Co

The Co—anomaly zone coincides quite well with the Ni—anomaly zone. The anomaly zone comprising 5 A-rank anomalies in the south end is believed to result from dispersion, due to the anomaly size and extention of the Ultramafic terrain.

Cr

Anomaly distribution is roughly similar to that of Ni and Co. There are a great number of samples which assay at more than 0.5 % Cr, which is the upper detection limit and in such cases the values are recalculated to 0.5 % prior to calculating. Consequently, the anomaly map shows only B-rank anomalies, because $M+2\sigma$ is statistically larger than 0.5 %.

4-3. Discussion

Two different models of genesis of the auriferous quartz vein hosted within the BIF have been proposed. One suggests that gold, precipitated syngenetically with the chemical sedimentation of BIF, was mobilized in hydrothermal fluids generated at the time of subsequent metamorphism and deformation. The mineralized fluids have filled faults and fractures to form vein type gold deposits, mostly hosted within the source rock.

Another model emphasises the BIF as a favourable host rock proposing that mineralized fluids containing magmatic Au, have selectively filled fractures and cracks in BIF favourable to the deposits.

The former model is in good agreement with higher mean Au value for BIF than in other rock types. On the contrary, the latter model still supports the mineral potential of the area where gold geochemical anomaly zones are superjacent, being parallel to the geologic trend of BIF.

Planitoid and Ni ore potential hosted within ultramafic and mafic rock

Platinum ore deposits, accompanied by Cu and Ni mineralisation occur 30 to 50 metres under the base of the norite layer of the Great Dyke. The ore grade is 3 to 5 g/t in terms of Pt+Pd and 0.25 % for Cu+Ni. The Cu/Ni ratio is often used as an indicator to show platinoid potential in sulphides hosted in ultramafic or mafic rocks. For example, the ratio of Sudbury, Canada gives values as high as 0.8 and Norilsk 2.5, whereas in the case of Kambalda, Western Australia with poor Pt-mineralisation, the ratio is much smaller on the order of 0.07 to 0.08. The Cu and Ni values for samples from the Kwekwe Ultramafic Complex of the area indicate that average Cu/Ni ratio is around 0.06. Small values for both elements and the small Cu/Ni ratio indicate a low potential for platinum.

The Ni/Cr ratio is sometimes used to demonstrate favourable Ni potential when it gives values higher than 1 or 1.5. This area yields 0.295 or smaller Ni/Cr ratio suggesting a poor Ni potential.

Table II-4-1 Fundamental Statistics of Each Element for Each Rock Type, Area D1(1)

Elem -ent	Rock Type	Number of Smp	Min. ppm	Max. ppm	Arith. Mean ppm	Std. Dev. ppm	Geomet. Mean ppm	Std. Dev. Log
Au	whole	294	L 50	840	108	144	58	0.55
	ML FL	31	L 50	460	93	123	50	0.43
	BI MI FI GR	113	L 50	840	145	181	73	0.50
	UM	150	L 50	590	84	104	50	0.41
Ag	Whole	294	L100	1,300	100	138	73	0.28
	ML FL	31	L100	300	89	72	72	0.25
	BI MI FI GR	113	L100	700	94	107	70	0.28
	UM	150	L100	1,300	107	166	75	0.28
Pt	Whole	294	L100	100	55	15	53	0.09
	ML FL	31	L100	100	58	18	56	0.11
	BI MI FI GR	113	L100	100	54	13	53	0.08
	UM	150	L100	100	55	15	54	0.90

Note 1. ML ; Mafic Lava FL ;Felsic Lava BI ; Banded Iron Formation
MI ; Mafic Intrusive FI ; Felsic Intrusive GR ; Granitic Rock
UM ; Ultramafic Rock

Table II-4-2 Fundamental Statistics of Each Element for Each Rock Type, Area D1(2)

Elem -ent	Rock Type	Number of Smp	Min. ppm	Max. ppm	Arith. Mean ppm	Std.Dev. ppm	Geomet. Mean ppm	Std.Dev. Log
Cu	Whole	294	6	120	42	22	35	0.27
	ML	31	14	90	39	25	32	0.28
	FL							
	BI	113	6	94	38	21	32	0.27
	MI							
	FI							
	GR							
	UM	150	10	120	45	22	38	0.27
Ni	Whole	294	74	1930	621	437	467	0.35
	ML	31	77	1360	357	336	238	0.38
	FL							
	BI	113	74	1840	539	398	397	0.36
	MI							
	FI							
	GR							
	UM	150	174	1930	737	446	608	0.28
Co	Whole	294	32	226	90	38	83	0.17
	ML	31	40	136	73	25	238	0.14
	FL							
	BI	113	38	197	89	35	83	0.16
	MI							
	FI							
	GR							
	UM	150	32	226	95	42	87	0.18

Note 1. ML ; Mafic Lava FL ;Felsic Lava BI ; Banded Iron Formation
MI ; Mafic Intrusive FI ; Felsic Intrusive GR ; Granitic Rock
UM ; Ultramafic Rock

Table II-4-3 Fundamental Statistics of Each Element for Each Rock Type, Area D1(3)

Elem -ent	Rock Type	Number of Smp	Min. %	Max. %	Arith. Mean %	Std. Dev. %	Geomet. Mean %	Std. Dev. Log
C r	Whole	294	0.021	0.500	0.246	0.19	0.17	0.40
	M L	31	0.021	0.500	0.182	0.19	69.28	0.49
	F L							
	B I	113	0.021	0.500	0.258	0.19	0.18	0.43
	M I							
	F I							
	G R							
	U M	150	0.047	0.500	0.249	0.18	0.19	0.33

Note 1. M L ; Mafic Lava F L ;Felsic Lava B I ; Banded Iron Formation
M I ; Mafic Intrusive F I ; Felsic Intrusive G R ; Granitic Rock
U M ; Ultramafic Rock

Table Ⅱ-4-4 Correlation Coefficient between Element Area D1(1)

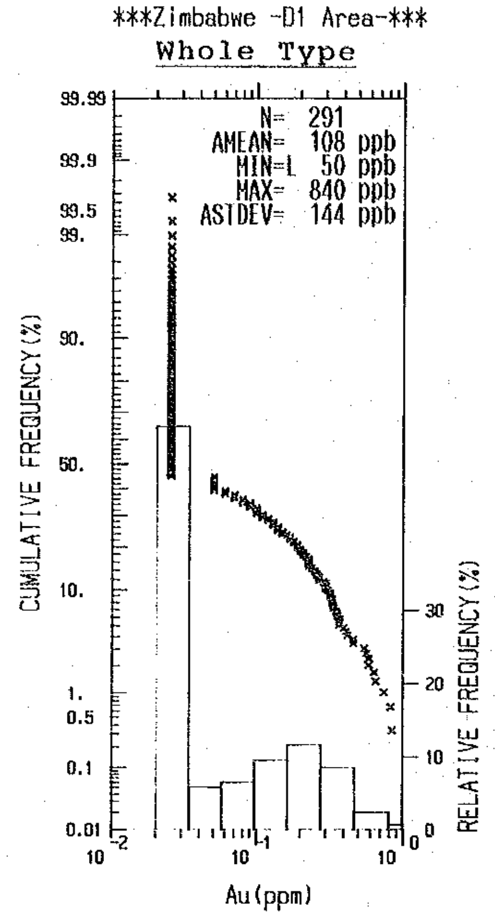
Rock Type	Au -Ag	Au -Ni	Au -Co	Au -Cr	Au -Pt	Au -Cu
Whole	0.07 (0.13)	-0.11 (-0.10)	-0.33 (-0.50)	0.27 (0.33)	0.30 (0.42)	0.38 (0.46)
M L	0.00 (0.15)	-0.19 (-0.14)	-0.22 (-0.27)	0.38 (0.43)	0.35 (0.47)	0.44 (0.46)
B I	0.28 (0.29)	-0.04 (0.05)	-0.30 (-0.48)	0.33 (0.41)	0.28 (0.40)	0.34 (0.43)
U M	-0.06 (0.01)	-0.16 (-0.18)	-0.41 (-0.56)	0.36 (0.36)	0.40 (0.48)	0.47 (0.52)

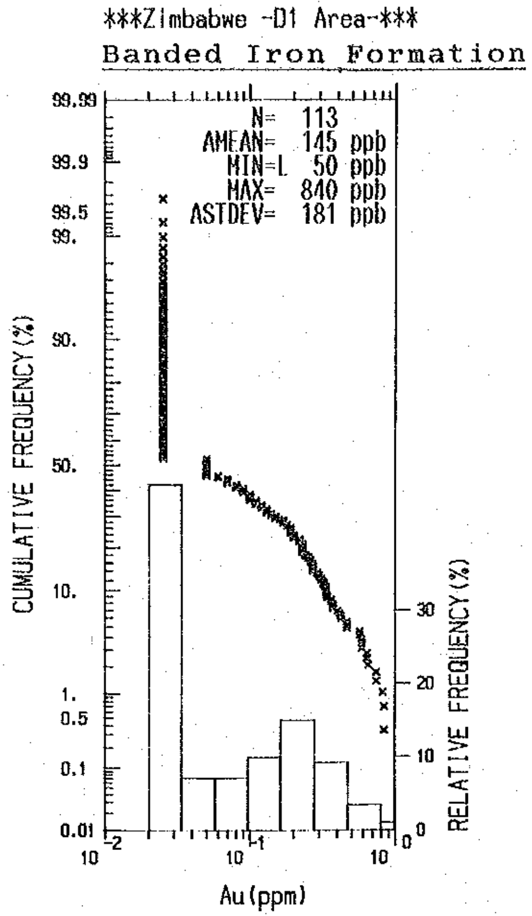
Rock Type	Ag -Ni	Ag -Co	Ag -Cr	Ag -Pt	Ag -Cu
Whole	-0.03 (-0.07)	0.16 (0.09)	-0.05 (0.04)	-0.00 (0.06)	-0.06 (0.03)
M L	-0.05 (-0.06)	-0.23 (-0.29)	0.14 (0.22)	0.13 (0.20)	0.09 (0.21)
B I	-0.11 (-0.15)	0.05 (0.05)	0.00 (0.07)	0.09 (0.12)	0.12 (0.15)
U M	-0.00 (-0.04)	0.25 (0.17)	-0.11 (-0.06)	-0.05 (-0.01)	-0.17 (-0.13)

Table Ⅱ-4-5 Correlation Coefficient between Element Area D1(2)

Rock Type	Ni －Co	Ni －Cr	Ni －Pt	Ni －Cu
Whole	0.05 (0.06)	-0.09 (-0.10)	-0.11 (-0.12)	-0.09 (-0.09)
M L	0.10 (0.07)	0.20 (0.11)	0.28 (0.21)	0.17 (0.15)
B I	0.02 (0.01)	0.03 (-0.02)	-0.00 (-0.01)	-0.00 (-0.01)
U M	0.04 (0.08)	-0.21 (-0.23)	-0.22 (-0.24)	-0.21 (-0.24)

Rock Type	Co －Cr	Co －Pt	Co －Cu	Cr －Pt	Cr －Cu	Pt －Cu
Whole	-0.41 (-0.41)	-0.39 (-0.39)	-0.61 (-0.59)	0.89 (0.82)	0.79 (0.85)	0.80 (0.78)
M L	-0.53 (-0.61)	-0.36 (-0.36)	-0.56 (-0.68)	0.90 (0.86)	0.93 (0.92)	0.86 (0.77)
B I	-0.58 (-0.57)	-0.49 (-0.48)	-0.69 (-0.63)	0.88 (0.87)	0.84 (0.88)	0.82 (0.78)
U M	-0.41 (-0.42)	-0.38 (-0.38)	-0.60 (-0.62)	0.90 (0.83)	0.79 (0.81)	0.80 (0.80)





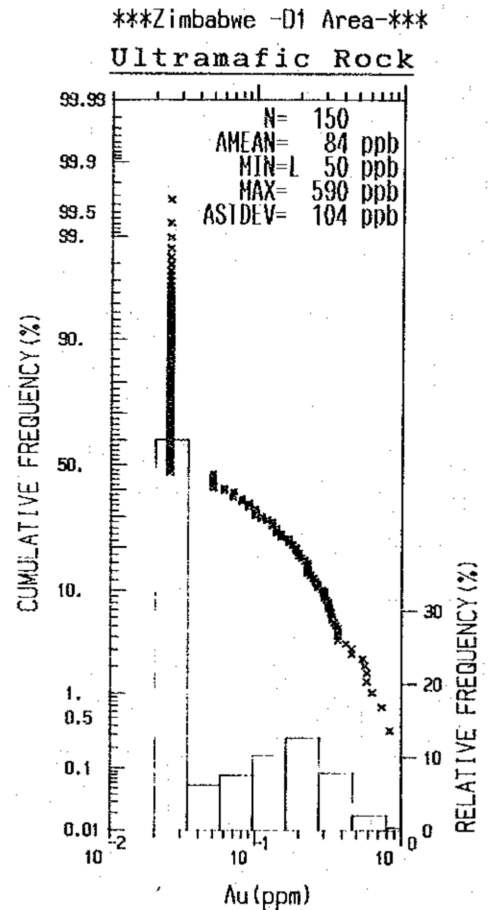
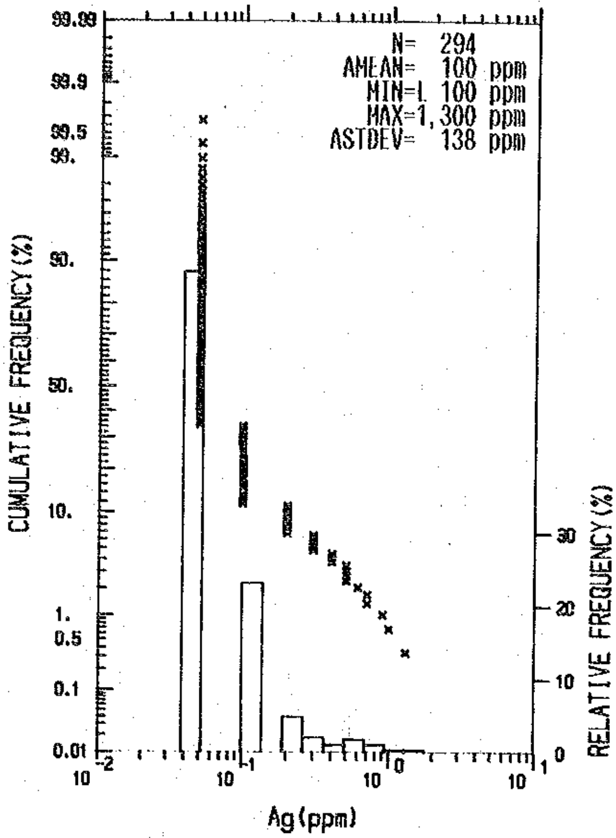
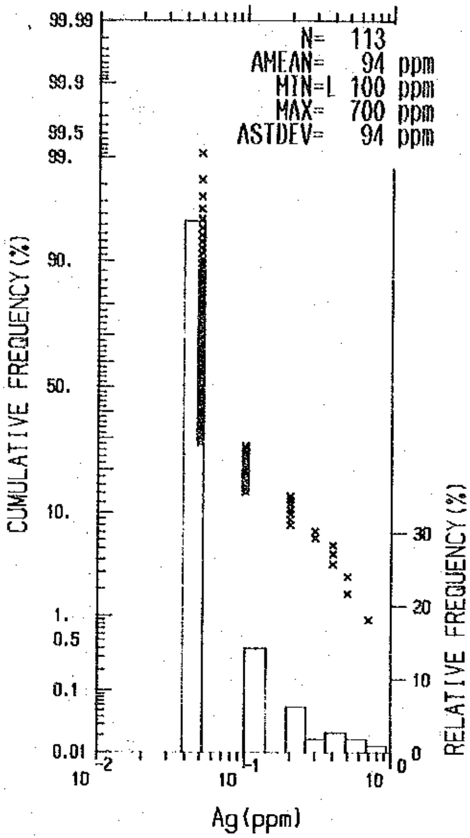


Fig.Ⅱ-4-2 Histogram and Cumulative Frequency Distribution Diagram of Au for Rock Type, Area D1

Zimbabwe -D1 Area-
Whole Type



Zimbabwe -D1 Area-
Banded Iron Formation



Zimbabwe -D1 Area-
Ultramafic Rock

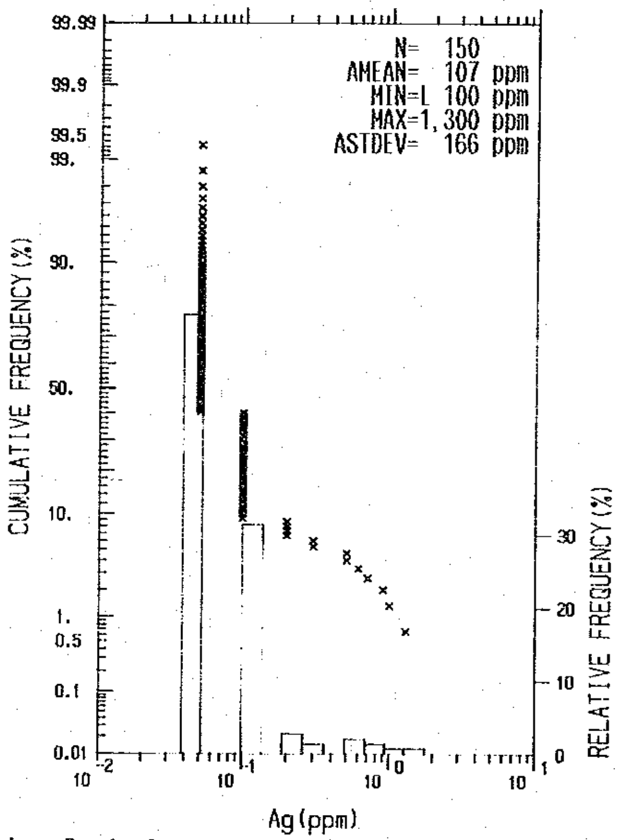
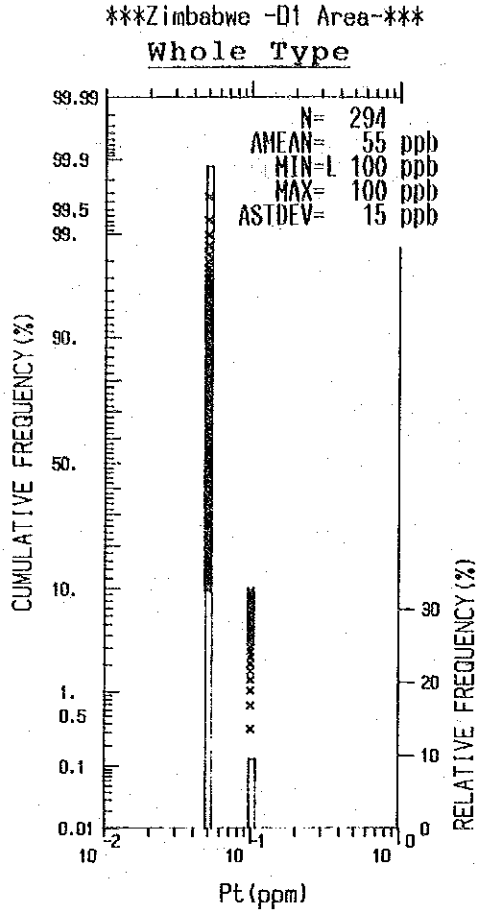
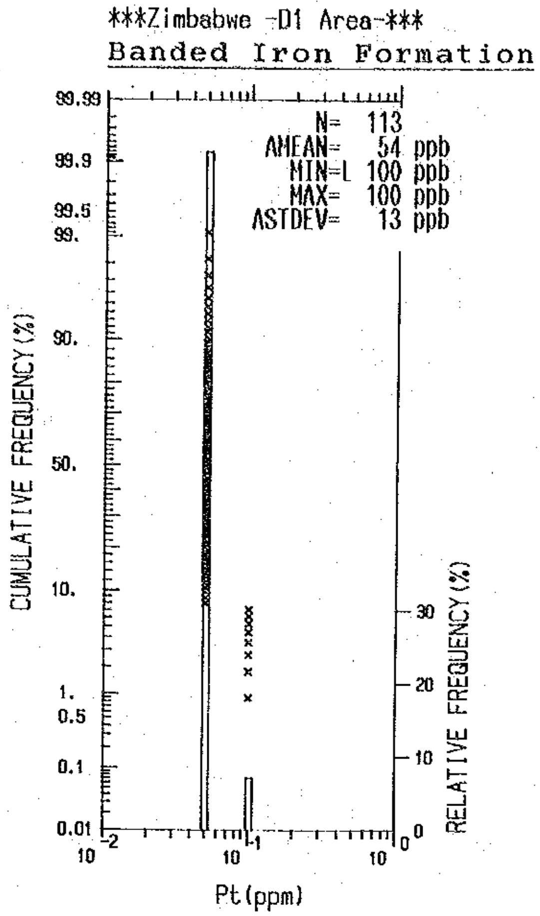


Fig.Ⅱ-4-3 Histogram and Cumulative Frequency Distribution Diagram of Ag for Rock Type, Area D1





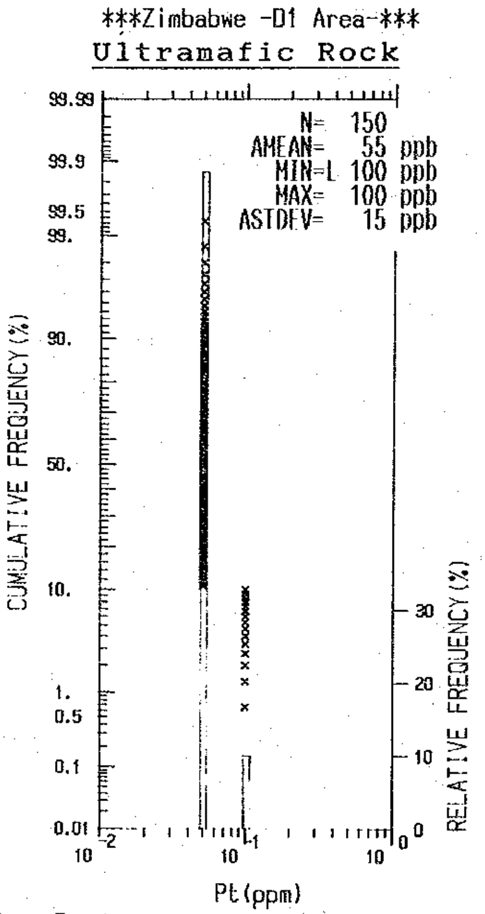
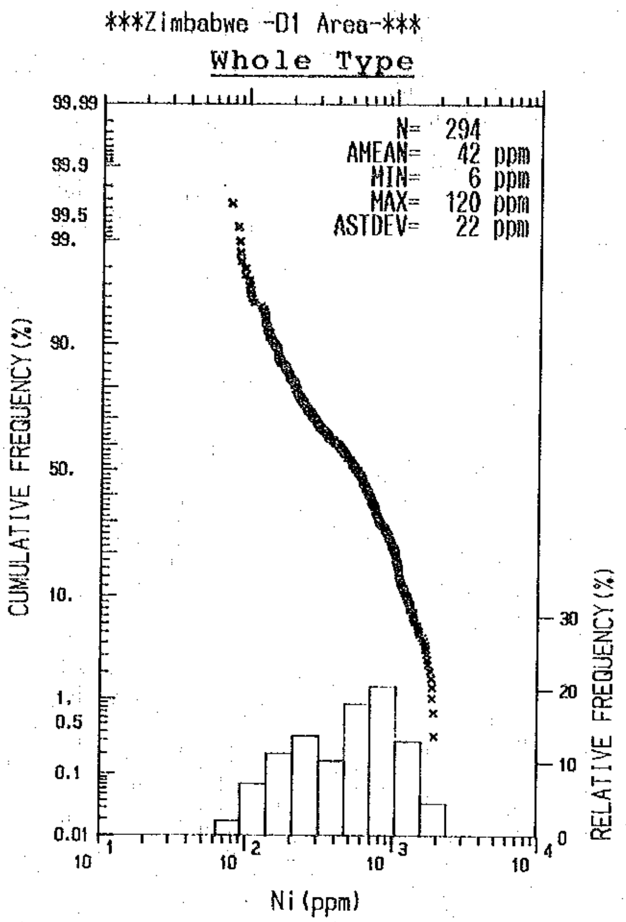
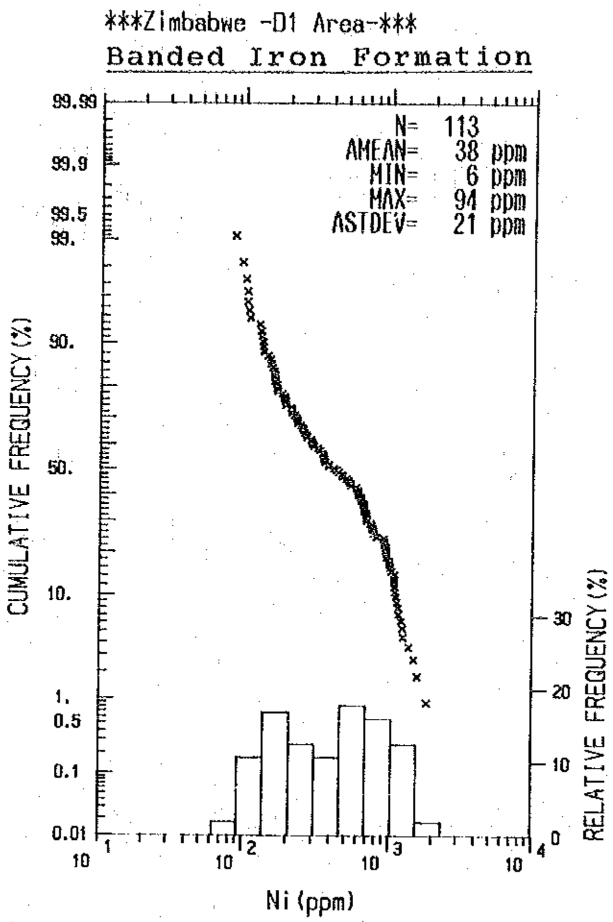


Fig. Ⅱ-4-4 Histogram and Cumulative Frequency Distribution Diagram of Pt for Rock Type, Area D1





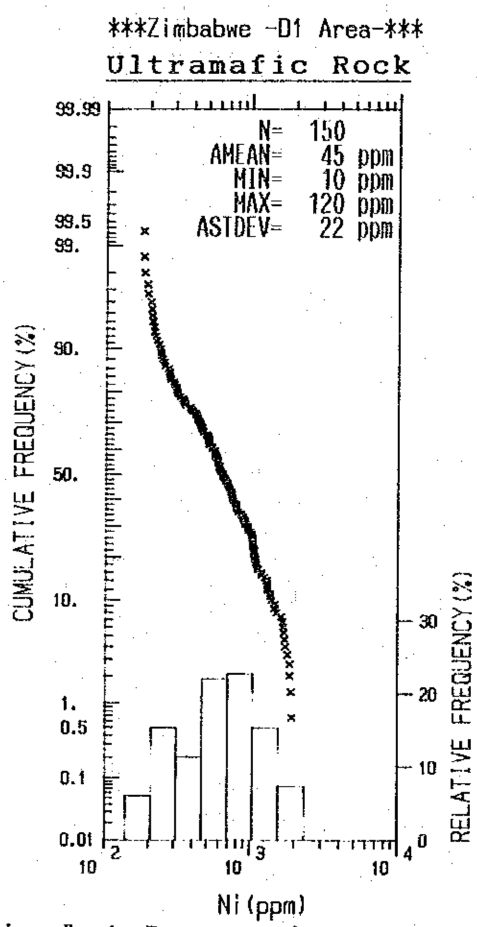
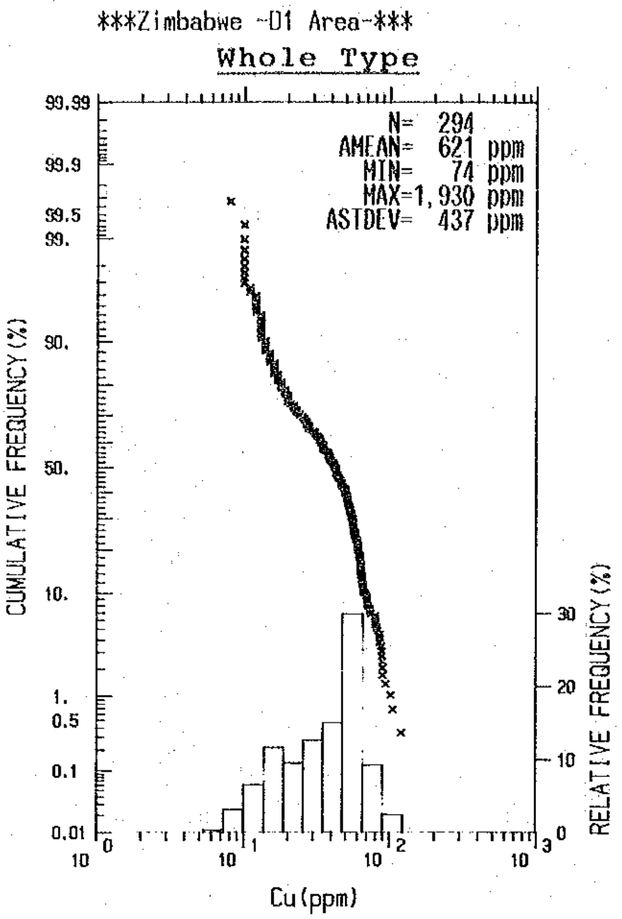
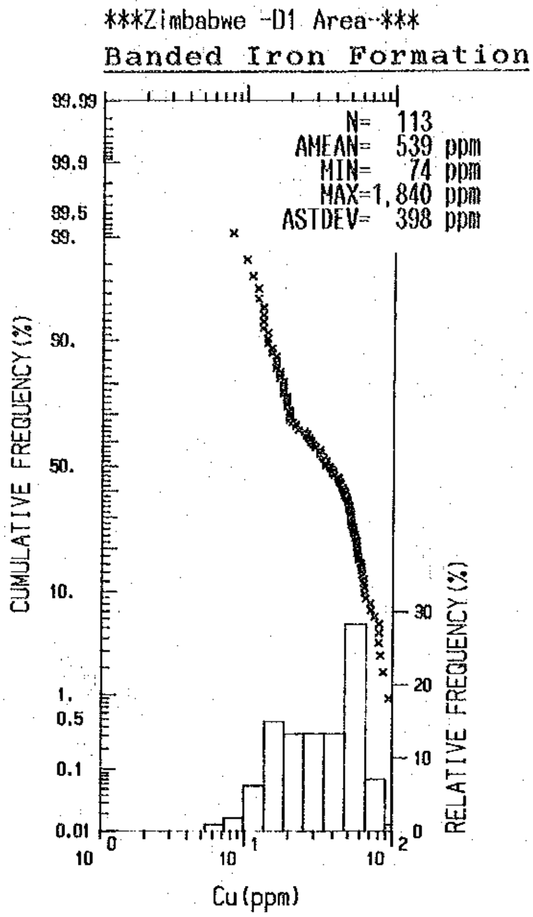


Fig.II-4-5 Histogram and Cumulative Frequency Distribution Diagram of Ni for Rock Type, Area D1





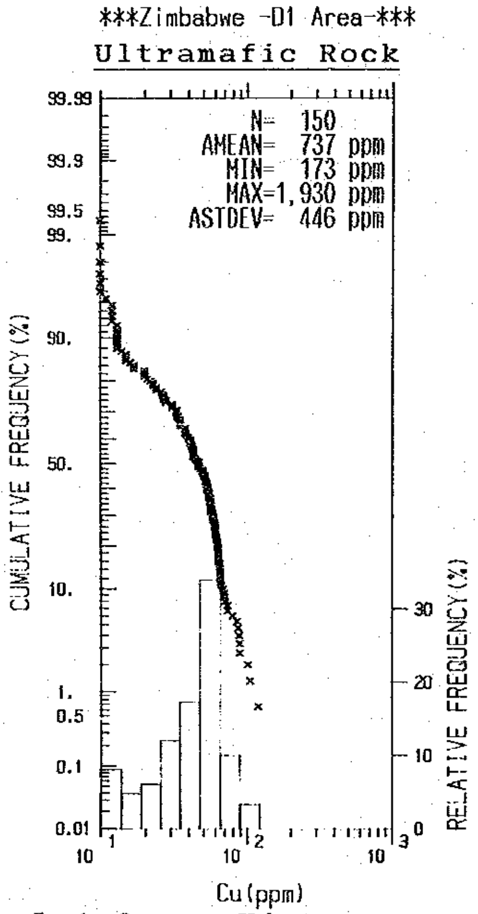
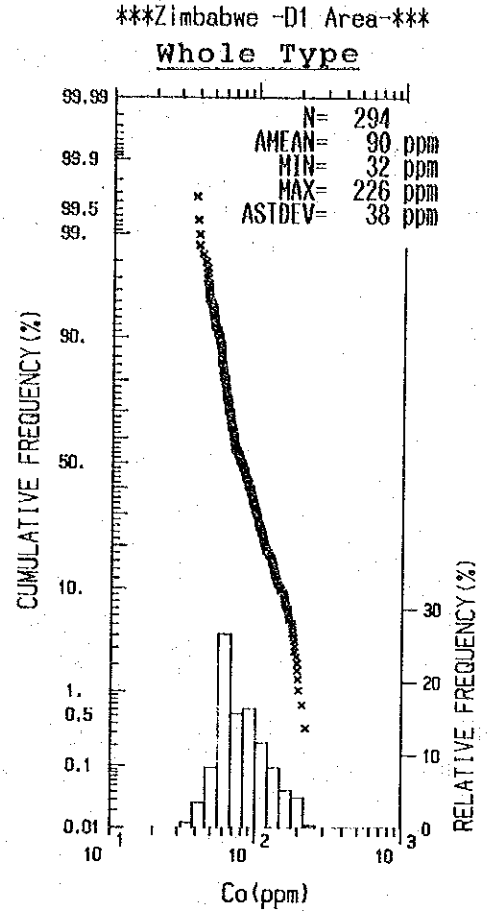
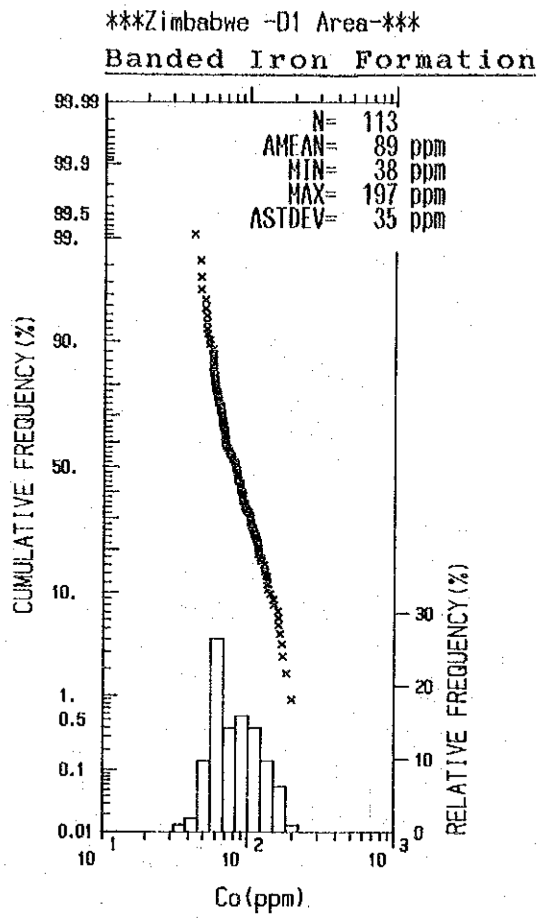


Fig.Ⅱ-4-6 Histogram and Cumulative Frequency Distribution Diagram of Cu for Rock Type, Area D1





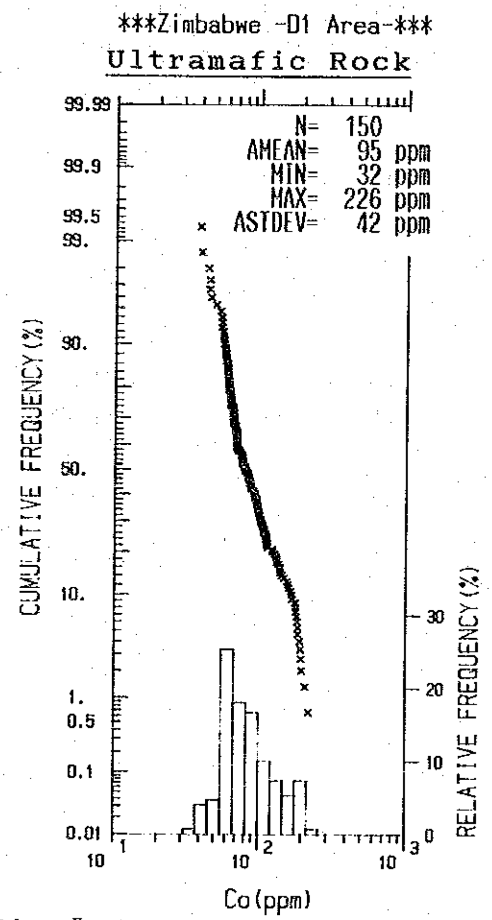
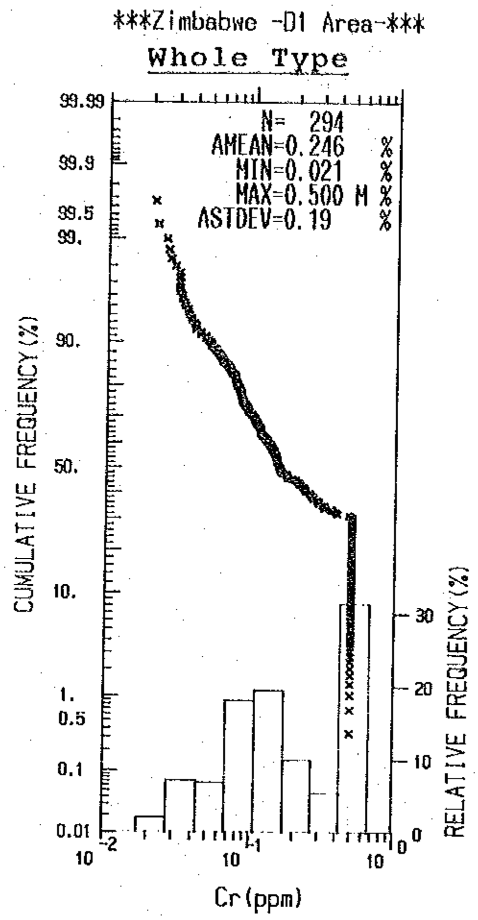
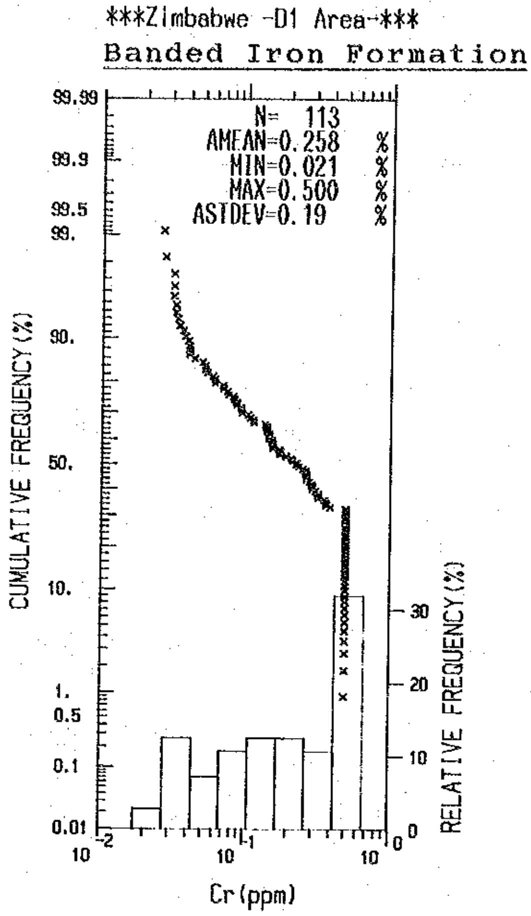


Fig. II-4-7 Histogram and Cumulative Frequency Distribution Diagram of Co for Rock Type, Area D1





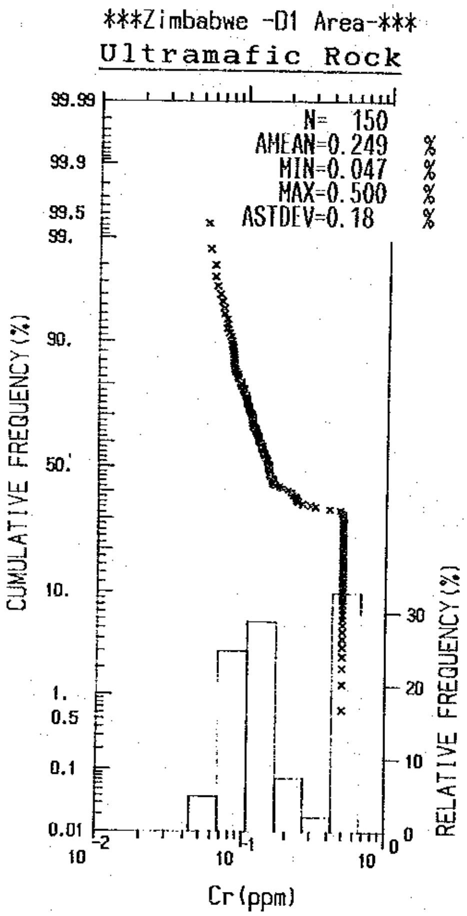


Fig. II-4-8 Histogram and Cumulative Frequency Distribution Diagram of Cr for Rock Type, Area D1

CHAPTER 5 D2 AREA

5-1. Geology

Topography

Approximately the same as D1 area.

Geology

Fig.II-5-1 and PL.II-4-1 show the geologic map of the area. North-south trending BIF and Kwekwe Ultramafic Complex are distributed from west to east in this sequence. The BIF often forms gentle hills with a very thin soil profile. The gradual change in strike from N20° W to 70° W and dips from 10° S to 65° S may suggest folding in the vicinity of the abandoned Rosstack gold mine.

Mineralisation

BIF terrain in the west of the area includes the Rosstack gold mine and multiple trenches 20-30 metres long,which run parallel to each other at 25-30 metres intervals. A group of trenches which may be accountable to historical exploration for Au in secondary quartz in the BIF. Their trends are roughly equal and vary from N45° E to N60° E. Vein quartz is white homogeneous and rarely shows any specific structures such as banding.

5-2. Geochemical Survey

PL.II-5-1 II-5-3 illustrate geochemical anomalies for each element. Table II-5-1 shows the fundamental statistics for each element for each rock type. Table II-5-2 shows correlation coefficients between element and rock type and Fig.II-5-2 II-5-4 illustrate histograms and cumulative frequency distribution diagrams of element for rock types.

Au

Since some high gold values are concentrated around the tailings dump of the abandoned Rosstack mine, Au contamination in the form of particulates is suspected. But the anomaly zone appears to follow the primary trend, which is parallel to the strike of the BIF across the dump disposal. Migration of the anomalies via surface water is less probable because the flatness of the land.

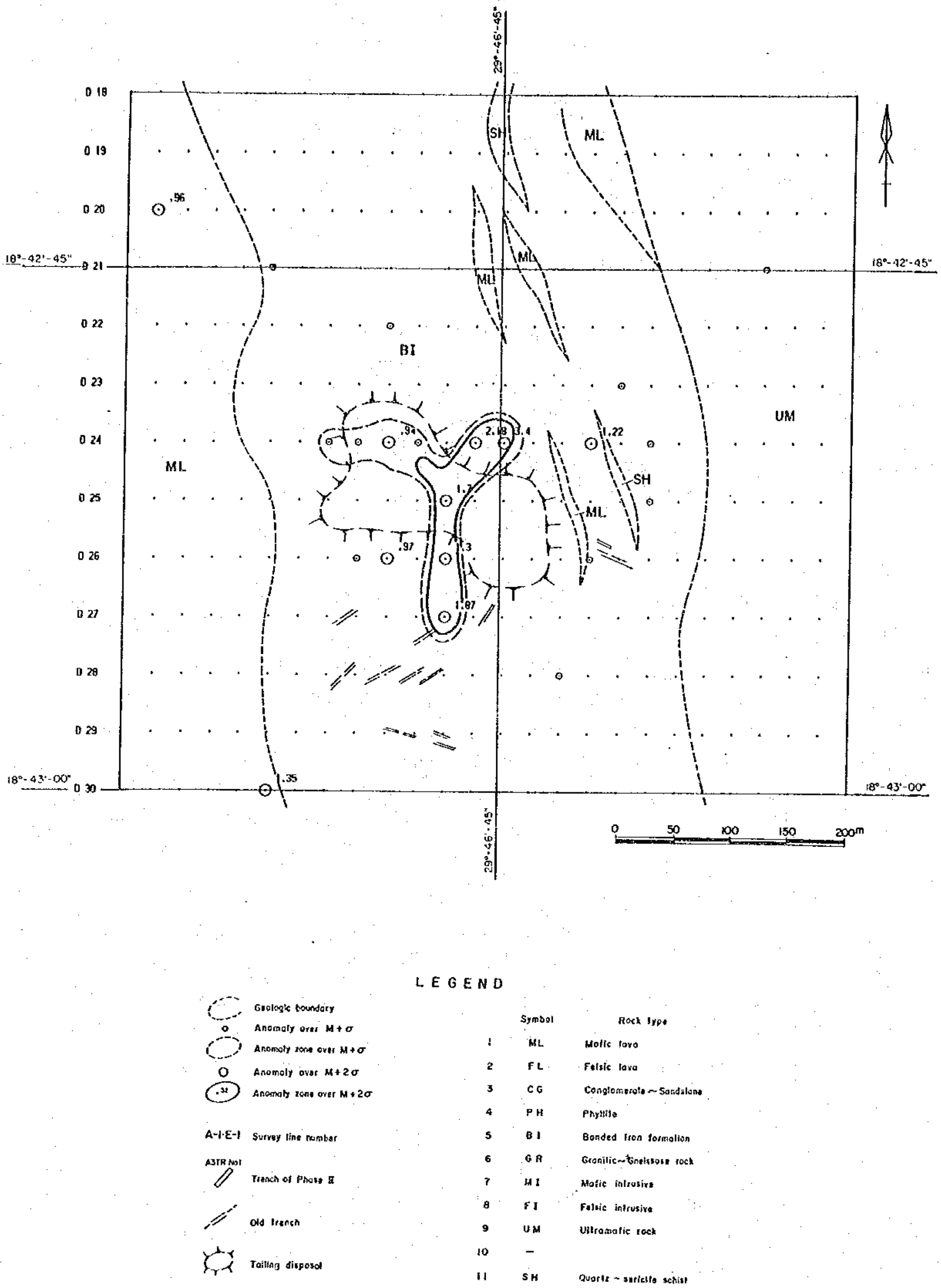


Fig.II-5-1 Geochemical Anomaly Map Au of Area D2

Ag

Statistical analysis becomes meaningless due to the extraordinarily high value of 14.8 g/t from east of the old mine. The other trial without an exceptional value, shows some A-rank anomalies alligned with the sampling line, and raises suspicion of analytical techniques.

As

There is a comparatively large anomaly zone containing 17 A-rank and 23 B-rank anomalies within the BIF terrain in the northwest. The general configuratin rarely shows the noted trend but the distribution of some of the A-rank anomalies shows a NNE trend. Threshold values for A-rank anomalies are 2.4 times as high as the mean value at most, and each anomaly is 2 to 3 times the mean value. The intensity is not this highly evaluated.

5-3. Discussion

The highest Au values of 1 to 3 g/t Au in the samples collected in the Phase II programme, are believed to be due to contamination from the old tailings dump, however, there is no way to measure the noise level of the contamination in mineral potential evaluation. If As anomalies north of the tailings dump also result from contamination, the intensity of the As-anomaly zone around the real ore deposit may be as much as 2 to 3 times the mean value at most and such an intensity may suggest some ore potential in the survey area.

Table II-5-1 Fundamental Statistics of Each Element for Each Rock Type, Area D2

Elem-ent	Rock Type	Number of Smp.	Min. ppm	Max. ppm	Arith. Mean ppm	Std.Dev. ppm	Geomet. Mean ppm	Std.Dev. log
Au	Whole	329	L 50	3,400	236	312	55	0.49
	ML FL	73	L 50	1,500	82	194	40	0.39
	BI MI FI GR	173	L 50	3,400	194	398	74	0.55
	UM	78	L 50	700	58	92	37	0.32
Ag	Whole	329	50	600	131	130	94	0.32
	ML FL	73	50	600	130	141	89	0.34
	BI MI FI GR	173	50	600	134	128	97	0.32
	UM	78	50	600	119	113	88	0.30
As	whole	329	15	179	47	30	40	0.23
	ML FL	73	24	162	46	27	40	0.21
	BI MI FI GR	173	17	179	48	34	40	0.25
	UM	78	15	142	45	22	40	0.20

Note 1. ML ; Mafic Lava FL ; Felsic Lava BI ; Banded Iron Formation
MI ; Mafic Intrusive FI ;Felsic Intrusive GR ; Granitic Rock
UM ; Ultramafic Rock
2. Grade of Au is ppb.
3. L 50 means less than detection limit (50 ppm for Au)

Table Ⅱ-5-2 Correlation Coefficient between Element Area D2

Rock Type	Au－Ag	Au－As	Ag－As
Whole	0.09 (0.20)	－0.00 (－0.15)	－0.02 (0.17)
M L	0.05 (0.06)	－0.01 (0.03)	0.01 (0.13)
F L			
B I	0.08 (0.22)	－0.16 (－0.29)	－0.04 (0.13)
M I			
F I			
G R			
U M	0.04 (0.24))	0.32 (0.39)	0.24 (0.33)

Note * ML ; Mafic Lava FL ; Felsic lava BI ; Banded Iron Formation
MI ; Mafic Intrusive FI ; Felsic Intrusive GR ; Granitic Rock
UM ; Ultramafic Rock ( ) ; Logarithmici Data

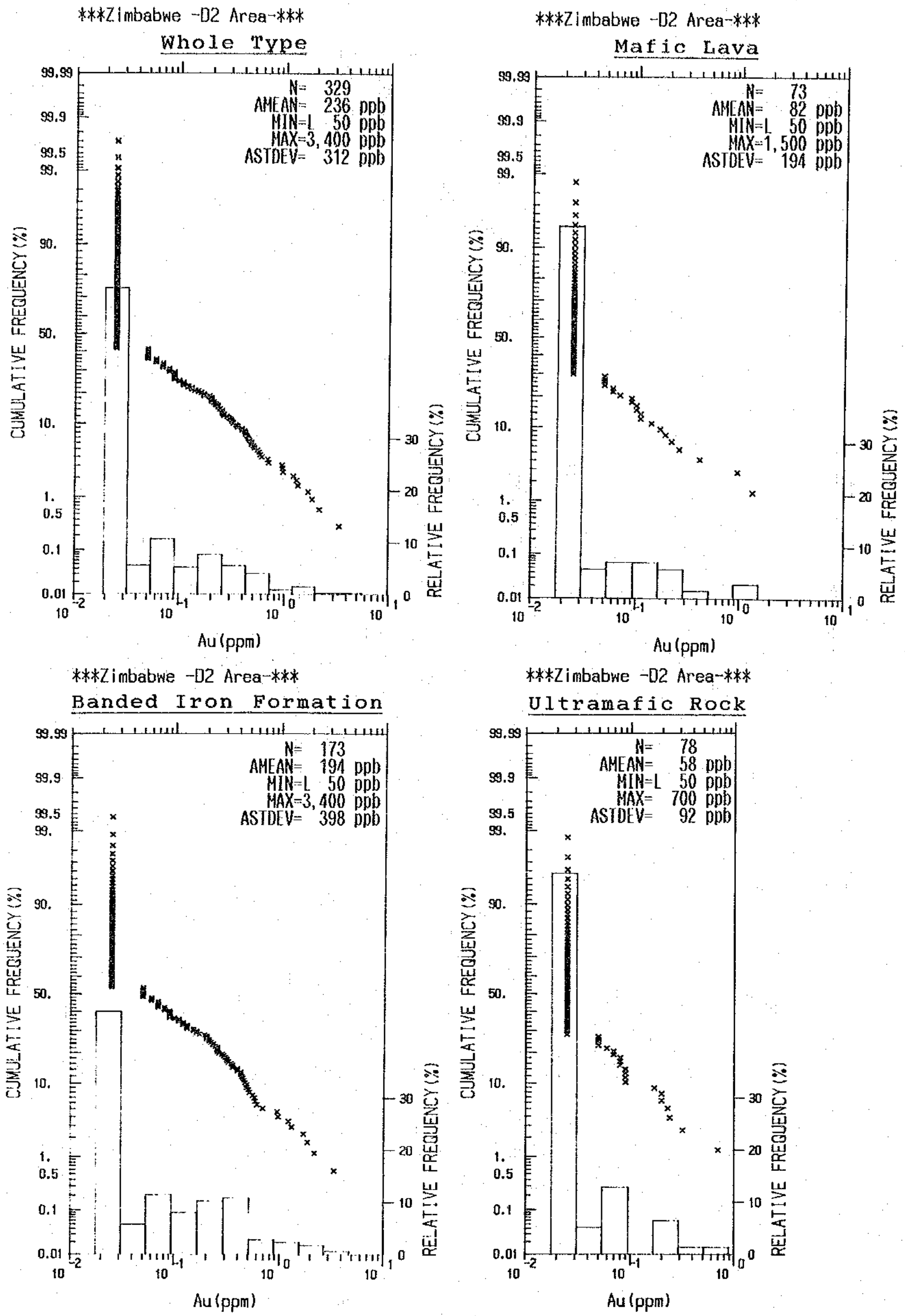
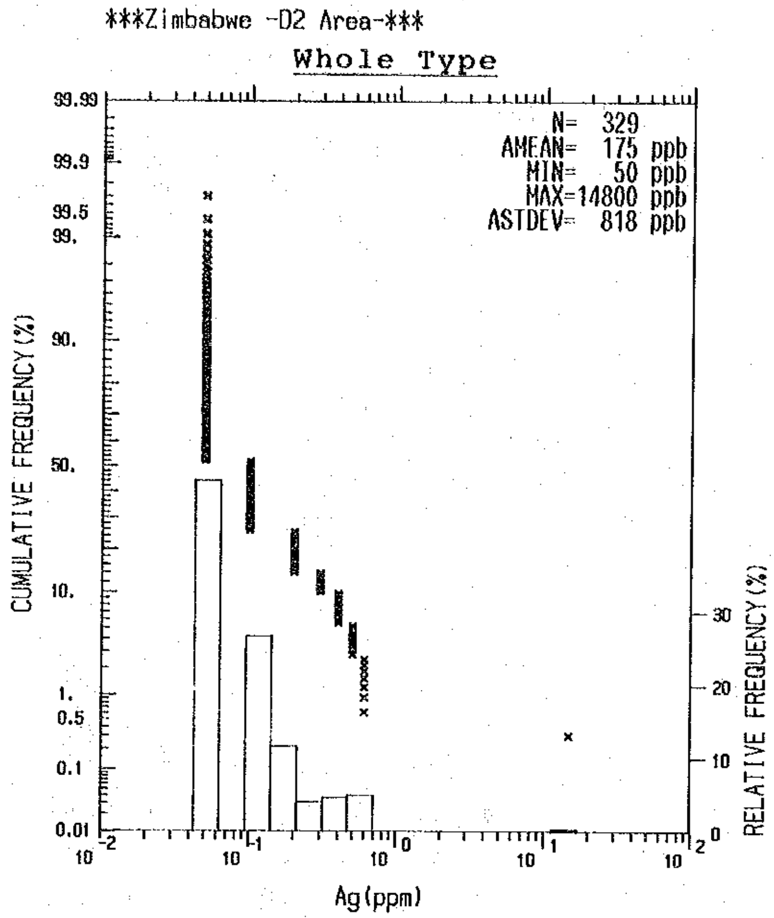
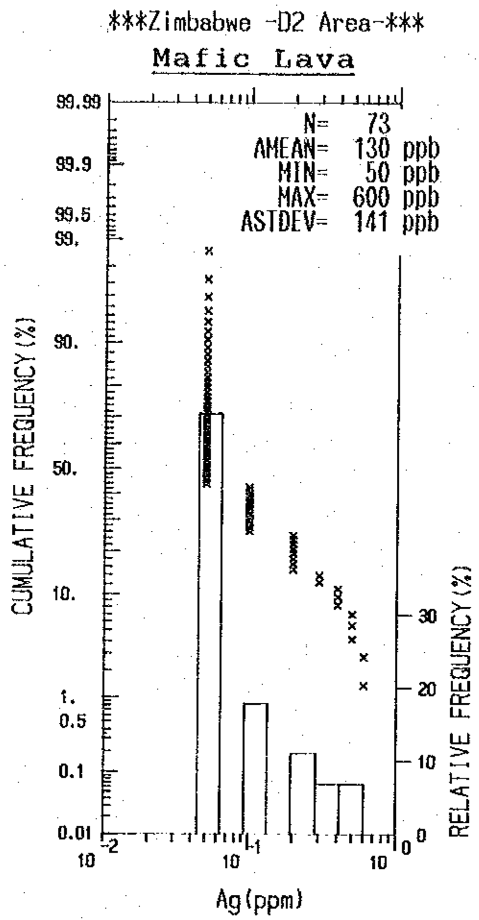
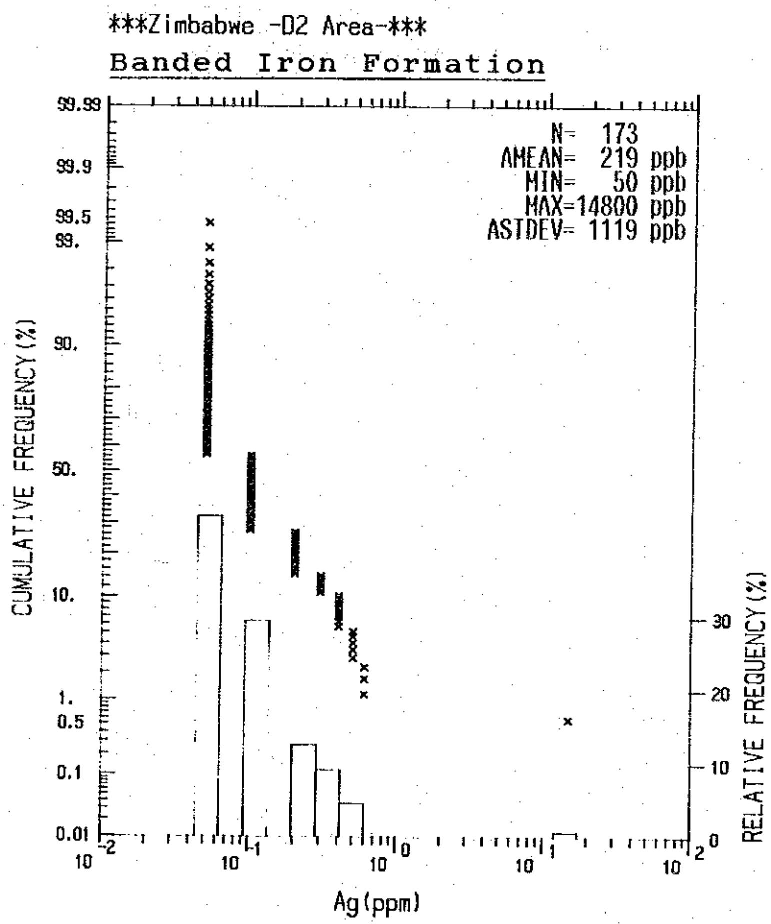


Fig.Ⅱ-5-2 Histogram and Cumulative Frequency Distribution Diagram of Au for Rock Type, Area D2







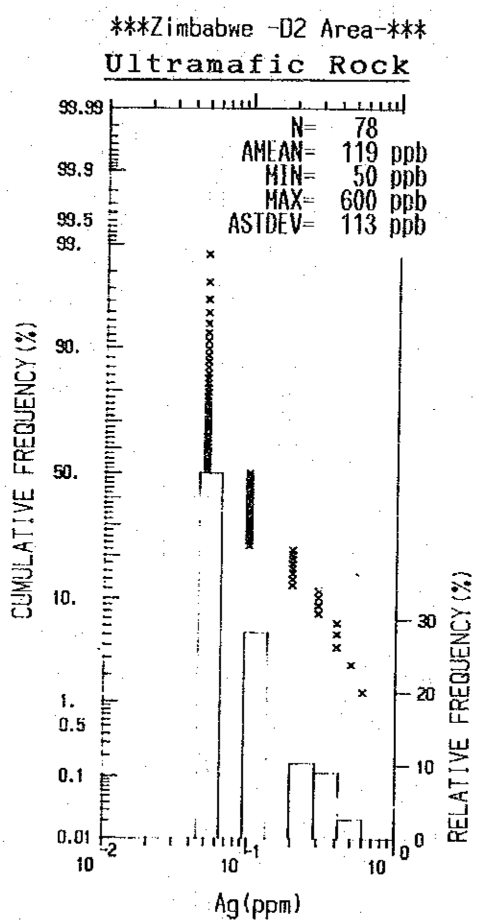
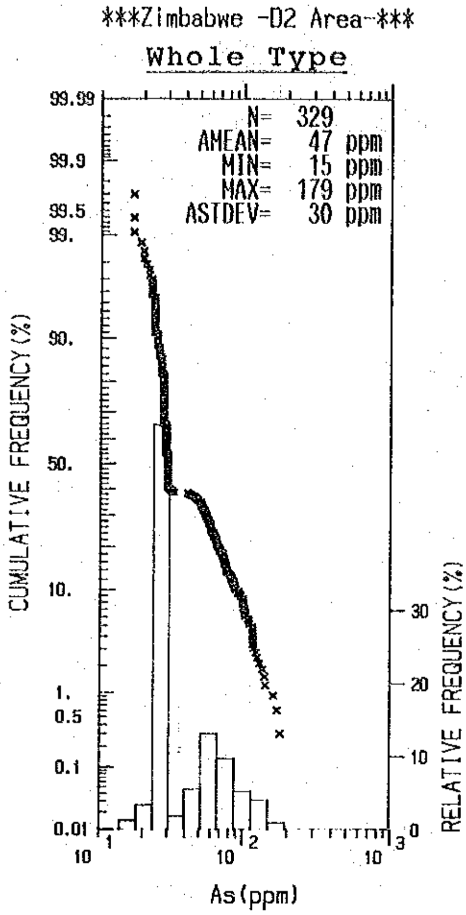
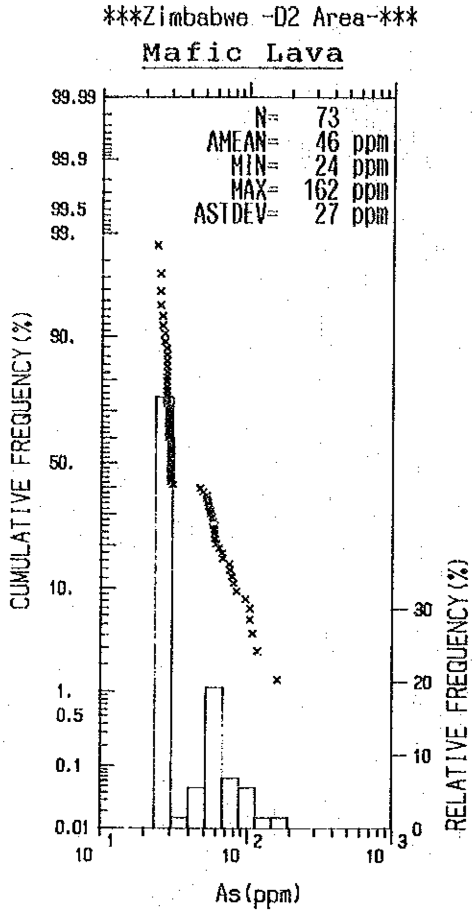
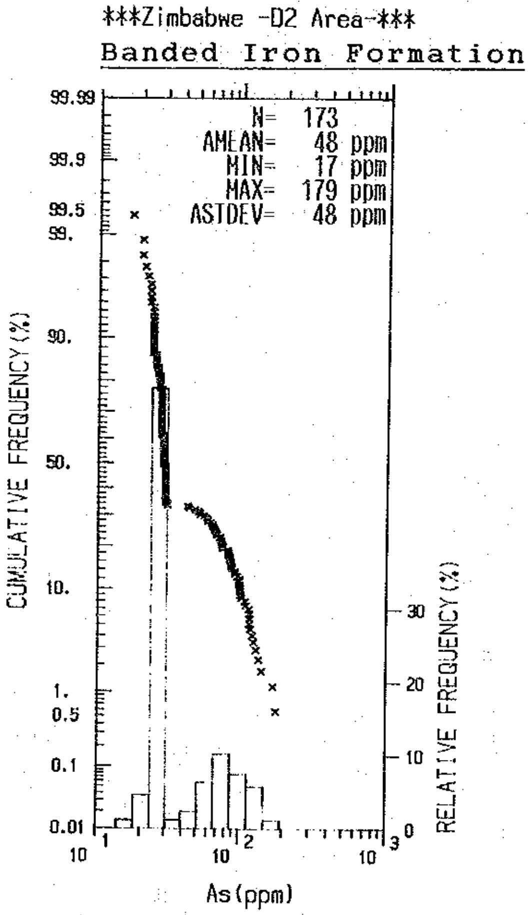


Fig.II-5-3 Histogram and Cumulative Frequency Distribution Diagram of Ag for Rock Type, Area D2







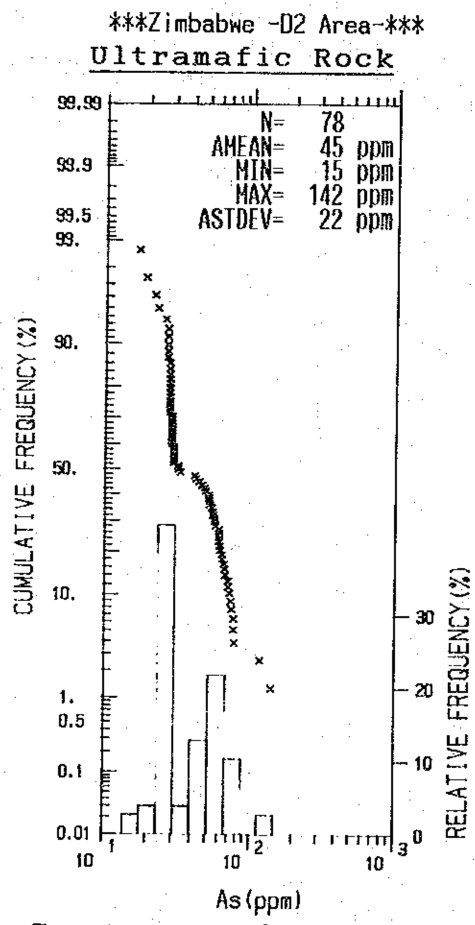


Fig.Ⅱ-5-4 Histogram and Cumulative Frequency Distribution Diagram of As for Rock Type, Area D2

CHAPTER 6 E1 AREA

6-1. Geology

<u>Topography</u>

Gentle intermittent ridges and valleys extends towards the northeast in this area. Relief is less than 10 metres.

<u>Geology</u>

Fig. II-6-1 and PL. II-6-1 is a geologic map of the area. The area is underlain by felsic lava, felsic tuff, felsic lapilli tuff and dolerite dykes. The felsic lava is dark purplish green and appears very similar to basalt, however it contains quartz and plagioclase phenocrysts 1 milimetre in diametre. Being frequently affected by silicification and carbonitization, it is quickly limonitized to yellowish brown and contains disseminated pyrite.

On the southeast flank of BIF, which forms a gentle hill, are felsic pyroclastics and reddish-brown bedded tuff. Schistose structure, approximately parallel to bedding, shows a N50° E N70° E trend with almost vertical dip. X-ray diffractometric analysis shows quartz and pyrophyllite in such altered rocks. Fractures are dominant, trending N70° E N80° E with vertical dip in some outcrops.

<u>Mineralisation</u>

The area was characterized by broad Au-anomaly zones in Phase I. Felsite lava sometimes contains disseminated pyrite and this dacite extends over a large area, but quartz veins with pyrite mineralisation, and hopefully, gold, were not mapped during the detailed geological survey. Therefore the Au-anomalies may be derived from the BIF terrain or from the secondary quartz veins derived from the BIF.
zone around the real ore deposit may be as much as 2 to 3 times the mean value at most and such an intensity may suggest some ore potential in the survey area.

6-2. Geochemical Survey

PL. II-6-2 II-6-4 illustrate geochemical anomalies for each element. Table II-6-1 shows the fundamental statistics for each element for rock type. Table II-6-2 shows correlation coefficients between element and rock type and Fig. II-6-2 II-6-4

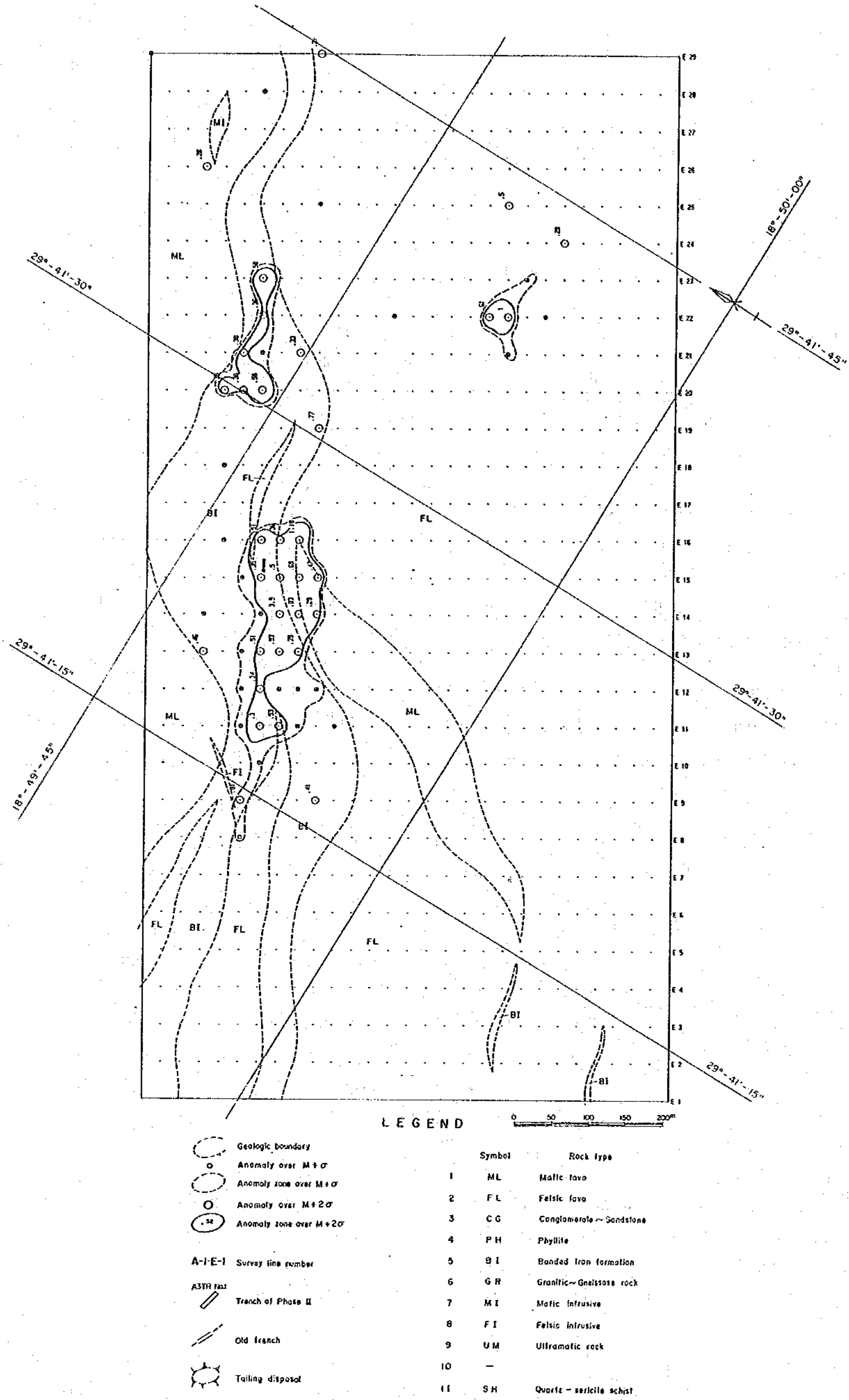


Fig.Ⅱ-6-1 Geochemical Anomaly Map Au of Area E1 illustrate histograms and cumulative frequency distribution diagrams of element for rock types.

Au

A medium-sized anomaly zone comprising 11 B-rank and 17 A-rank anomalies in the central western part of the area, is defined by a NE trend within the BIF and across the contact between the BIF and the felsic lava. Another small anomaly zone within the BIF, consisting of a B-rank and 6 A-rank anomalies, located on the northeast extension of NE trend. A small anomaly zone containing 2 B-rank and 2 A-rank anomalies, is delineated in felsic tuff which has been affected by pyrophyllitic alteration. The threshold value of A-rank anomalies is 3.5 times larger than the mean value for BIF and the anomaly zones contain values as extraordinarily high as 3.5, or 1.18 ppm, which is 25 times higher than the mean value.

Since the mean value and standard deviation for felsic tuff intercalated in felsic lava are much smaller than those for BIF, the intensity of the anomaly zone; the ratio of threshold value of A-rank anomalies to the mean value; is nearly 5 and each value reaches 13 to 22 times as the mean value.

Ag

The broadest anomaly zone consists of 10 B-rank and 10 A-rank anomalies in the north and overlaps the Au-anomaly zone. The maximum value is 1.2 ppm, which is equivalent to about 11 times the mean value. Others are small ones in the BIF, felsic lava or tuff terrain, each of which comprise 3 to 7 A-or B-rank anomalies in total. The easternmost one coincides well with the Au anomaly. Anomaly intensity is 2.7 for BIF and 3 for felsic rock. Most of the A-rank anomalies are between 0.4 and 0.5 ppm, which equals 3.5 and 4.4 times the mean value, respectively.

As

From the north to the east, some small-to medium-sized anomaly zone occur, comprising dominant B-rank anomalies, regardless of rock type. Some of the zones show a good correspondence with the Au-or Ag-anomaly zones, which is a common trend in gold mineral belts. The belt of B-rank anomaly is possibly caused by such analytical problems as difference in condition of batches.

6-3. Discussion

The area is characterized by some anomaly zones, some of which definitely overlap As- or Ag-anomalies. The high gold values and the conditions are favourable for mineral potential. The area occupies the southeast part of the Sesombi Tonalite Pluton, where felsic intrusive rocks have been emplaced and scattered small- to medium-sized abandoned gold mines are located. The geochemical anomalies,taken together with such a favourable geologic environment leads to a high estimation of the mineral potential.

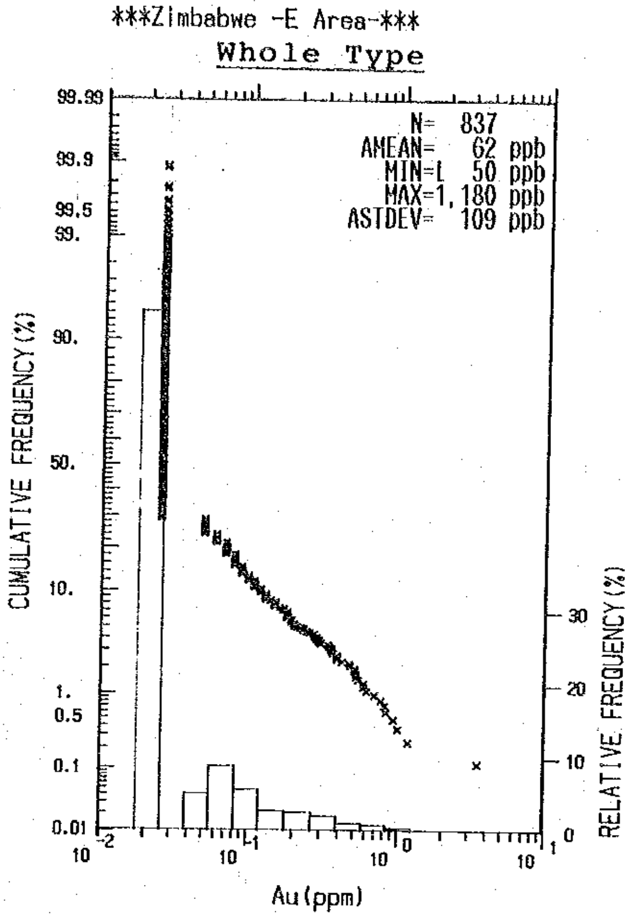
Table II-6-1 Fundamental Statistics of Each Element for Each Rock Type, Area E1

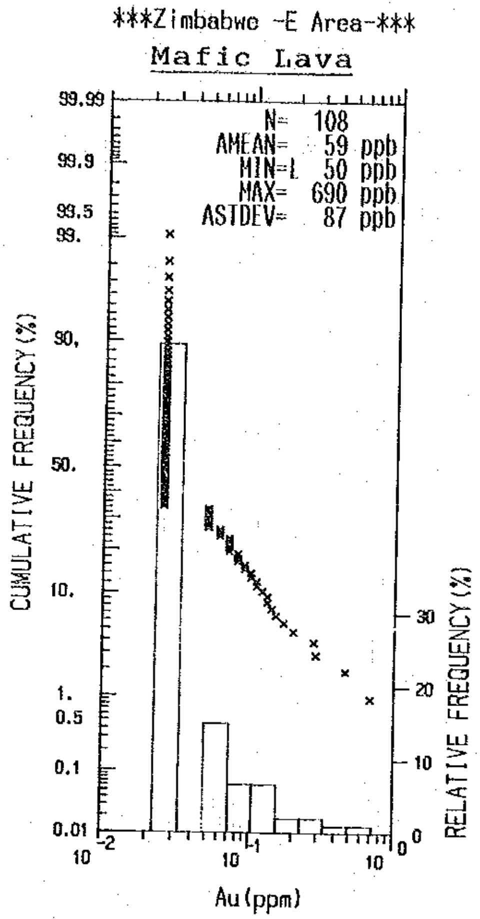
Element	Rock Type	Number of Smp.	Min. ppm	Max. ppm	Arith. Mean ppm	Std.Dev. ppm	Geomet. Mean ppm	Std.Dev. Log
Au	Whole	837	L 50	1,180	62	109	38	0.34
	ML	108	L 50	690	59	87	39	0.32
	FL	596	L 50	1,180	46	86	33	0.26
	BI	130	L 50	930	137	169	77	0.45
	MI	2						
	FI	1						
	GR							
	UM							
Ag	Whole	837	L 100	1,200	118	114	90	0.29
	ML	108	L 100	690	59	87	92	0.30
	FL	596	L 100	1,200	113	114	86	0.28
	BI	130	L 100	900	142	122	109	0.30
	MI	2						
	FI	1						
	GR							
	UM							
As	Whole	837	12	36	25	4	24	0.07
	ML	108	18	35	24	4	24	0.06
	FL	596	12	36	25	4	24	0.07
	BI	130	15	33	25	3	24	0.06
	MI	2						
	FI	1						
	GR							
	UM							

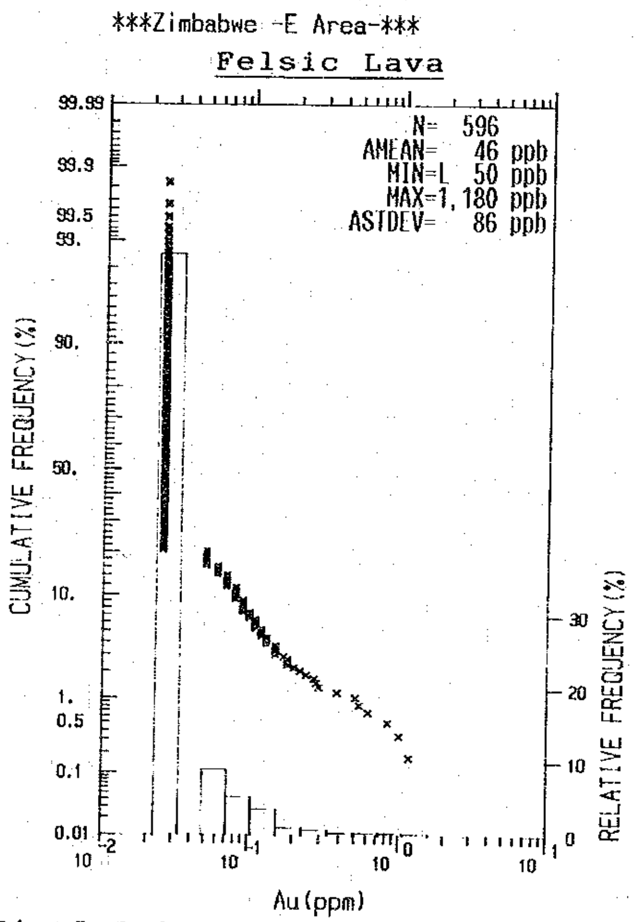
Table Ⅱ-6-2 Correlation Coefficient between Element Area E1

Rock Type	Au－Ag	Au－As	Ag－As
Whole	0.21 (0.29)	0.03 (0.05)	0.16 (0.18)
M L	－0.04 (0.02)	0.03 (0.05)	0.32 (0.30)
F L	0.16 (0.27)	0.08 (0.10)	0.14 (0.18)
B I	0.38 (0.42)	0.08 (0.13)	0.17 (0.09)
M I			
F I			
G R			
U M			

Note * M L ; Mafic Lava F L ; Felsic Lava B I ; Banded Iron Formation
M I ; Mafic Intrusive F I ; Felsic Intrusive G R ; Granitic Rock
U M ; Ultramafic Rock ( ) ; Logarithmici Data







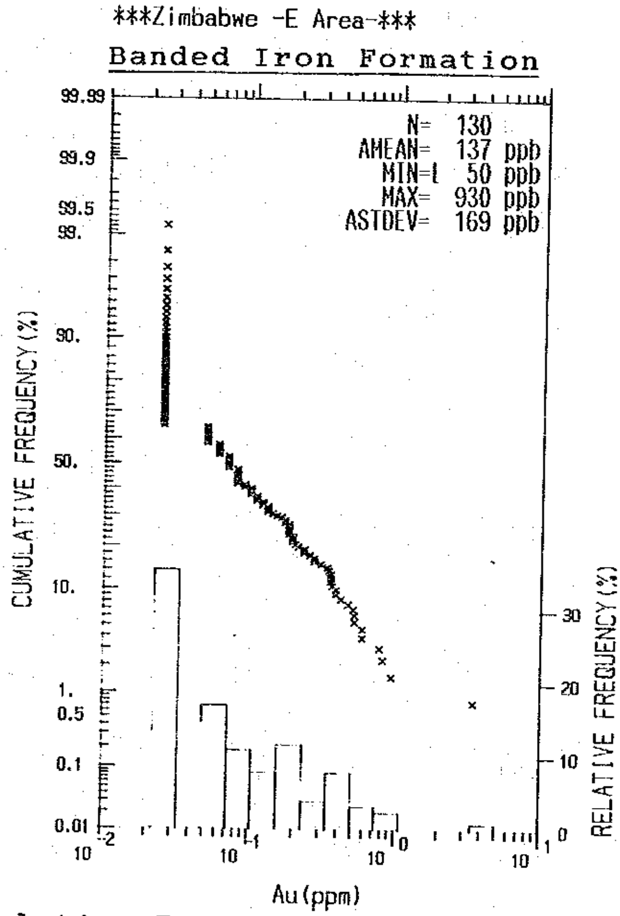


Fig.Ⅱ-6-2 Histogram and Cumulative Frequency Distribution Diagram of Au for Rock Type, Area E1

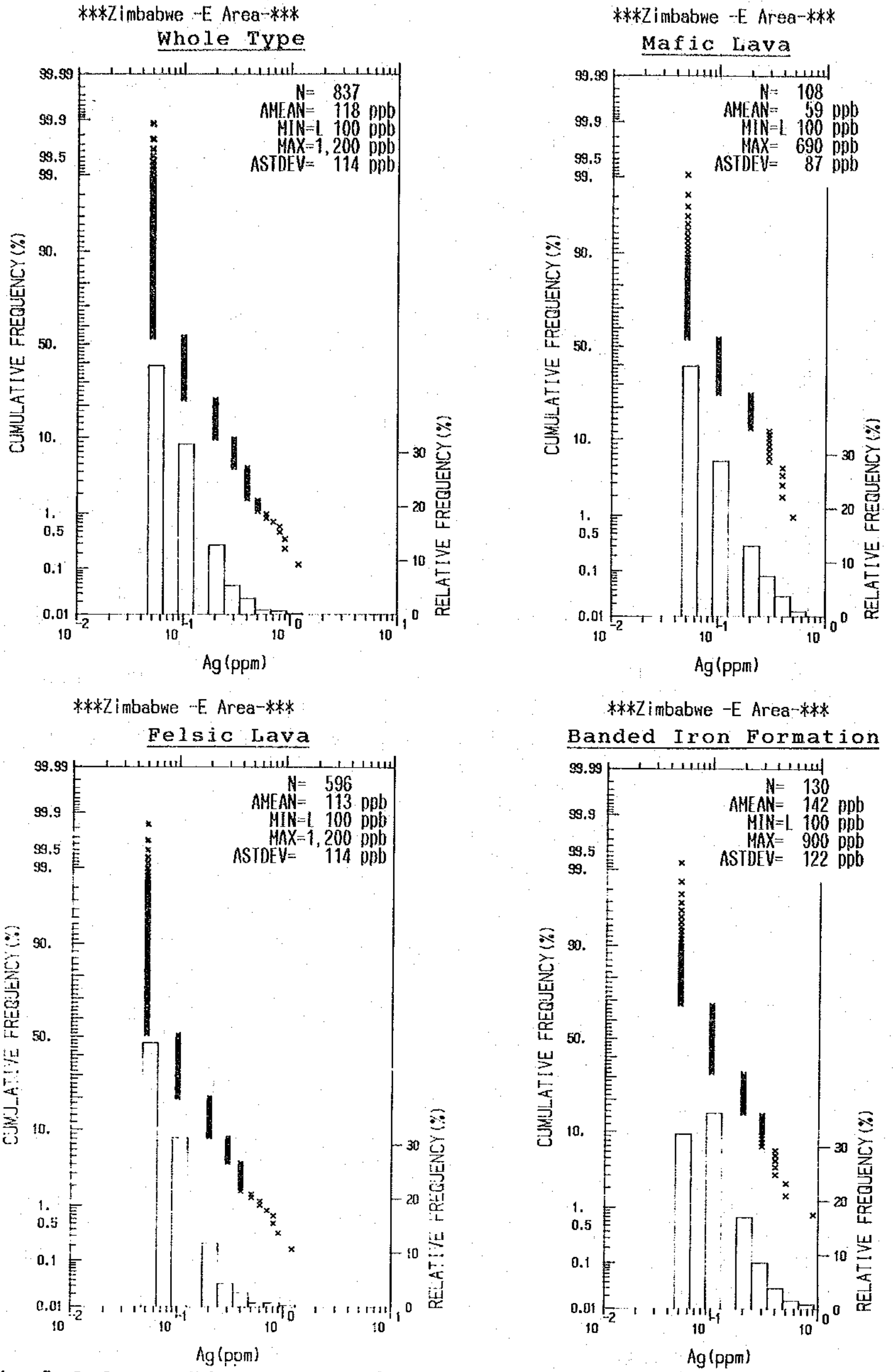
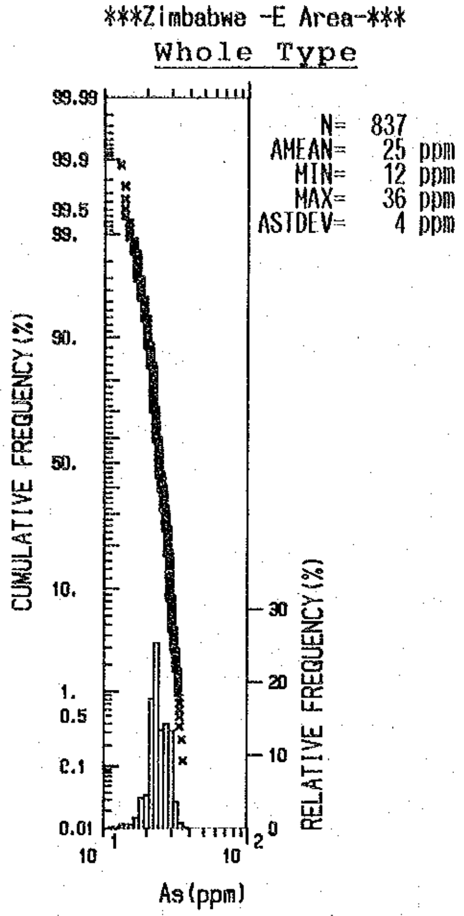
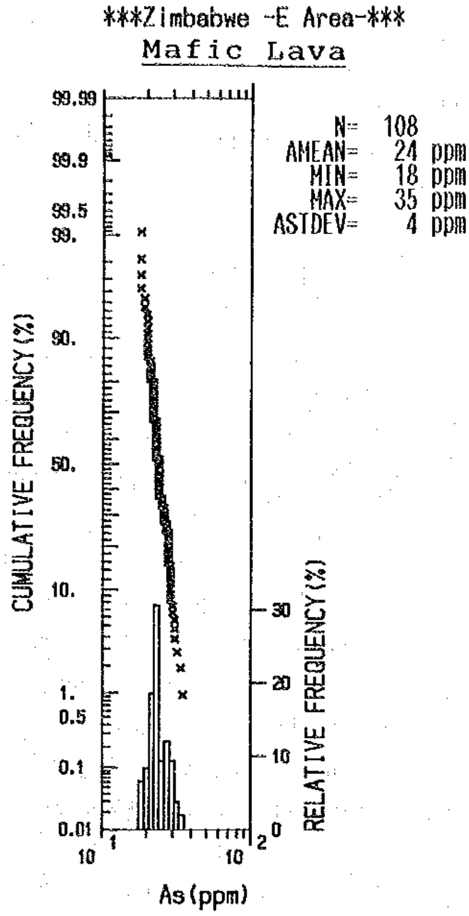
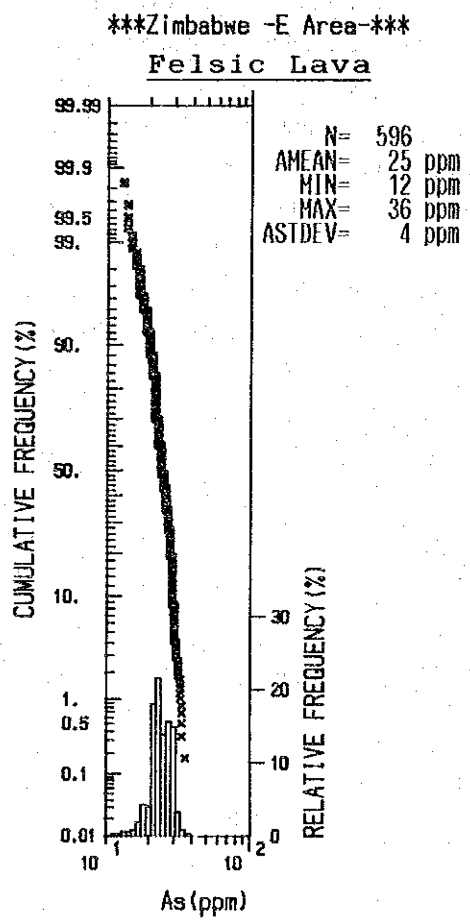


Fig.Ⅱ-6-3 Histogram and Cumulative Frequency Distribution Diagram of Ag for Rock Type, Area E1







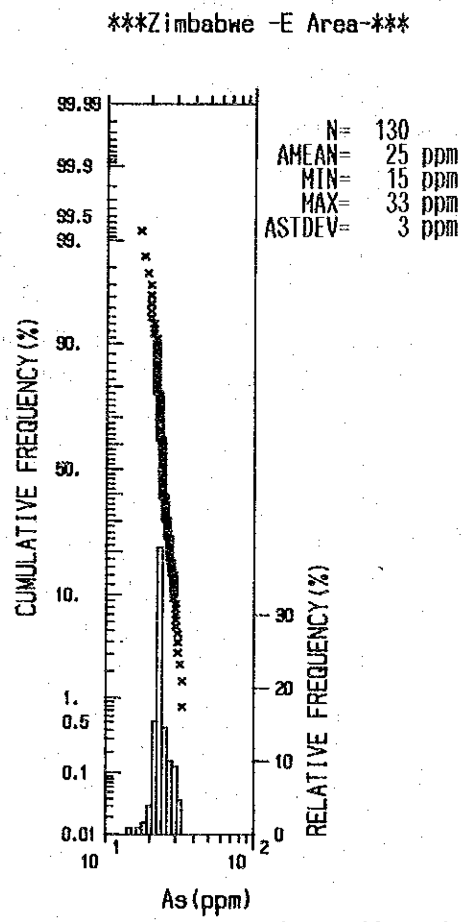


Fig. II-6-4 Histogram and Cumulative Frequency Distribution Diagram of As for Rock Type, Area E1

CHAPTER 7 COMPREHENSIVE DISCUSSION OF GEOCHEMICAL SURVEY

7-1. Geochemical anomaly and dispersion

In order to prepare for the next exploration programme, it is necessary to collect information regarding the relationship between the factors such as size, intensity and ore potential from various types of mineral districts. Generally, the mobility of elements differs in the case of soil. While some elements such as As and Sb are easily to form broad dispersion zones, Au can move from one to 100 metres from the primary ore deposit, depending upon the topography and soil development. The vertical dispersion is commonly much greater than horizontal and sometimes is more than 100 metres for Au, Ag and As. This is because the ore deposits hosted in steeply dipping fractures are very mobile passing through them easily. The horizontal dispersion in the survey area is considered to be small enough to neglect from the viewpoints of thin soil development, less rugged topography and poorly developed horizontal elements of geologic structure, such as bedding planes in the Greenstone belt, where a great number of ore deposits are embedded.

For example, the pilot soil geochemical survey conducted in the vicinity of the Venice mine by Falcon Mines, reveals that the background(B.G.)value of Ag and As are 0.1 to 0.3 ppm, and 3.2 ppm, respectively, in the case of bed rock, and 0.1 to 1 ppm and 1 to 50 ppm, respectively, in the case of soil, and also reveals that an Au anomaly of more than 1 ppm extends at most merely 30 centimetres from the ore vein.

It is reported that the As-anomaly encompasses the geochemical halo up to 70 centimetres from the deposit in the case of Dalny mine. The two examples indicate that the Ag dispersion within rocks and soil may be small and As could be concentrated as much as 20 to 25 times the B.G.value in soil.

7-2. Relation between B.G.value and anomaly

Table II-7-1 and -2 represent the intensity of geochemical anomalies as $M+2\sigma/M$ for area and rock type. It is believed that the intensity of anomalies should be expressed by $M+2\sigma$ divided by B.G.value, however, if the area to be geochemically surveyed is large enough compared to the extent of anomaly zone(halo), and if the number of samples is greater enough, the mean value may approximate the B.G.value. Although comparison is not easily allowed, because of the differences in the detection limits between the Phase I and Phase II geochemical analyses, there seems to be no important difference between the mean value of Phase II and the B.G.value estimated from Phase I histograms for indicator element and rock type.

The orientation study of the geochemical exploration in the Gweru,Kwekwe and Kadoma areas, conducted by Dr. Viewing of the Institute of Mining, University of Zimbabwe, indicates that -20 mesh sized soil samples give 20 ppb, 50 ppb and more than 100 ppb for B.G.value, threshold value and anomaly, respectively, in the vicinity of the Verdun mine, which produces ore containing 4.1 g/t Au. The study also reports 40 ppb, 50 to 60 ppb and 100 ppb for the above-mentioned specific values, respectively, in the case of Cactus mine south of Kwekwe, whose deposit is hosted within the BIF. Both the cases suggest that the gold anomaly value is 100 ppb Au and lead anomaly/B.G.value to 2.5-5.0.

The case examples suggest that the geochemical anomalies derived through Phase II analysis are comparable to, or higher than those delineated in the vicinity of the Phase II survey areas. Fig.II-7-1 illustrates schematically the relation between B.G. value, mean value, threshold and anomaly. The mean value of Phase II is theoretically compared to the local threshold and the mean value of Phase I to regional threshold, which is reffered to in H.F.Hawkes et al.(1965)

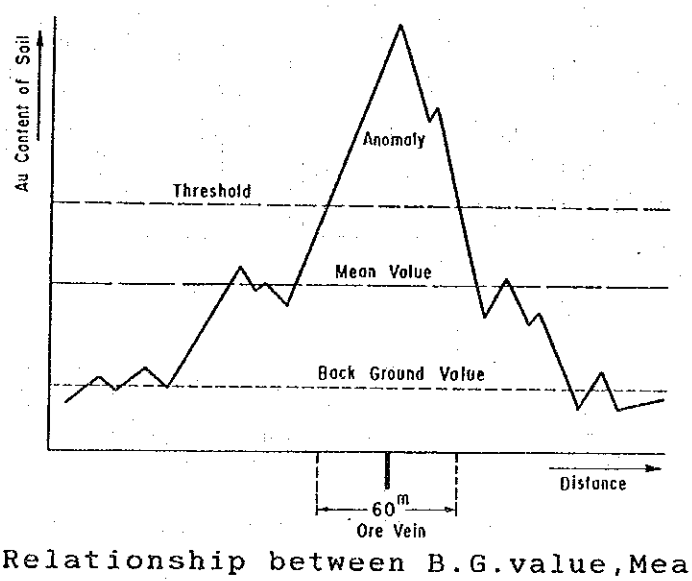


Fig.II-7-1 Relationship between B.G.value,Mean and Threshold

Table Ⅱ-7-1 Intensity of Geochemical Anomaly (1)

Area	Element	Rock Type	(M+σ)/M	(M+2σ)/M
A3	Au	Whole	3.16	5.33
		ML	3.24	5.49
	Ag	Whole	1.69	2.39
		ML	1.72	2.45
	As	Whole	1.44	1.88
		ML	1.42	1.83
C2	Au	Whole	2.67	4.35
		ML MI	2.45 2.64	3.89 4.28
	Ag	Whole	1.81	2.62
		ML MI	1.63 1.87	2.26 2.74
	As	Whole	1.31	1.62
		ML MI	1.31 1.31	1.62 1.62
D1	Au	Whole	2.33	3.67
		BI UM	2.25 2.24	3.50 3.48

Area	Element	Rock Type	(M+σ)/M	(M+2σ)/M
D1	Ag	Whole	2.38	3.76
		BI UM	2.14 2.55	3.28 4.10
	Pt	Whole	1.27	1.55
		BI UM	1.24 1.27	1.48 1.55
	Cu	Whole	1.54	2.07
		BI UM	1.54 1.50	2.09 2.00
	Ni	Whole	1.70	2.41
		BI UM	1.74 1.61	2.48 2.21
	Co	Whole	1.43	1.85
		BI UM	1.39 1.45	1.78 1.89
	Cr	Whole	1.77	2.54
		BI UM	1.74 1.72	2.47 2.45

Table Ⅱ-7-2 Intensity of Geochemical Anomaly (2)

Area	Element	Rock Type	(M+σ)/M	(M+2σ)/M	Area	Element	Rock Type	(M+σ)/M	(M+2σ)/M
D2	Au	Whole	2.32	3.64	E1	Au	Whole	2.76	4.52
		ML	3.37	5.73			ML	2.47	3.95
		BI	3.05	5.10			FL	2.87	4.74
		UM	2.59	4.17			BI	2.23	3.47
	Ag	Whole	5.67	10.35		Ag	Whole	1.97	2.93
		ML	2.08	3.17			ML	2.47	3.95
		BI	6.11	11.22			FL	2.01	3.02
		UM	1.95	2.90			BI	1.86	2.72
	As	Whole	1.64	2.28		As	Whole	1.16	1.32
		ML	1.59	2.17			ML	1.17	1.33
		BI	1.71	2.42			FL	1.16	1.32
		UM	1.49	2.20			BI	1.12	1.24

Note: M ; Mean Value σ ; Standard Deviation
ML ; Mafic Lava FL ; Felsic Lava BI ; Banded Iron Formation
MI ; Mafic Intrusive FI ; Felsic Intrusive GR ; Granitic Rock
UM ; Ultramafic Rock

CHAPTER 8 LABORATORY TESTS AND ANALYSES

Samples for the various analyses and microscopic tests were taken in the course of detailed geochemical soil sampling.

8-1. Microscopy of Thin Sections

Identified constituent minerals and photomicrographs are presented in Appendix 2. Since microscopic features of the rocks are mentioned in the geological explanation of each area, metamorphism based upon metamorphic mineral association is discussed here.

In most cases amphibole, biotite, chlorite, epidote, muscovite and calcite have been recrystallized. On the other hand, pelitic rocks thinly embedded within the basic rocks may contain cordierite, andalusite, muscovite, biotite and amphibole as recrystallized minerals. The metamorphic minerals of basic origin may suggest green-schist facies and in those of pelitic origin,the lower temperature end of the amphibolite facies. Regional metamorphism accounts for the green-schist facies which may then have been subjected to thermal metamorphism to the amphibolite facies, owing to granitic intrusions. ACF diagrams showing the relationships of metamorphic facies are illustrated in Fig. II-8-1.

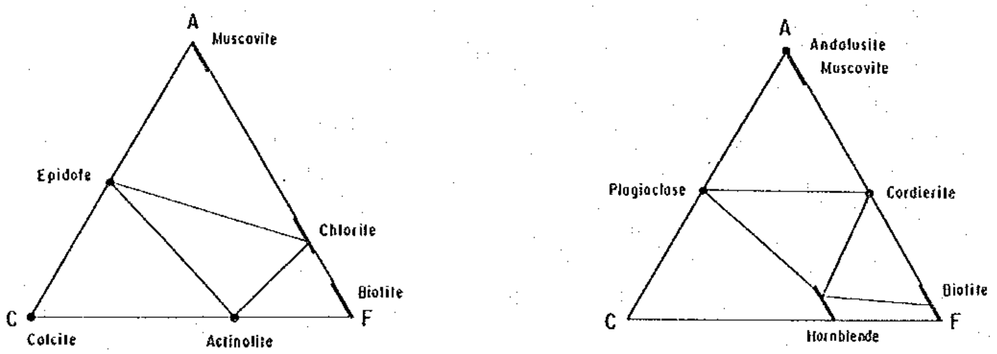


Fig. II-8-1 ACF Diagram showing mineral assemblage of green -schist facies and amphibolite facies

8-2. Ore Microscopy

Appendices 3 and 7 show identified ore minerals and photomicrographs, respectively. The polished samples essentially consist of ore veins from levels deeper than L10 of the Globe and Phoenix mine. Some ores from old workings and rocks containing visible ore minerals were also polished. The champion vein has the same mineral assemblage of pyrite, chalcopyrite, galena, sphalerite, tetrahedrite and arsenopyrite as those of levels shallower than L10. Pyrite sometimes may include grains of electrum.

Boulangerite ($Pb_5Sb_4S_{11}$) and Bournonite ($PbCuSbS_3$) identified at L12 of the Apple vein clearly suggest the concentration of Sb during precipitation. Reef quartz, collected from the old workings of Umniati mine in the extreme east part of Area C, contains small visible grains of pyrite, galena and sphalerite. Electrum grains occasionally occur within the oxidized pyrite and account for the 35g/t Au of the sample.

8-3. X-ray diffractometry

Altered and metamorphosed rocks from the trenches of A3 area and from the significant reef quartz contact below L10 of Globe and Phoenix were analyzed by X-ray diffractometry. The equipment is the Type D8C diffractometer manufactured by Rigaku Denki. The conditions of the analysis were as follows.

Voltage : 30kV
Current :15mA
Full scale: 2000 cps
Scanning speed : 2°/min.
Scanning range : =2°~40°
Chart speed : 2cm/min.

Identified minerals are shown in Appendix 4. Sericite and calcite have been formed in quartz porphry and the quartz sericite schist originating from a felsic tuff in Area A3. Montmorillonite is identified at the contact of reef quartz.

Kwekwe Ultramafic Complex of Area D1,D2 contains a high amount of serpentine (antigorite) and chlorite.

Felsic tuff from Area E1, showing good schistosity, has been altered to form pyrophyllite and kaolin. At the levels deeper than L10 of Globe and Phoenix gold mine, a remarkable amount of dolomite and magnesite have formed at the reef quartz

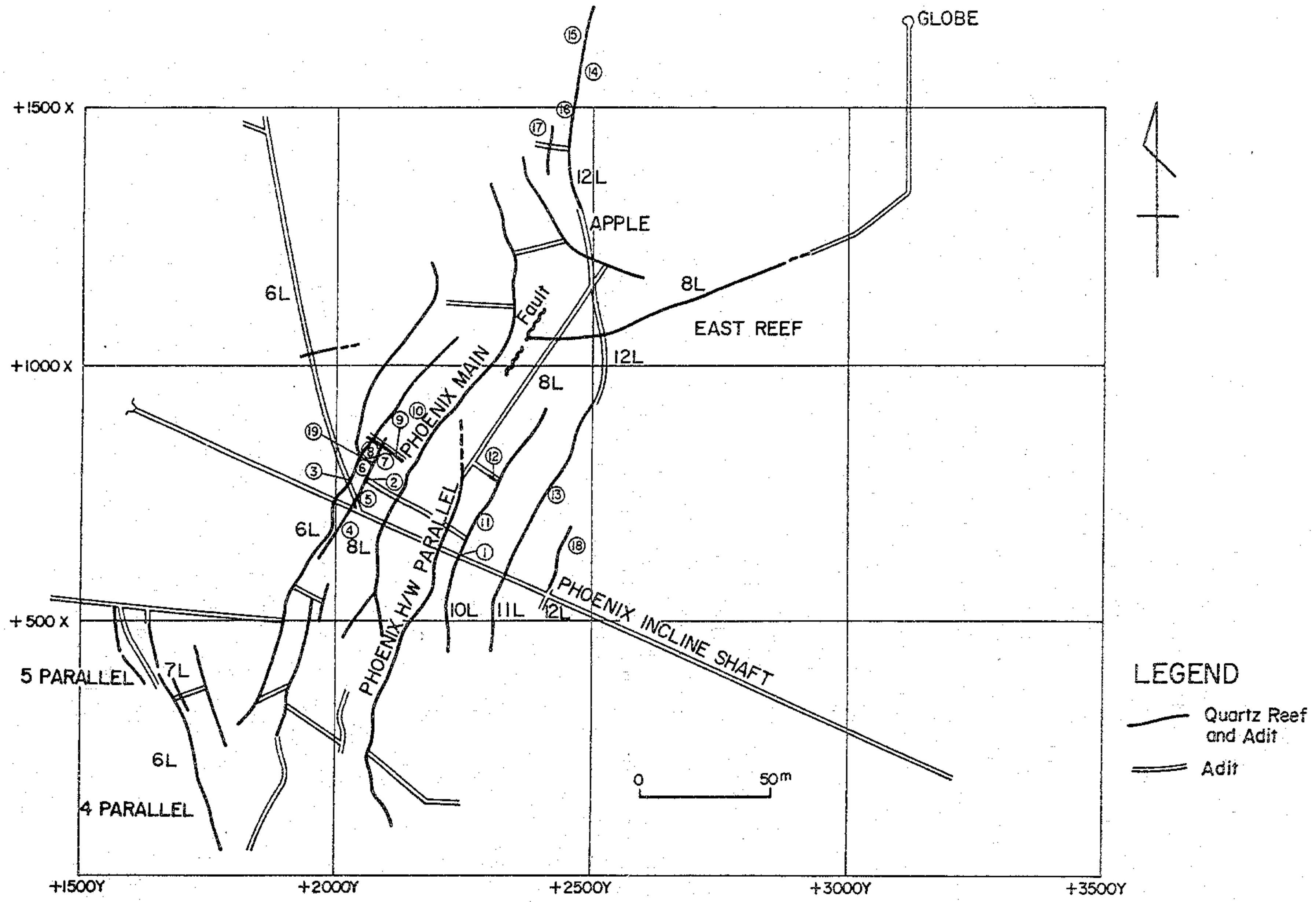


Fig. II-8-2 Vein Map of the Globe and Phoenix Mine with Ore Sample Location contact as well as the levels higher than L9 where the host rock was tested in 1986. In the vicinity of the reef quartz, the host rock shows characteristic fresh green color which may be due to extremely small amounts of metalic elements.

8-4. Au Ag Assay of ore and rock

The assay is shown in the table of Appendix 5. The samples of quartz and host rock collected from surface trenches and old workings were analyzed at Iijima Centre of Analysis Company Ltd. The method used was fire assay combined with atomic absorption spectrometry. The gold concentration is the same level as the soil ranging from not detectable to 1000ppb, except for a sample from Umniati mine. Compared to the host rock, Area E1 and a part of the BIF of Area A3 show higher concentraions. A 12-centimetre thick quartz reef hosted within the quartz porphyry of No.4 trench was assayed at 100-2000 ppb Au.

Ag/Au ratios varying between the samples are indicative of the poor relationship between the host rock and geology, however, it is comparatively evident that the Ag/Au ratio is small in the case of high concentrations of gold.

The quartz ore sample containing a small amount of sulphide from Umniati old working yields 35.93g/t Au. Although Phase I geochemical Au anomalies in the vicinity of the old workings include 30 to 200 ppb of gold, anomaly zones are small and sporadic and are not included in the area for the 1987 detailed geochemical sampling programme.

PART III CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1 CONCLUSION

The Phase II survey started with the definition of target areas of 2.36 ㎢ out of 125 ㎢ for detailed geochemical and geological surveying based upon the results of the Phase I survey. Discussion and interpretation resulted in the selection of some geochemical anomalies with high ore-bearing potential which show a good correspondence between the geological environment from the geological survey and trenching in the areas. Some of the areas reveal high potentials for mineral deposits.

Table III-1 gives a summary of the Phase II geochemical survey.

In Area A3, mineral potential of the Au-anomaly zone is highly estimated to be of first priority, with anomalies 5 to 20 times as intense as the mean value, the zone extends over a small area 50 metres by 200 metres.

Old trenches and anomaly zonation lying on the structural extension from Rise Up mine to the southeast, may support this evaluation.

Area E1 is characterized by some Au-anomaly zones overlapping the As-anomaly and pyrophyllitic alteration zones, and by Au values 4 to 20 times the mean, including one of 1 g/t Au. Other anomaly zones enclosed in the BIF also contain Au values as high as 3 g/t Au. The survey thus reveals a high mineral potential worthy of further exploration.

In Area C2, intensive zonation of the Au-anomaly, Au values 3 to 12 times as high as the mean value and mineralized quartz veins with some sulphide, give the area a good mineral potential. But the area is ranked lower than Area A3 and E1 because of poor information on fractures and mineralisation. Trenching and Au assay of quartz veins are necessary for further work.

All Au anomalies of Area D1 are located within the BIF and are superjacent. The intensity is 2 to 4 times the mean value, which gives the area a lower Au potential than other areas. Metal contents of Ni, Pt and Cr and indicative ratios of Cu/Ni and Ni/Cr suggest a very low potential for platinoid or Ni mineralisation.

In Area D2 it is difficult to properly evaluate the mineral potential because high Au anomalies are apparently derived from contamination from the tailings dump. But the dump and NS anomaly zonation, which may not be explained by contamination still seem to have potential.

Table Ⅲ-1 Appraisal of Geochemical Anomalies of the Phase Ⅲ Survey

Area	Au Anomaly							Other Anomalies than Au
	Number of Anomaly Zone	Number of over $M+\sigma$	Number of over $M+2\sigma$	$\frac{M+2\sigma}{M}$	Host Rock	structural Control	Correlation with Anomalies of other Indicators	
A3	1	1	6	5.5	Basalt Felsic Dike Granitic Intrusi-ve	NE fractures and Felsic dike Aurifeous quartz veins max. 1.7 g/t Au	Unconformable with Ag, As	Ag, As $\leqq$ B.G.x 2.5 small zone of 4 samples of $\leqq M+2\sigma$ Ag, As anomalies No coinciden-ce with Au anomalies
C2	2	9	9	4.3	Mafic Intrusive (Dolerite)	Inffered NE quartz system	Unconformable with Ag, As	Cu mineralisation in quartz vein
D1	2	12	9	3.5	Banded Iron Form-ation (BIF)	NNE to NS trend conformable to BIF strike	Unconformable to any other indicators	Ni Co Cr anomalies located at convex contact of Kwekwe Complex, Intensity is small
D2	1	3	6	5.0	BIF	NS ? Contamination by dump dispo-sal	As anomalies lie some hundred metres north	Intensity of As anomalies 2~2.5 times of the mean
E1	3	14	25	3.5 5.0	BIF Felsic tuff	elongated zonation parallel to geological trend	North and east anomali-es overprint Ag, As ano-malies	Ag anomalies concentrate in the north Some analytical problem with As?

CHAPTER 2 RECOMMENDATIONS FOR PHASE Ⅲ EXPLORATION PROGRAMME

The following exploration programme is recommended on the basis of the conclusionS previously mentioned.

1. Diamond drilling exploration at the Au geochemical anomaly zones in Area A3,E1 and C2 to test for mineralisation. Short holes shallower than 100 metres and maximum coverage by the holes should be designed.

2. Chemical assay of core samples of quartz and shear zone for Au,Ag,As,Sb and Hg.

3. Prior to drilling, Area C2 necessitates trenching for information such as trend and dip of quartz veins and fractures necessary for the drilling programme.

BIBLIOGRAPHY

Bibliography

1)Boyle R.W.

1979:The Geochemistry of Gold and its Deposits;Geol.Sur. Canada Bull.,280,p.584

2)

1982:Geochemical Method for the Discovery of Blind Mineral Deposits;CIM Bull.

3)Cux R.

1985:Geochemical Soil Surveys in Exploration for Nickel Copper Sulphides at Pioneer,Near Norseman,Western Australia;Jour.,Geochem.,Expl.,v.23,p.437-460

4)Falcon Mines Limited

1976:Final Report-E.P.O.,No.470

5)Foster R.P.et al

1985:Major Controls of Archean Gold Mineralisation in Zimbabwe;Geol.Soc.S.Afr.Trans.,v.88,p.109-133

6)

1982:The Geology,Geochemistry and Genesis of Gold Deposits; A.A.Balkema,Rotterdam,p.753

7)Grichting E.et al

1982:Gold '82 Excursion Guidebook;Geol.Soc.Zim.

8)JICA MMAJ

:Report on the Cooperative Mineral Exploration of the Kadoma Area,Republic of Zimbabwe Phase I Feb.1987

9)Hawkes H.E. et al

1965:Geochemistry in Mineral Exploration

10)Lepeltier C.

1969:A Simplified Statistical Treatment of Geochemical Data by Graphical Representation;Econ.Geol.,v.64,p.538-550

11)Naldrett A.J.Cabri L.J.

1976:Ultramafic and Related Mafic Rocks-Their Classification and Genesis with Special Reference to the Concentration of Nickel Sulphides and Platinum Group Element;Econ.Geol.,v.71,p.1131-1158

12)Phillips G.N.et al

1984:An Epigenetic Origin for Archean Banded Iron Formation-Hosted Gold Deposits;Econ.Geol.,v.79,p.162-171

13)Rio Tinto Rhodesia Limited

1972:Final Report-E.P.O.No.180

1972:Final Report-E.P.O.No.291

14)Rio Tinto Zimbabwe

1983:Geological Aspects of Empress Nickel Mine

15)Tarrus Pty.Ltd.

1975:Final Report-E.P.O.No.470

16)Viewing K.A.

1985:Geochemical Orientation Studies near Gweru,Kwekwe and Kadoma applied to prospecting for Gold,Copper,Lead,Zinc and Nickel;Report No.C338,Institute of Mining Research, University of Zimbabwe