Table-2 Major Investigated Mineral Showings in Bohol · Siquijor

	*1 MINERAL SHOWING NAME	LOCATION	COMMODITY AND MINERALIZATION	AGE	TECTONIC PROVINCE	DESCRIPTION	
						OCCURRENCE	CHEMICAL ASSAY OF SAMPLE
Bohol Is.	3 Balisong	124°15' E 10° 8' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Dissemination of small amount pyrite and rare malachite are visible in silicified diorite	Cu 0.01%
Bohol Is.	7 Laka	124°15' E 10° 7' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Silicified and argillized zone in diorite, pyrite and small amount of chalcopyrite are visible	
Bohol Is.	15 Nagasnas	124°26' E 9°55' N	Ni Orthomagmatic	Paleogene	Volcano-plutonic Arc	Magnetite veinlets in serpentinite	Ni 0.17%, Fe 5.7%, Mg 19.9%, Cu 0.31%
Bohol Is.	17 Buenavista	124°13' E 9°53' N	Mn Residual	Post Tertiary	Volcano-plutonic Arc	Residual accumulation in cracks and druses of limestone	
Bohol Is.	41 Bonakan	124°11' E 10° 7' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Quartz veinlets with small amount of malachite in hornblende andesite	Au 4.18 g/t, Ag 2.4 g/t, Cu 1.02%
Bohol Is.	43 Kauswagan	124°16' E 10° 1' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Dissemination pyrite and rare amount chalcopyrite, bornite and magnetite in silicified zone of diorite	Au 77.6 g/t, Ag 35.7 g/t, Cu 0.56%
Bohol Is.	44 Mahayag	124°17' E 9°56' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Dissemination of pyrite and rarely chalcopyrite in silicified zone of diorite	
Bohol Is.	45 Anda	124°33' E 9°41' N	Mn Residual	Post Teritiary	Volcano-plutonic Arc	Residual manganese nodule in pit of limestone	Mn 42.3%, Ni 0.01%, Fe 3.7%, Ba 1.27%
Bohol Is.	54 Boyong	124°10' E 10° 7' N	Au Hydrothermal vein	Paleogene	Volcano-plutonic Arc	Pyrite vein in silicified zone of andesite, gold grade check sampling were carried out.	Cu 0.01/%
Bohol Is.	56 Compacot	124°19' E 10° 8' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Silicified zone with dissemination of malachite and pyrite in andesite	Cu 1.02/%
Bohol Is.	57 Cangmundo	124°14' E 10° 6' N	Cu, Au Hydrothermal vein	Paleogene	Volcano-plutonic Arc	Quartz vein with gold blebs and pyrite in andesite	Au 0.18 g/t, Ag 0.3 g/t, Cu 0.01%
Bohol Is.	58 Baas	124°14' E 10° 9' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Pyrite, magnetite and malachite are accompanied by silicified zone in diorite and andesite	
Bohol Is.	59 Salamanca	124°15' E 9°55' N	Cu Hydrothermal vein	Paleogene	Volcano-plutonic Arc	Quartz veins with chalcopyrite and pyrite in andesite fissure	Width < 40 cm, Au 0.2 g/t, Ag 1.5 g/t, Cu 0.03%
Bohol Is.	60 Boctol	124°23' E 9°44' N	Ni Orthomagmatic	Paleogene	Volcano-plutonic Arc	Nickel and magnesite prospect in serpentinite	
Bohol Is.	61 Bangwalog	124°21' E 9°44' N	Ni Orthomagmatic	Paleogene	Volcano-plutonic Arc	Nickel and magnesite prospect in serpentinite	
Siquijor Is.	1 Conmasque	123°37' E 9°14' N	Mn Residual	Post Teritiary	Volcano-plutonic Arc	Manganese concentration on the surface of shale	
Siquijor Is.	3 Nangka	123°39' E 9°14' N	Mn Residual	Post Teritiary	Volcano-plutonic Arc	Residual accumulation in limestone cracks	Mn 21.09%, Fe 4.05%, Ba 0.33%
Siquijor Is.	7 Pisong	123°38' E 9°12' N	Mn Residual	Post Teritiary	Volcano-plutonic Arc	Residual accumulation in limestone cracks	Mn 20.31%, Ni 0.01%, Fe 0.27%, Ba 0.31%

*1 These numbers correspond to the numbers in Attached Pl.-8.

Neogene formations unconformably.

The diorite occurs at stocks or dykes and the main body is elongated in a NE-SW trending ellipsoidal shape 6 km long and 3 km wide. The lithology of the diorite shows distinctive facies change to quartz diorite porphyry and quartz porphyry. These occur around the main mass which has porphyritic texture.

Mineralization is related to the porphyry intrusion and occurs as copper mineral dissemination on both sides of the porphyry body.

Ore minerals are generally chalcopyrite and bornite accompanied by magnetite, molybdenite, tetrahedrite, pyrite and secondary copper minerals. Oxidized zone is confined to 20 to 30 m below surface and most of the ores are of primary origine.

Ore deposits are Cansibit (western side), Binulig (eastern side) and Baclao Deposits among which the first and the second are situated at the confluence of Binulig River and Taoangan River and the third is located in the upper reaches of Taoangan River. Only the Cansibit Deposit (including a part of the Binulig) is currently being mined. This deposit occurs in a ellipsoidal shape of 2,000 m long diameter, 1,800 m in short diameter and 450 m in maximum thickness at the contact of porphyry and altered andesite.

The ore reserves of the Cansibit deposit are calculated at 286,942,500 MT (0.49% Cu) at 0.25% cut-off grade and 244,703,500 MT (0.536% Cu) at 0.3% cut-off grade (Resources Information Center of MMAJ. "The metal mine development in the ASEAN countries", 1988).

Table-3 Major Investigated Mineral Showings in Southwest Negros

*1 MINERAL SHOWING NAME	LOCATION	COMMODITY AND MINERALIZATION	AGE	TECTONIC PROVINCE	DESCRIPTION	
					OCCURRENCE	CHEMICAL ASSAY OF SAMPLE
23 San Jose	122° 27' E 9° 49' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Developed as Sipalay Mine by Maricalum Mining Corp. details are shown in later	Ore Assay Sample No. Cu(%) Mo(%) Pb(%) Zn(%) Au(g/t) BAO-1 0.96 0.012 <0.001 <0.001 0.14 BAO-2 2.11 0.001 <0.001 <0.001 <0.07 BAO-3 0.29 0.265 <0.001 <0.001 <0.07
29 Colet and Catwanan	122° 31' E 9° 42' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Pyrite and small amount chalcopyrite disseminate in sheared zone of silicified and chloritized andesite	Ore Assay SIBG-01; Cu, Mo, Pb, Zn <0.01% Au 0.07 g/t X-Ray Analysis; Quartz, chlorite and sericite are identified as alteration products.
60 Calatong River II	122° 31' E 9° 49' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Silicified sheared zone with malachite and pyrite in quartz diorite	Pyrite and Sphalerite disseminated zone.
61 Calatong River I	122° 31' E 9° 47' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Chalcopyrite, pyrite and malachite scattered in NNW-SSE sheared zone of silicified andesite	Ore Assay SIGB-02; Cu, Mo, Pb, Zn <0.01% Au 0.21 g/t X-Ray Analysis; Mixed layer mineral and anatase are identified.
62 Cabilocan River	122° 33' E 9° 44' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Dissemination zone in silicified and chloritized andesite.	
63 Sangke	122° 30' E 9° 38' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Dissemination zone of malachite, pyrite and small amount chalcopyrite along N-S to NW-SE sheared zone	
64 Alingadyon	122° 31' E 9° 37' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Chalcopyrite, malachite and azurite dissemination in sheared zone at boundary of andesite and diorite	
65 Paling Gamay	122° 32' E 9° 34' N	Au Hydrothermal vein	Paleogene	Volcano-plutonic Arc	Dissemination zone with chalcopyrite and gold blebs accompanied by quartz veinlets in oxidized diorite	Ore Assay; Cu 0.03% Pb 0.02% Ag 10 g/t Au 0.96 g/t Geothite and lepidocrocite is identified.
66 Capayasan	122° 33' E 9° 32' N	Cu Porphyry copper	Paleogene	Volcano-plutonic Arc	Malachite and azurite with network of quartz and clay veinlets accompanied with N-S sheared zone at boundary of andesite and quarts diorite.	Ore Assay; Cu 0.36% Mo 0.002% Zn 0.1% Au <0.07 g/t X-Ray analysis; Quartz and chlorite is identified as alteration products.

*1 These numbers correspond to the numbers in Attached Plate-8.

3. Geochemical Sample Analyses and Data Processing

3-1 Analytical Methods and Precision

3-1-1 Analytical Methods

The survey area were divided into cells whose unit is a NS 2 km, EW 2 km cell with the datum point is at long 121° 45' E, lat 9° 00' N. Chemical data of the stream sediment samples (JICA-MMAJ, 1985-1987) distributed in the cells were statistically analyzed in the following four kinds methods. All data are regarded as one population.

(1) Univariate analyses of the geometrical average values (hereinafter called cell average values) of the geochemical analyses data in each cell.
(2) Univariate analyses of the moving average values, where a frame consisting of nine cells (three cells in both N-S and E-W directions) is set and the average value of nine cells in taken to be the value of the central cell. The frame is moved one cell at a time throughout the survey area and the average for every step is calculated.
(3) Univariate analyses of the high-pass filter values - - the positive differences between the cell average and the corresponding moving average values (only positive values) - - (hereinafter called high-pass filter values).
(4) Multivariate analyses (Factor analyses) of the cell average values.

The following are the numbers of samples, cells and chemical analysis components which were prepared for the above mentioned analyses.

The Numbers of Sample	The Numbers of Cell	The component for Analysis
8,066	2,828	10 elements; Cu, Pb, Zn, Ag, As, Mn, Ni, Co, Hg, Mo

An IBM 3084Q computer and statistical analyses package BMD 08M (UCLA developed) were utilized for statistical procedures. Computation was done in logarithmic values then subsequently converted into normal values. For the purpose of statistical procedure, 50% of the detection limit value was assigned to each cell with values below the detection limit.

Chemical analyses of Southwestern Negros samples were conducted in PETROLAB the chemical analysis section of the MGB, and that of Cebu, Bohol and Siquijor samples were conducted in CHEMEX CANADA (commercial laboratory) by using AAS analyses. Detection limits of AAS analyses are shown in Table-4.

Table-4 Detection Limits of AAS analyses (ppm)

Element	Cu	Pb	Zn	Ag	As	Mn	Ni	Co	Hg	Mo
PETROLAB	2	10	2	1	0.5	50	3	3	0.04	2
CHEMEX	2	1	1	0.1	0.5	5	1	1	0.005	1

3-1-2 Precision Check

Precision checks for the chemical analyses were carried out. The variance of the analyzed value at 95% confidence level was calculated by the Thompson and Howarth method (1973) with the result of the batch test.

A sample was chosen from each analyzed bath (about 20 samples) and was analyzed with another batch after which the variance was calculated statistically.

The number of batch test samples for the entire RP-Japan Project is approximately 1,000 for Cu, Pb, Zn, As, Mn and Hg, and approximately 800 for Ni and Co.

Table-5 Dispersion of Batch Test Results

Component	Dispersion	Component	Dispersion
Cu	±15%	Mn	±10%
Pb	±20%	Ni	±20%
Zn	±20%	Co	±20%
As	±25%	Hg	±25%

The variance for Ag and Mo values could not be determined because the results of many samples were below the detection limit.

3-2 Cell Average Values

As mentioned above, geometrical average values of the geochemical data in each cell were used in the analyses. For cells without any sampling point (blank cell), the following gap-filling process was carried out.

(1) Geometrical average of the eight cells around the blank cell is applied as the value of the blank cell (when the number of effective values was less than four, this process was not carried out).
(2) This gap-filling process was done twice.

3-2-1 Basic Statistical Values

Basic statistical values of the cell average for each element are shown in Table-6. Basic statistical values of the original analytical results are also shown in Table-7.

3-2-2 Histograms and Cumulative Frequency Curves

Histograms and cumulative frequency curves showing the frequency distribution of the cell average values for each element were drawn (Ref. Pl. 1-10 Appendix).

Inflection point of the curve was selected by the Lepeltier's method (1969) and its corresponding cell average value was regarded as the lowest anomalous value (threshold value).

Inflection points for Ag, Pb and Hg could not be used, because 90 to 99% of the cells contained Ag, Pb and Hg values below the detection limits.

Table-6 Basic Statistical Values for the Cell Average Value

	Cu (ppm)	Zn (ppm)	As (ppm)	Mn (ppm)	Ni (ppm)	Co (ppm)	Mo (ppm)
M	33.83	51.65	3.54	616.80	16.89	12.97	1.24
M+1.0σ	71.22	86.48	7.68	1,214.24	38.66	29.85	1.95
M+1.5σ	103.33	112.65	11.31	1,703.63	58.50	45.28	2.44
M+2.0σ	149.91	146.09	16.66	2,390.39	88.51	68.69	3.06
Maximum	4,089.00	920.00	69.00	10,000.00	1,673.00	81.39	55.00
Minimum	1.00	6.00	0.25	25.00	1.50	1.50	1.00
R. B. D.L.	0.2%	0%	0.4%	0.1%	3%	8%	87%

M ; mean value σ ; standard deviation R. B. D.L. ; ratio of below detection limit

Table-7 Basic Statistical Values for the Original Analytical Values

	Cu (ppm)	Zn (ppm)	As (ppm)	Mn (ppm)	Ni (ppm)	Co (ppm)	Mo (ppm)
M	33.47	51.29	3.54	631.88	17.33	13.65	1.23
M+1.0σ	75.25	92.57	8.73	1,332.05	45.65	33.21	2.09
M+1.5σ	112.84	124.38	13.71	1,934.03	82.99	51.80	2.73
M+2.0σ	169.98	167.33	21.53	2,808.07	120.24	80.80	3.56
Maximum	6,340.00	2,500.00	299.00	11,700.00	1,750.00	381.00	110.00
Minimum	1.00	1.00	0.25	25.00	1.50	1.50	1.00

M ; mean value σ ; standard deviation

Table-8 Details of Inflection Point (Cell Average Value)

Element	Cu	Zn	As	Mn	Ni	Co	Mo
Cumulative frequency	80%	80%	80%	80%	80%	80%	90%
Cell average value	60 ppm	100 ppm	6 ppm	1,100 ppm	30 ppm	25 ppm	2.5 ppm

Details of the inflection points for each element are shown in Table-8.

3-2-3 Correlation Coefficients of Analyzed Elements

Correlation coefficients among elements of cell averages are shown in Table-9. Correlation coefficients among elements of the original analytical results are also shown in Table-10.

Table-9 Correlation Coefficients of the Cell Average Data

	Cu	Pb	Zn	Ag	As	Mn	Ni	Co	Mo	Hg
Cu	1.000									
Pb	0.162	1.000								
Zn	0.640	0.253	1.000							
Ag	0.019	0.159	0.046	1.000						
As	0.035	0.249	0.137	0.029	1.000					
Mn	0.606	0.186	0.735	0.004	0.087	1.000				
Ni	0.508	0.078	0.514	-0.020	0.125	0.635	1.000			
Co	0.709	0.111	0.703	-0.017	0.025	0.834	0.699	1.000		
Mo	-0.122	0.053	-0.201	-0.012	0.143	-0.356	-0.291	-0.463	1.000	
Hg	0.049	0.335	0.144	0.184	0.283	0.137	0.117	0.093	-0.003	1.000

Table-10 Correlation Coefficient of Original Analyses Results

	Cu	Pb	Zn	Ag	As	Mn	Ni	Co	Mo	Hg
Cu	1.000									
Pb	0.146	1.000								
Zn	0.625	0.242	1.000							
Ag	0.046	0.175	0.056	1.000						
As	0.053	0.235	0.160	0.028	1.000					
Mn	0.615	0.150	0.701	0.010	0.082	1.000				
Ni	0.458	0.058	0.451	-0.011	0.098	0.558	1.000			
Co	0.688	0.072	0.652	0.001	0.007	0.815	0.646	1.000		
Mo	-0.106	0.054	-0.175	0.004	0.082	-0.321	-0.249	-0.394	1.000	
Hg	0.057	0.258	0.143	0.099	0.290	0.125	0.087	0.067	-0.011	1.000

Of the cell average values, positive correlation coefficient more than 0.5 are observed among the following elements.

Cu — Zn, Mn, Ni, Co
Zn — Mn, Ni, Co
Mn — Ni, Co
Ni — Co

3-2-4 Areal Distribution of the Cell Average Values (Attached plate 2-1 to 2-9)

The cell average values of each element were classified into eleven ranks and were plotted on a 1 : 1,000,000 scale map with corresponding rank color. The classified ranks are as follows.

Rank	Cumulative Frequency	Rank	Cumulative Frequency
A	99%≦Z	G	40%≦Z<50%
B	95%≦Z<99%	H	30%≦Z<40%
C	90%≦Z<95%	I	20%≦Z<30%
D	75%≦Z<90%	J	Detection Limit≦Z<20%
E	60%≦Z<75%		
F	50%≦Z<60%	K	Detection Limit>Z

The areal distribution zone of the anomalous cell averages are as follows (anomalous elements are shown in brackets). These localities are shown in Fig.-8.

A-1: Northern part of Cebu (Cu, Pb, Zn, As, Mn, Ni, Co, Hg)
A-2: Middle part of Cebu (Cu, Pb, Zn, As, Ni, Co, Mo, Hg)
A-3: Southern part of Cebu (Mo, Hg)
A-4: North coast of Bohol (Cu, Zn, Mn, Co)
A-5: Southeastern part of Bohol (Cu, Zn, As, Mn, Ni, Co)
A-6: Western part of Bohol (Pb, As, Mo, Hg)
A-7: Western part of Siquijor (Cu, Pb, As, Hg)
A-8: West coast to inland in Southwestern Negros (Cu, Pb, Zn, As, Mn, Co, Mo, Hg)

On the basis of the above information, the following anomalous zones can be understood by taking into consideration the present knowledge on the geology, igneous activities and mineralizations of the area.

(a) Middle part of Cebu Is. (A-2)

This zone is underlain by the Mesozoic to Miocene formations and diorites which intruded them. The famous Atlas Mine and almost all of the mineral showings surveyed in the Cebu Is. occur in this zone.

Generally anomalous cells of Cu, Pb, Zn, As and Mo appear near the diorite stocks at the southeast of Toledo, at the west side of Liloan and on the Tunlob Schist in its northern portion. The anomalous areas seems to be related with the mineralization due to diorite intrusion and formation of the schist. Nickel and Cobalt anomalous cells show tendency to be related with the Mananga Group white Hg anomalous cells with the Miocene formations.

(b) North coast of Bohol Is. (A-4)

This zone is underlain by in the Paleocene Ubay Volcanics and Pliocene to Pleistocene Maribojoc Formation in its the southwestern portion of this zone. Accumulation of Zn, Mn and Co anomalous

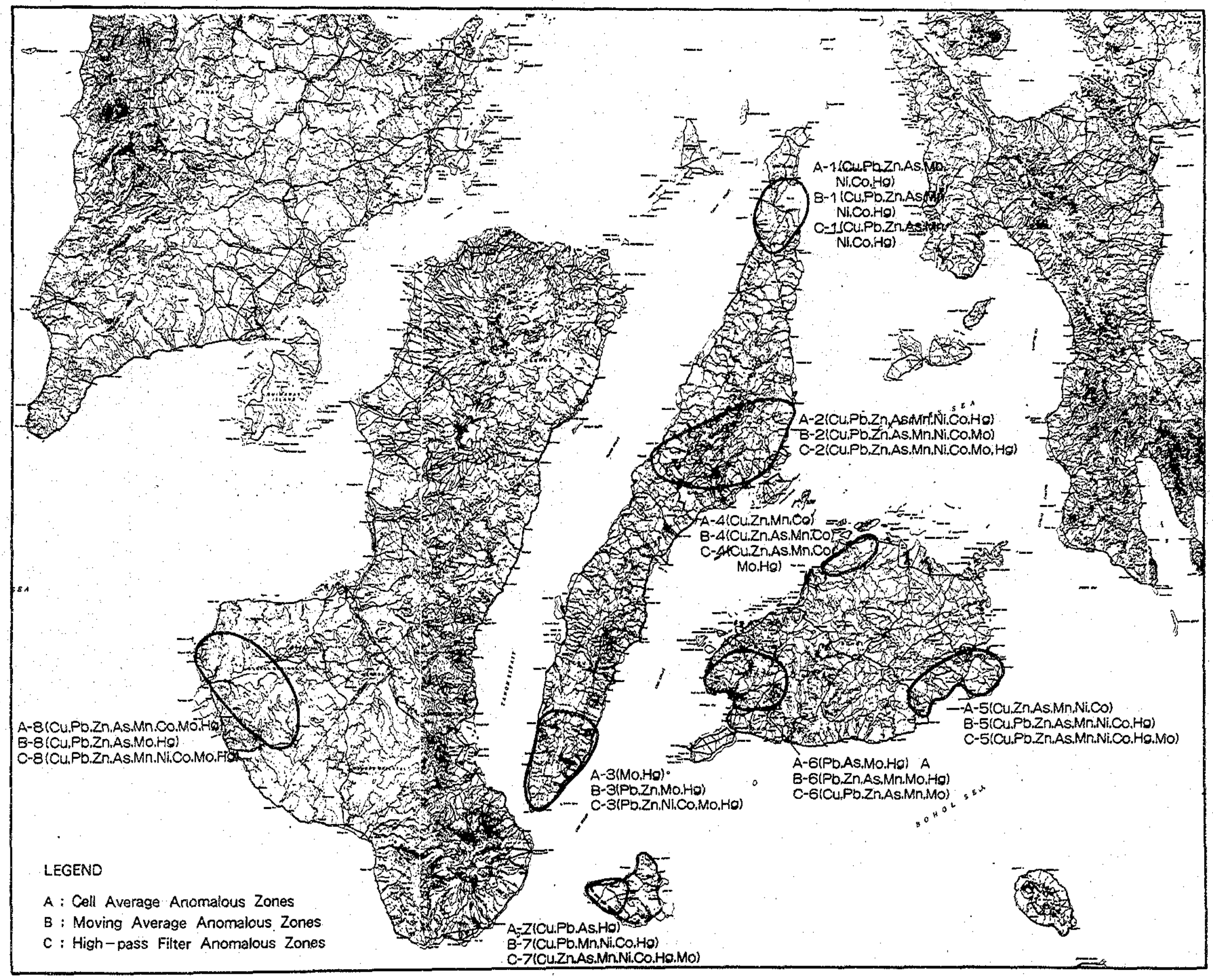

Fig. -8 Distribution Map of Anomalous Zones of Univariate Analyses cells is thought to be derive from the Ubay volcanics. Many mineral showings (Bonakan, Compacot, Cangmundo, Bass, Laka and Balisong etc.) are also observed in this zone.

(c) Southeastern Bohol Is. (A-5)

This zones in underlain by in the Miocene Carmen Formation and Sierra Bullones Limestone and the Mesozoic Boctol Serpentinite. Anomalous cells of Cu, Zn, As and Mn are related to the Miocene sedimentary rocks and that of Ni and Co to the Boctol Serpentinite. Residual manganese type mineral showing (Anda) occurs in the Sierra Bullones Limestone.

(d) West coast to inland part of West Negros Is. (A-8)

This zone in underlain by in the Eocene Basak formation and was intruded by Oligocene Pagatban Diorite in its eastern part. Miocene Dacon-cogon and Canturay Formations covered the northern part. Cu, Pb, As, Mo, Hg anomalous cells are believed to be related mainly with the diorite intrusive bodies. The famous Sipalay Mine and all other mineral showings surveyed are proximal to the diorite bodies. This anomalous zone is believed to be related with mineralization accompanied by diorite activity. In this zone also, Cu, Pb, Zn, Hg anomalous cells of A, B rank show concentration at 16 km ENE of Sipalay Town where exist Colet and Catwanan mineral showings.

In addition above mentioned, concentration of Pb, As, Mn, Ni and Co anomalous cells is observed at Pliocene limestone exposed zone in the northern Cebu. Mo anomalous cells are concentrated at Pliocene limestone zone in the southern Cebu. Pb, As and Mo anomalous cells concentrate at Pliocene to Pleistocene limestone zone in the middle Bohol Is. and Cu, Pb, As, Ni, Co and Hg anomalous cells are concentrated at Pliocene limestone zone in Siquijor. All these anomalous zones occur in limestone areas and not any igneous activities and mineralizations have been observed. These are inferred to be derive from absorption effect of limestone.

3-3 Moving Average Data

As stated in 3-1-1, the geochemical average of every nine cells is defined as the value of the central cell and this values is calculated for every movement in two kilometer steps. The gap-filling process for a blank cell is done in a way that when more than half of the immediately surrounding cells have effective values, the average of these cells is taken as the moving average values of the blank cell. This procedure was carried out twice. The moving average as stated above, are suitable for finding general trends and geological changes of the sources as each values represent the average value of an area 6 km × 6 km in size around a particular cell.

3-3-1 Basic Statistical Values

Basic statistical values for each element of the moving average values of Cebu, Bohol and southwest Negros Area shown in Table-11. All cells contained Ag, Pb and Hg values below the detection limits, leading to their omission in the table of basic statistical values.

3-3-2 Histograms and Cumulative Frequency Curves

Histogram and cumulative frequency curves of the moving average values, were made for each element. Moving average values corresponding to inflection points, of the cumulative frequency curves were regarded as the lowest anomalous values (threshold) following Lepertier's method (1969)

Inflection points and threshold values for Pb, Ag and Hg could not be determined because over 90% of the cells comtained Pb, Ag and Hg amounts below detection limits. Details of the inflection point for each element are shown in Table-12.

Table-11 Basic Statistical Values for Moving Average Value

	Cu (ppm)	Zn (ppm)	As (ppm)	Mn (ppm)	Ni (ppm)	Co (ppm)	Mo (ppm)	Hg (ppb)
M	33.85	51.62	3.53	615.87	16.88	12.94	1.24	24.32
M+1.0σ	62.99	78.25	6.65	1,090.45	33.82	26.98	1.77	31.52
M+1.5σ	85.92	96.25	9.12	1,450.99	47.88	38.97	2.11	35.88
M+2.0σ	117.21	118.62	12.52	1,930.74	67.78	56.28	2.52	40.85
Maximum	722.74	158.13	47.46	5,169.90	344.05	61.15	8.37	127.06
Minimum	3.90	13.85	0.63	81.92	1.60	1.50	1.00	20.00
R. B. D.	0%	0%	0%	0%	1.3%	5%	88%	93%

M ; mean value　σ ; standard deviation　R. B. D. ; ratio below detection value

Table-12 Details of Inflection Point of the Cumulative Frequency Curves (Moving Average Value)

Element	Cu	Zn	As	Mn	Ni	Co	Mo
Cumulative frequency	76%	70%	96%	93%	92%	94%	90%
Moving average value	53 ppm	70 ppm	11 ppm	1,200 ppm	40 ppm	32 ppm	2.3 ppm

3-3-3 Areal Distribution of the Moving Average Data (Attached Pl 2-2 No. 1-10)

The moving average values for each element were classified into eleven ranks and were plotted on a 1 : 1,000,000 scale map with the corresponding rank color.

Areal distribution of the anomalous moving average values of each element are as follows (anomalous elements are shown in trackets) (Fig. 8).

B-1: Northern part of Cebu (Cu, Pb, Zn, As, Mn, Ni, Co, Hg)
B-2: Middle part of Cebu (Cu, Pb, Zn, As, Mn, Ni, Co, Mo)
B-3: Southern part of Cebu (Pb, Zn, Mo, Hg)
B-4: Northern coast of Bohol (Cu, Zn, As, Mn, Co)
B-5: Southeastern part of Bohol (Cu, Pb, Zn, As, Mn, Ni, Co, Hg)
B-6: Western part of Bohol (Pb, Zn, As, Mn, Mo, Hg)
B-7: Western part of Siquijor (Cu, Pb, Mn, Ni, Co, Hg)
B-8: Westcoast to inland part of southwestern Negros (Cu, Pb, Zn, As, Mo, Hg)

These anomalous zones overlap to the anomalous zones defined by the cell average values. On concentrated elements with comparing to the cell average anomalous zones. Arsenic is additional element in the northern part of Cebu (B-1), the southern part of Cebu (B-3), and the northern coast of Bohol (B-4). Zn and Mn are added in the southeastern part of Bohol (B-5), Mn is added in western part of Siquijor (B-7) and Ni is added to the westcoast to inland part of southwestern Negros (B-8). The lacking element is only As in the western part of Siquijor (B-7). As mentioned-above, the moving averages have more reflected concentration tendencies than cell averages.

The above mentioned anomalous zones can be understood by taking into consideration the knowledge on the geology, igneous activities and mineralization of the area.

(a) Middle part of Cebu (B-2)

Details of this zone are almost similar to the cell average values. Anomalous cells express elongated tendency along the faults. A and B rank cells of Cu elongate north-easterly along the North Barot Fault near Atlas Mine. In the southern part of Tuburan in the west coast of Cebu similar kind of cells elongated to the north along the Tunlob Fault cutting across Tunlob Schist.

(b) Northern coast of Bohol (B-4)

Details of this zone are almost similar to the cell average value. A to C rank cells of As, Mn and Co are related to Ubay Volcanics and A to C rank cells of Zn has tendency to be related to Maribojoc Formation.

(c) Southeastern part of Bohol (B-5)

Details of this zone are almost similar to the cell average values, newly additional elements Pb and Hg accompany with Carmen Formation.

(d) Westcoast to inland part of Southwest Negros (B-8)

Details of this zone are almost similar to the cell average values, newly additional element Ni accompany with Basak Formation.

Aside from above, Concentration of Cu, Pb, Mn, Ni, Co, Mo and Hg anomalous cells are recognized in Pliocene limestone at the northern and southern Cebu, Plio-Pleistocene limestone in the middle western Bohol and Pliocene limestone in Siquijor, but neither mineralization nor igneous activity are observed in these zone. These are inferred to be the result of limestone absorption effect.

3-4 High-pass Filter Data

As stated in 3-1, the positive difference between the cell average and the corresponding moving average value is defined as the high-pass filter value. This indicates the extent of the deviation of the individual cell averages from the filtered moving averages. Calculating the difference between the two values offsets the background value, thus, the high-pass filter values indicate anomalous zones derived from such added factors as mineralization and secondary enrichment. These values provide guidelines regarding the locality, strength and selection of priority targets among the geochemical anomalous zones.

3-4-1 Basic Statistical Values

Basic statistical values for each element of the high-pass average values are shown in Table-13. No cell contained effective Pb and Ag values, thus Pb and Ag values were omitted from the statistical analysis.

3-4-2 Histogram and Cumulative Frequency Curves

Histogram and cumulative frequency curves of high-pass filter values were prepared each element. Inflection points of the curve was selected following Lepeltier's method (1969) and its corresponding high-pass filter value was regarded as the lowest anomalous value (threshold value). There are no values for Pb, Mo and Hg since more than 99% of the cells contain no effective Pb, Mo and Hg values. Details of the inflection points for the elements are shown in Table-14.

3-4-3 Areal Distribution of High-pass Filter Values (Fig.-8. Attached Pl-2-3)

Each anomalous value was classified based on the following formula for each element and was plotted on a 1 : 1,000,000 scale map with the corresponding rank color. All the threshold values selected were more than $M+1.0\sigma$ (Fig. -8).

Classified Rank of High-pass Filter Anomalous Values

Classified Formula	Rank	Rank Color
$M+2.0\sigma \leqq Z$	A	Red
$M+1.5\sigma \leqq Z < M+2.0\sigma$	B	Yellow
$M+1.0\sigma \leqq Z < M=2.0\sigma$	C	Blue

The following zones of anomalous high-pass filter values are related to the anomalous zones of cell averages and are considered important.

C-1: Northern part in Cebu (Cu, Pb, Zn, As, Mn, Ni, Co, Hg)
C-2: Middle part in Cebu (Cu, Pb, Zn, As, Mn, Ni, Co, Mo, Hg)
C-3: Southern part in Cebu (Pb, Zn, Ni, Co, Mo, Hg)

Table-13 Basic Statistical Values for High-pass Filter Values

	Cu (ppm)	Pb (ppm)	Zn (ppm)	As (ppm)	Mn (ppm)	Ni (ppm)	Co (ppm)	Mo (ppm)	Hg (ppb)
M	4.84	1.58	5.95	0.97	77.08	2.90	2.04	0.67	4.56
M+1.0σ	20.22	6.79	25.21	3.22	344.32	12.58	6.95	2.03	22.76
M+1.5σ	41.33	14.05	51.89	6.65	728.30	26.23	12.83	3.52	50.87
M+2.0σ	84.51	29.11	106.79	10.68	1,539.67	54.67	23.69	6.12	113.70
Maximum	3,864.30	127.68	764.53	55.13	8,094.20	1,480.20	50.91	48.96	1,878.70
Minimum	0.11	0.10	0.11	0.10	0.27	0.10	0.10	0.10	0.11

M: mean value σ: standard deviation

Table-14 Details of Inflection Points of Cumulative Frequency Curves (High-pass Filter Value)

Element	Cu	Zn	As	Mn	Ni	Co	Mo	Hg
Cumulative frequency	93%	91%	90%	93%	90%	91%	92%	92%
High-pass filter value	29 ppm	36 ppm	4.2 ppm	500 ppm	18 ppm	9.2 ppm	2.7 ppm	33 ppb

C-4: Northwestern Coast in Bohol (Cu, Zn, As, Mn, Co, Mo, Hg)

C-5: Southeastern part in Bohol (Cu, Pb, Zn, As, Mn, Ni, Co, Mo, Hg)

C-6: Middlewestern Part in Bohol (Cu, Pb, Zn, As, Mn, Hg)

C-7: Whole Siquijor (Cu, Zn, As, Mn, Ni, Co, Mo, Hg)

C-8: West coast to inland part in southwestern Negros (Cu, Pb, Zn, As, Mn, Ni, Co, Mo, Hg)

All these zones overlap the anomalous zones defined by the cell averages. Concentration of anomalous elements when compared to the cell average defined zones; Arsenic is added at northern part (C-1), Mn is added at middle part (C-2) and Cu, Pb, Zn, As, Mn, Ni, Co are added at southern part (C-3). In Bohol and Siquijor; As, Mo, Hg are added at northern coast (C-4), Pb, Mo, Hg are added at southeastern part (C-5), Cu, Zn, Mn, Ni are added at Middlewestern part (C-6) and Cu, Pb, Zn, As, Mn, Ni, Co are added at whole Siquijor (C-7). In Southwestern Negros; Ni is added at west coast to inland Part (C-8).

These high-pass filter anomalous zones seems to reflect many elements more than cell average anomalous zones.

Of above anomalous zones, the following anomalous zones can be understood by the taking into consideration the present knowledge on the geology, igneous activity and mineralizations of the area.

(a) Middle part of Cebu (C-2)

Details of this zone are similar to those of cell averages. The Mn anomalous cells newly brought out are accompanied with Miocene sedimentary rocks.

(b) Northern coast of Bohol (C-4)

Details of this zone are similar to those of cell averages. The As, Mo and Hg anomalous cells newly brought out are accompanied with Ubay Volcanics.

(c) Southeastern of Bohol (C-5)

Details of this zone are similar to those of cell averages. The Pb, Mo and Hg anomalous cells newly brought out are accompanied with Sierra Bullones Limestone.

(d) West coast to inland part of southwestern Negros (C-8)

Details of this zone are similar to those of cell averages. The Ni anomalous cells newly brought out are accompanied with Basak Formation and Miocene Formation.

Aside from above concentration Cu, Pb, Mn, Ni, Co, Mo and Hg anomalous cells are recognized in Pliocene limestone at the northern and southern Cebu, in Plio-Pleistocene limestone at the western Bohol and in Pliocene limestone at whole Siquijor, but neither mineralization nor igneous activity are observed in these zones. These are inferred to be result of limestone absorption effect.

3-5 Factor Analysis of Cell Average Data

Factor analysis was carried out on each cell average values using the Varimax rotation method.

The content of silver was below detection limit in 99.9% of the cells and thus this was omitted from this analysis. Therefore, the nine elements used for factor analysis : they are Cu, Pb, Zn, As, Mn, Ni, Co, Mo and Hg.

3-5-1 Extraction of Factors

Correlation matrix and eigenvalue (λ) taken from normalization and interpretation of the cell average value for elements are shown in Table-15 and Table-16.

It can be seen from Table-16 that the eigen values in decreasing order are $\lambda_1 = 3.992$ and $\lambda_2 = 1.364$ - - - and if those over 1 are taken, the factor value will be 3. However, as λ_4 and λ_5 are relatively large and the cumulative proportion of total variance reaches 87.9% up to λ_5 and covers most of the dispersion, the factors up to No. 5 are considered. On the other hand, when SMC (Squared Multiple

Correlation) diagonal factors are used as common estimate values, the eigen values will be $\lambda_1=3.671$, $\lambda_2=0.555$ ---. The positive values are up to factor No.5 and thus five factors were adopted for factor analyses.

Table-15 Correlation Matrix of Cell Average Values

	Cu	Pb	Zn	As	Mn	Ni	Co	Mo	Hg
Cu	1.000								
Pb	0.168	1.000							
Zn	0.613	0.208	1.000						
As	0.137	0.172	0.106	1.000					
Mn	0.554	0.130	0.739	0.130	1.000				
Ni	0.579	0.051	0.580	0.236	0.684	1.000			
Co	0.732	0.093	0.743	0.108	0.845	0.728	1.000		
Mo	-0.098	-0.021	-0.288	0.036	-0.442	-0.291	-0.463	1.000	
Hg	0.079	0.272	0.133	0.152	0.092	0.098	0.076	-0.016	1.000

3-5-2 Interpretation of Each Factor

Adopting the five factors and diagonal factors and diagonal factors SMC (Squared Multiple Correlation), the left half of Table-17 shows the factor loadings obtained which were processed by the main analysis. The right half of Table-17, on the other hand, shows the factor loadings after processing using the Varimax rotation method.

Interpretations of each factor are as follows:

(a) Factor No. 1: Factor loading values before rotation are all positive except for Mo and values for Cu, Zn, Mn, Ni and Co are high. These values after rotation have similar tendency as well, the above indicates that this factor is related to mineralization of Cu, Zn, Mn, Ni and Co.

(b) Factor No. 2: Factor loading values before rotation for Mn and Co are negative and those values for Pb, As, Mo are positive and high. Factor loading values after rotation for all elements are positive and those values for Pb, As and Hg are high. The above indicates that this factor is related to vein type Pb, As and Hg mineralization.

(c) Factor No. 3: Factor loading values before rotation for Pb, Zn, As, Mn and Hg are negative and values of Cu, Mo are positive and high. Those values after rotation for Zn, Mn, Ni, Co and Hg are negative and those absolute values for Mn and Co are remarkable high. The above indicates that this factor is related to Cu and Mo mineralization and concentration of Mn and Co which depended on the influence of the lithology of host rocks.

(d) Factor No. 4: Factor loading values before rotation are negative for Cu, Pb, Zn, Co and Hg and those values of As and Ni are positive and comparably high. Those values after rotation for only Zn is negative and those values for Ni and As are positive and comparably high. This factor thus appear to be related concentration of Ni and As which depended on the influence of the lithology of host rocks.

(e) Factor No. 5: Factor loadings before rotation for Cu, Pb, As, Co and Hg are negative and those values after rotation for Cu, As, Co and Hg are negative. Both values for all elements show comparably small absolute amount (below 0.1) except for Mn (the factor loading after rotation is 0.112). The concerned element or mineralization type on this factor thus remained to be solved.

Table-16 Eigenvalues and Cumulative Proportions of Variance

Factor	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7
Eigen Value (Diagonal Factor : 1)	3.992	1.364	0.967	0.850	0.735	0.393	0.370
C. P. T. V.	0.444	0.595	0.703	0.797	0.879	0.922	0.963
Eigen Value (Diagonal Factor : SMC)	3.761	0.555	0.327	0.142	0.020	-0.118	-0.124

C. P. T. V. : Cumulative Proportion of Total Variance

Table-17 Factor Loadings

Before Rotation						After Rotation					
Factor	No.1	No.2	No.3	No.4	No.5	Factor	No.1	No.2	No.3	No.4	No.5
Cu	0.732	0.203	0.320	-0.088	-0.045	Cu	0.811	0.142	0.044	0.075	-0.064
Pb	0.172	0.388	-0.221	-0.105	-0.018	Pb	0.092	0.481	0.005	0.014	0.007
Zn	0.800	0.075	-0.020	-0.149	0.069	Zn	0.724	0.248	-0.278	-0.004	0.093
As	0.173	0.306	-0.066	0.216	-0.001	As	0.107	0.262	0.039	0.305	-0.001
Mn	0.880	-0.124	-0.127	0.017	0.073	Mn	0.710	0.131	-0.514	0.199	0.112
Ni	0.763	0.011	0.070	0.232	0.005	Ni	0.667	0.063	-0.277	0.340	0.011
Co	0.947	-0.138	0.048	-0.027	-0.064	Co	0.849	0.053	-0.437	0.081	-0.042
Mo	-0.407	0.347	0.310	0.005	0.057	Mo	-0.199	0.020	0.587	0.031	0.004
Hg	0.132	0.329	-0.228	-0.007	-0.025	Hg	0.034	0.411	-0.027	-0.088	-0.001

3-5-3 Classification of Factor Score

Factor scores were calculated by multiplying the cell average value by factor score coefficient. After the statistical procedure was done, these scores were classified into the following eight ranks and were plotted on a 1 : 1,000,000 scale map (Fig. 9, Attached Pl. 2-4 No. 1 ~ No. 5).

Table-18 Classified Rank of Factor Loadings

Rank	Frequency	Rank	Frequency
A	$90\% \leqq Z < 100\%$	E	$30\% \leqq Z < 50\%$
B	$80\% \leqq Z < 90\%$	F	$20\% \leqq Z < 30\%$
C	$70\% \leqq Z < 80\%$	G	$10\% \leqq Z < 20\%$
D	$50\% \leqq Z < 70\%$	H	$0\% \leqq Z < 10\%$

3-5-4 Distribution of the Geochemical Anomalies (Factor Scores)

Attached plates (Pl. 2-1 No. 1~No. 5) show the areal distribution of the factor scores. The areas of concentration of the high scores are as follows:

(A) No. 2 Factor (after rotation, closely related factor to Pb, As and Hg)

D-2-1: Concentration A and B rank cells in the vicinity of Lutopan and Talamban Diorite at the zone from the eastcoast Danao via Liloan, Cebu City to Toledo in Cebu.

D-2-2: Concentration A and B rank cells in the area of Plio-Pleistocene Carcar Formation at the northern and southern parts of Cebu.

D-2-3: Concentration A, B and C rank cells in the area of Paleocene Ubay Volcanics at the northern part in Bohol.

D-2-4: Concentration of A and B rank cells in the area of Miocene Carmen Formation at the central part in Bohol.

D-2-5: Concentration A and B rank cells in the area of Oligocene Pagatban Diorite intrusive bodies are of Sipalay Mine and in the northeastern part of Hinoba-an in southwestern Negros.

D-2-6: Concentration A, B and C rank cells in the area of Pleistocene Calaogao Pyroclastics and Miocene formations at the northwestern and southeastern part respectively of southwestern Negros.

(b) No. 3 Factor (before rotation, closely related to Cu, Mo)

D-3-1: Concentration A and B rank cells in the Cretaceous-Paleocene Mananga Group at the central part of Cebu.

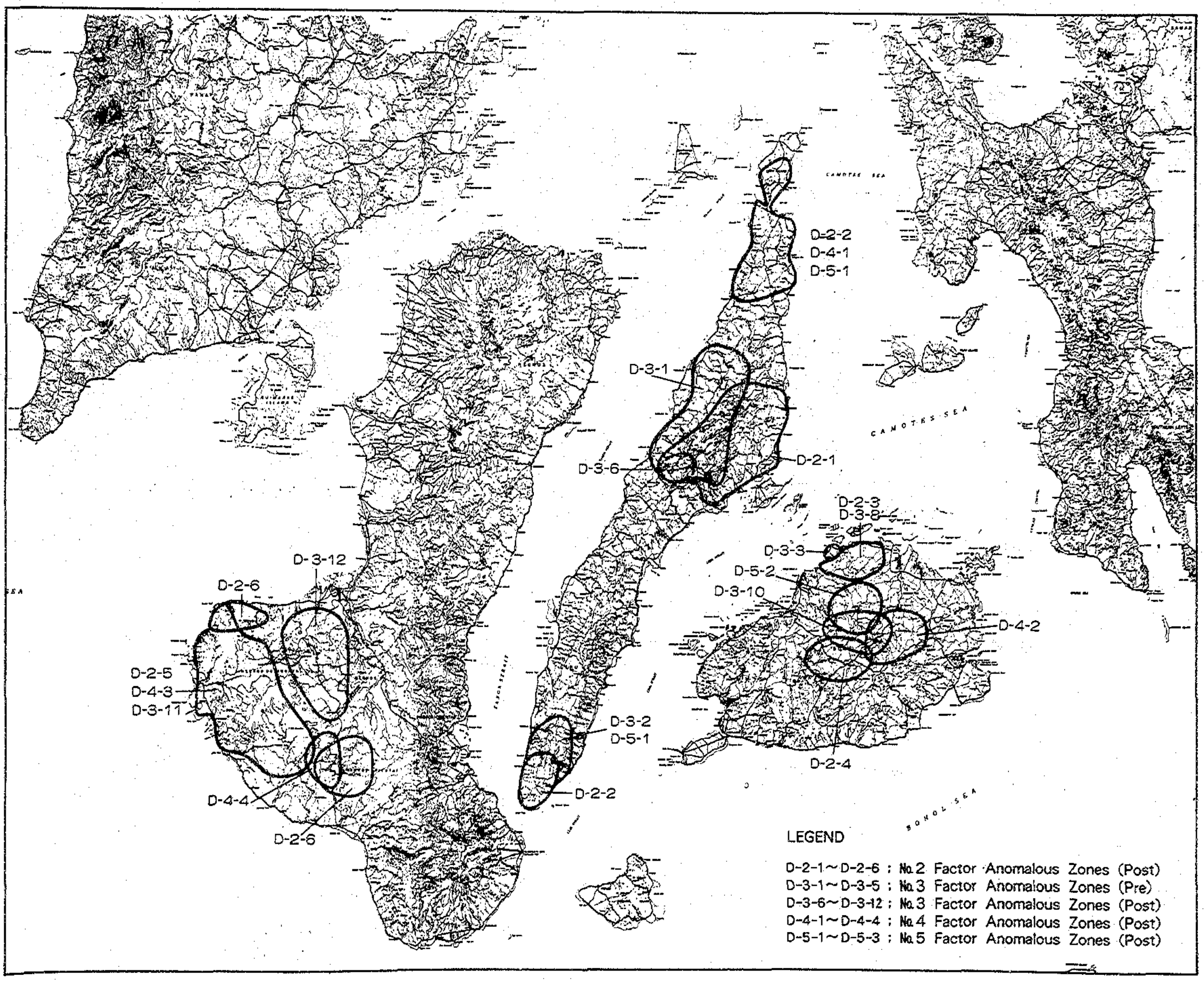

Fig. -9 Distribution Map of Anomalous Zones of Multivariate Analyses

D-3-2: Concentration A and B rank cells in the area of Plio-Pleistocene Barili and Carcar Formations at the southern part of Cebu.

D-3-3: Concentration A and B rank cells in the area of Paleocene Ubay Volcanics and Talibon Diorite at the northern part of Bohol.

D-3-4: Concentration B, C and D rank cells in the area of Miocene Carmen Formation at the middle eastern part of Bohol.

D-3-5: Concentration A, B and C rank cells in the area of Eocene Basak Formation and Oligocene Pagatban diorite at the northwestern to southeastern part of southwestern Negros.

(C) No. 3 Factor (after rotation, closely related Mn (−), Co (−) and Mo (+)

D-3-6: Concentration A and B rank cells in the area of Lutopan Diorite at the westcoast Toledo to Toledo Mine and Plio-Pleistocene Barili and Carcar Formation at the southern part of Cebu.

D-3-7: Concentration G and H rank cells in the area of Plio-Pleistocene Barili and Carcar Formation at northern part of Cebu.

D-3-8: Concentration A and B rank cells in the area of Paleocene Ubay Volcanics at the northcoast of Bohol.

D-3-9: Concentration C and D rank cells in the area of Paleocene Talibon Diorite at the southern side of Talibon of Bohol.

D-3-10: Concentration G and H rank (−) cells in the area of Paleocene Ubay Volcanics and Miocene Carmen Formation at the middle part of Bohol.

D-3-11: Concentration A, B, C; (+) and G, H; (−) rank cells in the area of Miocene Tabu Formation at the northeastern part of southwestern Negros.

(d) No. 4 Factor (after rotation, closely related As, Ni)

D-4-1: Concentration A, B and C rank cells in the area of Plio-Pleistocene Barili and Carcar Formations at the northen and southern parts of Cebu.

D-4-2: Concentration A and B rank cells in the area of Miocene Carmen Formation at the middle eastern part of Bohol.

D-4-3: Concentration A, B and C rank cells in the area of Eocene Basak Formation, Oligocene Pagatban Diorite, Miocene Dacong-cogon and Canturay Formations at the northwestern and southeastern parts of southwestern Negros.

(E) No. 5 Factor (after rotation, closely related Zn, Mn)

D-5-1: Concentration A and B rank cells in the area of Plio-Pleistocene Barili and Carcar Formations at the northern and southern parts of Cebu.

D-5-2: Concentration A, B and C rank cells in the area of Paleocene Ubay Volcanics at the middle northern part of Bohol.

D-5-3: Concentration A, B and C rank cells in the area of Miocene Tabu Formation at the northeastern part of southwestern Negros.

3-6 Synthetic Analyses of Panned Samples

3-6-1 Univariate Analysis of Analytical Results of Panned Samples

A total of 443 panned samples were collected in this area. Au (ppb), Ag (ppb), Ga (ppm) components of these samples were analyzed by AAS at PETROLAB.

Univariate analyses of these results were carried out as follows.

Table-19 Basic Statistical Values of Panned Samples

	Au (ppb)	Ag (ppb)	Ga (ppm)
M	59	506	12
M+1.0σ	309	589	20
M+1.5σ	707	635	26
M+2.0σ	1,618	686	33
Maximum	3,600	2,000	52
Minimum	<20	<1,000	<4
D. L.	20	1,000	4
R. B. D. L.	83%	99%	6%

M : Mean value σ : Standard deviation
D. L. : Detection limit R. B. D. L. : Ratio below detection limit

3-6-2 Areal Distribution of Anomalous Panned Samples (Attached Pl-3)

Samples with content below detection limits were assigned and calculated by giving values corresponding to 1/2 of the detection limit values of elements. Those values above M+σ were classified into the following three ranks and were plotted on 1 : 1,000,000 scale map with corresponding rank symbols (Attached Pl-3).

Range	Rank	Symbol Au	Symbol Ag	Symbol Ga
M+2.0σ≦Z	A	◎	◬	⧈
M+1.5σ≦Z<M+2.0σ	B	○	△	□
M+1.0σ≦Z<M+1.5σ	C	○ (small)	△ (small)	□ (small)

The details for distribution of each element anomalous samples are as follows.

Au: One A class cell is observed in Miocene sedimentary rocks at the western side of Carmen (eastcoast) and three B rank cells are observed in Quaternary sediments at Toledo to Balamban (westcoast) in Cebu.

Two B rank cells are observed in Miocene Sedimentary rocks at northeastern part of Bohol.

One cell is observed in each Miocene sedimentary rocks at Candoni (middle northern part) and southern part of southwestern Negros.

Ag: One A rank cell is observed in Pleistocene Carcar Formation at the mouth of Simala River (southern eastcoast) in Cebu.

One A rank cell is observed in each Miocene sedimentary rocks at the northeastern part and Plio-Pleistocene Formation at the northwestern coast in Bohol.

Anomalous cell is not observed in southwestern Negros.

Ga: Two A rank and several C rank cells are observed in Pleistocene Carcar Formation at the northern eastcoast and one B rank and several C rank cells are observed in Carcar formation at Badian (southern westcoast) in Cebu.

Four A rank and Two C rank cells are observed in Plio-Pleistocene Maribojoc Formation at the western part and one A rank cell is observed in Miocene Carmen Formation at the central part in Bohol.

One A rank cell is observed in Miocene Tabu Formation at the eastern side of Tabu (eastern part) in southeastern Negros.

3-7 Modal Analysis of Constituent minerals of Panning Sample

A total of twenty panning samples selected at random ten each from Cebu and southwestern Negros have been identified for constituent minerals by binocular microscope at PETROLAB.

The samples from areas collected with scarce heavy minerals contain considerable amount of silicate minerals as uniform panning procedure was applied.

Attached Plate-4 shows the constituent ratio of heavy minerals with fun shape graph in corresponding sampling points.

3-7-1 Characteristics of the Ratio Constituent Minerals for Panned Samples in Cebu

Identified heavy mineral samples in Cebu are classified following three groups by the constituent ratio of heavy minerals, and these groups have different hinterland lithology in each.

① The group showing over 80% heavy mineral ratio (one sample).
At upper reaches of this sampling point, the Atlas Mine (the biggest porphyry copper mine in Philippines) is located. Main heavy minerals are hematite (40%) and pyrite (15%) which are assumed the influence of porphyry copper type mineralization.

② The group shows 50 to 65% heavy mineral ratio (five samples).
These samples occur in Lutopan diorite at central part (one sample), in Pleistocene Carcar Formation at northern and southern part (three samples) and in Cretaceous to Paleocene Formations at southern side of Tuburan (west coast) (one sample).

③ The group shows 10 to 25% heavy mineral ratio (three sample).
These sample occur in Pleistocene limestone area which have scarce amount of heavy minerals.

3-7-2 Characteristics of Constituent Minerals for Panned Sample in Southwestern Negros

Identified heavy mineral samples in southwestern Negros are classified following two groups which have different hinterland lithology in each.

① The group shows 75 ~ 95% heavy mineral ratio (six samples).
The hinterland lithology of this group is consisted of Eocene pyroclastics (Basak Formation) and Oligocene Pagatban Diorite intrusive bodies at the western to southern part of the area. The high heavy mineral ratio is assumed to be influence by these lithology.

② The group shows below 22% heavy mineral ratio (four samples).
These samples occur in Miocene sedimentary rocks at the northern part (three) and in the alluvial sediments at Hinoba-an area. In these localities, the low heavy mineral ratio are assumed to be confined by the lithology of the area.

Table-20 Weight percent of Constituent Minerals in Identified Panned Samples

(Unit ; %)

Mineral	Magnetite	Chromite	Ilmenite	Rutil	Fe minerals	Zircon	Olivine	Pryoxene	Amphibole	Feldspar	Quartz	others	total
Code	mt	cm	il	ru	Fe	Z	ol	P	H	F	Q	oth	
Cebu Area	27.7	3.6	–	–	12.8	0.5	–	8.6	21.4	9.6	9.6	6.2	100
W. Negros	37.9	5.6	1.3	0.4	12.6	–	–	17.4	15.1	1.1	8.0	0.6	100

4. Correlation with Existing Regional Data

During the data collection in the fiscal 1984. Compilation of existing gravimetric and aeromagnetic survey maps and extraction of lineaments from LANDSAT images were carried out (JICA-MMAJ., 1985), these data were plotted on a 1 : 1,000,000 scale map (Attached Pl. 5, 6, 7) and were analyzed in terms of their significance and relationship with the results of the geological and structural surveys.

4-1 Gravimetric Data

Gravimetric data of this area is available only for Cebu.

Gravimetric survey is carried out since 1966 by BMG and Bouguer anomaly maps with 10 miligal contour have been made (Attached Pl-5).

According to this map, Bouguer anomaly in Cebu shows synmetrical mesa shape which has over 70 miligal central high anomalous zone in Cretaceous Paleocene Mananga Formation. On the other hand, northern and southern below 70 miligal low anomalous zones are observed in Neogene formations. The maximum high anomalous zone is observed along the mountain range at northwestern side of Cebu City which has NE-SW trend about 10 km length with over 110 miligal Bouguer anomaly.

Lutopan Diorite and Talamban Diorite intrusive bodies are distributed at the around this zone and many mineral showings are associated with them.

4-2 Aeromagnetic Data

The international geometric reference (IGRF) maps are available for Cebu, Bohol and western part of southwestern Negros. A total magnetic intensity map has been prepared for southeastern Negros. The aeromagnetic survey was done using proton magnetometer at 6,000 feet elevation, NS direction observation point at 2.5 km interval and EW tie lines at 10 km interval (Attached Pl-6).

Contour line distribution of Cebu IGRF map shows NEE-SWW trend, however the trend geologic structures has NE-SW. This trend assumed to be reflection of E-W trend of the basement mesa structure, high anomalous zones are as follows:

① Anomalous zone over 100 gamma from Borbon to Sogod of eastcoast of Cebu:
This zone is locate in Pleistocene limestone. The reason for aeromagnetic anomaly origine is unclear.

② Anomalous zone over 100 gamma from Balamban of westcoast to Carmen eastcoast:
This zone is elongated along Cabagdalan Fault which cut Cretaceous to Paleocene Mananga Formation. The anomalous zone assumed to have been derived from basic rocks (Cansi Volcanics, etc.) along the fault.

③ Anomalous zone over 100 gamma at 13 km northeast side of Toledo:
The Lutopan Diorite intrusive bodies, which intruded the Mananga Formation at the northeast and west side of this zone, is assumed to be the source of areromagnetic anomaly in the area.

Contour line distribution trend of Bohol is NEE-SWW, this trend is similar to folding structure of Bohol.

① Anomalous zone over 200 gamma along Catigbian-Sagbayan Syncline:
This zone is located in Miocene Carmen Formation and Plio-Pleistocene Maribojoc Formation. Original of aeromagnetic anomaly is unclear.

② Anomalous zone over 150 gamma at northeastern part of Sierra Bullones Anticline:
This zone is located in Paleocene Ubay Volcanics and Miocene Carmen Formation and Sierra Bullones Limestone. Origine of aeromagnetic anomaly is unclear.

Contour line distribution trend in the southwestern Negros is E-W, while on the contrary the trend of geologic structure is NW-SE, the anomalous zones are as follows:

① The combination high and low anomalous zone at middle reaches of Tayabanon River:
This zone is located in gabbroic part of Talamban Diorite at the middle reaches of Tayabanon River in southwestern Negros. The aeromagnetic anomaly is assumed to be due to high magnetic permiability of gabbroic rock.

4-3 Lineament Data

Attached Pl-7 combines two lineaments plates made by LANDSAT image analysis of JICA-MMAJ and NRMC (Natural Resources Management Center, Philippine). The former analyzed the image of Visayas in the first fiscal year and the latter analyzed the imagery data of Cebu, Bohol and southwestern Negros in 1985.

According to this plate, the major faults in Cebu, Calagan, Tunlob, Guibansan, Tuburan, Balamban and Lutac-Jaclupan fault, etc. which control the structures of Cebu are clearly observed. Although of lesser importance many diagonal lineaments are also clearly identified.

In Bohol, NNW-SSE trend excellent lineaments and many minor lineaments which have diagonal trend to the above are observed. The NNW-SSE trend lineament at north side of Jagna in southeastern Bohol is parallel to accretion zone of Boctol Serpentine.

In southwestern Negros, NE-SW and NNW-SSE trend excellent lineaments and minor lineaments which have diagonal trend to the above are identified. The NNW-SSE trend is assumed parallel to the intrusion direction of Pagatban diorite and NE-SW trend is assumed to understood as the conjugate to former.

5. Relationship between the Surveyed Mineral Showings and Geochemical Anomalies

Table-21 shows the relations between geochemical anomalies and investigated mineral showings. In this table, the mineral showings with many univariate anomalies include Sigpit Lutopan (98), Mandawe River (38), Consolacion No. 3 (101) in Cebu, Nagasnas (15), Bangwalog (61) and Anda (45) inBohol, Comsque (1) in Siquijol and San Jose (23) in southwestern Negros.

Mineral showings associated with numerous multivariate anomalies are Maypay (97), Sigpit Lutopan (98) and Botong Sinsin (40) in Cebu, Bonakan (41) in Bohol and San Jose (23) and Calatong river I (61) in southwestern Negros. Sigpit Lutopan, San Jose and Calatong river I are worth to noticing, because these have associated anomalous cells of No. 2 factor (vein type mineralization) and No. 3 factor (porphyry copper mineralization).

Table-21 Relationships between Mineral Showings and Geochemical Anomalies

Area	No.	Mineral Showing	Commodity	Cell Average									High-pass Filter									Factor Analysis				
				Cu	Pb	Zn	As	Mn	Ni	Co	Mo	Hg	Cu	Pb	Zn	As	Mn	Ni	Co	Mo	Hg	No. 2 Post*1	No. 3 Pre	No. 3 Post	No. 4 Post	No. 5 Post
Cebu	95	Santa Rita	Cu	◎	–	○	–	–	○	–	–	–	–	–	–	○	–	–	–	–	–	–	◎	–	–	◎
	96	Buanoy	Au	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	○	–	–
	97	Maypay	Au	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	○	–	○
	98	Sigpit Lutopan	Au	◎	◎	○	○	–	–	○	–	–	–	–	–	–	–	–	–	–	–	◎	◎	◎	–	–
	40	Botong Sinsin	Au	○	–	–	–	–	◎	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	–	◎	–
	38	Mandawe River	Pb, Zn	◎	○	◎	◎	–	○	–	–	–	–	–	–	○	–	–	–	–	–	◎	–	○	–	–
	99	Consolacion No.1	Au, Cu, Zn	○	–	○	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	◎
	100	Consolacion No.2	Au, Cu, Zn	◎	–	○	○	–	–	–	–	–	–	–	○	–	–	–	–	–	–	◎	–	○	–	–
	101	Consolacion No.3	Au, Cu, Zn	◎	◎	◎	◎	–	–	–	–	–	–	–	○	○	–	–	–	–	–	◎	–	◎	–	–
Bohol	41	Bonakan	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	–	◎	–	–
	56	Campacot	Cu	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	◎	◎	–	–	–	–
	57	Cangmundo	Au, Cu	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	–	–	–	–
	58	Baas	Cu	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–
	7	Laka	Cu	–	–	–	–	–	–	–	–	–	○	–	–	○	–	–	–	–	–	–	–	○	–	–
	3	Balisong	Cu	○	◎	–	–	–	–	–	–	–	–	–	◎	–	–	–	–	–	–	◎	–	○	–	–
	54	Boyong	Au	–	–	–	–	–	–	–	–	–	–	–	–	○	○	–	–	–	–	○	–	–	–	–
	43	Kauswagan	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–
	44	Mahayag	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	59	Salamanca	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	15	Nagasnas	Ni	–	–	–	–	–	◎	○	–	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–
	17	Buenavista	Mn	–	–	–	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	60	Boctol	Ni	–	–	–	–	–	◎	○	–	–	–	–	–	–	–	○	–	–	–	–	–	–	–	–
	61	Bangwalog	Ni	–	–	–	–	–	◎	◎	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–	–
	45	Anda	Mn	–	◎	–	–	◎	○	○	–	○	–	◎	○	◎	◎	–	–	–	–	–	–	–	–	–
Siquijor	1	Conmasque	Mn	○	–	–	–	○	○	○	–	–	–	–	–	–	◎	–	–	–	–	–	–	–	–	–
	3	Nangka	Mn	–	–	–	–	◎	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	7	Pisong	Mn	–	–	–	–	○	○	–	–	–	–	–	–	–	–	○	○	–	–	–	–	–	–	–
West Negros	60	Calatong River II	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–
	23	San Jose	Cu	◎	–	–	○	–	–	–	◎	–	◎	–	◎	–	–	–	–	–	–	◎	◎	◎	–	–
	61	Calatong River I	Cu	◎	–	–	◎	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	◎	◎	○	–
	62	Cabilocan River	Cu	◎	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	◎	–	–
	29	Colet and Catwanan	Cu	◎	–	○	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	◎	◎	–	–
	63	Sangke	Cu	–	◎	–	–	–	–	–	–	◎	–	–	–	–	–	–	–	–	–	◎	–	◎	–	–
	64	Allingadyon	Cu	–	–	–	–	–	–	–	◎	–	–	–	–	–	–	–	–	–	–	–	○	◎	–	–
	65	Paling Gamay	Au	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	○	–	–	–
	66	Capayasan	Cu	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

◎ : Mineral showing located in over $M + 1.5\sigma$ cell
○ : Mineral showing located in $M + 1.0\sigma \sim M + 1.5\sigma$ cell
– : Mineral showing located in below $M + 1.0\sigma$ cell
*1 : Pre ; Before rotation Post : Afterotatio

6. Evaluation and Conclusions

6-1 Consolidated Evaluation of the Survey Results

6-1-1 Geology and Structure

The survey area is located in the Visayas Region, in the Central Philippine Archipelago, the area is surrounded by the islands of Masbate to the north, Leyte to the east, Mindanao to the south and the Sulu Sea to the west.

According to Mitchel, et al. (1986), the Sulu-Zamboanga-Masbate Arc which extended along the east side of the area collided with the West Mindanao Terranes in Miocene. Sinistral movement of Philippine Fault which extended along the far eastern side of the above arc was displaced the eastern terrane to northwest wardconsiderably (Fig. 8).

The structural features of the area are strongly affected by the above tectonic setting. The NNE-SSW trending faults of Cebu and the westward tilting movement in Bohol are inferred to have been caused by the movement of the Sulu-Zamboanga-Masbate Arc. The direction of the diorite intrusion in Southwest Negros is assumed to be parallel to the Negros Trench and at right angle to the spreading direction of Sulu Sea with NNE-SSW trend (Fig. -2).

The oldest formations of the area are Jurrasic schists; the Tunlob Schist in Cebu and Alicia Schist in Bohol.

Intense volcanic activity occurred in Cretaceous to Paleocene. They are Cansi Volcanics in Cebu, and Ubay Volcanics in Bohol and Basak Formation in Southwest Negros which was formed a little later than the former two. During this period, mostly in Paleocene, fairly large scale diorite intrusion occurred in Cebu and Bohol. The diorite in Cebu is important resource-wise as it formed the deposits of Atlas Mine.

In Eocene, deposition of Baye Limestone in Cebu. Calape Limestone of Bohol and Ishio Limestone in Southwest Negros were the major geologic occurrences.

In Oligocene, deposition of various kinds of sedimentary rocks are recorded. They are Lutac Hill Limestone and Cebu Formation in Cebu, Ilihan Shale in Bohol. During this period, Pagatban Diorite which is important resource-wise intruded in Southwest Negros.

In Miocene, limestone deposition occurred twice in Cebu and Bohol, while in Southwest Negros, it occurred only once and also sandstone, shale and conglomerate were deposited in all of the area during this epoch. Miocene is very important epoch for mineralization in the Philippine because of the diorite intrusion in many areas. In the survey area, those are observed in Cebu and dacite intrusion in Southwest Negros. Also serpentine was emplaced in Cebu and andesite intrusion occurred in Cebu and Bohol.

In Plio-Pleistocene, limestone deposition occurred throughout the area, and Pleistocene pyroclastics is recognized only in Southwest Negros.

6-1-2 Mineralization

Four principal types of mineralization are recognized in the survey area as follows:

① Vein, network and dissemination type (including porphyry copper type) which is associated with intrusive diorite body during Paleocene, Oligocene and Miocene.
(Examples; Atlas, Sipalay)

② Contact metasomatic type which occur in the contact zone between diorite bodies and limestone.
(Examples; Mandawe River)

③ Orthomagmatic type which is associated with ultramafic rocks.
(Example; Boctol)

④ Residual type manganese.
(Example; Anda)

6-1-3 Geochemical Analyses

Anomalous zones which warrant further investigation are selected from the results of geochemical studies. The basis for selecting these zones are the following considerations.

① Each anomalous zone should be defined by anomalous values of at least two elements.

② Each anomalous zone should at least be suggested by more than two methods of geochemical analyses.

③ In addition to satisfying the above two conditions, alteration associated with mineralization should be observed in the zone.

Table-22 and attached plate-9 show the anomalous zones selected on the basis of standards and their relevant features.

Evaluation of the anomalous zones are as follows:

No.1 zone. Western side of Atlas Mine in Cebu

In this zone, there are cells which have overlapping anomalous contents of Cu, Zn, As, Ni, Co and Mo. Also regarding the results of factor analysis, there are cells with overlapping Nos. 2, 3 and 4 factors. Nos. 2 and 4 concerns As, while, No. 3 concerns Mo. Geologically, Lutopan Diorite and mineral showings such as Botong Sinsin, Sigpit Lutopan and Maypay occur in this zone. It is also adjacent to the Atlas Mine. From the above considerations, this zone was selected as promising area I for hydrothermal mineralization.

No.2 zone. Western side of Liloan

In this zone, there are cells which have overlapping anomalous contents of Pb, Zn and As. Also regarding the results of factor analysis, all factors overlap. Geologically, Talamban Diorite and the Mineral showings Conception No. 1, No. 2, No. 3 and Mandawe River occur in this zone. From the above considerations, this zone was selected as promising area II for hydrothermal mineralization.

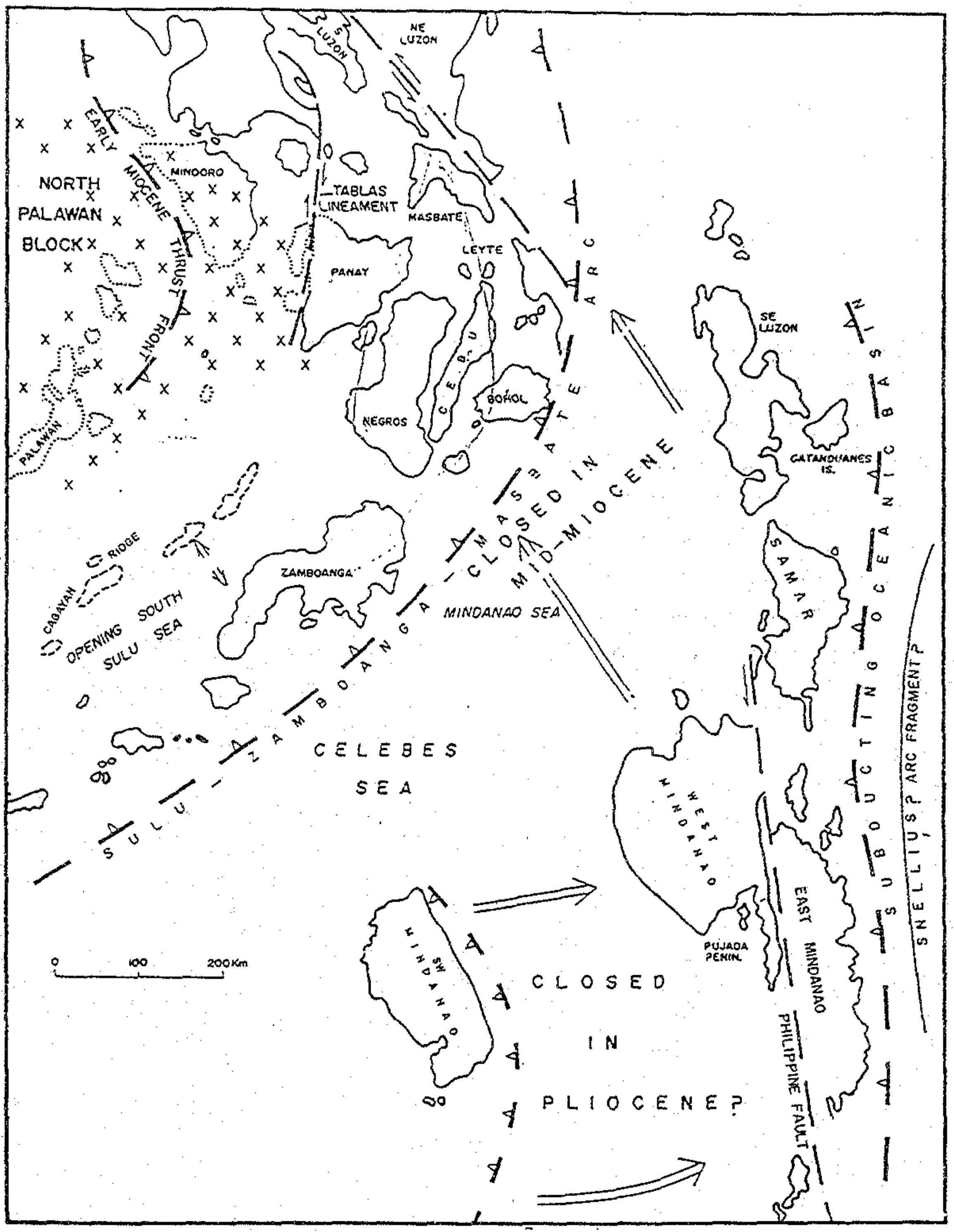

Fig. -10 Schematic Paleogeografic Reconstruction Map in Miocene
(After A. H. G. Mitchell, et al. 1986)

Table-22 Relation between the Extracted Anomalous Zones and Geological Setting

Area	No. Location	Cell Average									High-pass Filter									Factor Analysis					Geological Setting
		Cu	Pb	Zn	As	Mn	Ni	Co	Mo	Hg	Cu	Pb	Zn	As	Mn	Ni	Co	Mo	Hg	No. 2	No. 3	No. 3	No. 4	No. 5	
Cebu	1 Western part of Atlas Mine 123° 44' E 10° 20' N	○	-	○	○	-	○	○	○	-	○	○	○	-	○	-	○	○	-	Post ○	Pre ○	Post ○	Post ○	Post ○	Anomalous zone in Cretaceous-Paleocene Mananga Group, Oligocene Cebu Formation and Paleocene Lutopan Diorite.
	2 West of Liloan in east coast 123° 56' E 10° 23' N	○	○	○	○	-	-	-	-	-	-	○	○	○	○	-	-	-	-	○	○	○	○	○	Anomalous zone in Jurassic Tunlob Schist, Miocene Malubog Formation and Talamban Diorite.
Bohol	3 North coast of Bohol 124° 07' E 10° 05' E	○	-	-	○	○	-	○	○	-	-	-	-	○	○	-	-	-	-	○	○	○	-	-	Anomalous zone in Paleocene Ubay Volcanics
	4 Southeastern part of Bohol 124° 33' E 9° 41' N	○	○	○	○	○	○	○	-	○	○	○	○	○	○	○	○	○	○	-	-	-	-	-	Anomalous zone in Miocene Carmen Formation and Sierra Bullones Formation.
West Negros	5 15km southeast from Sipaly 122° 33' E 9° 40' N	○	○	○	-		-	-	-	○	-	-	-	-	-	-	-	-	-	○	○	○	-	-	Anomalous zone in Eocene Basak Formation and Oligocene Pagatban Diorite.

○: Elements concerned anomalous zone

No. 3 zone. North coast of Bohol (vicinity of Buenavista)

In this zone, there are cells which have overlapping anomalous contents of As and Mn. Geologically, Ubay volcanics and mineral showing such as Bonakan occur in this zone. The anomalies are not necessarily high compared to Cebu and Southwest Negros, but intensive alteration occur in this zone. The zone, it is considered, warrants further detailed check. The direct comparison of the results of the stream sediment analysis of this zone to those of other areas should be suspect because the used samples were collected by BMG (Geochemical Atlas Project, 1984) not by the RP-Japan Project.

No. 4 zone. Southeastern part of Bohol

In this zone, there are cells which have overlapping anomalous contents of Cu, Pb, Zn, As, Mn, Ni, Co and Hg. Factor analysis was not carried out for this zone because the Mo analysis could not made. Neither evidences of metallic mineralization, significant mineral showings nor alteration are known except for small residual manganese showings. Therefore this zone is not considered promising.

No. 5 zone. Fifteen kilometers southeast of Sipalay Town.

In this zone, there are cells which have overlapping anomalous contents of Pb, Zn and Hg. Also regarding the results of factor analysis, there are cells with overlapping Nos. 2 and 3 factors. No.2 concerns Pb, As and Hg while No. 3 concerns Cu and Mo before rotation and Mn, Co and Mo after rotation. Geologically, Pagatban Diorite and mineral showings such as Cabilocan River and Colet and Catuanan occur in this zone. From above consideration, this zone was selected as promising area Ⅲ for hydrothermal mineralization.

6-2 Conclusions

It is concluded from the results of the geological and geochemical consideration of Cebu, Bohol and Southwest Negros, that the following three areas are promising for future exploration for mineral resources. The order of the importance of the areas is that of the listing.

(I) Western side of Atlas Mine of Cebu

Porphyry copper type mineralization is anticipated in this area and the expected commodities are Cu, Zn and Mo.

(II) Western side of Liloan

Contact metasomatic and vein type mineralization associated with diorite is anticipated in this area and the expected commodities are Cu, Pb and Zn.

(Ⅲ) Southeastern side of Sipalay Town

Vein type mineralization is anticipated in this area and the expected commodities are Cu, Pb and Zn.

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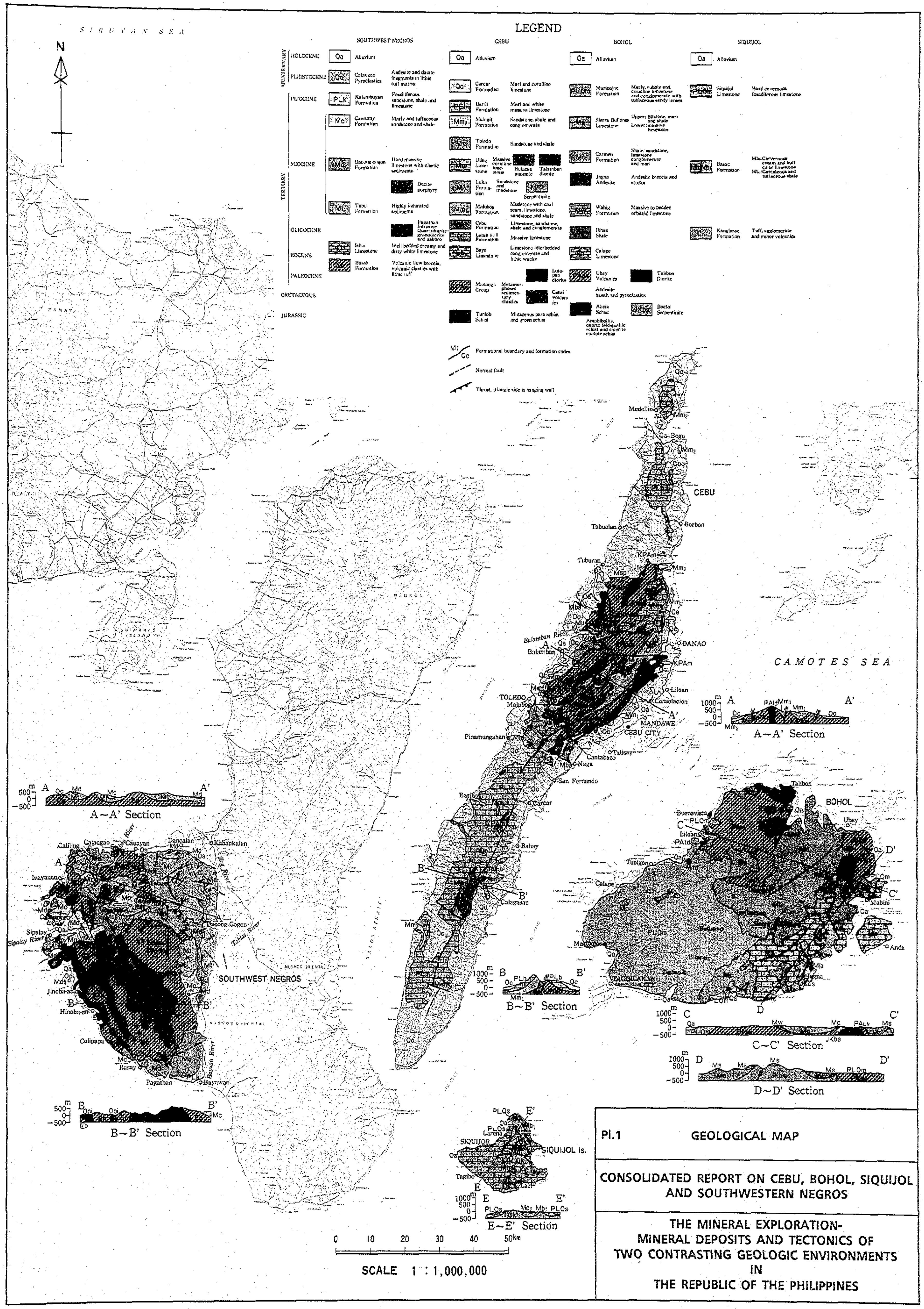
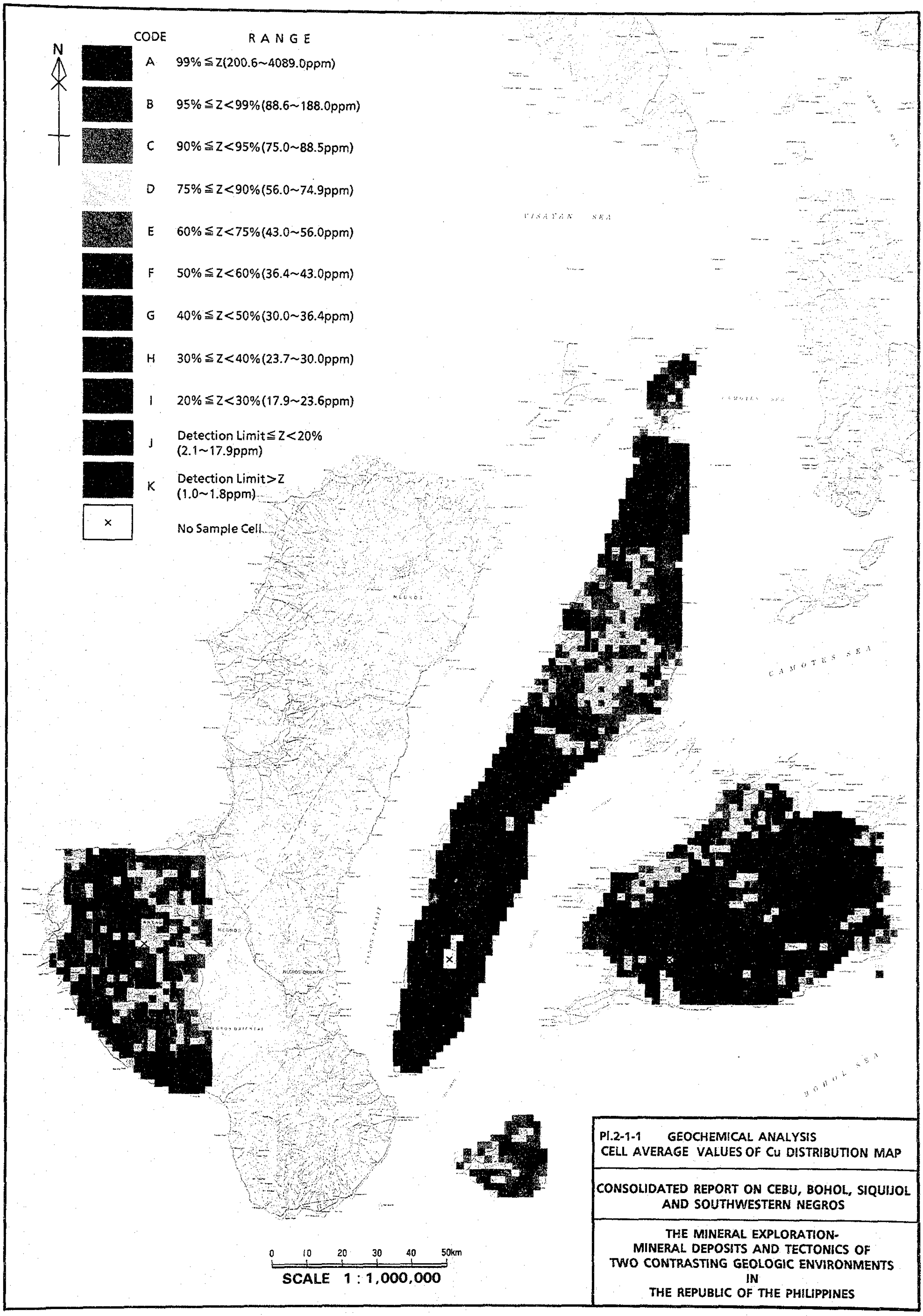
*1 unpub. ; unpublished

*2 ms. ; manscript

Pl.1 Geological Map and Section (1:1,000,000)


SIBUYAN SEA
N
LEGEND
SOUTHWEST NEGROS
CEBU
BOHOL
SIQUIJOL
QUATERNARY
HOLOCENE
PLEISTOCENE
TERTIARY
PLIOCENE
MIOCENE
OLIGOCENE
EOCENE
PALEOCENE
CRETACEOUS
JURASSIC
Formational boundary and formation codes
Normal fault
Thrust, triangle side is hanging wall
PANAY
NEGROS
GUIMARAS ISLAND
CEBU
Medellin
Bogo
Tabuelan
Borbon
Tuburan
Balamban
DANAO
Liloan
Consolacion
MANDAWE
CEBU CITY
TOLEDO
Pinamungahan
Talisay
Naga
San Fernando
Barili
Carcar
Balay
Calagusan
CAMOTES SEA
A~A' Section
B~B' Section
C~C' Section
D~D' Section
E~E' Section
BOHOL
Talibon
Buenavista
Ubay
Tubigon
Calape
TAGBILARAN
Anda
Mabini
SOUTHWEST NEGROS
Calilling
Cauayan
Kabankalan
Inayauan
Sipalay
Jinoba-an
Hinoba-an
Colipapa
Basay
Pagatban
Bayawan
SIQUIJOR
Larena
SIQUIJOL Is.
Tagibo
0 10 20 30 40 50km
SCALE 1 : 1,000,000
Pl.1
GEOLOGICAL MAP
CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS
THE MINERAL EXPLORATION-
MINERAL DEPOSITS AND TECTONICS OF
TWO CONTRASTING GEOLOGIC ENVIRONMENTS
IN
THE REPUBLIC OF THE PHILIPPINES

Pl.2-1 (No. 1 to No. 9) Geochemical Analysis Cell Average Values Distribution Map (1:1,000,000)


N
CODE
RANGE
A 99%≦Z(200.6~4089.0ppm)
B 95%≦Z<99%(88.6~188.0ppm)
C 90%≦Z<95%(75.0~88.5ppm)
D 75%≦Z<90%(56.0~74.9ppm)
E 60%≦Z<75%(43.0~56.0ppm)
F 50%≦Z<60%(36.4~43.0ppm)
G 40%≦Z<50%(30.0~36.4ppm)
H 30%≦Z<40%(23.7~30.0ppm)
I 20%≦Z<30%(17.9~23.6ppm)
J Detection Limit≦Z<20% (2.1~17.9ppm)
K Detection Limit>Z (1.0~1.8ppm)
× No Sample Cell
VISAYAN SEA
CAMOTES SEA
BOHOL SEA
0 10 20 30 40 50km
SCALE 1 : 1,000,000
Pl.2-1-1 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Cu DISTRIBUTION MAP
CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS
THE MINERAL EXPLORATION-
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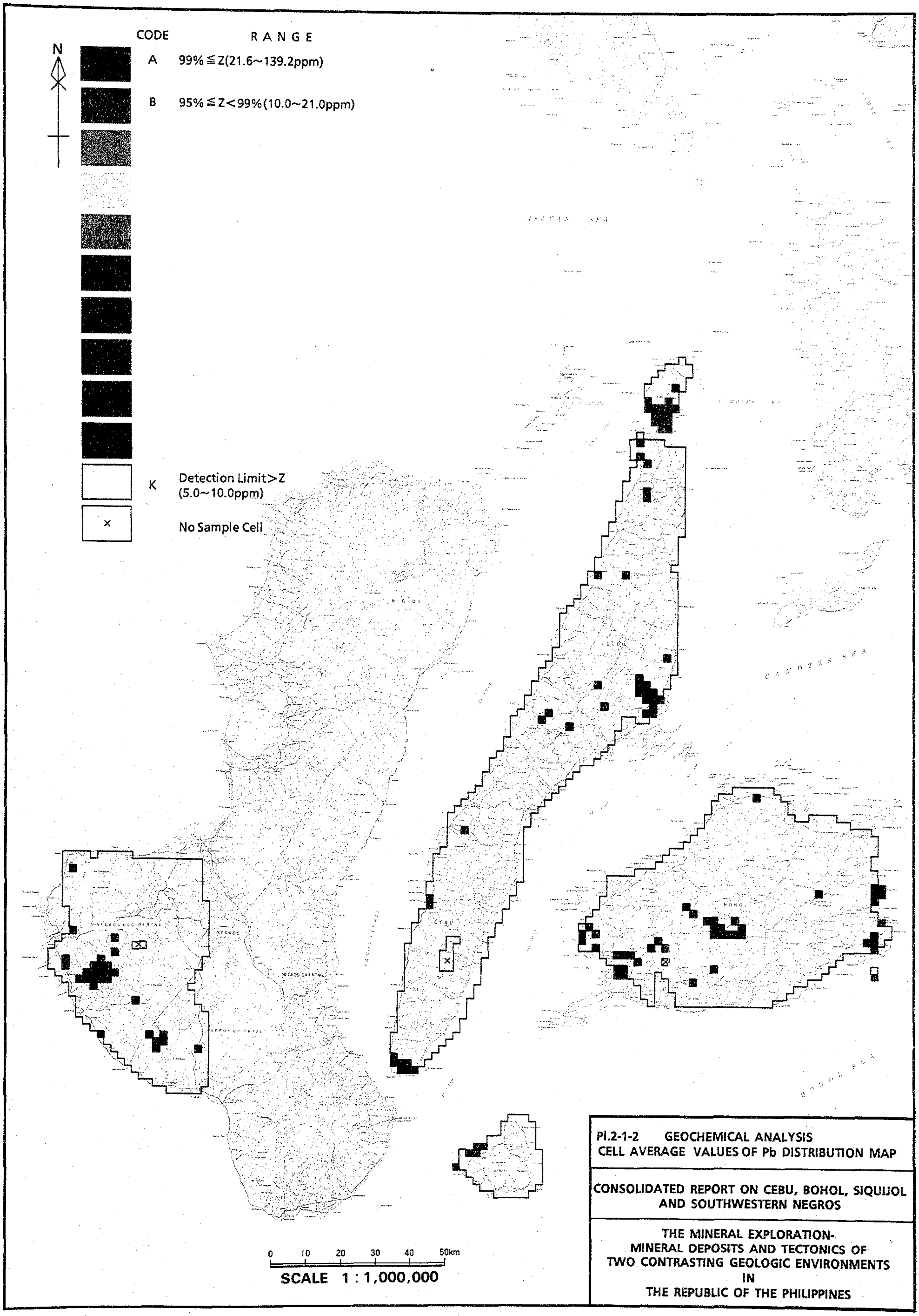
IN
THE REPUBLIC OF THE PHILIPPINES



Pl.2-1-2 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Pb DISTRIBUTION MAP

CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS

THE MINERAL EXPLORATION-
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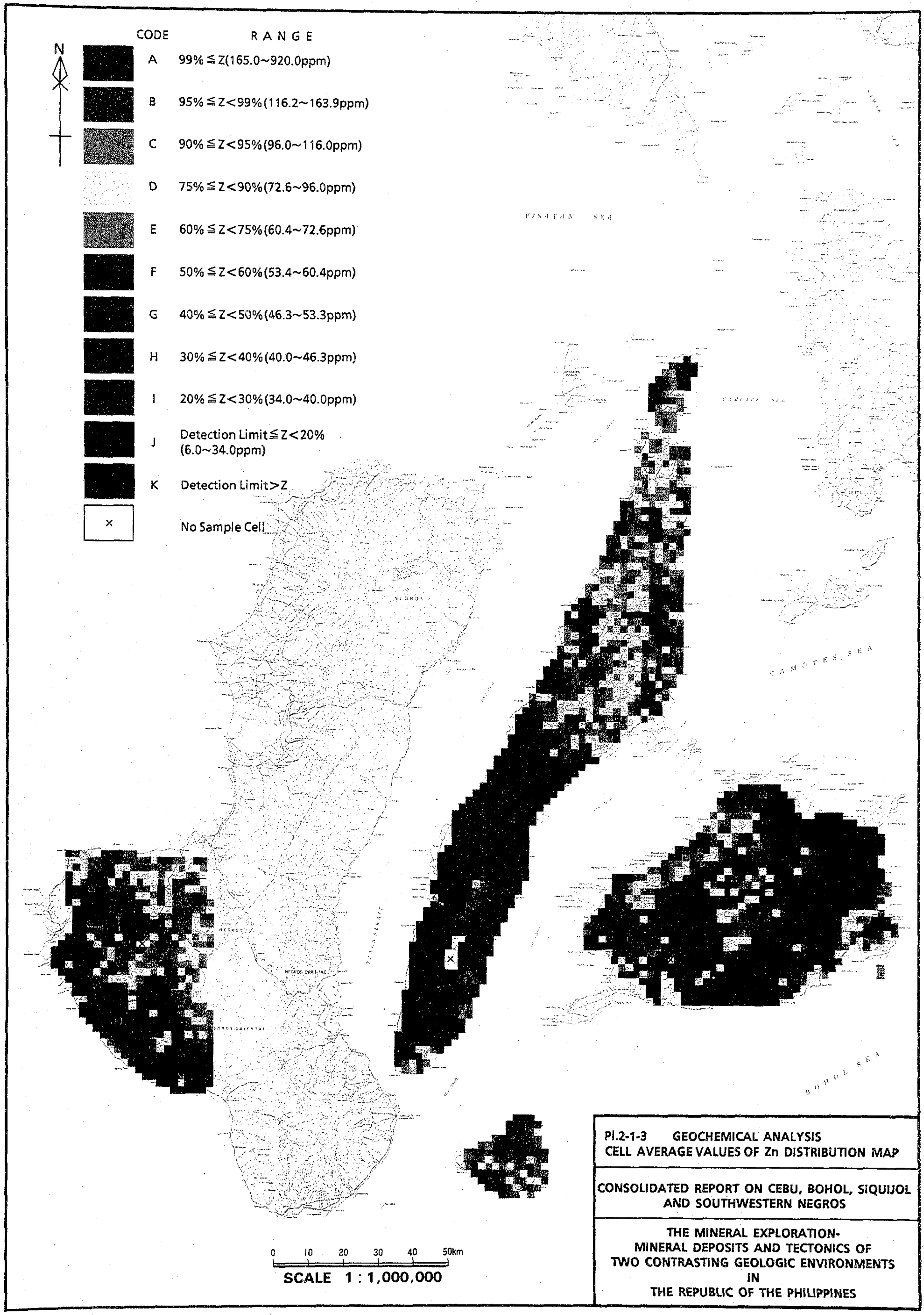

Pl.2-1-3 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Zn DISTRIBUTION MAP

CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS

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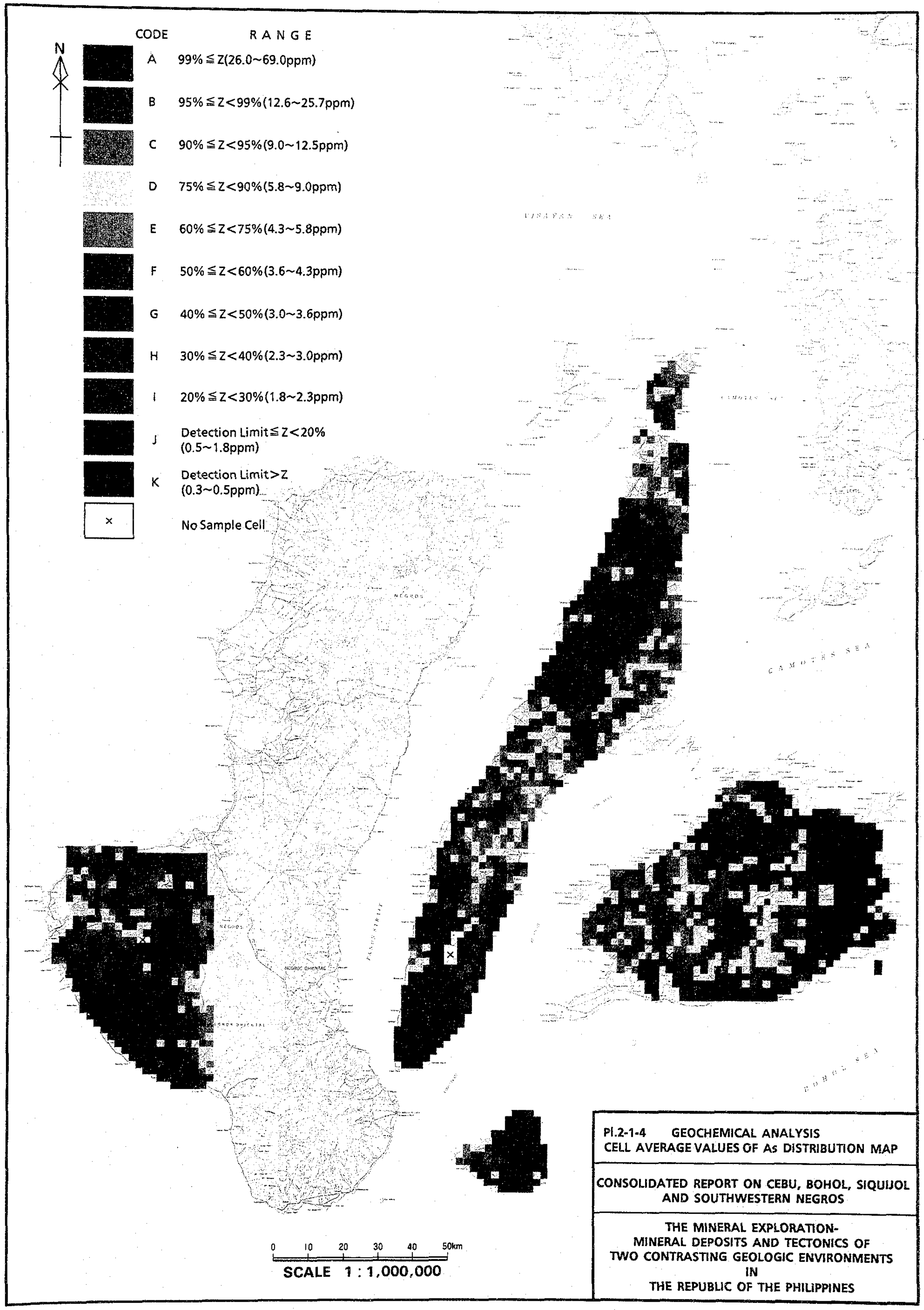

CODE
RANGE
N
A 99% ≦ Z(26.0~69.0ppm)
B 95% ≦ Z < 99%(12.6~25.7ppm)
C 90% ≦ Z < 95%(9.0~12.5ppm)
D 75% ≦ Z < 90%(5.8~9.0ppm)
E 60% ≦ Z < 75%(4.3~5.8ppm)
F 50% ≦ Z < 60%(3.6~4.3ppm)
G 40% ≦ Z < 50%(3.0~3.6ppm)
H 30% ≦ Z < 40%(2.3~3.0ppm)
I 20% ≦ Z < 30%(1.8~2.3ppm)
J Detection Limit ≦ Z < 20% (0.5~1.8ppm)
K Detection Limit > Z (0.3~0.5ppm)
× No Sample Cell
CAMOTES SEA
BOHOL SEA
0 10 20 30 40 50km
SCALE 1 : 1,000,000
Pl.2-1-4 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF As DISTRIBUTION MAP
CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS
THE MINERAL EXPLORATION-
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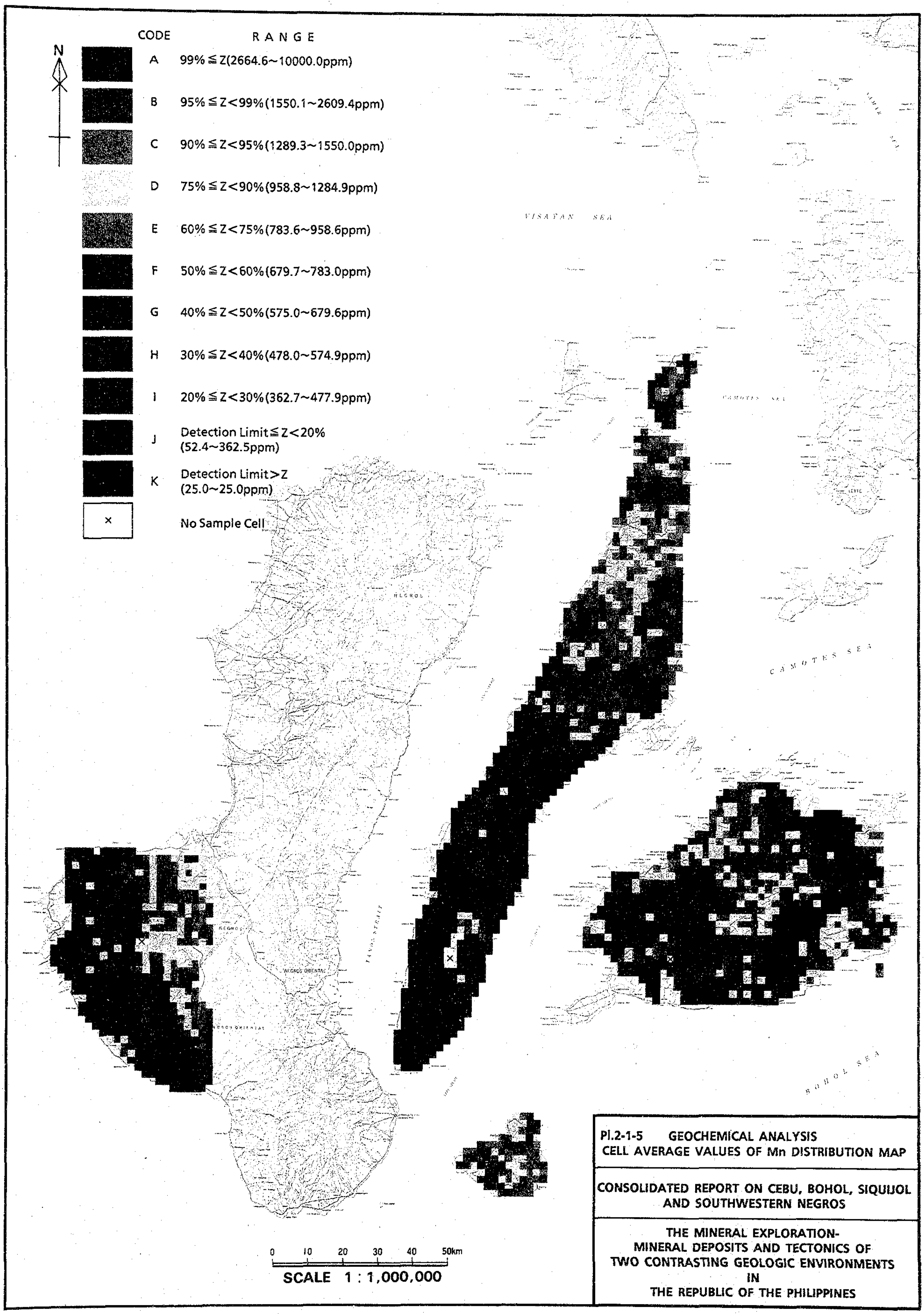

N
CODE
RANGE
A 99% ≦ Z(2664.6~10000.0ppm)
B 95% ≦ Z<99%(1550.1~2609.4ppm)
C 90% ≦ Z<95%(1289.3~1550.0ppm)
D 75% ≦ Z<90%(958.8~1284.9ppm)
E 60% ≦ Z<75%(783.6~958.6ppm)
F 50% ≦ Z<60%(679.7~783.0ppm)
G 40% ≦ Z<50%(575.0~679.6ppm)
H 30% ≦ Z<40%(478.0~574.9ppm)
I 20% ≦ Z<30%(362.7~477.9ppm)
J Detection Limit ≦ Z<20% (52.4~362.5ppm)
K Detection Limit>Z (25.0~25.0ppm)
× No Sample Cell
VISAYAN SEA
CAMOTES SEA
BOHOL SEA
0 10 20 30 40 50km
SCALE 1 : 1,000,000
Pl.2-1-5 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Mn DISTRIBUTION MAP
CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS
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TWO CONTRASTING GEOLOGIC ENVIRONMENTS
IN
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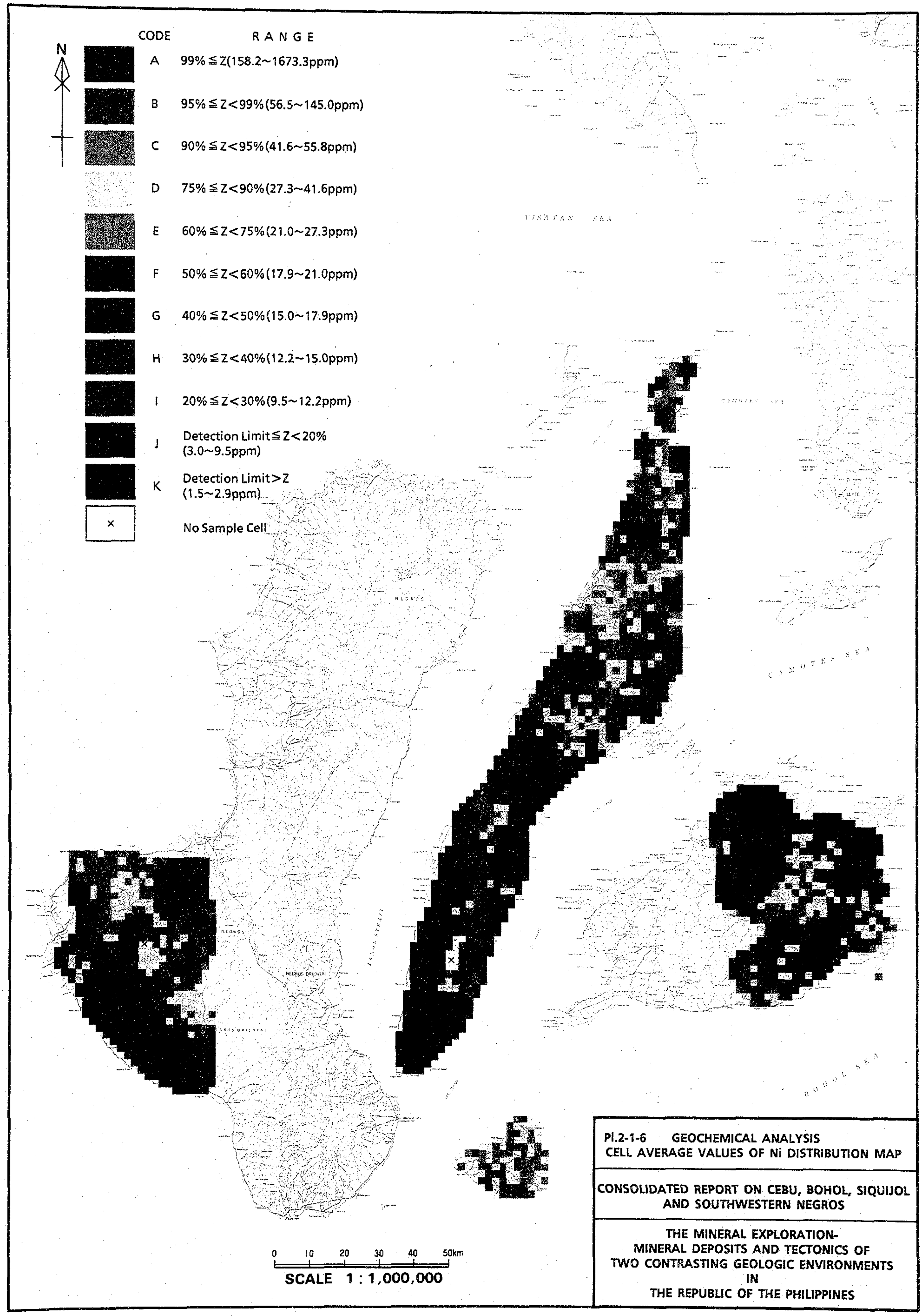
N
CODE
RANGE
A 99%≦Z(158.2~1673.3ppm)
B 95%≦Z<99%(56.5~145.0ppm)
C 90%≦Z<95%(41.6~55.8ppm)
D 75%≦Z<90%(27.3~41.6ppm)
E 60%≦Z<75%(21.0~27.3ppm)
F 50%≦Z<60%(17.9~21.0ppm)
G 40%≦Z<50%(15.0~17.9ppm)
H 30%≦Z<40%(12.2~15.0ppm)
I 20%≦Z<30%(9.5~12.2ppm)
J Detection Limit≦Z<20% (3.0~9.5ppm)
K Detection Limit>Z (1.5~2.9ppm)
× No Sample Cell
CAMOTES SEA
BOHOL SEA
0 10 20 30 40 50km
SCALE 1 : 1,000,000
Pl.2-1-6 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Ni DISTRIBUTION MAP
CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS
THE MINERAL EXPLORATION-
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TWO CONTRASTING GEOLOGIC ENVIRONMENTS
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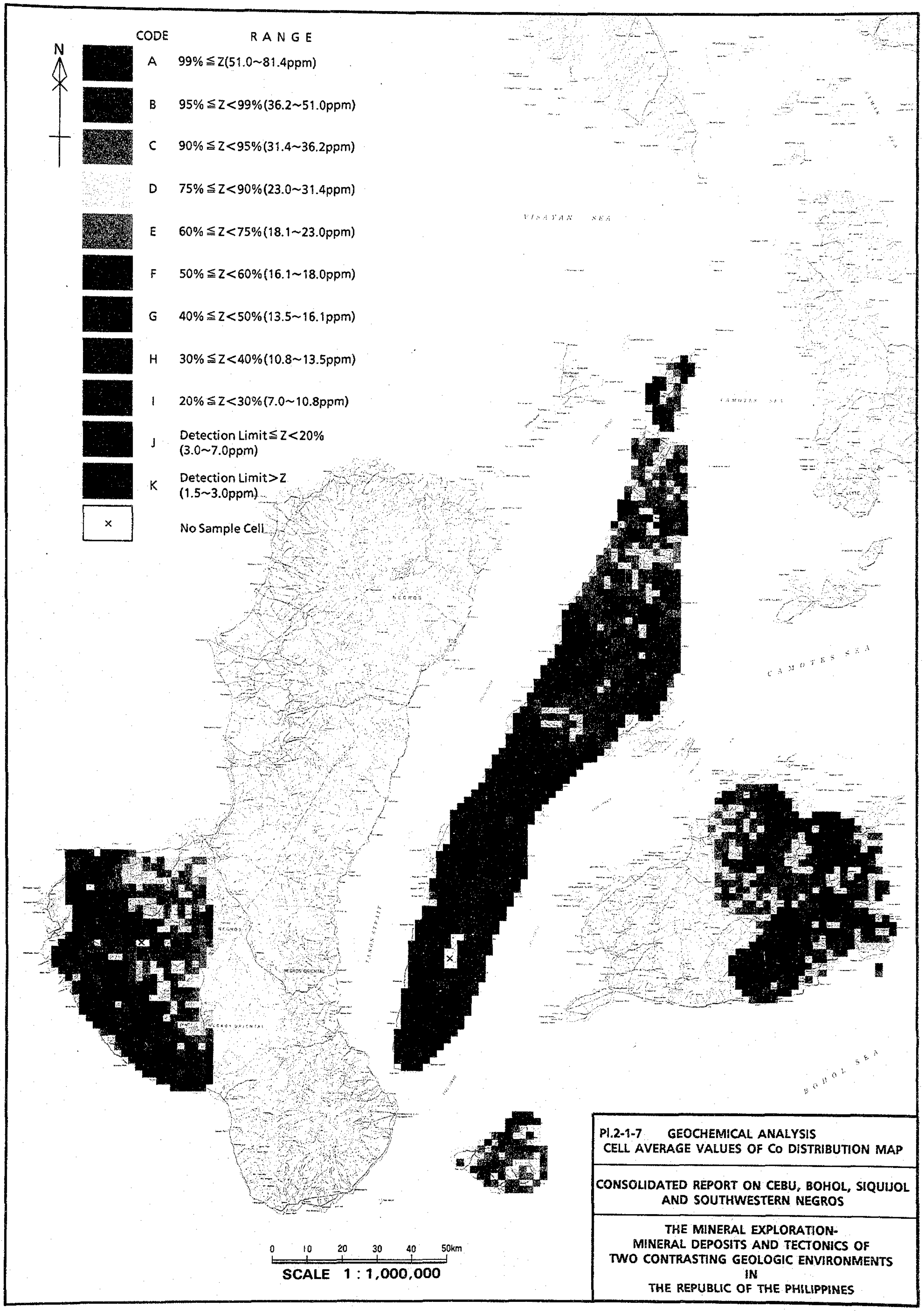

Pl.2-1-7 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Co DISTRIBUTION MAP

CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS

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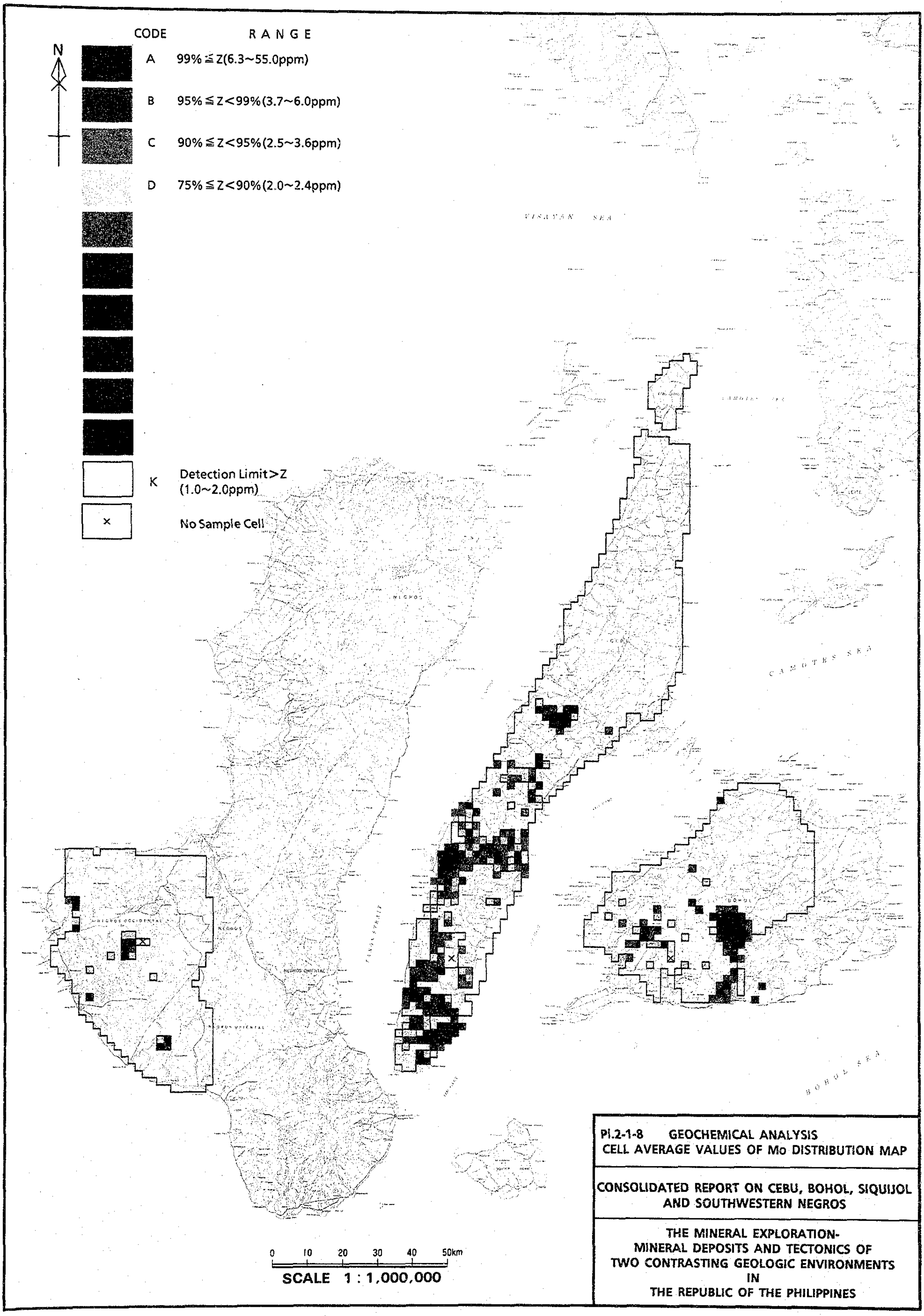

Pl.2-1-8 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Mo DISTRIBUTION MAP

CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS

THE MINERAL EXPLORATION-
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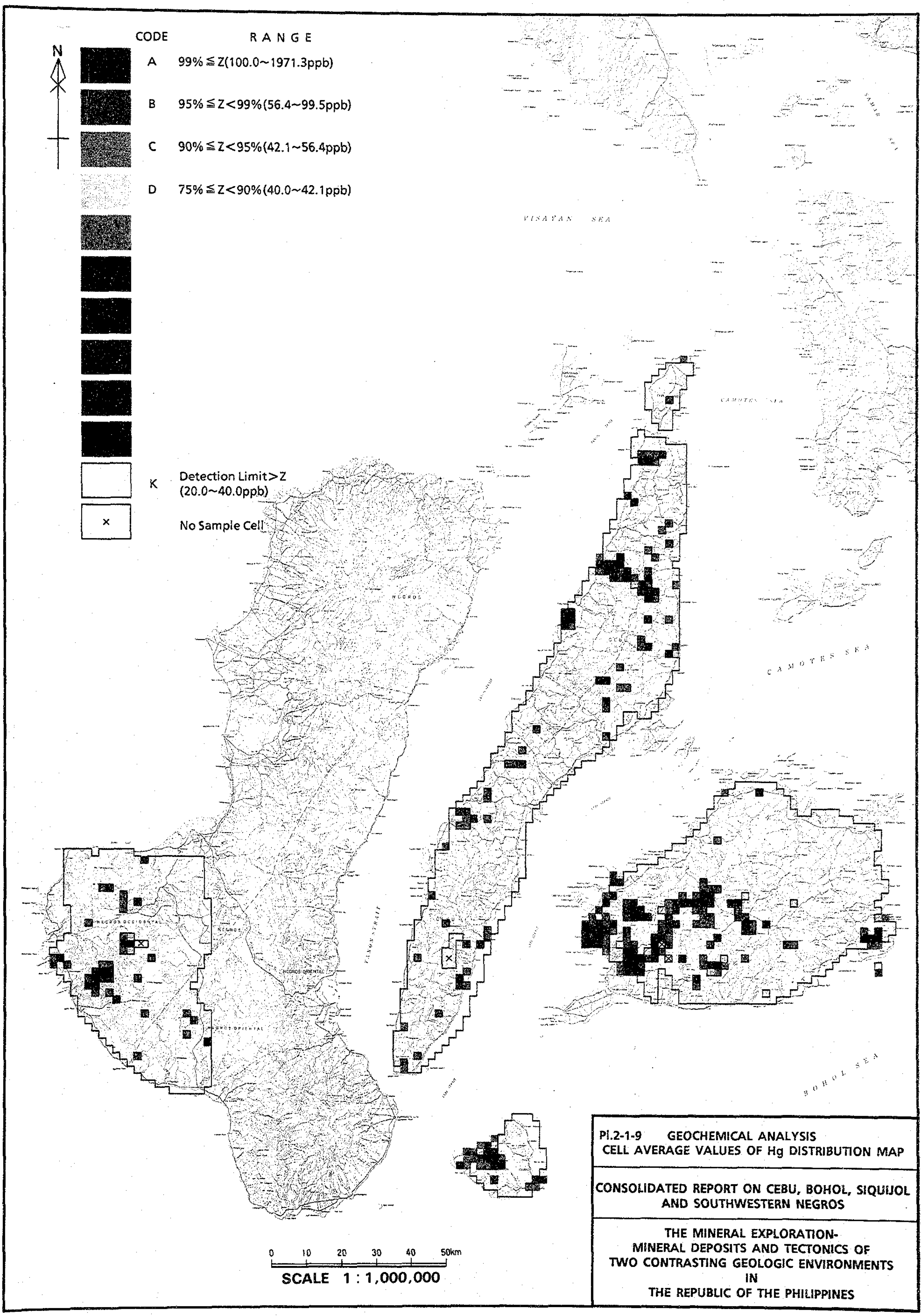

Pl.2-1-9 GEOCHEMICAL ANALYSIS
CELL AVERAGE VALUES OF Hg DISTRIBUTION MAP

CONSOLIDATED REPORT ON CEBU, BOHOL, SIQUIJOL AND SOUTHWESTERN NEGROS

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