between elements was discussed based on the calculated correlation coefficient. The EDA (Exploratory Data Analysis, Kurzl H.; 1988) was adopted to extract the anormalies of each element. This is a method to extract a threshold (i.e. anormaly) based on the statistic numerical process, irrespective of the distribution type of each element.

The factor analysis, which is an approach to extract a concerned factor based on the cluster analysis and the correlation between the elements, was adopted for multivariate analyses. The geological features of the survey area are key factors for the analysis, and the result of the geological survey carried out in this fiscal year was used for that.

## 5-4 Result of analysis

### 5-4-1 Result of statistical work

The statistical work was implemented using the analysis data obtained from all samples, after the result was fed into a computer. The result of statistical work is shown in Tab. II-5-1 to Tab. II-5-3. The maximum value of Au was indicated as 19,890ppb.

Among the 8 elements adopted for this survey, most data of Au, Ag, Sb and Hg were under the detection limit. The correlation coefficient was calculated in order to figure out the relation between the elements (Tab. II-5-2). In result, being that the correlation coefficients of Au-Ag, Cu-Au and Cu-As were not lower than 0.3.

### 5-4-2 Result of bivariate analysis

After examining the result of statistical work for each element, the value of the Upper Fence was determined as a threshold, based on the statistics of data (Tab. II-5-1), the result of EDA (Tab. II-5-3) and the cumulative frequency graph (Fig. II-5-1(1) to (2)). The threshold for Au was determined as the detection limit, while that for Zn as Mean + 2SD. The distribution maps of anomalies for each of As, Cu, Pb and Zn were prepared as shown in Fig. II-5-2 ~Fig. II-5-6, based on the above-mentioned threshold and the value of the Upper Wisker as a complementary threshold. According to the distribution maps, the distributional tendency of each element is summarized below.

Au : The threshold was determined as 5ppb. The range over 5ppb under 100ppm was determined as the low anormaly, the range of 100ppm~under 1,000ppm as the intermediate anormaly, and the range not lower than 1,000ppm as the high anormaly, respectively. The intermediate to high anormalies were extracted from the central part of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. The low anormalies were dotted over the whole survey area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings B, E, G, J, K, L and M as well as the mineral showing A around the Mahoma mine. The result of Au assay was shown in Tab. II-5-4, which was implemented on the 23 samples taken from the quartz vein which contains relatively high grade ore with the maximum assay value of 19,890ppb, and the 18 samples taken from green rocks and granites which contains relatively low grade ore. The assay value of quartz veins impregnated with green rocks were in a range of 19,890ppb to 5ppb, and that of granites was 5,370ppb to 37ppm, while that of other rocks was 562ppb to 14ppb. Regarding the assay result of the wall rock, the assay value of green rocks was 37ppb to 5ppb, and that of granites was 291ppb to 9ppb, while that of other rocks was 354ppb to 9ppb.

As : The threshold was determined as 15.6ppm, the complementary threshold as 6.0ppm, and the values over that as the anormaly. The anormalies were extracted from the west and middle to east parts of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, the south part of B, E, G,H, I, in the east of K and L.

Cu : The threshold was determined as 69.5ppm, the complementary threshold as 28.0ppm, and the values over that as the anormaly. The anormalies were extracted from the west and middle to east parts of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, B, between A and E, E, G, H, I and L.

Pb : The threshold was determined as 22.3ppm, the complementary threshold as 8.0ppm, and the values over that as the anormaly. The anormalies were recognized over the whole survey area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, B, C, in the north of G, H, K, L and M.

Zn : The threshold was determined as 203.7ppm, the complementary threshold as 72.0ppm, and the values over that as the anormaly. The anormalies were extracted from the central part of the main part of the San Jose area and the Arroyo Grande area. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, the south part of B, E, H, I, in the east of K and L.

### 5-4-3 Result of multivariate analysis

The cluster analysis and the factor analysis were adopted for multivariate analysis, in order to examine the relevance of the elements to the mineralization or to the property of wall rock, based on the analysis data of each sample. The cluster dendrogram of cluster analysis was produced (Fig. II-5-7). It proves that Au and Ag, and Cu and Zn are closely related.

As for the factor analysis, 3 factors were extracted by the Varimax method (Tab. II-5-5). For these factors, the factor score diagrams were prepared (Fig. II-5-8). The elements, which have high absolute value of a factor loading, are shown by factors as below.

Factor1 : Cu, Zn and As

Factor2 : Au and Ag

Factor3 : Pb and Zn

The distribution maps of factor scores were prepared (Fig. II-5-9~Fig. II-5-11), plotting the samples whose absolute value of a factor score is not lower than 1, to examine the relation between the geological features and mineralization.

**Factor 1** : The high factor score is distributed in the middle part of the main part of the San Jose area. The geological features of this high score area, consist of pCCps. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, E, H and I.

**Factor 2** : The high factor score is distributed in the middle part of the main part of the San Jose area, the western part of the San Jose area and the Arroyo Grande area. The geological features of these high score areas, consist of pCCsjo, pCCps, pCCsj, pCCag and pCCG. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, E, H, K, L and M.

**Factor 3** : The intermediate factor score is distributed in the middle part of the main part of the San Jose area and the west part of the Arroyo Grande area. The geological features of these intermediate score areas, consist of pCCsjo, pCCps, pCCag, pCCG and pCC. As contrasted with the mineral showings, the distribution corresponds to the mineral showings A, I and L.

### 5-4-4 Discussion

Based on the result of factor analysis, the following is estimated. Factor 1 is considered to be a factor that reflects the petrographic character of so-called mafic rock. As contrasted with the geological features, the factor score tends to be high in the distribution area of pCCps, which includes green rocks.

Factor 2 is considered to be a factor that is related to the gold mineralization. Factor 3 is inferred to be a mixed factor that gives granites a distinction and/or that gives non-mafic rocks a distinction. Examining the geochemical anormaly in the relation with mineral showings, the mineral showings A, E, G, H, K and L can be extracted as the place where the Au and As anormalies and high score of Factor2 correspond. From the result of rock geochemical prospecting, Au anormalies along the fracture zone were extracted in the mineral showing A. Additionally, Au anormalies near the fracture zone were also extracted in the mineral showings B, E, K and L. As a result of this fiscal year's survey, the possibility of bearing a potential gold ore deposit in these areas is sufficiently recognized.

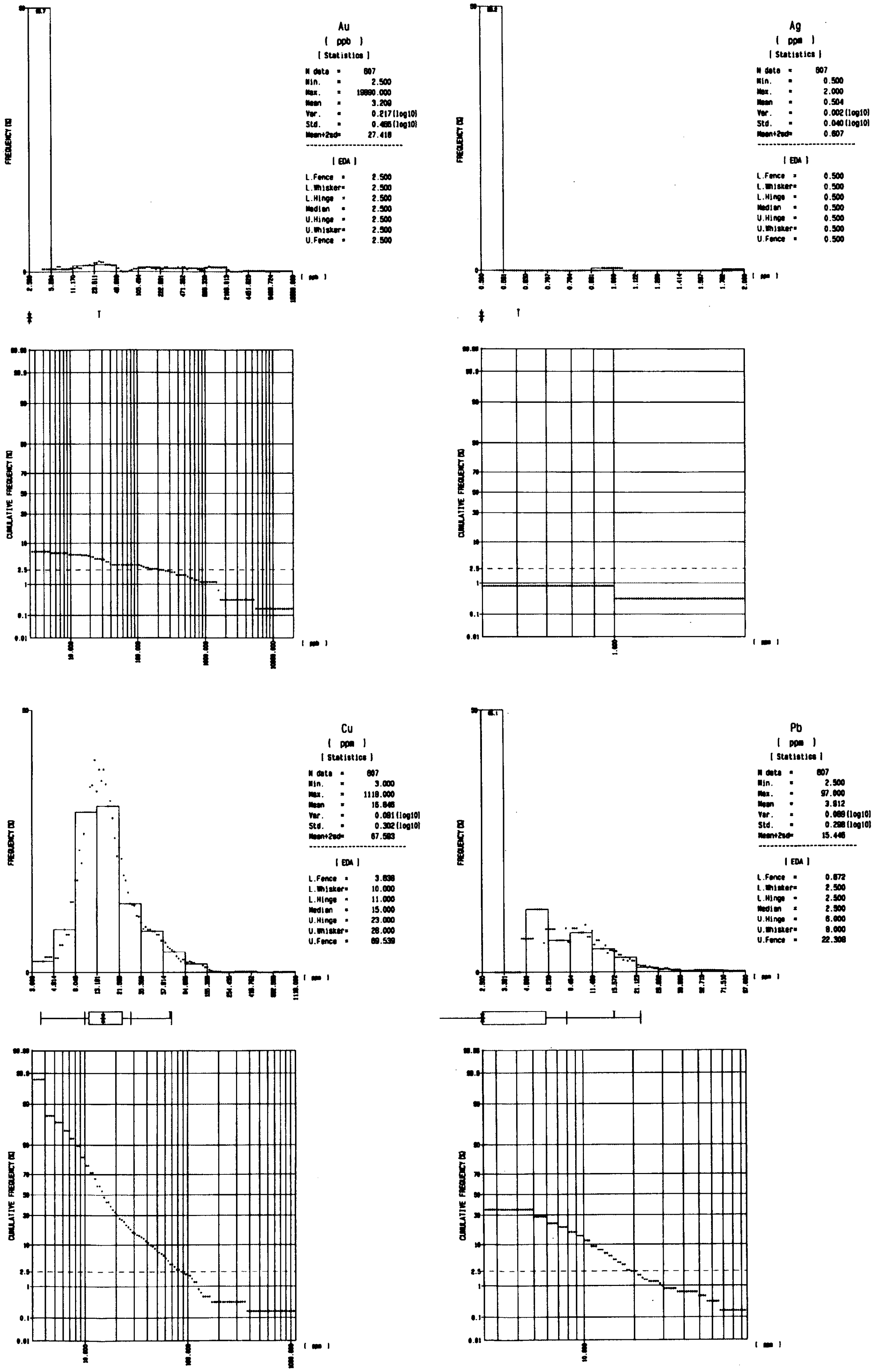
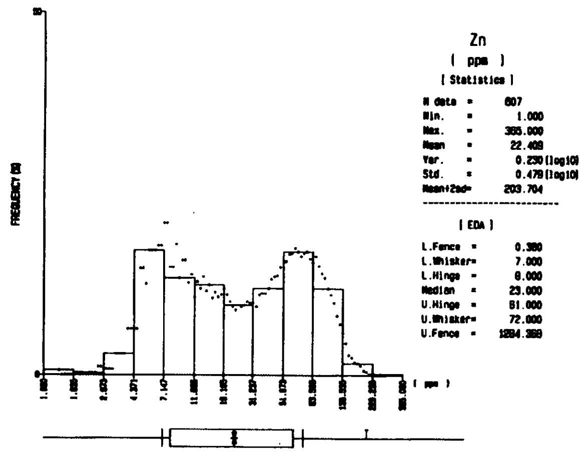
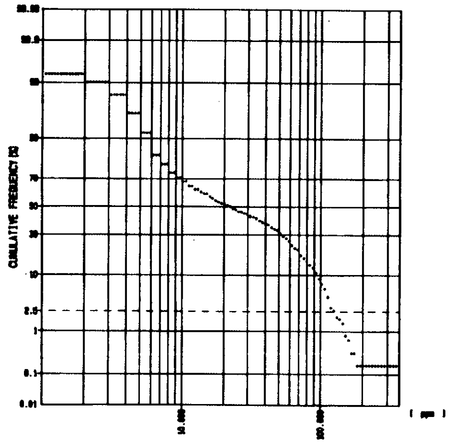
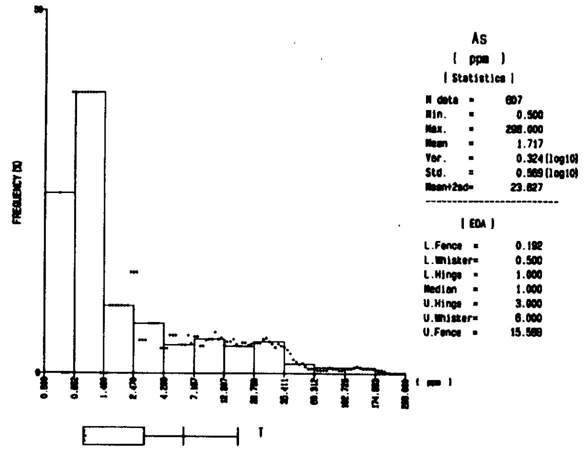
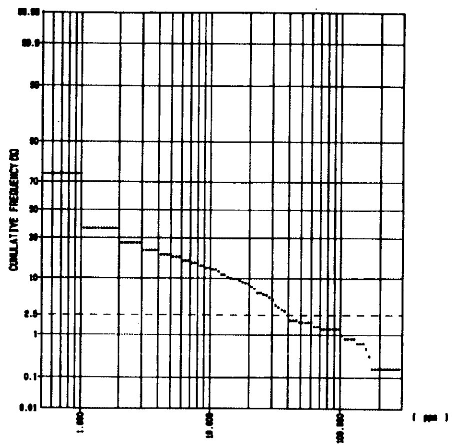


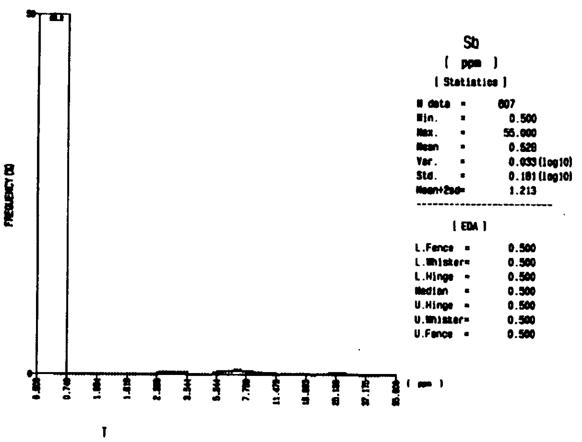

Fig.II-5-1(1) Histogram, EDA and cumulative frequency of each element of rock samples



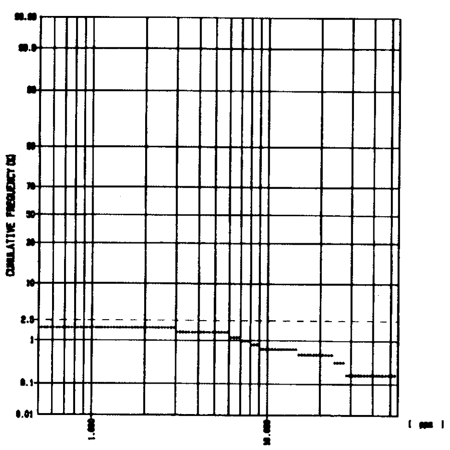




Fig.II-5-1(2) Histogram, EDA and cumulative frequency of each element of rock samples

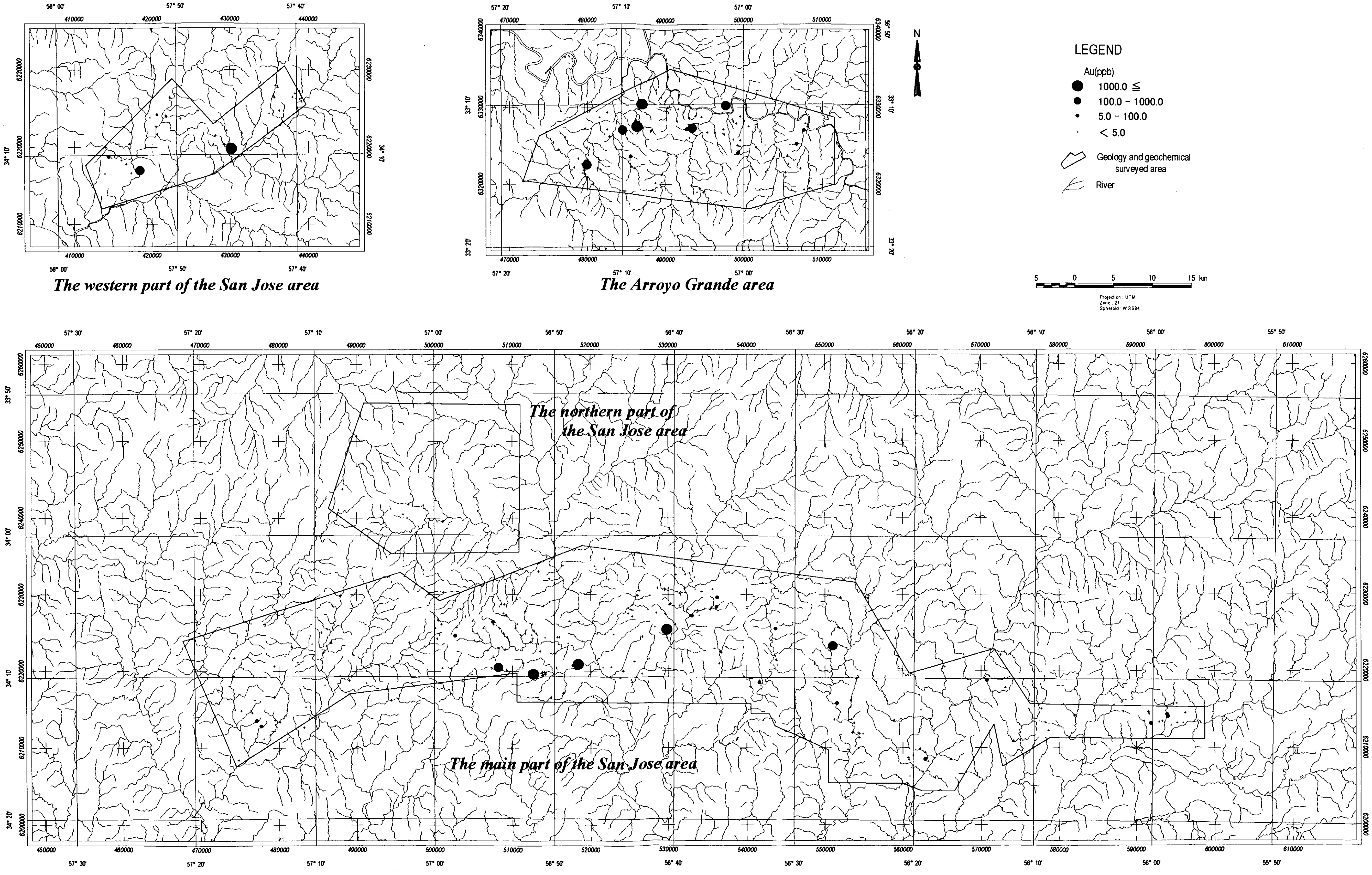



Fig.II-5-2 Distribution map of Au anomalies of rock samples

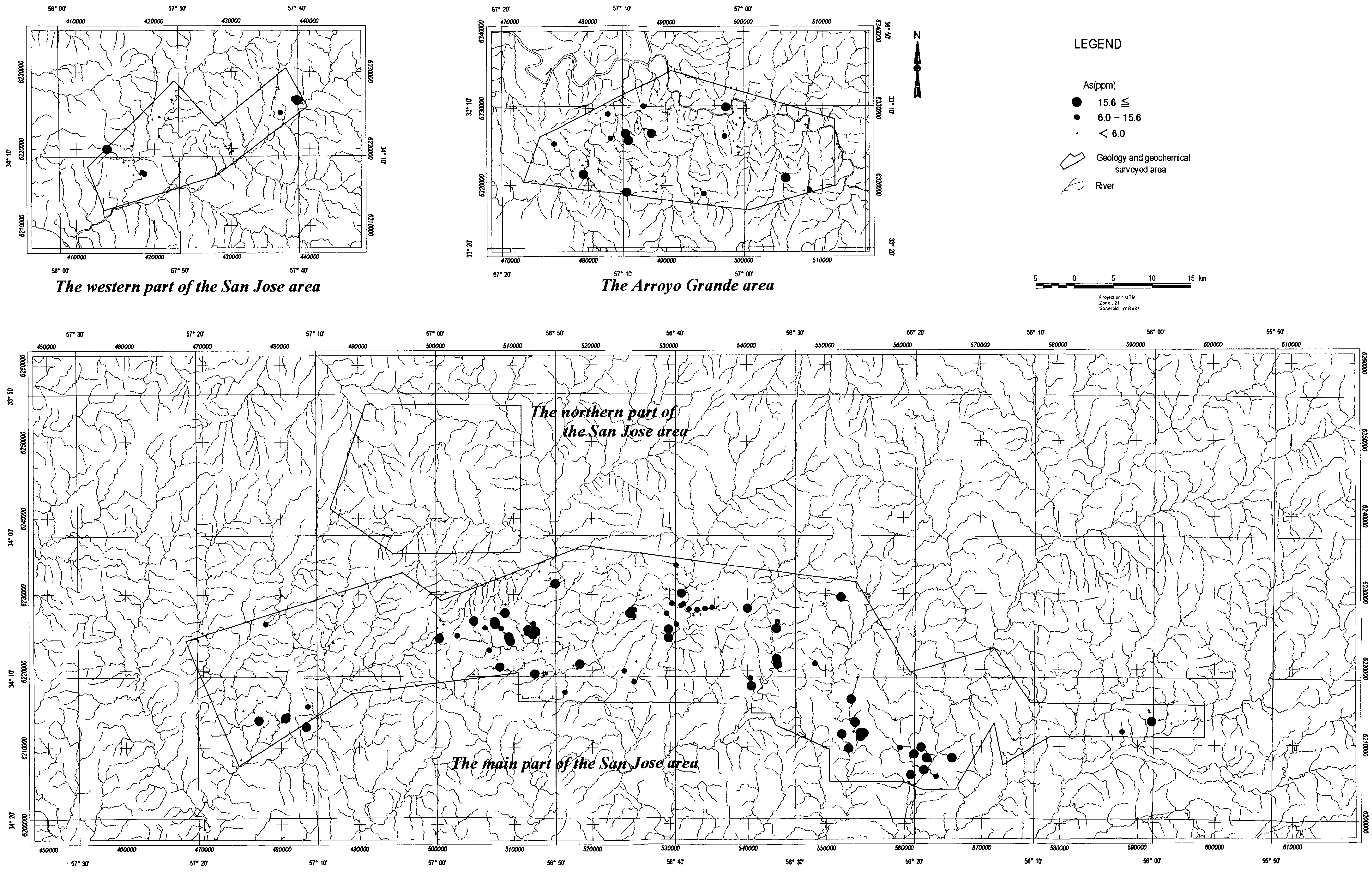



Fig.II-5-3 Distribution map of As anomalies of rock samples

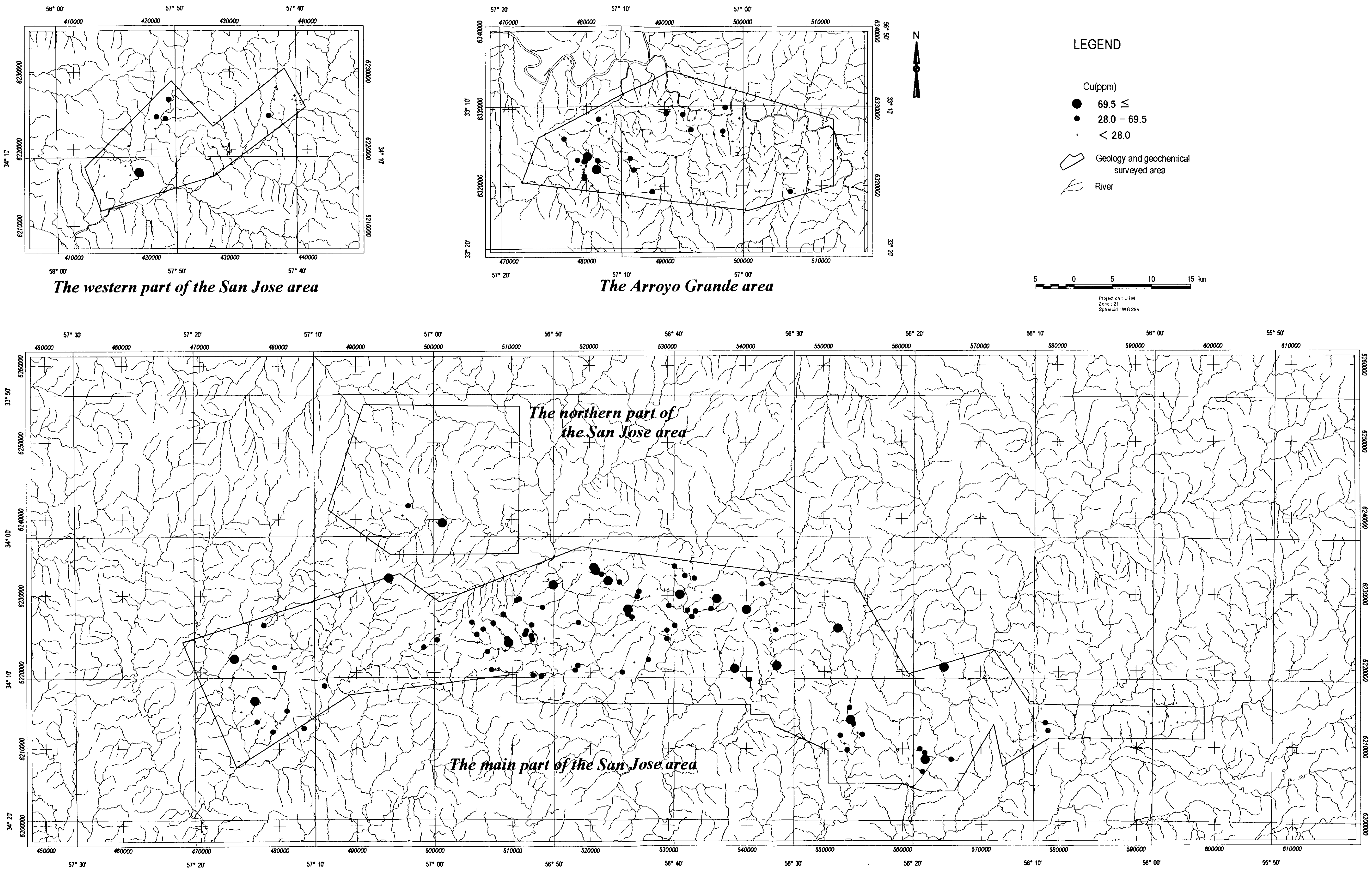



Fig.II-5-4 Distribution map of Cu anomalies of rock samples

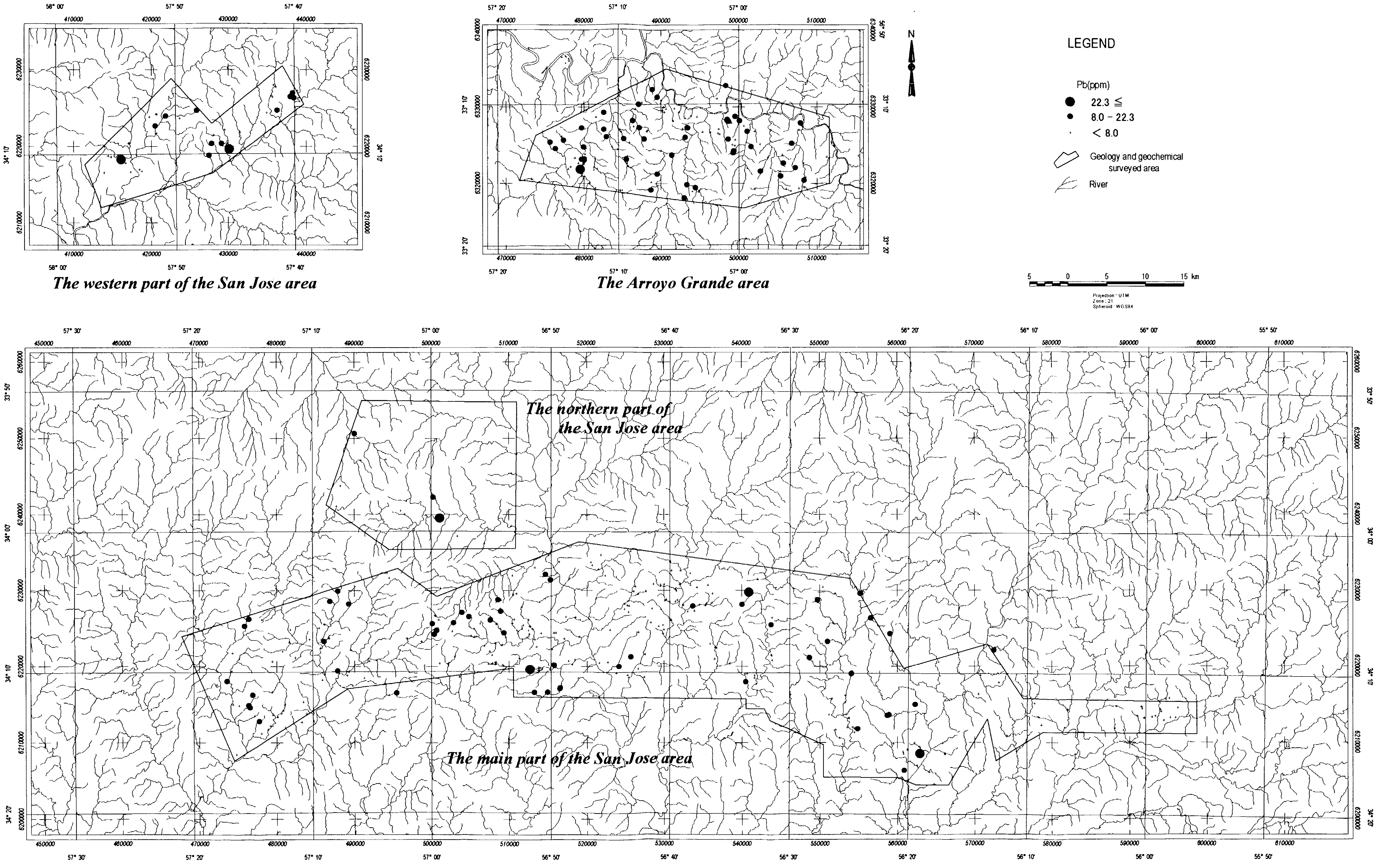



Fig.II-5-5 Distribution map of Pb anomalies of rock samples

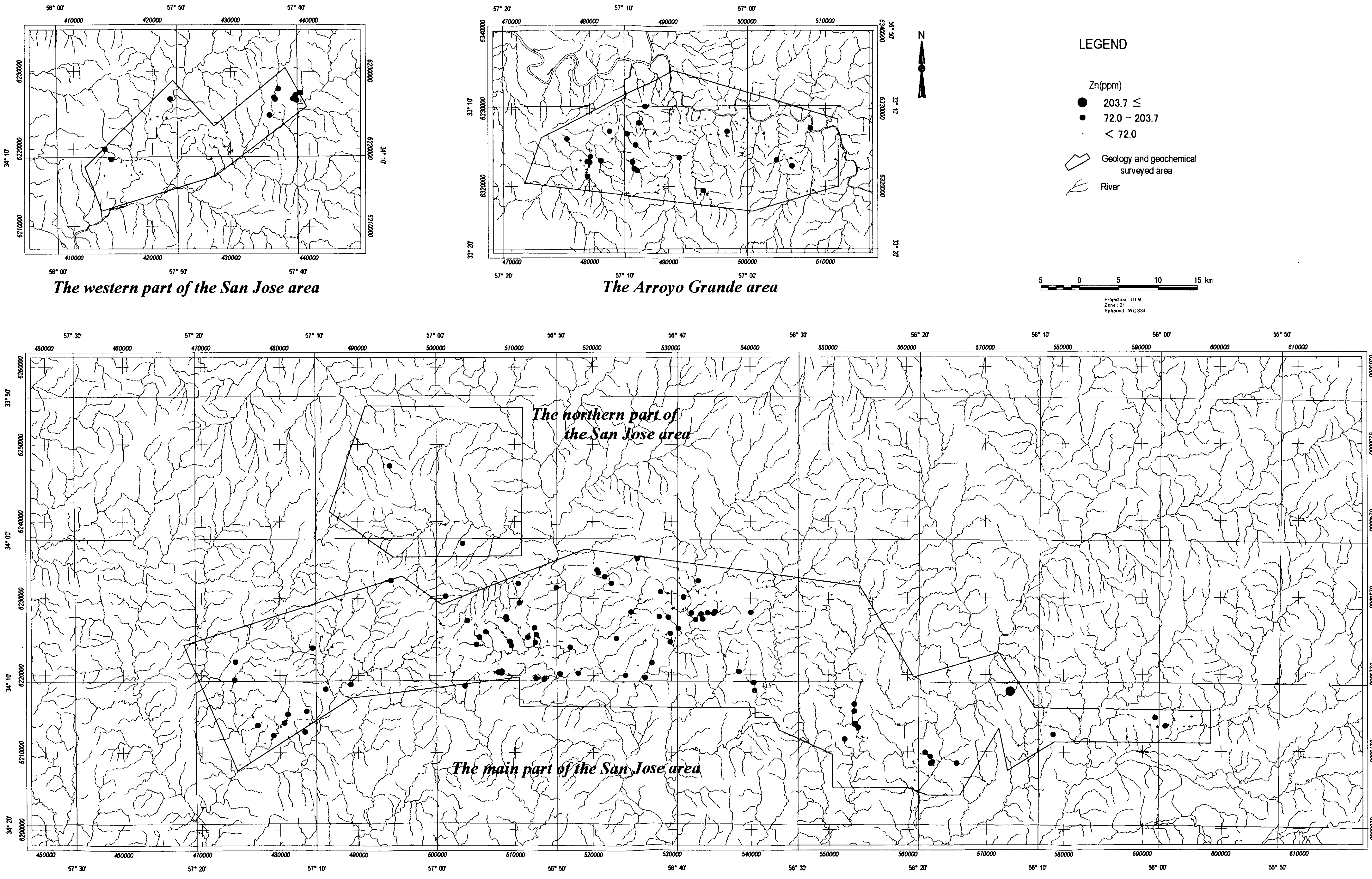



Fig.II-5-6 Distribution map of Zn anomalies of rock samples

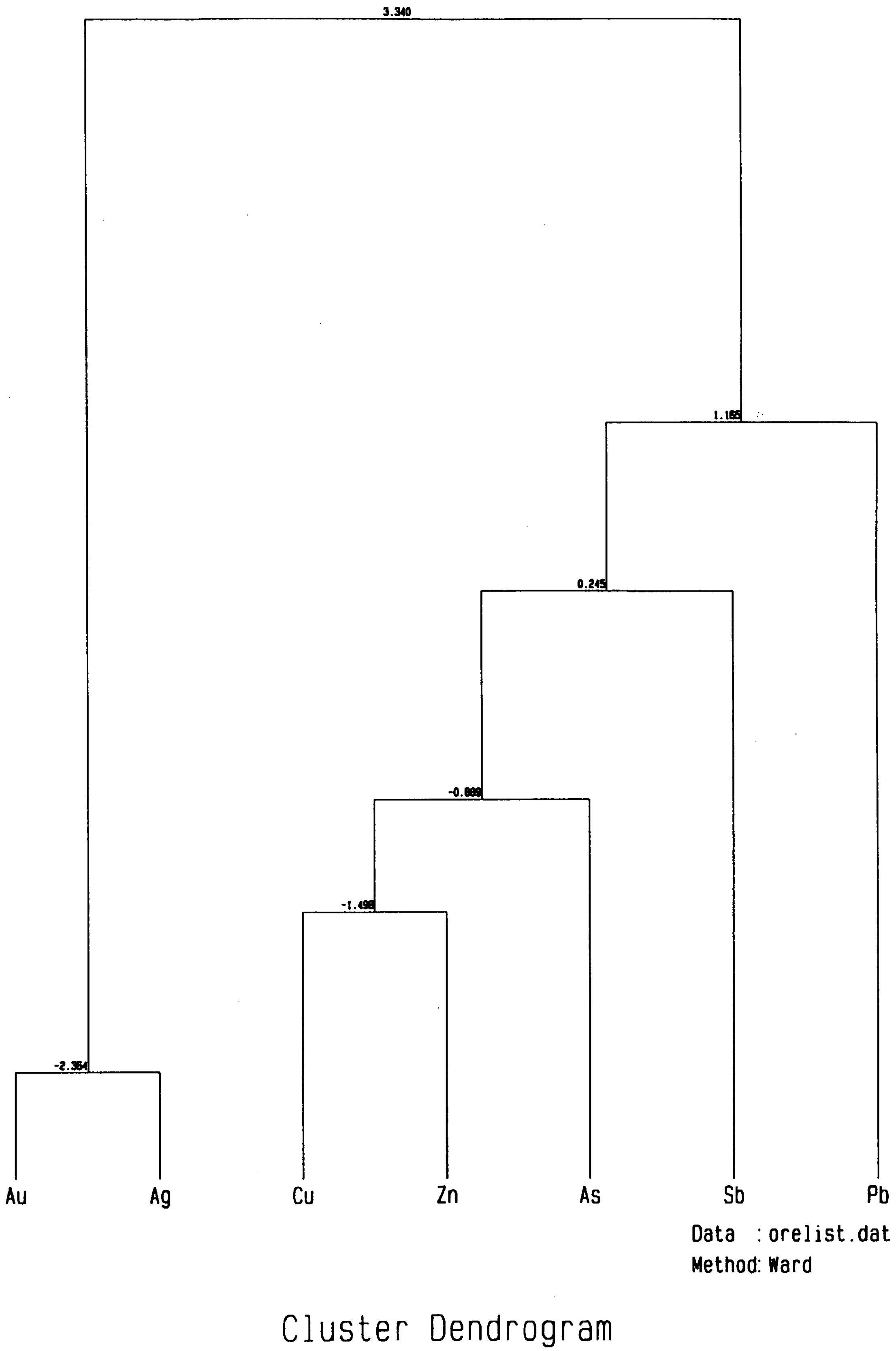



Fig.II-5-7 Dendrogram of cluster analysis of rock samples

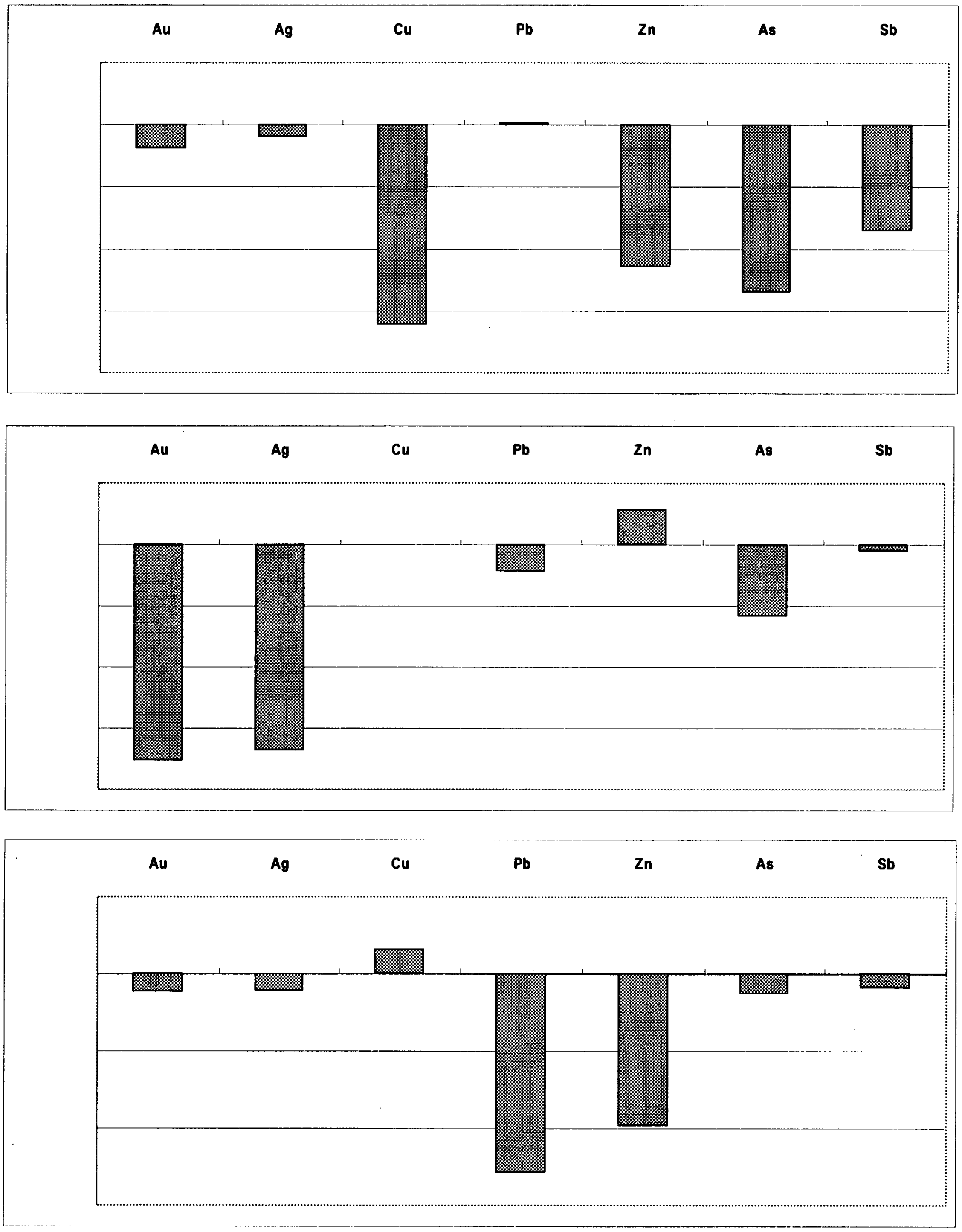



Fig.II-5-8 Factor score diagram of Factor 1 to Factor 3

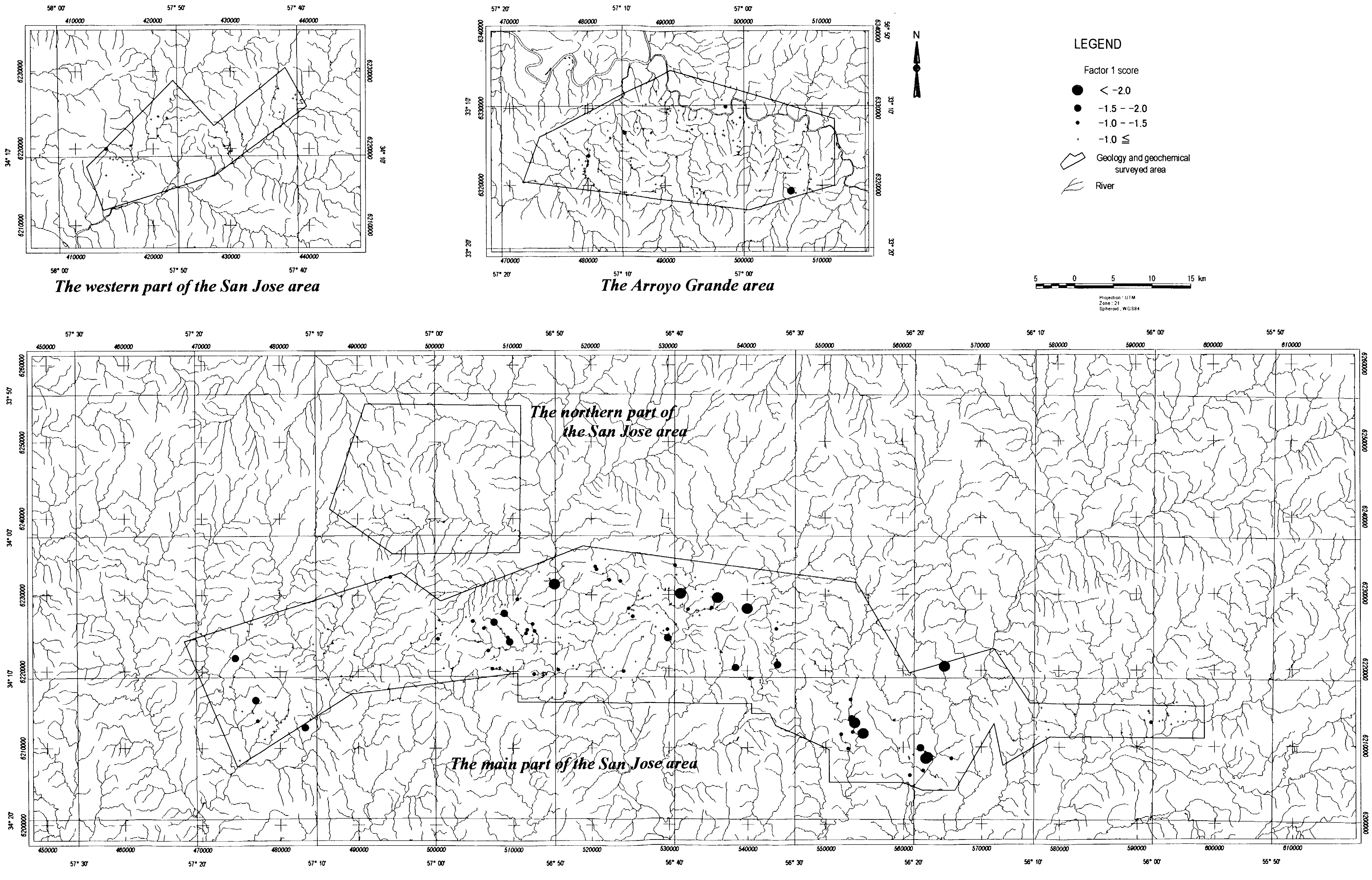



Fig.II-5-9 Distribution map of factor1 scores of rock samples

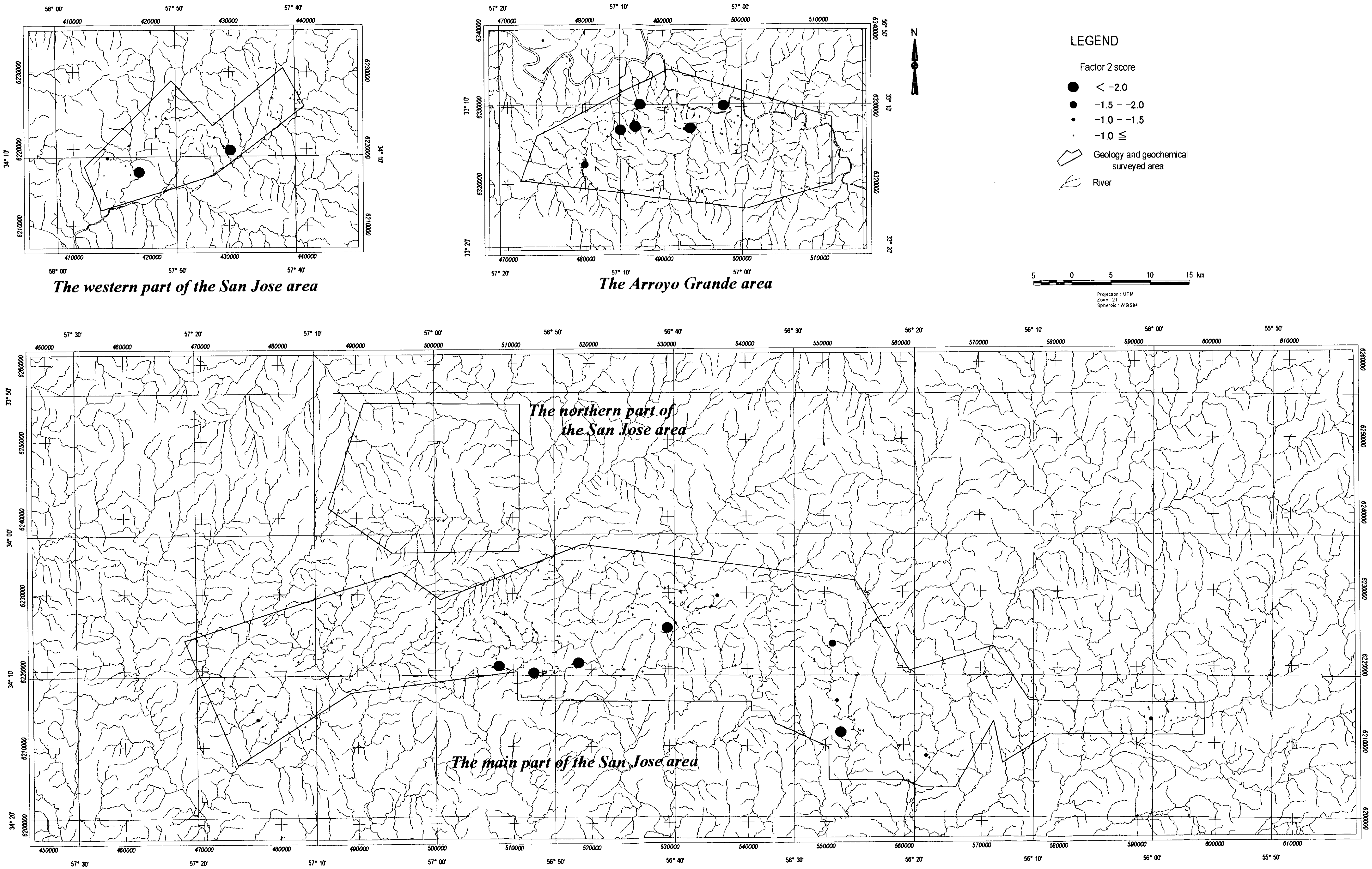



Fig.II-5-10 Distribution map of factor2 scores of rock samples

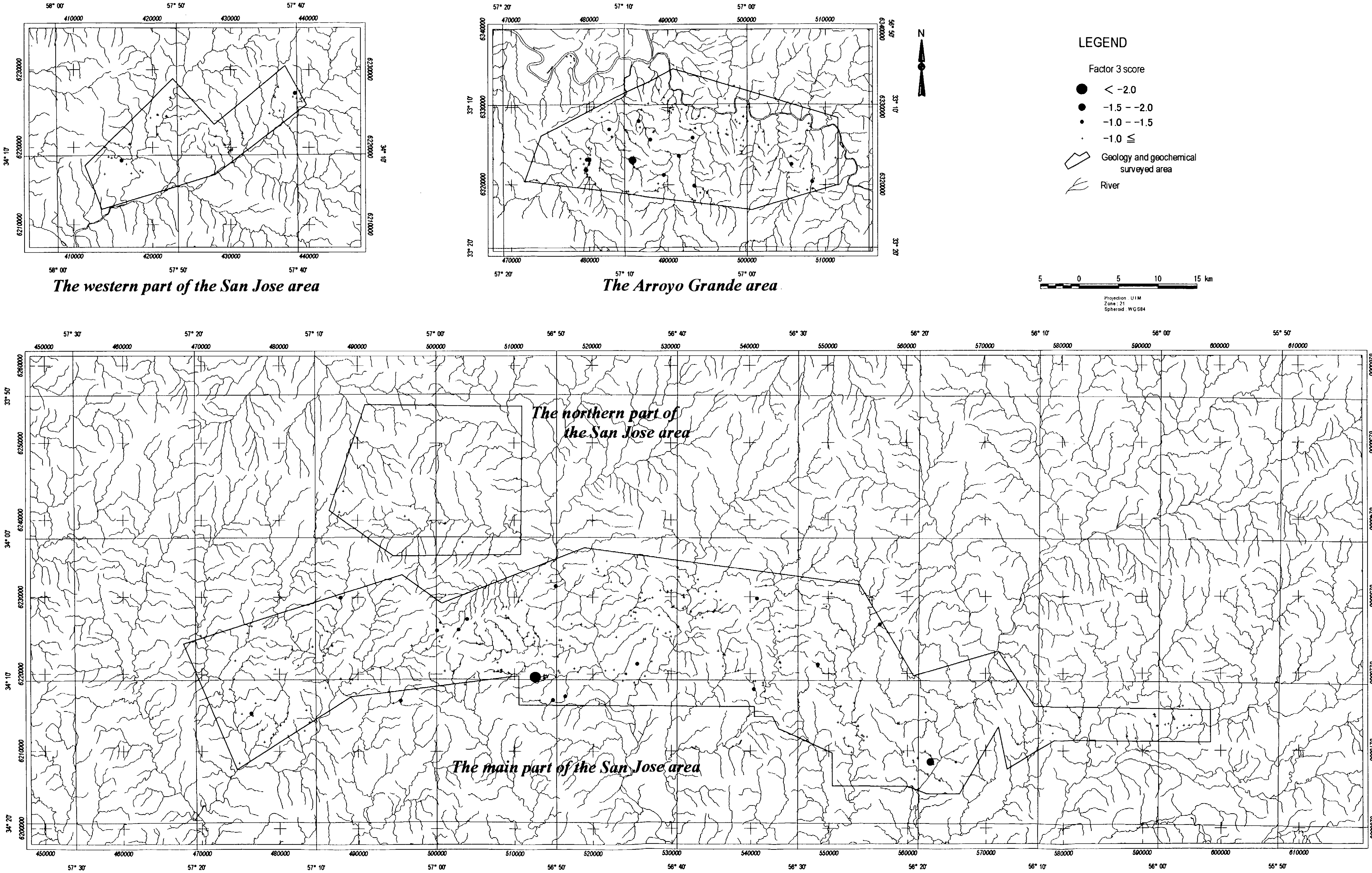



Fig.II-5-11 Distribution map of factor3 scores of rock samples

Tab. II-5-1 Statistics of rock geochemical data

| Elements | Mean | Var. | S.D. | Min | Max | Mean+2SD | D.L. | B.D.L.(%) |
|---|---|---|---|---|---|---|---|---|
| Au (ppb) | 3.2 | 0.217* | 0.466* | 2.5 | 19890 | 27.4 | 5 | 93.2 |
| Ag (ppm) | 0.5 | 0.002* | 0.040* | 0.5 | 2 | 0.6 | 1 | 99.2 |
| Cu (ppm) | 16.8 | 0.091* | 0.302* | 3.0 | 1118 | 67.6 | 2 | 0.0 |
| Pb (ppm) | 3.9 | 0.089* | 0.298* | 2.5 | 97 | 15.4 | 5 | 65.1 |
| Zn (ppm) | 22.4 | 0.230* | 0.479* | 1.0 | 365 | 203.7 | 2 | 0.7 |
| As (ppm) | 1.7 | 0.324* | 0.569* | 0.5 | 298 | 23.6 | 1 | 24.9 |
| Sb (ppm) | 0.5 | 0.033* | 0.181* | 0.5 | 55 | 1.2 | 1 | 98.2 |
| Hg (ppb) | 25.0 | 0.000* | 0.000* | 25.0 | 25 | 25.0 | 50 | 100.0 |

Tab. II-5-2 Correlation coefficient of each sample of rock geochemical data

| | Au | Ag | Cu | Pb | Zn | As | Sb |
|---|---|---|---|---|---|---|---|
| Au | 1.000 | | | | | | |
| Ag | 0.480 | 1.000 | | | | | |
| Cu | 0.043 | 0.049 | 1.000 | | | | |
| Pb | 0.111 | 0.056 | -0.111 | 1.000 | | | |
| Zn | -0.069 | -0.004 | 0.353 | 0.228 | 1.000 | | |
| As | 0.241 | 0.138 | 0.345 | 0.053 | 0.225 | 1.000 | |
| Sb | 0.048 | -0.011 | 0.219 | 0.084 | 0.074 | 0.204 | 1.000 |

Tab. II-5-3 Results of the EDA analysis of rock geochemical data

| Elements | L.Fence | L.Wisker | L.Hinge | Median | U.Hinge | U.Wisker | U.Fence |
|---|---|---|---|---|---|---|---|
| Au (ppb) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 |
| Ag (ppm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Cu (ppm) | 3.6 | 10.0 | 11.0 | 15.0 | 23.0 | 28.0 | 69.5 |
| Pb (ppm) | 0.7 | 2.5 | 2.5 | 2.5 | 6.0 | 8.0 | 22.3 |
| Zn (ppm) | 0.4 | 7.0 | 8.0 | 23.0 | 61.0 | 72.0 | 1284.4 |
| As (ppm) | 0.2 | 0.5 | 1.0 | 1.0 | 3.0 | 6.0 | 15.6 |
| Sb (ppm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Hg (ppb) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |

Tab. II-5-4 Assay results of rock geochemical samples

| Sample Name | Rock Type | Au(ppb) |
|---|---|---|
| DR037 | Quartz Vein(green rock) | 19890 |
| ER023 | Quartz Vein(green rock) | 1680 |
| FR013 | Quartz Vein(green rock) | 1680 |
| AR102 | Quartz Vein(green rock) | 826 |
| CR119 | Quartz Vein(green rock) | 641 |
| JR024 | Quartz Vein(green rock) | 245 |
| GR020 | Quartz Vein(green rock) | 37 |
| AR104 | Quartz Vein(green rock) | 32 |
| BR044 | Quartz Vein(green rock) | 32 |
| CR073 | Quartz Vein(green rock) | 23 |
| DR039 | Quartz Vein(green rock) | 19 |
| ER036 | Quartz Vein(green rock) | 18 |
| DR047 | Quartz Vein(green rock) | 5 |
| AR081 | Quartz Vein(granite) | 5370 |
| AR120 | Quartz Vein(granite) | 1550 |
| CR122 | Quartz Vein(granite) | 1548 |
| AR119 | Quartz Vein(granite) | 1520 |
| CR058 | Quartz Vein(granite) | 125 |
| AR111 | Quartz Vein(granite) | 37 |
| CR104 | Quartz Vein(others) | 562 |
| CR103 | Quartz Vein(others) | 543 |
| FR016 | Quartz Vein(others) | 375 |
| ER040 | Quartz Vein(others) | 14 |
| GR013 | Green Rock | 37 |
| GR011 | Green Rock | 32 |
| BR041 | Green Rock | 23 |
| DR001 | Green Rock | 5 |
| GR015 | Green Rock | 5 |
| AR122 | Granite | 291 |
| AR121 | Granite | 143 |
| ER118 | Granite | 115 |
| AR123 | Granite | 111 |
| DR046 | Granite | 9 |
| GR049 | Granite | 9 |
| BR011 | Others | 354 |
| CR105 | Others | 197 |
| JR009 | Others | 41 |
| GR048 | Others | 28 |
| CR013 | Others | 23 |
| GR034 | Others | 19 |
| ER104 | Others | 9 |

Tab.II-5-5 Results of factor analysis of rock geochemical

| | Factor 1 | Factor 2 | Factor 3 | Communarity |
|---|---|---|---|---|
| Au | −0.074 | −0.704 | −0.047 | 0.503 |
| Ag | −0.040 | −0.673 | −0.042 | 0.457 |
| Cu | −0.643 | −0.001 | 0.063 | 0.417 |
| Pb | 0.008 | −0.085 | −0.515 | 0.272 |
| Zn | −0.458 | 0.116 | −0.394 | 0.378 |
| As | −0.538 | −0.232 | −0.051 | 0.346 |
| Sb | −0.340 | −0.021 | −0.036 | 0.117 |