ii) Calculation of factor score

Factor score of each sample is obtained by totaling each element value multiplied factor weight. Then factor score is classified by a class.

Table-14 Statistical Values of Factor Score in Leyte Area

	1st Factor	2nd Factor	3rd Factor	4th Factor	5th Factor
$\bar{x}$	0	0	0	0	0
1 value	1.0	1.0	1.0	1.0	1.0
1.5 value	1.5	1.5	1.5	1.5	1.5
2 value	2.0	2.0	2.0	2.0	2.0
Maximum	6.06	5.61	5.79	5.53	29.87
Minimum	-3.88	-3.60	-1.46	-4.26	-2.60

4-3-2 Analysis for heavy mineral samples

1) Analytical method

256 heavy mineral samples are collected in Leyte Area. Statistical analysis is carried out on microchemical analysis results of these.

These samples were taken from down side of junction of streams, they were reduced from 3 kg to 50 gram by panning in each place.

Microchemical analysis for Au, Ag and Ga were carried out by atomic absorption method as same as of stream sediment samples. The results of this are shown in Appendics-8. According to the assumption that these data have shown logarithmic normal dispersion, mean value and standard deviation are calculated and then the data are classified by threshold value (1.5 value).

These statistical values are shown in Table-15.

Table-15 Statistical Value on Geochemical Analysis of Heavy Mineral Samples in Leyte Area

	$\bar{x}$ value	1σ value	1.5σ value	2σ value	maximum value	minimum value
Au (ppb)	245	2,035	5,865	16,903	22,800	5
Ag (ppb)	221	1,437	3,664	9,344	11,700	50
Ga (ppm)	15.6	20.9	24.2	28.0	31.3	2.0

2) Identification of Constituent minerals in heavy mineral samples

Constituent minerals are classified by biocular microscope on random 30 specimens.

Magnetite is recognized as main constituent minerals and details are shown in Table 16.

Table-16 Constituent Minerals of Heavy Mineral Samples in Leyte Area

Order	1	2	3	4	5	6	7	8
Mineral Name	Magnetite	Pyroxene	Chromite	Amphibole	Quartz	Feldspar	Olivine	Others
Constitution Range	75-25%	40-0%	20-3%	20-0%	15-0%	20-0%	10-0%	9-0%
Mean Constitution Ratio (%)	52%	12%	10%	8%	7%	6%	2%	3%

4-3-3 Local distribution of Anomalous Values

1) Univariate analysis for stream sediment samples

Anomalous values in each lithological code are classified in followiong limit.

These classified anomalous values have plotted in 1;250,000 scale sample locality map with symbol ●, ▲ and ■.

Distribution feature of anomalous values in each element are as follows.

Analytical Value

1 σ value	$\leqq$ Z $<$	1.5 σ value	●
1.5 σ value	$\leqq$ Z $<$	2 σ value	▲
2 σ value	$\leqq$ Z		■

Cu; Accumulation of high and middle anomalous values are observed at north and east parts of Biliran Is. where expose Quarternary volcanic rock, north-west Tacloban City where develop pre-Tertiary, north-east side Palompon in west coast where expose Miocene shale (Tagnocot Formation), north and northwest side of Sogod (Southern Leyte) where expose diorite intrusive body and east coast of Pnaon Is.. Mineralization has been known at North-west Tacloban city and north side of Sogod but other places are known up to recent age.

Pb; Accumulation of high and middle anomalous values are observed at west and south side at Biliran Is., north side of Mt. Calbugos in north eastern Leyte, around Mt. Cauayan at east side of Palompon (West coast), north side of Sogod, east side of Hilongos in west coast, around Cadlad in east coast and coast area of Panaon Is.. These places are located in andestic pyroclastics of Miocene except Biliran Is..

Ag; Over 10 high anomalous values are distributed in east coast of Panaon Is.. Other anomalous value is not observed.

Zn; Accumulation of many high anomalous values are located at north-west side of Tacloban City, northside of Mt. Cancajanag in central highland, north side of Sogod, around Mt. Lunas in south-west Peninsula and east of Kapinaw south of Abuyog minealization is not known in the later two of these.

Ni; Accumulation of many high anomalous values are located at north side of Palompon in west coast where underlies Miocene sediments, pre-Tertiary reagion of north-west side of Tacloban City, ultramafic rock reagion along the Philippine Fault west side of Abuyog and east coast of south-western Peninsula. These anomalous zones are considered to be under influence of mafic rocks.

Co; Distribution of high and middle anomalous values is visible at pre-Tertiary reagion in north-west Tacloban City, around Mt. Calbugas in north-west Peninsula, south-east coast of Abuyog and south-east coast of Sogod. Those anomalous values have not so strong accumulation.

Mn; Accumulation of high anomalous values are locate in from north-west Peninsula to west side of Ormoc City exposing Pliocene and lower Miocene formation. This anomalous zone seems to be caused by influence of stratabond manganese.

Mo; Strong accumulation of high anomalous value is observed from west side of Biliran Is. to North-west Peninsula. Accumulation of same manner is recognized at north side of Magsanga Western Ormac city.

As; Accumulations of Anomalous Values are observed at some part of Biliran Is., from North-west Peninsula to west of Ormoc City, geothermal field at north-east of Ormoc and in basic rocks along the Philippine Fault. Extention of this tendency reaches to east coast of Panaon Is.

Hg; Accumulation of high and middle anomalous values is observed at east side of Philippine Fault. This anomalous zone extent from Biliran Is.. to south of Abuyog. Another anomalous zones are observed at west of Ormoc, central part of South-western Peninsula and east side of Panaon Is..

2) Factor Analysis (Multivariate analysis) for Stream Sediment Samples

Factor scores are classified with the limit of following basis, these classified anomalous values are plotted in 1;250,000 scale sample locality map with symbol ●, ▲ and ■. Distribute features of anomalous values in each factor are as follows.

Factor Score				
1 σ value	$\leqq$	S	$<$ 1.5 σ value	●
1.5 σ value	$\leqq$	S	$<$ 2 σ value	▲
2 σ value	$\leqq$	S		■

First factor; This factor has strong relation to Mn, Co, Zn elements. Accumulation of many high anomalous values is observed from south side of Sogod to east coast of South-eastern Peninsula. Other anomalous zones are observed at 10 km north side of Sogod, east side of Ormoc, entral part of North-western Peninsula.

Second factor; This factor has strong concerning to Hg, Pb, As elements. Accumulation of anomalous value is observed from north side of Sogod to South-east Peninsula, around coast reagion of Panaon Is., around Mt. Calbugos of North-west Peninsula, and south-east side Biliran Is.

Third factor; This factor has concerned strong to Mo, As element. Accumulation of anomalous values is observed in whole area of North-western Peninsula. Other anomalous zones are distributed at north-east side of Ormoc, around Magsanga western Ormoc and north side of Sogod.

Forth factor; This factor has strong relation to Ni element. Accumulation of many anomalous values is located from North-western Peninsula to Merida (West of Ormoc), another accumulations are observed at pre-Tertiary reagion of Northwest side of Tacloban City, accomanying ultramafic rock along the Philippine fault, southern part of South-western Peninsula and northern part of Pauaon Is. distributing ultramafic rocks.

Fifth factor; This factor has strong relation to Ag, Cu elements. Small scale accumulation of anomalous values is observed at pre-Tertiary reagion in northwest of Tacloban City, north side of Sogod and east coast of Panaon Is..

3) Univariate Analysis for Heavy Mineral Samples

Anomalous values which are extracted by statistical procedure are classified by following basis.

These classified anomalous values are plotted with symbol ●, ▲ and ■ on 1;250,000 scale sample locality map. Distribution features of anomalous value in each elements are as follows.

Analytical Value			
1 σ value	$\leqq$ Z $<$	1.5 σ value	●
1.5 σ value	$\leqq$ Z $<$	2 σ value	▲
2 σ value	$\leqq$ Z		■

Au; Three anomalous values are seen at north and south part east coast of Panaon Is. respectively.

Anomalous value is not observed in main land of Leyte.

Ag; In east, north and south coast of Panaon Is., anomalous zones have located, each zone consists of three anomalous values, as same Manner Au.

Ga; Anomalous Values Are scattering in whole area. Accumulation is not obvious but along the west side of the Philippine fault some condense distribution is recognized.

4-4 Geochemical Analysis of Steam Sediment in Dinagat Siargao Area

4-4-1 Basic Statistical Data

1) Statistical data in each lithological code

The analysis of geochemical survey results was performed in 5 populations divided by geochemical characteristics of country rocks.

Lithological Code	Rock Facies	Number of Samples
02	Miocene-Pliocene Limestone	11
04	Miocene-Pliocene Volanic Clastics and Andesite	17
05	Pre-Testiary - Palaeogene Basaltic Volcanics	94
06	Pre-Tertiary Peridotite and Serpentine	626
07	Pre-Tertiary Metagabbro and Gabbro	37
	Subtotal	785
	Duplicate Samples	24
	Total	809

The statistical values in each lithological code are as following table.
(These values are calcurated by logalithmic base then transfer to natural base)

Lithological code 02; Miocene-Pliocene Limestone

Number of Sample: 11

(Unit; 1 ppm except Hg)

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg(ppb)	Remarks
$\bar{x}$	60.7	173	1.7	127	0.1	53.2	37.6	827	4.8	45	
1σ value	97.2	416	4.1	200.7	0.1002	112.7	52.1	1.163	21.4	69	
1.5σ value	123.0	645	6.4	252.2	0.1003	164.0	61.3	1,380	45.0	85	This value consider to be threshold
2σ value	155.8	1,000	10.0	317.0	0.1004	238.7	72.1	1,637	94.5	105	
Maximum	113	1,340	12	378	1.0	197	65.0	1,400	75.0	90	
Minimum	31	50	1	70	1.0	21	25.0	480	1.0	30	

Lithological code 04; Miocene-Pliocene Pyroclastics and Andesite

Number of Sample: 17

(Unit; ppm except Hg)

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg(ppb)	Remarks
$\bar{x}$	86.7	15	32.2	81.7	0.13	4.0	6.4	353	64.9	156	
1σ value	116.2	33	77.2	146.6	0.32	13.8	19.2	964	207.6	355	
1.5σ value	134.4	49	119.6	196.2	0.49	25.5	33.5	1,592	371.3	534	This value consider to be threshold
2σ value	155.6	73	185.2	262.8	0.76	47.1	58.9	2,631	663.9	805	
Maximum	51.0	240	8.0	186.0	3.00	64.0	46.0	1.550	960.0	1,000	
Minimum	145.0	10	149.0	18.0	0.10	1.0	1.0	60	10.0	50	

Lithological code 05; Pre-Tertiary-Palaeogene Basaltic Volcanics

Number of Sample 94

(Unit; ppm except Hg)

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg(ppb)	Remarks
$\bar{x}$	61.8	178	1.3	111.2	0.1	103.3	50.6	1,033	1.4	34	
1σ value	91.0	583	2.5	158.6	0.101	583.2	97.3	1,355	2.8	47	
1.5σ value	110.4	1,055	3.4	189.7	0.101	1,385.5	134.8	1,551	3.9	55	This value consider to be threshold
2σ value	134.2	1,909		226.6	0.102	3,291.5	186.8	1,776	5.4	64	
Maximum	150.0	3,750	45.0	335.0	0.1	3,500.0	300.0	2,400	29.0	60	
Minimum	25.0	30	1.0	36.0	0.1	7.0	15.0	500	1.0	20	

Lithological code 06; Pre-Tertiary Peidotite and Serpentive

Number of Sample: 626

(Unit; ppm except Hg)

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg(ppb)	Remarks
$\bar{x}$	37.7	1,349	1.0	98.3	0.10	2,465.7	206.5	1,676	1.6	52	
1σ value	57.8	2,820	1.2	137.2	0.117	5,062.9	358.2	2,527	3.5	82	
1.5 σ value	71.4	4,077	1.3	161.3	0.125	7,256.2	471.8	3,102	5.0	103	This value consider to be threshold
2σ value	88.4	5,895	1.4	189.6	0.135	10,400.0	621.3	3,809	7.3	129	
Maximum	132.0	10,000	21.0	259.0	1.3	8,600	795.0	5,500	125.0	1,300	
Minimum	8.0	40	1.0	35.0	0.1	23	28.0	390	1.0	10	

Lithological code 07; Pre-Tertiary Meta-Gabbro and Gabbro

Number of Sample: 37

(Unit; ppm except Hg)

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg(ppb)	Remarks
$\bar{x}$	37.0	397	1.1	60.1	0.1	182.4	43.7	901	1.0	28	
1σ value	57.0	1,468	1.6	100.8	0.101	692.9	91.6	1,657	1.2	42	
1.5 σ value	70.8	2,824	1.9	130.6	0.101	1,350.4	132.6	2,247	1.3	52	This value consider to be threshold
2σ value	87.8	5,432	2.2	169.2	0.102	2,631.7	191.9	3,046	1.4	64	
Maximum	184.0	3,700	7.0	172.0	0.1	4,400.4	284.0	5,900	2.0	28	
Minimum	19.0	80	1.0	18.0	0.1	32.0	16.0	220	1.0	10	

2) Histogram

Hystogram for each element in each lithological code is made by logarithmic scale with 1/2 standard diviation class (shown iin Appendix-5).

Each histogram features for each element are as follows:

Cu; All histograms show normal logarithmic dispersion. But in code 06, low content sample seems to be not enough in number.
Maximum content sample (184 ppm) is included in code 07.

Cr; All histograms show normal logarithmic dispersion. In code 04, low content sample seems to be shortage in number. This is due to detection limit is setted by 10 ppm Cr. Maximum content sample (10,000 ppm) is included in code 06.

Pb; About 80% of samples are under detection limit, so extreme accumulation of dispersion are observed at 1 ppm which is assumed grade of detection content. Maximum content sample (45 ppm) is included in code 05.

Zn; All histogram show normal logarithmic dispersion. Maximum content (378 ppm) is included in code 02.

Ag; Over 80% of samples are under detection limit, so all histograms are not of logarismic normal dispersion. Maximum content sample (3 ppm) is included in code 04.

Ni; All histograms except code 06 show normal logarithmic dispersion. Code 06 is seemed to be shortage of high grade dispersion in number. Maximum content sample (4,400 ppm) is included in code 07.

Co; All histograms show normal logarithmic dispersion. Maximum content sample (795 ppm) is included in code 06.

Mn; All histograms show normal logarithmic dispersion. Maximum content sample (5,900 ppm) is included in code 07.

As; Histograms of code 05, 06, 07 do not show of normal logarithmic dispersion. This is caused about 50% samples are under detection limit and dispersion shows extreme accumulatoin at 1 ppm which is assumed to be detection limit. Maximum content sample (960 ppm) is included in code 04.

Hg; Histogram of code 05, 06 show accumulation to around mean value and not normal dispersion. Maximum content of sample (1,300 ppb) is included in code 06.

3) Cumulative frequency

Cumulative frequency curves concerning above histograms are shown in Appendics-5. In each element, these curves show transition point between 1σ and 2σ value. This has justified to estimate 1.5σ value as threshold. Each curve features are as follows.

Cu; Transition points are observed near mean value in code 02 and 07 but it is not so clear. Transition points are observed near 1.0σ value in code 04 and 06, and near 1.5σ value in code 05.

Cr; Transition points are observed near mean value and 1σ value in code 02 and 04 but it is not clear because of shortage of sample in number. Transition points are observed near 1.5σ value in code 05, 0.5σ value in code 06 and mean value in code 07.

Pb; All transition points are not clear because of extreme accumulation at 1 ppm. Assumed transition points are as follows; near mean value for code 02 and 04, near 1σ value for code 05 and near 2σ value for code 06 and 07.

Zn; Transition points are observed near 1σ value in code 02, 04, 05 and 07, and near 2σ value in code 06.

Ag; Transition points are not clear in all code because of extreme accumulation at 0.1 ppm.

Ni; Transition points are observed near mean value and 0.5σ value in code 02 and 04 but it is not clear because of shortage of samples in number. Transition points are observed near 1.5σ for code 0.5 and 0.7 and near 1σ value for code 06.

Co; Transition points are observed near mean value and 0.5σ value for code 02 and 04 but it is not clear because of shortage of samples in number. Transition points are observed near 1σ value for code 05 and 07 and near 1.5σ value for code 06.

Mn; Transition point are observed near mean value for code 02, 04 but it is not clear. Transition points are observed near 1σ value for code 05, near 2σ value for code 06 and 0.5σ value for code 07.

As; Transition points are not clear in code 02, 04 and 07 because that almost all samples are under detection limit. In code 05 and 06, transition points are observed near 1.5σ value.

Hg; Except code 06, transition points are not clear because of shortage of effective samles in number. In code 06, transition point is observed near 1.5σ value.

4) Correlation coefficient

Correlation coefficient between detective elements on all samples is shown in Table .

Data; Table Correlation Coefficient between each detective elements in Dinagat · Siargao Area

Table-17 Correlation Coefficients between Each Detective Elements in Dinagat · Siargao Area

	Cu	Cr	Pb	Zn	Ag	Ni	Co	Mn	As	Hg
Cu	0.000									
Cr	**-0.206	1.000								
Pb	** 0.289	**-0.491	1.000							
Zn	** 0.420	** 0.315	-0.050	1.000						
Ag	** 0.109	**-0.105	** 0.222	0.035	1.000					
Ni	**-0.328	** 0.905	**-0.525	** 0.180	* -0.091	1.000				
Co	**-0.202	** 0.875	**-0.524	** 0.392	* -0.090	** 0.930	1.000			
Mn	-0.019	** 0.690	**-0.424	** 0.536	**-0.097	** 0.713	** 0.876	1.000		
As	** 0.291	**-0.131	** 0.586	** 0.177	** 0.255	**-0.197	**-0.170	**-0.126	1.000	
Hg	** 0.246	** 0.234	** 0.301	** 0.384	** 0.193	** 0.204	** 0.288	** 0.293	** 0.403	1.000

Strong correlation are observed between Cu and Zn, Ni, Cr and Ni·Co·Mn, Pb and Ni·Co·As, Zn and Mn·Co, Ni and Co·Mn, Co and Mn. In each lithological code, correlation coefficients between each detective elements are shown in Appendics .

5) Multivariate analysis (Factor analysis)

i) Determination of factor number

The relations between detective elements and factors by factor analysis of Dinagat·Siargao Area are as follows.

Factor	Elements
1st Factor;	Co, Ni, Cr, Mn
2nd "	As, Hg, Pb
3rd "	Cu, Zn
4th "	Ag

Elements listed above are concerned in all detective elements. Therefore these 4 factors are adopted.

Factor contribution of 1st to 4th factor is 84.4%.

Table-18 Result of Factor Analysis in Dinagat · Siargao Area

Factor Loadings

	1st Factor	2nd Factor	3rd Factor	4th Factor
Cu	-0.2694	0.1768	-0.8319	0.0407
Cr	0.9211	-0.0285	0.0303	-0.0423
Pb	-0.5084	0.7408	-0.0269	0.0588
Zn	0.3738	0.1333	-0.8043	0.0048
Ag	-0.0606	0.1648	-0.0321	0.9834
Ni	0.9476	-0.0651	0.1703	-0.0144
Co	0.9780	-0.0602	-0.0623	-0.0230
Mn	0.8475	-0.0594	-0.3154	-0.0530
As	-0.1155	0.8436	-0.1056	0.1067
Hg	0.3553	0.7077	-0.2674	0.0981

ii) Calculation of factor score

Factor score of each sample is obtained by totaling each element value multiplied factor weight. Then factor score is classified by a class.

Table-19 Statistical Values of Factor Score in Dinagat · Siargao Area

	1st Factor	2nd Factor	3rd Factor	4th Factor
$\bar{x}$	0	0	0	0
1σ value	1.0	1.0	1.0	1.0
1.5σ value	1.5	1.5	1.5	1.5
2.0σ value	2.0	2.0	2.0	2.0
Maximum	1.76	8.20	3.69	18.04
Minimum	-4.76	-1.72	-3.07	-1.63

4-4-2 Analysis for Heavy Mineral Samples

1) Analytical method

187 heavy mineral samples are collected in Dinagat·Siargao Area. Statistical analysis is carried out on microchemical analysis results of these.

These samples were taken from down side of junction of streams. They were reduced from 3 kg to 50 gram by panning in each place.

On these samples microchemical analysis for Au, Ag and Ga were carried out by atomic absorption method as same as of stream sediment samples. The results of that are shown in Appendics- . According to the assumption that these data have shown logarithmic normal dispersion, mean value and standard deviation are calculated, and the data are classified by threshold value (1.5 σ value).

These statistical values are shown in Table

Table-20 Statistical Values on Geochemical Analysis of Heavy Mineral Samples in Dinagat · Siargao Area

	$\bar{x}$ value	1 σ value	1.5 σ value	2 σ value	maximum value	minimum value
Au (ppb)	74.7	510.3	1,333.8	3,486	5,000	5
Ag (ppb)	66.2	164.1	258.4	406.8	1,100	50
Ga (ppm)	2.4	6.9	11.7	19.8	25	1

2) Identification of constituent minerals in heavy mineral samples.

Constituent minerals are classified by biocular microscope on random 20 specimens.

Magnetite is recognized as main constituent minerals and details are shown in Table 21.

Table-21 Constituent Minerals of Heavy Mineral Samples in Dinagat · Siargao Area

Order	1	2	3	4	5	6	7	8
Mineral Name	Magnetite	Chromite	Pyrite	Feldspar	Quartz	Proxene	Amphibole	Galena
Constitution Range (%)	60-10	40-0	80-0	16-0	10-0	15-0	10-0	10-0
Mean Constitution Ratio (%)	45	24	17	7	2	2	2	1

4-4-3 Local Distribution of Anomalous Values

1) Univariate Analysis of Stream Sediment Samples

Anomalous values in each lithological code are classified in following limits.

These classified anomalous values have plotted in 1:250,000 scale sample locality map with symbol ●, ▲ and ■. Distribution features of anomalous are as follows.

Analized Value (Z)			
1 σ value	$\leq$ Z $<$	1.5 σ value	●
1.5 σ value	$\leq$ Z $<$	2 σ value	▲
2 σ value	$\leq$ Z		■

Cu; Accumulation zones of anomalous values are observed at northern part of Dinagat Is., namely south side of Loreto in north-east coast, around General Luna in highland and east side Puerto Princesa in west coast, another anomalous zone is locate in northern part of Bucas Grande Is.

Pb; Accumulation zones of anomalous values are located at south side of Loreto in northwest Dinagat, northern part of Masapelid Is. and northern part of Siargao Is.

Ag; Accumulation zone of anomalous values is located at south side of Loreto.

Zn; Accumulation zones of anomalous values is observed at middle and southern part of Dinagat Is., west side of Caridao at east coast of Siargao Is. and northern part of Bucas Is.

Ni; Accumulation zones of anomalous values are located at middle part of Dinagat Is., northern part of Bucas grande which consist of low grade anomalies and north-eastern of Masapelid Is.

Co; In Dinagat Is. many anomarous values distribute with uniformity in middle part of Is., around Mt. Gaboc south end of Is. several midddle grade of anomalous accumulate.
In northern Bucas Is. about 10 anomarous values consisting of middle and low grade accumulate.

Mn; Accumulation zones express similar distribution as that of Co.

As; In Dinagat Is. anomalous values are accumulate north and south side of the zone connecting Puerto Princesa (West coast) and Peninsula Point (East coast), another accumulation zone is observed along north-west coast of Siargao Is.

Hg; In Dinagat Is. Accumulation zones of anomalous values are observed at pyroxene peridotite reagion in northern Is. another accumulation zones are seen at north-west coast in Siargao Is., northern part in Bucas Grande Is. and north-west part in Masapelid Is.

2) Factor analysis (Maltivariate analysis) of stream sediment samples

Factor scores are classified with the limit of following basis. These classified values are plotted in 1:250,000 scale sample locality map with symbol ● ▲ and ■, distribution features of anomalous in each factor are as follows.

Analized Value (Z)				
1 σ value	$\leqq$	S	$<$ 1.5 σ value	●
1.5 σ value	$\leqq$	S	$<$ 2 σ value	▲
2 σ value	$\leqq$	S		■

First factor; This factor has strong relation to Co, Ni, Cr, Mn elements. Accumulation zones of anomalous values are observed middle part of Dinagat Is where accumulate Co and Mn anomalous values, around Mt. Gaboc in southe end Dinagat Is. and Northern part of Bucas grande Is..

Second Factor; This factor has strong relation to As, Hg, Pb elements. In Dinagat Is. Accumulation zones are observed at middle north part accompanied with micro gabbro, pyroxinite and pyroxene peridotite. In Masapelid Is. Accumulation zone which consist of over 10 high grade anomalous values is observed in middle western of the Is.

Third factor; This Factor has strong relation to Cu, Zn elements. Accumulation zones of anomalous value are observed at southeast side of Loreto in northwest Dinagat Is., northern and western part of Siargao Is. and northern part of Bucas Grade Is.

Fourth Factor; This factor has strong relation to Ag element. In Masapelid Is., 2 high grade anomalous values distribute in west coast, another anomalous values are scattered east side Dinagat Is.

3) Univariate analysis for heavy mineral Samples

Anomalous values which are extracted by statistical procedure are classified by following limits, and plotting on 1;250,000 scale sample locality map with symbol ●, ▲ and ■.

Analized Value (Z)				
1 σ value	$\leqq$	Z	$<$ 1.5 σ value	●
1.5 σ value	$\leqq$	Z	$<$ 2 σ value	▲
2 σ value	$\leqq$	Z		■

Distribution features of anomalous value are as follows.

Au; Many anomarous values locate in Masapelid Is. but greater part of them concern gold mining area then these values except from plotting.

Ag; Accompanying Au anomalous values but greater part of them are under detective limit, there distribution feature are unclear.

Ga; Accumulation of anomalous values is observed at northern part of Siargao Is., in the reagion of tuff and audesite.

5. SYNTHETIC ANALYSIS

5 Synthetic Analysis

5-1 Summary

5-1-1 Geology and Structure

The survey area of this fiscal year locate in east part of Bisayas District in Middle of Philippines. The Philippine Fault have passed through center of survey area, and divided into east and west tectonical reagions.

East tectonical reagion have been contained east side of Leyte Is. Dinagat Is. and Siargao I., Ophiolite terranes and crystalline schist compose the basement of these islands, Neogene series are covered to the basement with unconformity.

Pre Tertiary basement is considered to uplift in thrust and expose at northwestern Tacloban and main part of Dinagat Is. Neogene series consist of mainly andesitic volcanic clastics accompanying andesite and basalt lava and interbedding conglomerate, sandstone, siltstone, shale and limestone. Andesite and diorite bodies are observed to intrude them.

West tectonical reagion contain westside of Leyte Is. and Masbate Is. Main basement consists of well folded Palaeogene series and middle and upper Miocene, Pliocene series which consist of mainly andesitic clastics interbedding many kinds of sedimentary rocks overlain on the basement with unconformity. These Neogene series have shown gentle folding and Miocene diorite and Upper Pliocene andesite intruded in them.

Besides above mentioned, serpentinized peridotite and recent andesite which constitute conical peak as Biliran Is. are observed along the Philippine Fault. Geothermal field at northeast Ormoc city seems also concerning adjacent fissure of the fault. Geological structure of both tectonic reagion has obvious difference, namely the east reagion has suffered strong block movement and many linearments are observed in aerial phtographs, on the contrary the west reagion have shown only gentle folding.

5-1-2 Mineralization

The both tectonic reagions as above mentioned have characteristic mineralization in each, chronological order is as follows; orthomagmatic chromite deposit accompanied to Mesozoic ophiolitic terraine (Dinagat Is.) massive sulphide deposit accompanied Mesozoic greenschist (Nothwest of Tacloban City in Leyte Is.), hydrothermal vein type deposit accompanied Miocene diorite intrusion (Aroroy in Masbate Is.), Neogene sedimentary manganese deposit (Punpunan in Southern Leyte Is.), fumarole native sulphur deposit accompanied recent volcanic activity (Biliran Is.), weathering residual deposit accompanied lateritic soil (Massine in Southern Leyte Is.)

5-1-3 Relationship between Geochemical Survey and Mineralization.

i) Univariate and Multivariate Analysis for Stream Sediment Samples

In this survey, total 8279 stream sediment samples (2,217 in Masbate Area, 5,277 in Leyte area and 785 in Dinagat · Siargao Area) were collected and analyzed by atomic absorption method (AAS) for Cu, Pb, Ag, Zn, Ni, Co, Mn, Mo, As and Hg (in Dinagat · Sargao Area Cr analized instead of Mo).

The results of this analysis have been performed statistical univeriate and multivariate analysis procedure.
The anomalous values which have extracted above mentioned procedure were plotted on 1:250,000 scale sample locality map and distribution features of anomalous values are inquired.
The results of this study has shown intimate relation to geology and mineralization data, for instance serpentine outcrops which expose along the Philippine Fault has close similar locality to anomalous score distribution of 4th factor. Statistical anomalous zones which assume intimate relation to mineralization are as follows; 1 Around Mt. Uac in Masbate Is., in where anomalous values of all detective element except As and 2nd factor of factor analysis are accumulated. 2 Around Aroroy Mine, in where anomalous values of Cu, Mo, As, Hg contents and 1st, 2nd factor of factor analysis are accumulated. 3 Northwest side of Tacloban, in where anomalous values of Cu, Zn, Ni, Co contents and 4th, 5th factor of factor analysis are accumulated. 5 Around Antipolo Mineral Showing, in where anomalous values of Zn, Ni contents and 4th factor of factor analysis are accumulated. 5 Panaon Is. in south end of Leyte Is., in where anomalous values of Cu, Pb, Ag, As, Hg contents and 2nd, 5th factor of factor analysis are accumulated. 6 Around Mt. Gaboc in south end of Dinagat Is., in where anomalous values of Cr content and 1st factor of factor analysis are accumulated. 7 West side of Masapelid Is., in where anomalous values of Cu, Pb, Ag, Hg contents and 1st, 2nd, 4th factor of factor analysis are accumulated.

ii) Univariate Analysis for Heavy Mineral Samples.

Results of univariate analysis for heavy mineral samples show fair concordant relation to result of univariate and multivariate analysis for stream sediment samples. Anomalous zones of around Aroroy (Masbate Is.), around Mt. Uac (Masbate Is.), east side of Panaon Is. (Southend of Leyte Is.) and west side Masapelid Is. are similar to Au, Ag anomalous zone of heavy mineral analysis.

5-1-4 Conclusion of Survey

This survey have carried out as the second year field work for Impremental Agreement which concluded 26th of September, 1984. This report is summerized results of field survey and results of statistical analysis on microchemical analysis data on Masbate area, Northern Leyte area and Southern Leyte · Dinagat · Siargao Area.

Following items are clarified by synthetic consideration on these results

1) Survey Area was divided by the Philippine Fault into east side and west side. Former basement consist of Pre-Tertiary Ophiolitic Terraine and crystalline schist and suffer strong block movement, on the contrary later basement consist of Palaeogene sedimentary rocks and show gentle folding.

2) Kinds of known mineralization are as follows; originating in Pre-Tertiary ophiolitic terraine and green schist, originating from dioritic activity which intruded in Miocene, sedimentary origine deposit in Neogene, fumarole native sulphur deposit accompanying recent volcano, weathering residual deposit.

3) Extracted anomalous zones which assume to have intimate relation to strong mineralization are as follows; 1 Around Aroroy Mine (Masbate Is.) 2 Around

Mt. Uac (Masbate Is.) 3 Northwest side of Tacloban City (Leyte Is.) 4 Around Antipole Mineral Showing (Leyte Is.) 5 East coast of Panaon Is. (southend of Leyte Is.) 6 Around Mt. Gaboc (southend of Dinagat Is.) 7 West coast of Masapelid Is.

4) Some extracted anomalous zones have difficulties to find out corresponding mineralization, such anomalous zones are as follows;

1 Anomalous zones of Cu, Zn, Ni, Co, Mo, As, in Pliocene and Pleistocene series at south side of Mt. Bagacay south eastern Masbate Is. 2 Anomalous zones of Pb, Mn, Mo, As, Hg in Pliocene sediments at middle part of Northwestern Peninsula of Leyte Is..

5-2 Recommendation for Following Work

In this survey, microchemical analysis over 8,400 stream sediment samples is performed, and these results are analized statistically. The mean values of Ag, Pb, Mo, Hg are very near to detective limits, then almost half analysis results show under detective limit values. This bring some trouble for statistical treatment, so introducing some hypothesis is inavoidable, as the result of this some problems have to remain on reliability of the results.

This survey work will perform more three years, so improving on detective limit is very necessary to get accuracy for statistical analysis of geochemcial data.

References

REPORT NO.	AUTHOR/S	TITLE OF REPORTS
*62 RA	C. Cruz F. Comsti	Report on the Baleno Cu mine, Panal, Baleno, Masbate
*76	W. Wright	Report of investigation of the Baleno Cu at Panal, Masbate Island, CCXXXV
*61 RA	L. Abad N. Gamatero	Evaluation of Mn stockpiles in Milagros, Masbate
*124 RA	L. Miguel R. Viloria F. Silay	Report on the iron prospect at Tugbo, Masbate, Masbate
*311	A. Magpantay	Report on the Fabella Cu prospects, Dagosongon, Milagros, Masbate
647	P. Fortuno	Geological investigation of Mabuhay claim-2 in Ayat. Mandaon, Masbate
*757 (1102)	B. Duna	Preliminary report on the geochemical and geological survey of the Masbate Forest reservation
*880 (1257)	H. Fernandez	Geology of Lolave group claim and adjacent areas and its related copper deposits Mobo, Masbate
*881 (1259)	E. Vallesteros	Memo report on the geological investigation and survey verification of the XYZ group of mining claims in Masbate, Masbate
*896 (1290)	F. Miranda	Geological investigation of Mr. J-XI Manganese claim of Guaan, Capsay, Masbate, Masbate
*937	F. Comsti	Report on the guano caves of Aroroy, Masbate
*1046 (1493)	R. Pena	Geological verification of Lla-12187-D in Palanas, Masbate
*1284 (1899)	A. Baptista I. Oscillada	Geological investigation and verification of Napuangan gold prospects, Concepcion, Aroroy, Masbate
*1397	P. Montero E. Ariate	Evaluation on the Drilling project in Tinananan, Aroroy, Masbate
*1447	R. Encina	Report on geological verification of Magget lode claims in Bo. Capsay, Aroroy, Masbate
*1454	P.O. Montero	Geological investigation for exploration permit of the area within the municipalities of Aroroy and Baleno, Province of Masbate

REPORT NO.	AUTHOR/S	TITLE OF REPORTS
*1468	P.M. Alcantara	Geological investigation and verification of gold prospects in Luya, Aroroy, Masbate
*168	R.B. Jagolino	Geologic investigation of the guano and phosphate rock deposits in Northwestern Aroroy, Masbate
1540	R.Y. Encina	Preliminary report on the drilling exploration program in barrio Panal, Baleno, Masbate
PHIL-8, p.26	BMG & U.S. AEC	Reconnaissance for Uranium in the Philippines.
*33 & 59 RA	C. Domingo Z. Felizminio	Sulphur deposits of Biliran Island
*174	J. Teves	Geology of Calubian and vicinity, Leyte
*196	D. Palacio	Preliminary report on the geology and rock asphalt deposits of Balite, Villaba, Leyte
*209	D. Basco	Report on the Manila Rock Asphalt property at a sitio of Bo. Balite, Municipality of Villaba, Leyte
132 RA	G. Oca D. Palacio	Progressive report on one possibilities of rock asphalt in Balite, Villaba, Leyte
*134 RA	G. Oca D. Palacio	Report on the extraction of sand and gravel by the Bureau of Public Highways in sitio Agbanga, and Bahangbahang, Matalom, Leyte
*446	R.F. Sampio	Report on the investigation on the sulfur and iron-sulphide occurrence in Caibiran, Biliran Island, Northern Leyte
*560	J. Fernandez	Magnetometer survey of the black sand in the Eastern coast of Leyte
*641	J. Fernandez	Geophysical reconnaissance of Tongonan geothermal field, Ormoc City, Leyte del Norte
*719	J. Pilac	Geology of Northern Leyte
*782 (1146)	E. Gamus J. Lauron	Report on the verification of copper occurrence at Bo. Suhi, Tacloban City del del Norte
951 (1362)	J. Fernandez	Geological investigation of the nickel project in Antipolo, Jaro, Leyte del Norte
*1101 (1573)	O. Abarquez	Mineral canassing of part of Western Leyte

REPORT NO.	AUTHOR/S	TITLE OF REPORTS
*1132 (1625)	C. Samonte	Geological investigation of the copper prospect in barrio Pulta, Hlongos, Northern Leyte
*1143 (1668)	A. Paderes	Report on the geological investigation of Bagacay copper prospect Bagacay, Tacloban City
*1154 (1586)	P. Manlansing	Geology and Mineral resources of Southern Leyte Prov.
*1173 (1636)	Z. Zerda	Memo report on the geological investigation for verification of the magnetite sand in Dulag, Leyte del Norte
*1328 (1973)	J. Lauron	Geological and survey verification of the magnetite sand deposits in the municipalities of Hinunangan and Silago, Province of Leyte
*1391	R. Zerda	Report on the mineral ver. of One Hundred Twenty five (125) lode claims of United Copper Mine Co., located at Sogod, Southern Leyte
*1393	M.R. Apelo	Report on the Mineral ver. of Sixteen (16) placer claims of Great Pacific Mining Corp. in Palo, Leyte del Norte
1578 (1975)	J. N. Ronan I. Gappe, Jr.	Preliminary Report on the Detailed Mapping of a Peat Deposit in Bo. Liberty, Ormoc City, Leyte del Norte
PC-SA-3	M.V. Garcia M.O. Mercado	Geology and Mineral Deposits of Samar & Leyte Island Journal of GSP, Vol. 35, N. 4, December 1981
PNOC-1	1981 Student Trainee	Geology of Northwest Upper Daguitan River, PNOC-EDC July, 1981
MRDP-80-1	R.S. Javelosa	Notes on the Geological & Geochemical Occurrence of Copper-Gold Prospect in Bgy. Bantawan, St. Bernard, Southern Leyte
MRDP-80-2	R.S. Javelosa	Exploration Studies of Copper-Gold Prospect in Bgy. Ingan, Hinunangan, Southern Leyte
MRDP-80-9	R.G. Robles	Summary Report on the Diamond Drilling Exploration on the Cura-Jo, Caiba-an Copper Prospect Tacloban City, Leyte in Connection with the Samar-Leyte Mineral Resources Development Project

REPORT NO.	AUTHOR/S	TITLE OF REPORTS
MRDP-80-10	R.S. Javelosa	Report on the Core Logs of Six (6) Diamond Drill Holes on the Copper Prospect in Curajo-Caiba-an Area, Tacloban City, Leyte Province
MRC-VII-1	P. Villacastin	A Progress Report of the Geology of Parts of the Hilongos & Sogod Quadrangles
		Geology and Mineral of Southern Leyte Provinces (1971)
		Progress Report on Geology of parts of the Hilongos and Sogod Quadrehgles Paulina T. Viuacustine (1981)
	Jovito G. Lahron	Geology and Survey verification of the Magnetite Sand Deposites in the Municipalities of Hinunagan and Silago Province of Leyte
	Juan E. Pilac	Geology of Northern Leyte (1965)

Masbate Area
(Thin Section Micro-photograph)

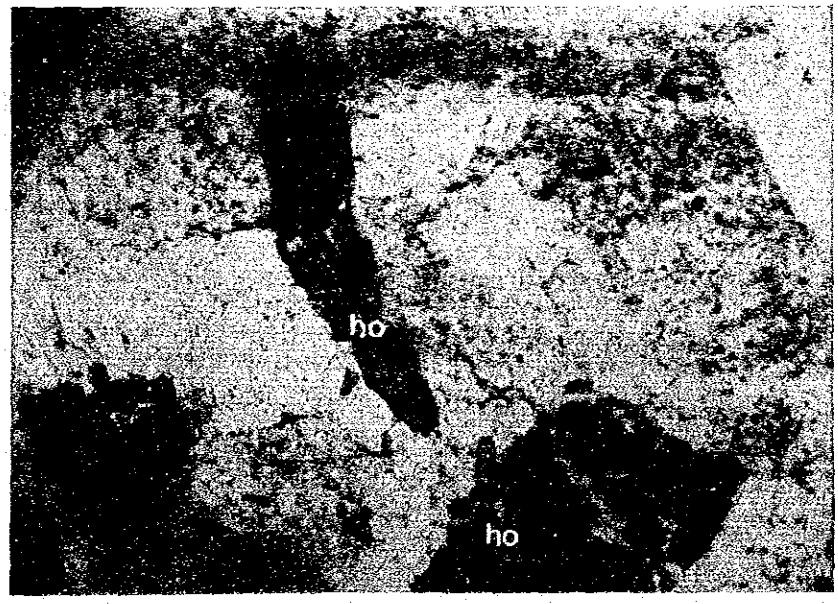
q ; quartz
Pl ; Plagioclase

Cross Nicol

0 0.5mm

Quartz diorite. (Sample No. A091101)

Locality ; 6 km West Baleno North coast Masbate.
Main Mineral ; Hormblend, biotite, plagioclase, potash feldspar, quartz
Accessory mineral ; Sphene, Fe-mineral.



ho ; hornblend

Parallel Nicol

0 0.5mm

Pl ; plagioclase

Croso Nicol

0 0.5mm

Porphyrite (Sample No. L061091385)

Locality ; Kalogo Is. 7 km SW Mandaon West Coast Masbate
Phenocryst ; Augite, hypersthene, Fe mineral
Groundmass ; Silica mineral, plagioclase, clino-pyroxene, Fe mineral (Porphyritic texture)

au ; augite

Parallel Nicol

0 0.5mm

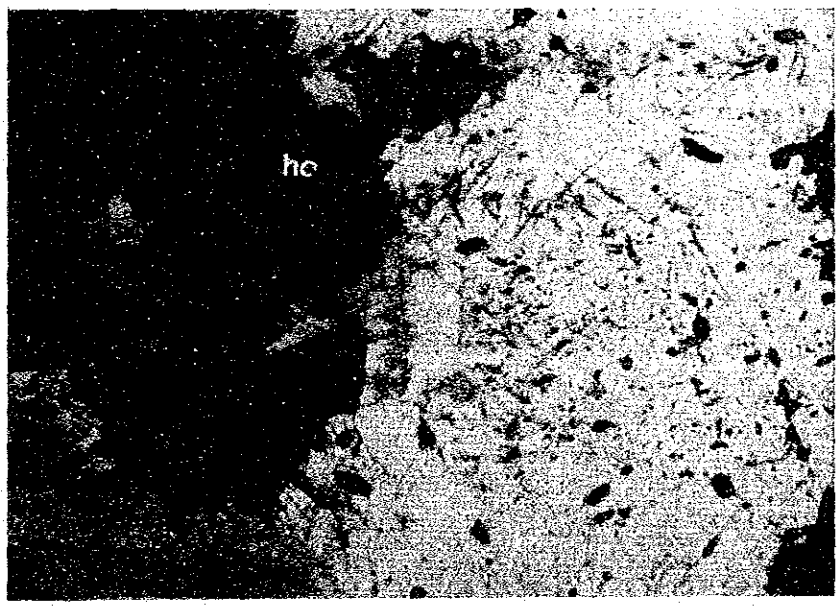
q ; quartz
Pl ; plagioclase

Cross Nicol

0 0.5mm

Diorite (Sample No. A090401)

Locality ; 6 Km west of Baleno north coast of Masbate
Main mineral ; Plagioclase, hornblend, Fe mineral
Accessory mineral ; Sphene
Altered mineral ; Epidote



ho ; hornblend

Parallel Nicol

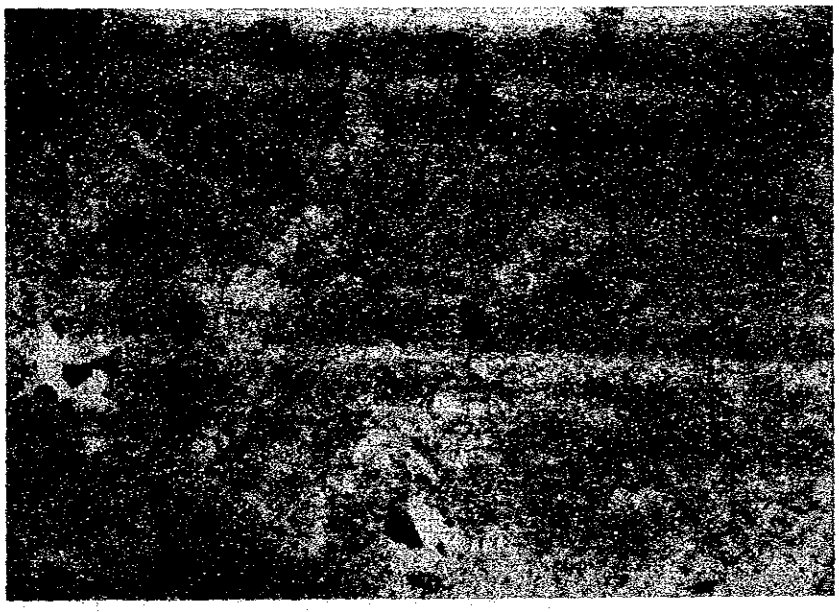
0 0.5mm

Cross Nicol

0 0.5mm

Andesite (Sample No. K1000)

Leocality ; 18 Km NE Mandaon West Coast Masbate
Phenocryst ; Plagioclase, augite, Fe mineral
Ground Mass ; Silica mineral, plagioclase, Fe mineral (porphyritic texture)



Parallel Nicol

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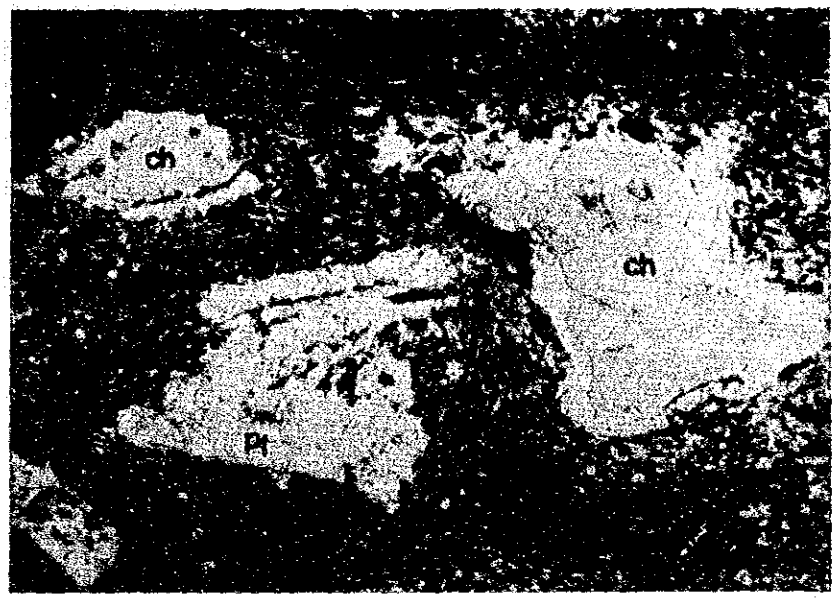


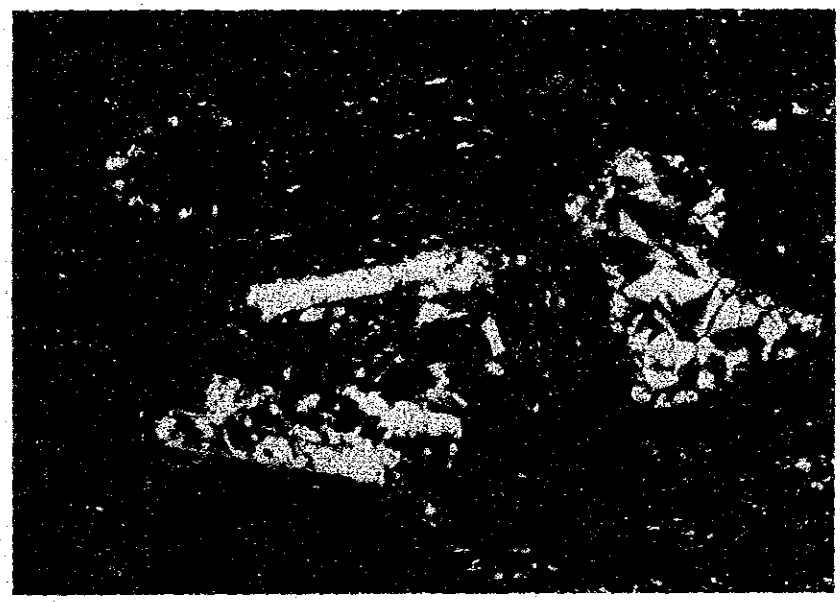
ch ; chlorite
Pl ; plagioclase

Cross Nicol

0 0.5mm

Andesite (Sample No. B28098503)

Locality ; 15 Km NE Mobo North-East coast Masbate.
Phenocryst ; Plagioclase, augite.
Groundmass ; Plagioclase, clinopyroxene, Fe mineral glass. (Porphyritic texture)
Alternated Mineral ; Chlorite, zeolite, Calcite



Parallel Nicol

0 0.5mm

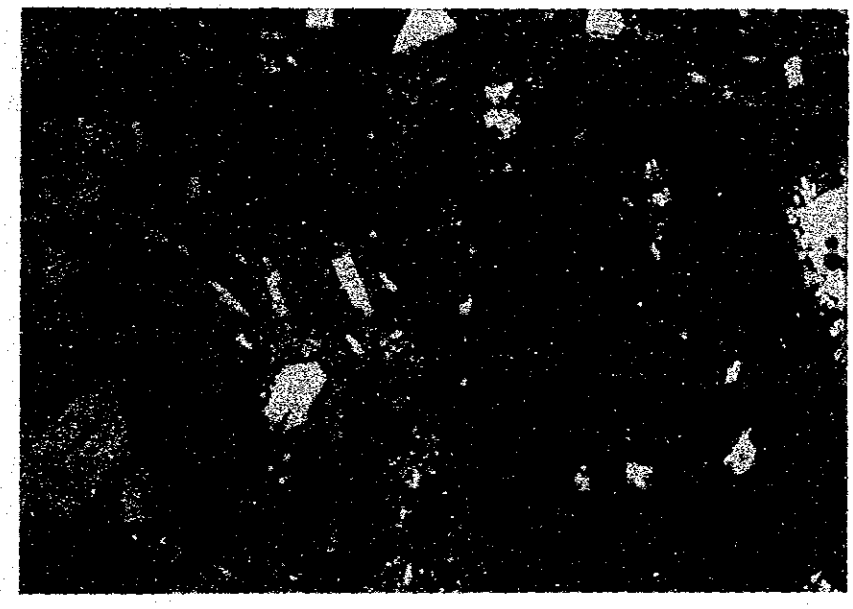
Northern Leyte Area
(Thin section micro-photograph)

Cross Nicol x 30

0 0.5mm

Hornblend Andesite (Sample No. NA021)

Locality ; 4 Km NNE Lioliog in west coast of Leyte.
Phenocryst ; Plagioclase, hornblend, biotite, augite, Fe mineral
Groundmass ; Plagioclase, Fe mineral, glass.



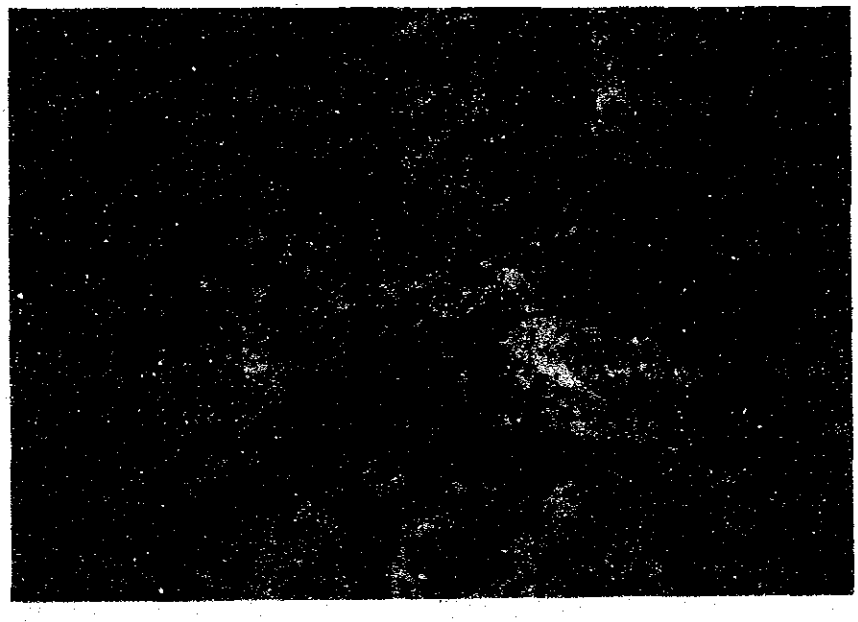
Parallel Nicol x 30

0 0.5mm

Cross Nicol 0 0.5mm

Diorite (Sample No. NLR-4)

Locality ; 4 Km NE Albuera in west coast of Leyte
Main Mineral ; Plagioclese (Andesine - Labladorite)
Accessory Mineral ; Hornblend, K-feldspar, quartz, biotite, Fe-mineral apatite, epidote, zircon, chlorite.



Parallel Nicol 0 0.5mm

Cross Nicol

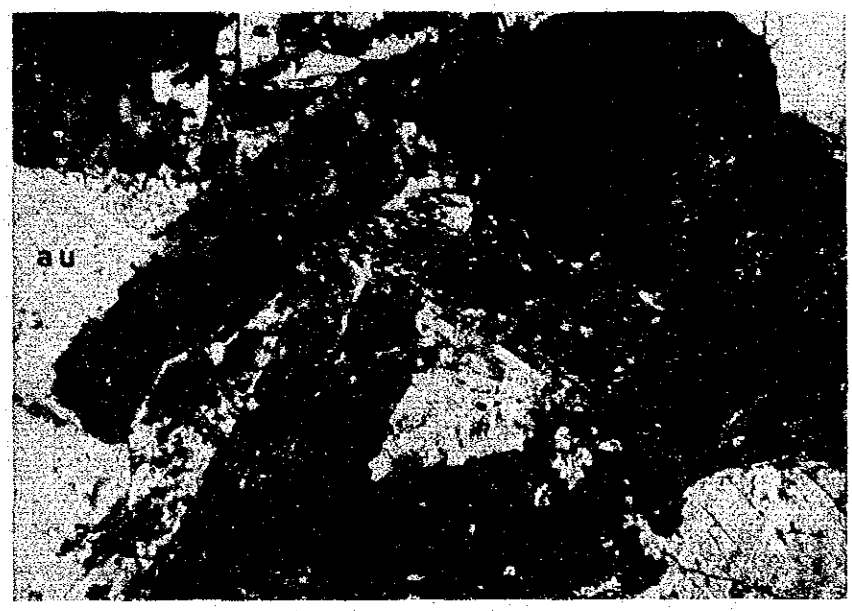
0 0.5mm

Serpentine (Sample No. K100701)

Locality; 18 Km E Ormoc. city of West side Leyte.
Main Mineral ; Serpentinite
Accessory Mineral ; Fe mineral. Chlorite

Parallel Nicol

0 0.5mm



Cross Nicol

0 0.5mm

Altered Gabbro (Sample No. NC249R)

Locality ; 15 K NW Tacloban City
Main Mineral ; Plagioclase, augite, actinolite
Accessory Mineral ; Apatite, Fe mineral

Parallel Nicol

0 0.5mm

Cross Nicol x 30

0 0.5mm

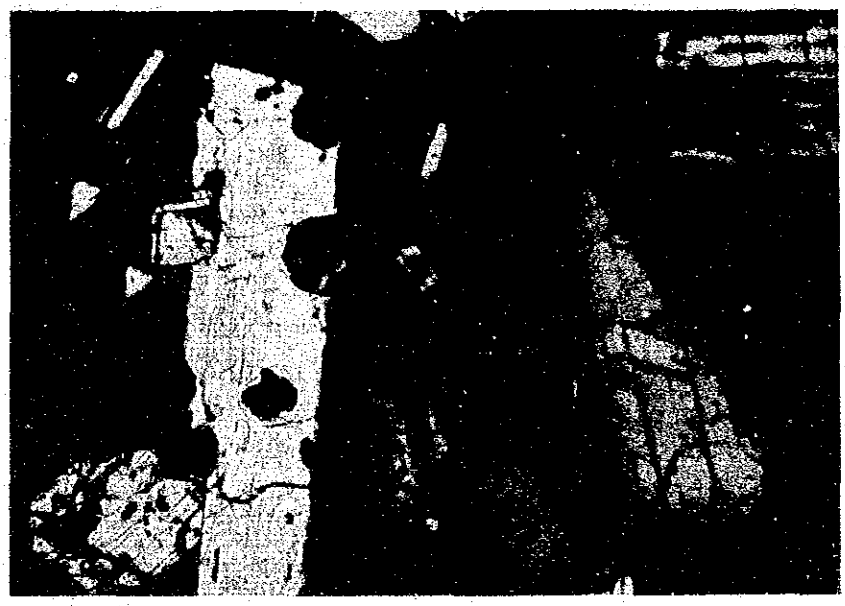
Sericite Quartz Schist (Sample No. VC02 101085)

Locality ; 5 Km NW Tacloban
Main Mineral ; Quartz
Accessory Mineral ; Sericite, Hematite

Parallel Nicol x 30

0 0.5mm

Southern Leyte · Dinagat · Siargao Area
(Thin section micro-photograph)

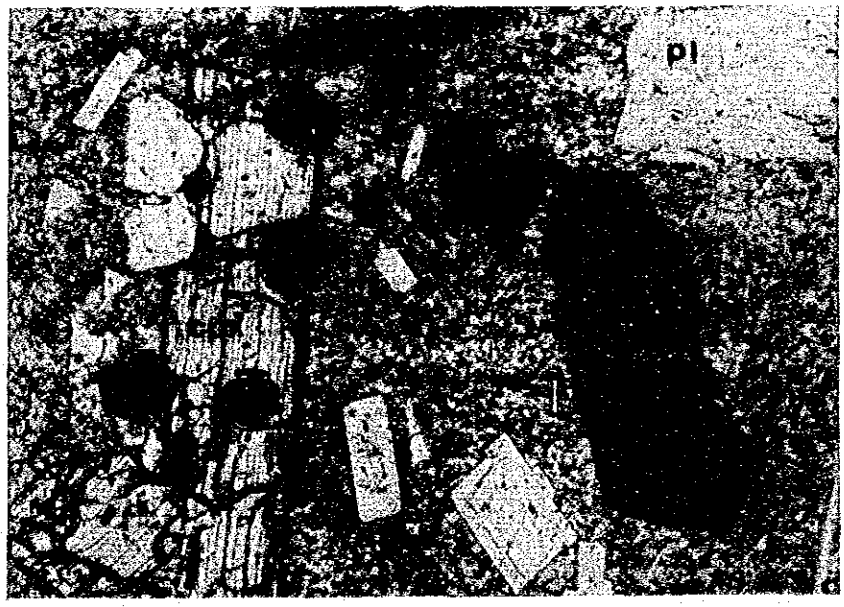


Cross Nicol

0 0.5mm

Biotite hornblend two pyroxene andesite (Sample No. S110)

Locality ; 8 Km N of Sogod in Southern Letye
Phenocryst ; *Plagioclase, orthopyroxene, clinopyroxene, hornblend, biotile*
magnetite, apatite
Groundmass ; Plagioclase, magnetite, glass



Pl ; plagioclase
ho ; hornblend
Cpx; clinopyroxene

Parallel nicol

0 0.5mm

Cross Nicol

0 0.5mm

Lherzolite (Sample No. N121)

Locality ; 5 Km S Punta west coast South-East Peninsula of Southern Leyte
Main mineral ; Olivme, Orthopyroxene, clinopyroxene,
Accessory mineral ; Magnetite, chromite

opx; orthopyroxene
ol ; olivine

Parallel Nicol

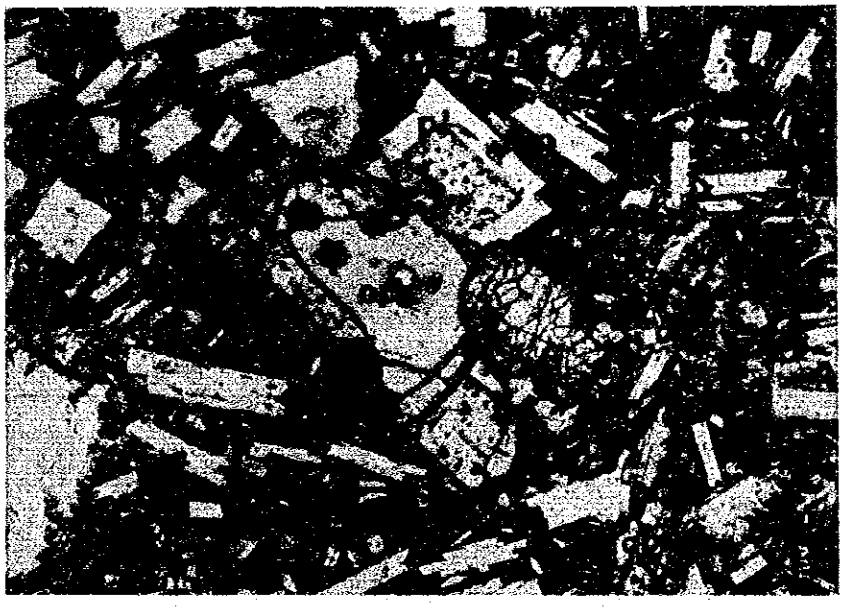
0 0.5mm

Cross Nicol

0 0.5mm

Two-pyroxene Andesite (Sample No. R165)

Locality ; 5 Km NW Pintuyan South-West coast Panaon Is. in Southern Leyte
Phenocryst ; Plagioclase, orthopyroxene, clinopyroxene, magnetite
Groundmass ; Plagioclase, orthopyroxene, clinopyroxene, magnetite, glass



Pl ; plagioclase
Op ; orthopyroxene

Paraller Nicol

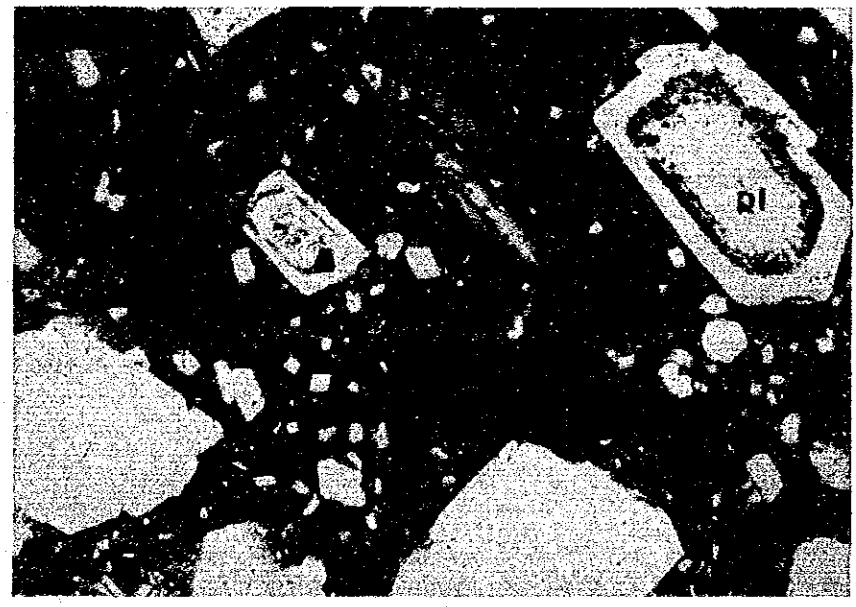
0 0.5mm

Cross Nicol

0 0.5mm

Hornblend andesite (Sample No. P160)

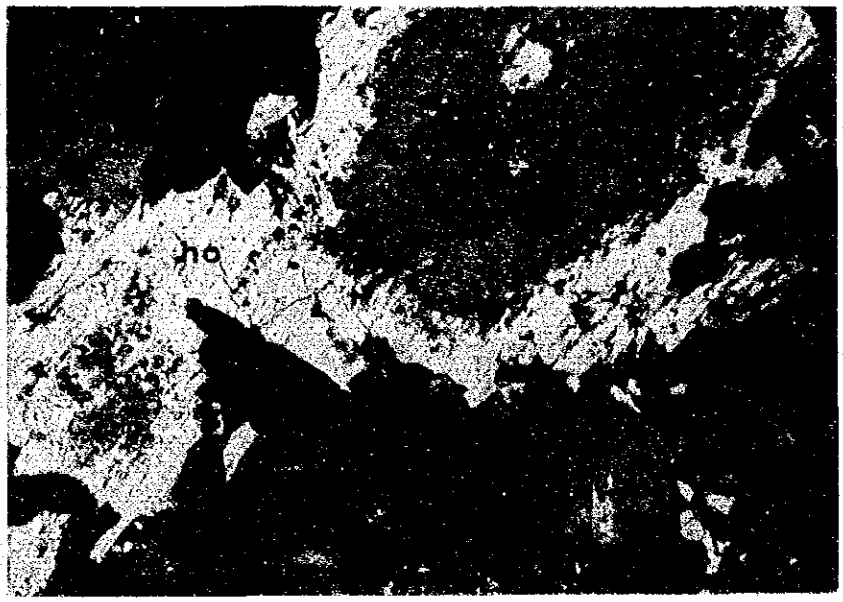
Locality ; 1 Km S pintuyan South-West Coast Panaon Is in Southern Leyte
Phenocryst ; Plagioclase, hornblend, biotite, magnetite, apatite
Groundmass ; Plagioclase, hornblend, magnetite, glass



ho ; hornblend
Pl ; plagioclase

Parallel Nicol

0 0.5mm



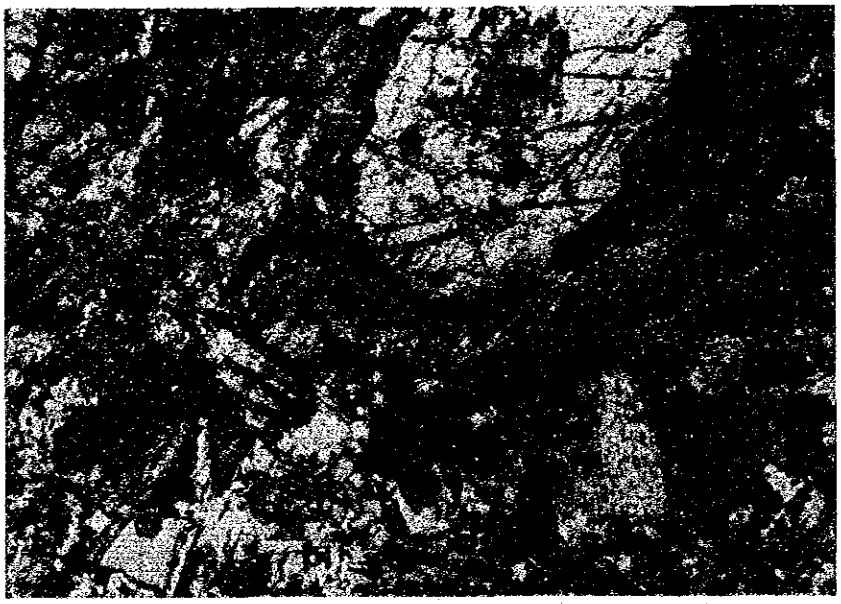
cpx; clinopyroxene
ho ; hornblend

Cross Nicol

0 0.5mm

Pyroxene hornblend gabbro (Sample No. Y-23-2)

Locality ; Middle Bucas Is
Main mineral ; Plagioclase, hornblend, clinopyroxene
Accessary mineral ; Biotite, magnetite, ilmenite, sphene



Parallel Nicol

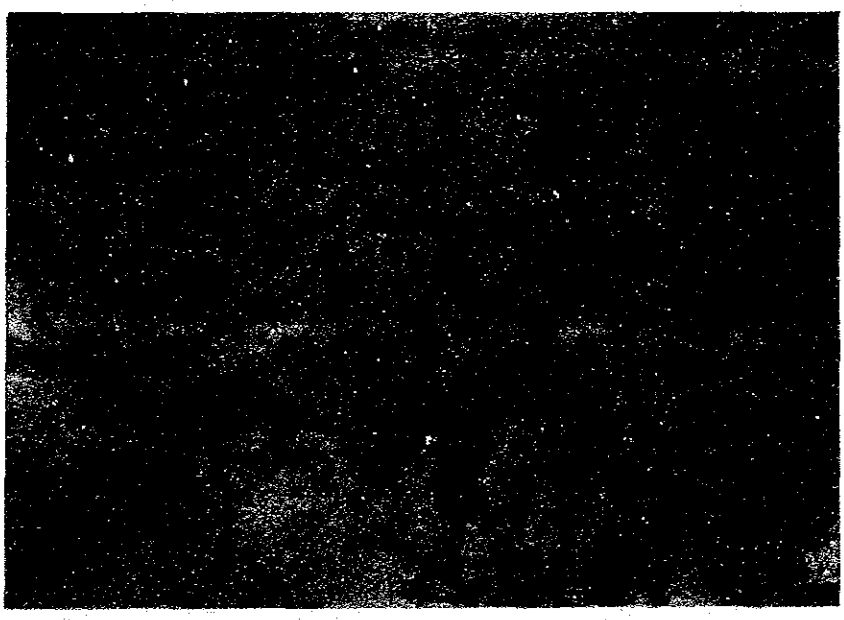
0 0.5mm

Masbate Area
(Polished section micro-photograph)

Sample of Dogosangan Showing
Disseminated Ore
Grain size under 0.7 mm
consisting of massive
chalcopyrite sphalerite and
granular pyrite.
Covelline occur margine of
chalcopyrite and sphalerite.

cp ; chalcopyrite
sp ; sphalerite
cov; covelline

0 0.1mm

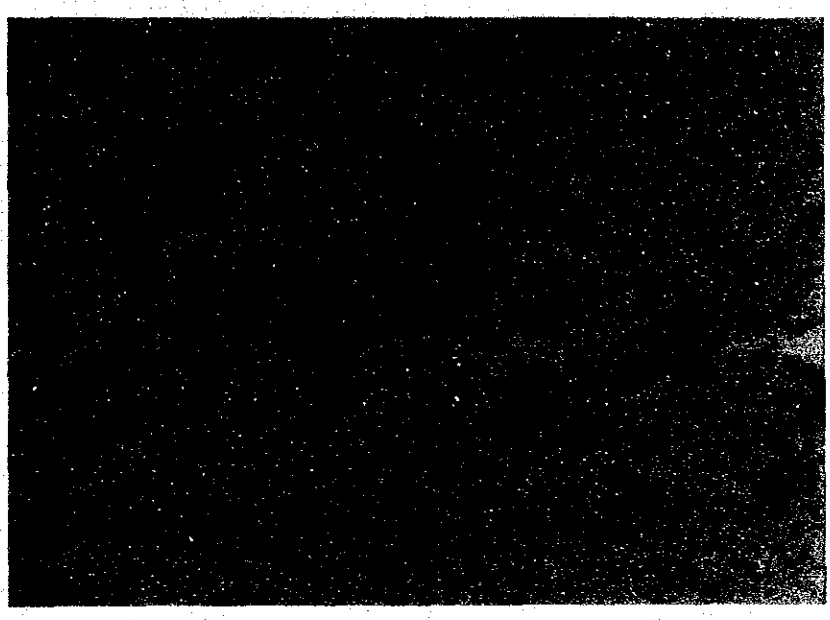


Sample of Matanglad Showing
Secondary Enriched Massive Ore
Brochantite > chalcocite
Covelline ≒ Bornite

cc ; chalcocite
cov; covelline

0 0.1mm

Northern Leyte Area
(Polished section micro-photograph)



Sample of Antipolo Showing Disseminated Marcasite Pyrite Ore

Marcasite; 0.05 - 1 mm size Idiomorphic and Semi-Idiomorphic Form. Anisotropism strong.

mar; marcasite

0 0.5mm

Sample of Curajo Showing Pyrite-chalcopyrite massive ore

Pyrite; 0.1 - 0.3 mm Semi-idromorphic and xenomorphic Form
Chalcopyrit; Cementing around Pyrite grain with sphalerite

py ; Pyrite
cp ; Chalcopyrite

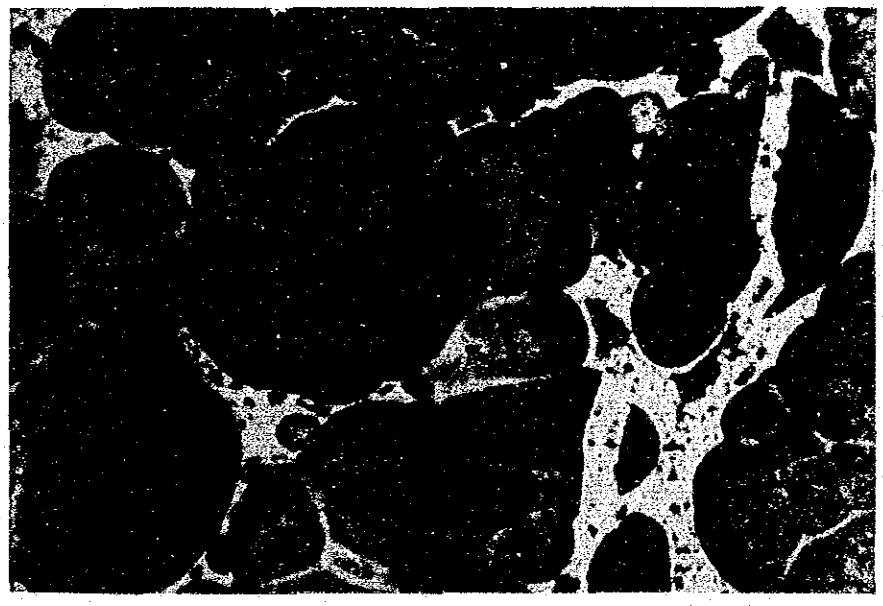
0 0.5mm

Southern Leyte Area
(Polished section microphotograph)

Sample of Anilao Showing
(Druse Ore)
Specularite Chalcopyrite
Magnetite Covelline
Sepecularite;
Idiomaphic columnar,
needle and platy habit.
3 - 0.3 mm

cp ; chalcopyrite
sp ; specularite

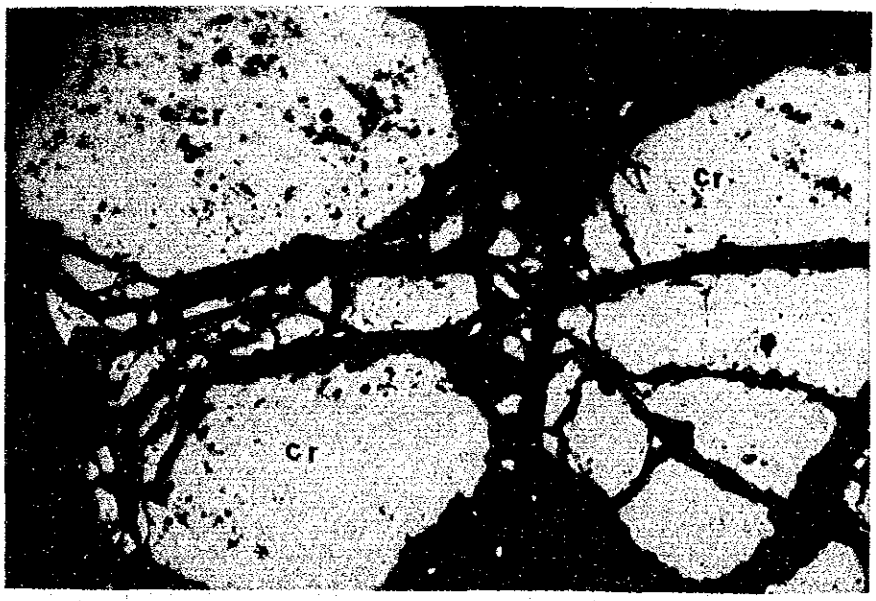
0 0.5mm



Sample of Punpunan Showing
Manganese Ore
(Manganese nodule like)
Pyrolusite and Todorokite are
identified by X-Ray
diffraction method.

0 0.5mm

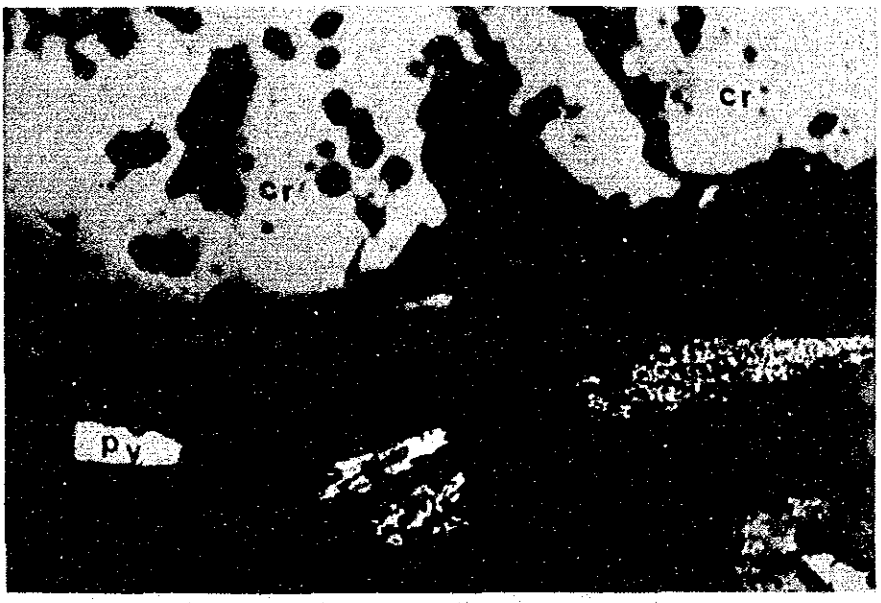
Dinagat area
(polished section micro-phtograph)



Sample of Velor Showing
(SF25)
Chromite ;
Idiomorphic crystal or
Granular texture.

ch ; chromite

0 0.5mm



Sample of Avelina Showing

Chromite ore
Combination of ore
mineral.

ch ; chromite
mg; magnetite
py ; pyrite

0 0.5mm

APPENDICS

Appendix-3-1

Masbate Area

Sample No.	Radiolaria	Foraminifera	Known age
1. 091904	Barren	Barren	Unknown
2. E25098502	Barren	Rare/Poor	Unknown
3. C090907	Barren	Rare/Poor	Unknown
4. 0912013	Barren	Barren	Unknown
5. C0922018	Barren	Rare/Poor	Unknown
6. G001R	Barren	Barren	Unknown
7. L003090385	Barren	Barren	Unknown
8. L091092985	Barren	Barren	Unknown
9. S0928010	Rare/Poor	Barren	Unknown
10. G124R	Barren	Barren	Unknown
11. H0269685	Barren	Barren	Unknown
12. A093001	Barren	Rare/Poor	Unknown
13. M169FD	Rare/Poor	Barren	Unknown
14. B20098502	Barren	Barren	Unknown
15. F165R	Rare/Poor	Barren	Unknown
16. F185R	Barren	Barren	Unknown
17. H08792085	Barren	Barren	Unknown
18. L086092285	Rare/Poor	Barren	Unknown
19. M094FD	Rare/Poor	Barren	Unknown
20. N163	Rare/Poor	Barren	Unknown

Northern Leyte Area

Sample No.	Radiolaria	Foraminifera	Known age
NF-225-1R	Barren	Globorotalia tumida (s.l.)	younger than Pliocene
NM-005R	Barren	Barren	Unknown
NJR-01	Barren	Barren	Unknown
NJR-02	Barren	Barren	Unknown
NJR-03	Barren	Barren	Unknown
NK-020R	Barren	Barren	Unknown
NK-018R	Barren	Barren	Unknown
NES-07R	Barren	Barren	Unknown
NES-09R	Barren	Barren	Unknown
NFS-07R	Barren	Barren	Unknown
NF-202R	Barren	Barren	Unknown
NF-204R	Barren	Barren	Unknown

Southern Leyte; Dinagat and Siargao Area

Sample No.	Radiolaria	Foraminifera	Known age
T-018	Barren	Globorotalia tumida tumida G. tumida flexuosa G. ungulata	Late Pliocene to Pleistocene
T-086	Barren	Globorotalia tosaensis G. crassaformis G. inflata Pulleniatina obliquiloculata Neogloboquadrina dutertri	Late Pliocene to Pleistocene
R-099	Barren	Globorotalia crassaformis G. tosaensis G. inflata Spheroidinella dehiscens	Late Pliocene to Pleistocene
N-020	Barren	Globorotalia tumida tumida G. tumida flexuosa G. ungulata Sphaeroidinella dehiscens Pulleniatina praecursor P. obliquiloculata	Late Pliocene to Pleistocene
W91225(No.1)	Barren	Abundant/Poor	Unknown
SF003	Barren	Barren	Unknown
N186	Barren, Sponge spicules	Common/Moderate	Unknown
V114	Barren	Rare/Poor	Unknown
P197	Barren	Barren	Unknown
V003	Barren	Abundant/Poor	Unknown
Q063	Barren	Rare/Poor	Unknown
N118	Barren	Barren	Unknown
S153	Barren	Rare/Poor	Unknown
U093	Barren	Rare/Poor	Unknown
R131	Barren	Rare/Poor	Unknown
T237	Barrn	Rare/Poor	Unknown
V035	Barren	Common/Poor	Unknown
Q245	Barren	Rare/Poor	Unknown
R048	Barren	Barren	Unknown

Appendix 3-2 Microfossil Correlation Table

Age Determination on Calcareous Nanno-Plankton Fossils
by Dr. N. Okada Geo-Science Fac. Yamagata Univ.

Sample No.	Nanno-Plankton Zone	Geological Age	Note
(Masbate Area)			
2. B25098502	CN 4	Middle Miocene	
5. C0922018	CN 9	Upper Miocene	
7. L003090385	CN 1a	Lower Miocene	
9. S0928010	?	Upper Eocene - Oligocene	Rare fossils
13. M169	CN8-11	Upper Miocene - Lower Pliocene	
20. N163	?	Probable Upper Oligocene	Rare fossils
(Northern Leyte Area)			
1. NM003R	CN 9	Upper Miocene	
6. NK008R	CN14b-15	Upper - Middle Pleistocene	Bearing many Resedimentation Fossils of Miocene and Plioce
9. NK004R	CN 14b	Upper - Middle Pleistocene	
13. NF143R	CN 9	Upper Miocene	
14. NF154R	CN 9	Upper Miocene	
15. NF159R	CN 9b	Upper Miocene	
16. NF182R	CN 9	Upper Miocene	
19. NF210-2R	CN 14b	Upper-Middle Pleistocene	Bearing many rese dimentation fossils of Miocene and Pliocene.
(Southern Leyte; Dinagat; Siargao Area)			
2. W91225(No.1)	CP 19b	Upper Oligocene	
3. SF003	CP 13-CN5a	Middle Eocene-Middle Miocene.	Rare fossils
4. T018	CN 11	Lower Pliocene	
5. N186	?CN13a	Upper Pliocene.	Bearing many resedimentation fossils of Miocene an Pliocene.
6. V114	CN 14a	Middle-Lower	Pleistocene.
7. T086	CN 14a	"	"
8. N020	CN 10-11	Lower Pliocene	
10. V003	CN 9-11	Upper Miocene-Lower Pliocene.	Small amount of Discoaster
11. Q063	CN 12a,b	Upper Pliocene	
12. N118	CN 12	Upper Pliocene.	Bearing many resedimentation fossils of Miocene and Pliocene.
13. S153	CN 14a	Upper-Middle Pleistocene.	
14. U093	CN 5b-11	Middle Miocene-Lower Pliocene	
15. R099	CN 12a	Upper Pliocene.	Bearing many resedimentation fossils of Miocene and Pliocene.

Southern Leyte; Dinagat and Siargao Area

Sample No.	Radiolaria	Foraminifera	Known age
T-018	Barren	Globorotalia tumida tumida G. tumida flexuosa G. ungulata	Late Pliocene to Pleistocene
T-086	Barren	Globorotalia tosaensis G. crassaformis G. inflata Pulleniatina obliquiloculata Neogloboquadrina dutertri	Late Pliocene to Pleistocene
R-099	Barren	Globorotalia crassaformis G. tosaensis G. inflata Spheroidinella dehiscens	Late Pliocene to Pleistocene
N-020	Barren	Globorotalia tumida tumida G. tumida flexuosa G. ungulata Sphaeroidinella dehiscens Pulleniatina praecursor P. obliquiloculata	Late Pliocene to Pleistocene
W91225(No.1)	Barren	Abundant/Poor	Unknown
SF003	Barren	Barren	Unknown
N186	Barren, Sponge spicules	Common/Moderate	Unknown
V114	Barren	Rare/Poor	Unknown
P197	Barren	Barren	Unknown
V003	Barren	Abundant/Poor	Unknown
Q063	Barren	Rare/Poor	Unknown
N118	Barren	Barren	Unknown
S153	Barren	Rare/Poor	Unknown
U093	Barren	Rare/Poor	Unknown
R131	Barren	Rare/Poor	Unknown
T237	Barrn	Rare/Poor	Unknown
V035	Barren	Common/Poor	Unknown
Q245	Barren	Rare/Poor	Unknown
R048	Barren	Barren	Unknown

Appendix- 4

Age Determination of Whole Rock Samples
by K-Ar Method

Sample No.	Isotopic Age (Ma)	^{40}Ar (scc/gm x 10^{-5})	% ^{40}Ar	% K
(Masbate Area)				
A091101	7.1 ± 0.5			
		0.041	29.5	1.48
		0.041	39.2	1.50
L061091385	22.6 ± 1.1			
		0.618	91.4	6.95
		0.621	86.0	6.98
				7.06
(Northern Leyte Area)				
NC249R	50.0 ± 3.9			
		0.035	29.0	0.18
		0.036	28.3	0.18
NLR4	20.9 ± 2.3	0.073	40.3	1.01
		0.084	49.8	1.01
		0.091	48.6	
(Southern Leyte Dinagat Siargao Area)				
P160	0.2 ± 0.1			
		0.001(1)	3.7	1.82
		0.001(2)	5.4	1.84
		0.001(8)	9.1	
R165	1.44 ± 0.7			
		0.008(5)	40.0	1.51
		0.008(5)	43.8	1.52
S110	2.48 ± 0.12			
		0.023	31.2	2.48
		0.025	50.5	2.49
Y23-2	84.8 ± 4.2			
		0.131	54.1	0.40
		0.139	49.4	0.40

(Studied by TELEDYNE JAPAN)