第２年次は，第１年次未調査の地域に対して，同様の採取を行い，鉱床の賦存が予想される地域については採試密度を高めた。第１年次に鉱種ごとの鉱化作用の及んでいる区域（鉱床生成区）を把握することができたので，第２年次に採取した1,１０９箇の沢砂を下記４地区(Fig.２２)に分け，その地区に最も効果的と考えられる成分につき化学分析を行った。

Ⅰ地区……Cr 又は Ni 鉱床が期待される超マフィック岩類の分布地域。

分析成分；Cu,Pt,Ni,Cr,Fe,Co

Ⅱ地区……Au,Ag,Pb,Zn 鉱床が期待される地域。

分析成分；Au,Ag,Cu,Pb,Zn

Ⅲ地区……鉄鉱床が期待される地域。

分析成分；Au,Cu,Fe,Co,V,Ti,P

Ⅳ地区……重晶石鉱床が期待され，Au の鉱化作用が重複している可能性がある地域。

分析成分；Au,Ag,Cu,Pb,Zn,Ba

第３年次は，Cu鉱床が期待される地区において，２７箇の補足沢砂試料を採取し，Cu,Pb,Zn の化学分析を行った。

１－２　分析データの処理及び結果

第１年次に分析した１０成分のうち，因子分析によってAg,Cu,Zn,Ni,Cr の５成分が鉱化作用に関係があるとして抽出されたが，Agはしきい値(t)が0.9㎎と低く，しかも火成活動が全くみられない石灰岩地域に異常が現れたため，第２年次には，Agの挙動を凝問視して分析成分から除き，代わりに南部の重晶石の鉱化作用の範囲をみるためBaを追加した。

したがって，全島の地化学データ解析に当っては，Cu,Zn,Ni,Cr,Ba の５元素について，第１年次～第３年次の全データを総合した。成分ごとのヒストグラム及び累積頻度分布図をFig,２３，２４に，諸統計量をTable ７に示してある。

この図から明らかなように，Cu,Zn,Cr,Baの４成分は，ほゞ対数正規分布に近い傾向を示すが，Ni は濃度区分全体にわたって，ほゞ均等な頻度で分布している。これは，Ni が超マフィック岩類中に平均的に含有され，分化過程で特定箇所に濃集しなかったことを示唆している。

Plate ２は，Cu,Zn,Ni,Cr,Ba の５成分について，各試料濃度 $t' = 10^{\log M+2S.D.}$～$t = 10^{\log M+2S.D.}$以上の２段階に分けて１：２５０,０００の地形図上にプロットしたものである。地化学異常帯の概略は次のとおりである。

1. Bongabong 川の支流 Siange 川で Zn 異常を伴う Cu 異常（Cu：１００～４５０㎎，Zn：１６０～５２０㎎）が得られた。Siange 川の南斜面には珪化帯があり，北側にはAcliang &Pajo（㎞１０）の鉱徴があるので，Cu鉱化帯がＮ－Ｓ方向に伸びていることが予想される。

西側の道路沿いで得られたCu異常は，人工汚染の疑いがあり，又西側のLumintao川より

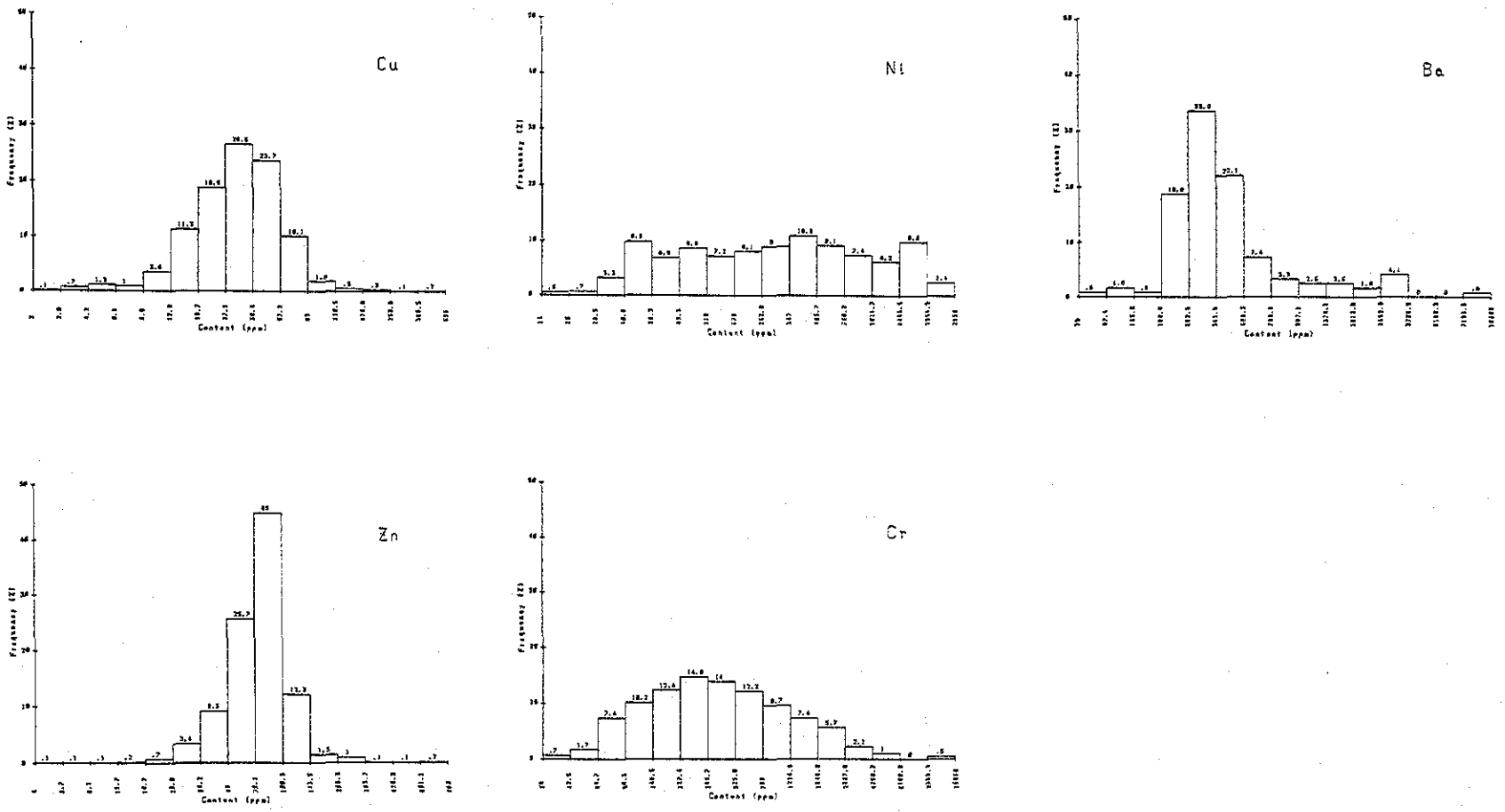

Fig. 23 Histogram of Geochemical Data (Stream Sediment)

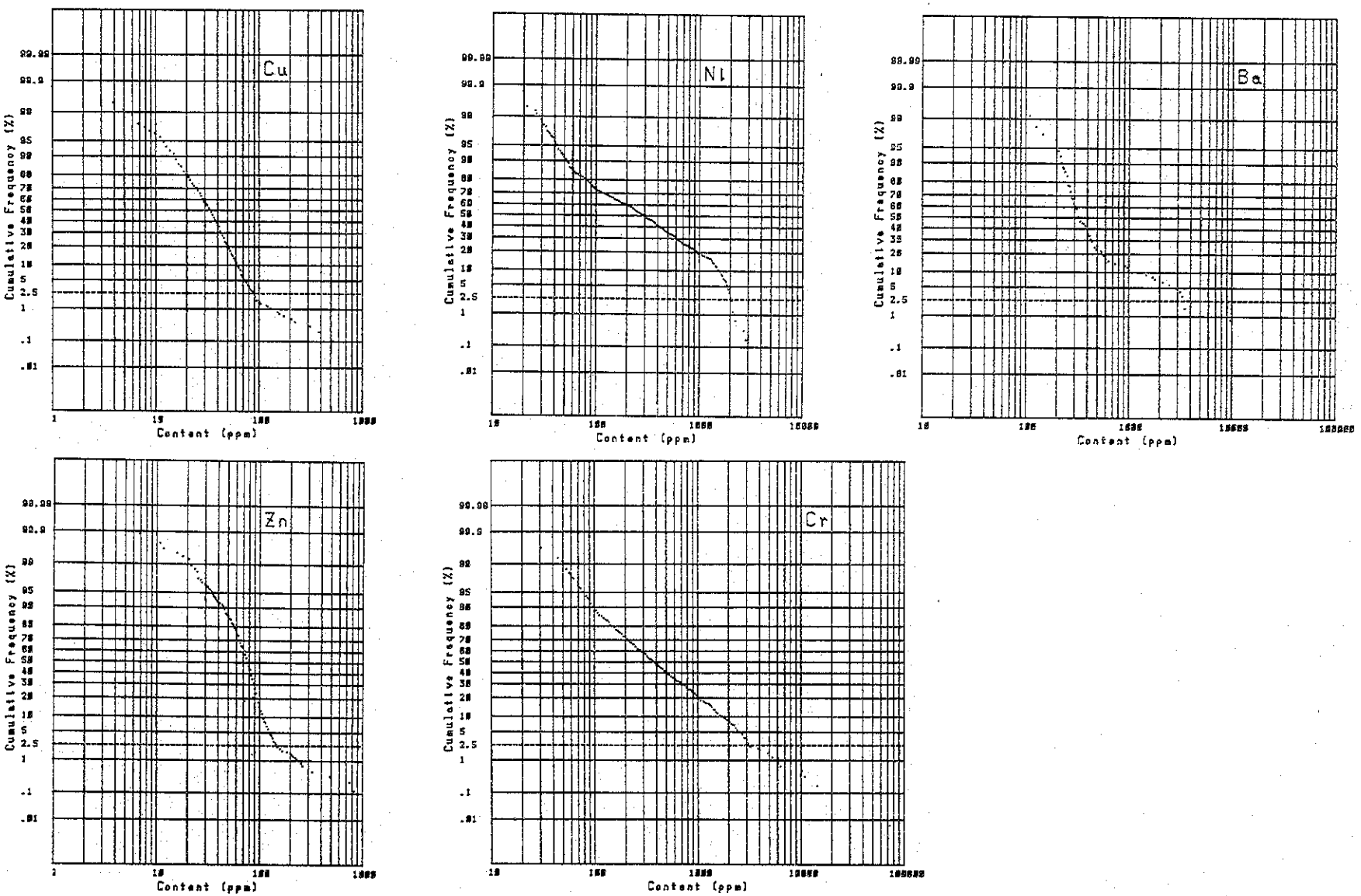

Fig. 24 Cumulative Frequency Distribution of Each Element

Table 7 Statistic Values of Geochemical Data (Stream Sediment)

(in ppm)

	Cu	Zn	Ni	Cr	Ba
Number of Samples (pcs)	1,558	1,071	913	913	213
Minimum	1	7	26	45	50
Maximum	225	755	2,950	15,000	10,000
Geometric Mean (M)	31.3	73.0	278	401	478
Standard Deviation (Log)	0.286	0.189	0.536	0.473	0.342
$10^{\text{Log M + S.D.}}$	58	113	956	1,192	1,051
$10^{\text{Log M + 2S.D.}}$	107	174	3,283	3,541	2,309
Number of Anomalous Samples	10	14	0	12	7

Rayusan 川にかけて広がる弱い Cu 異常は Lumintao 層の玄武岩が分布する地域であって，恐らく岩質によると考えられる。

2. Rayusan 川の Cu を伴う弱い Zn 異常（１５２～２０４ppm）は，Mansalay 層の粘板岩地域にある。流域に鉱化変質が全く認められないで，岩質による可能性が強い。

3. Ni，Cr の異常は，超マフィック岩類が分布する地域とよくマッチしている。Ni の弱い異常（９５６～２９５０ppm）は，超マフィック岩類の分布域に万遍なく広がり，Cu の異常とも重複している箇所が多い。一方 Cr の t（ 3,５４１ppm）以上の異常は，西側の Pintin 岩体中にはなく，東側の Ogas 岩体中に集中している。この分布はパンニング結果とも一致し，クロム鉄鉱の露頭位置と良く対応している。

Pula 川と Balete 川にかゝる異常は，Cr 含有量が 2,４２６～１０,５６５ppm と非常に高い値を示したが，地質調査の結果，Bongabong 層群の礫岩を構成する超マフィック岩類の礫に因ることが明らかになった。

4. Ba の異常は，Taoga 重晶石鉱床のある Baroc 川上流の主として南斜面に分布している。異常流域は１０km^2に過ぎないが，１３箇所で 1,２６０～１０,０００ppm（平均 2,９７３ppm）を示した。Ba 異常は，Taoga 鉱床を中心として，よいまとまりをみせているので，新しい重晶石鉱床が期待される。

第2章　土壌による地化学探査

2－1　調　査　方　法

土壌による地化学探査は，第3年次に，Pula川上流にあるManamburao，Masnon，Shawoodの3つの銅鉱化帯の規模を確認するため，2㎞×5㎞の区域について実施した。

土壌試料は，採試線間隔２００m，採試間隔１００mの矩形格子法によりB層から採取したが，鉱化帯の近傍では採試線間隔１００mの補助線を設けた。採試数は５９１個。

採取試料は，風乾後８０メッシュ以下に調整し，混合酸に2時間浸析後，沪液中のCu，Pb，Znの含有量をICAP（プラズマ発光分光分析）法で定量分析した。

2－2　分析データの処理と結果

土壌試料は，Bongabong層群の砂岩，Lumintao層の玄武岩，Mansalay層の粘板岩及びカンラン岩で構成されるので，各層ごとにヒストグラムと累積度数曲線を作成し，諸統計量を算出した。この結果から，Pbを除いて分析データは対数正規分布を示し，各平均値や標準偏差値はほゞ等しい値をとることが明らかになった。したがって分割すると，層によっては統計処理がむずかしくなることもあって，全分析データーを一括処理した。

Table 8 Statistic Values of Geochemical Data (Soil)

		Cu	Pb	Zn
Number of Sample	(pcs)	591	591	591
Minimum	(ppm)	3	0	3
Maximum	(ppm)	168	38	151
Geometric Mean (M)	(ppm)	31.2	7.0	42.3
Standard Deviation	(Log)	0.207	0.342	0.187
$10^{\text{Log M + S.D.}}$		50.2	15.3	65.1
$10^{\text{Log M + 2S.D.}}$		80.9	33.6	100.1

Cu，Pb，Zn　元素の濃度分布図をFig.25に示したが，しきい値（ｔ＝2.5％）のほかに全体の傾向を示すため，全箇数の１０％に相当する等濃度曲線も記入してある。

この分布図と地質調査の結果を総合すると次のようになる。

(1)　土壌中のCu，Pb，Zn異常はあまり連続せず，むしろ孤立する傾向にあり，3成分が重複して現われた箇所は，Manamburao 露頭だけで，他のMasnon, Shawoodには，異常が検出できなかった。

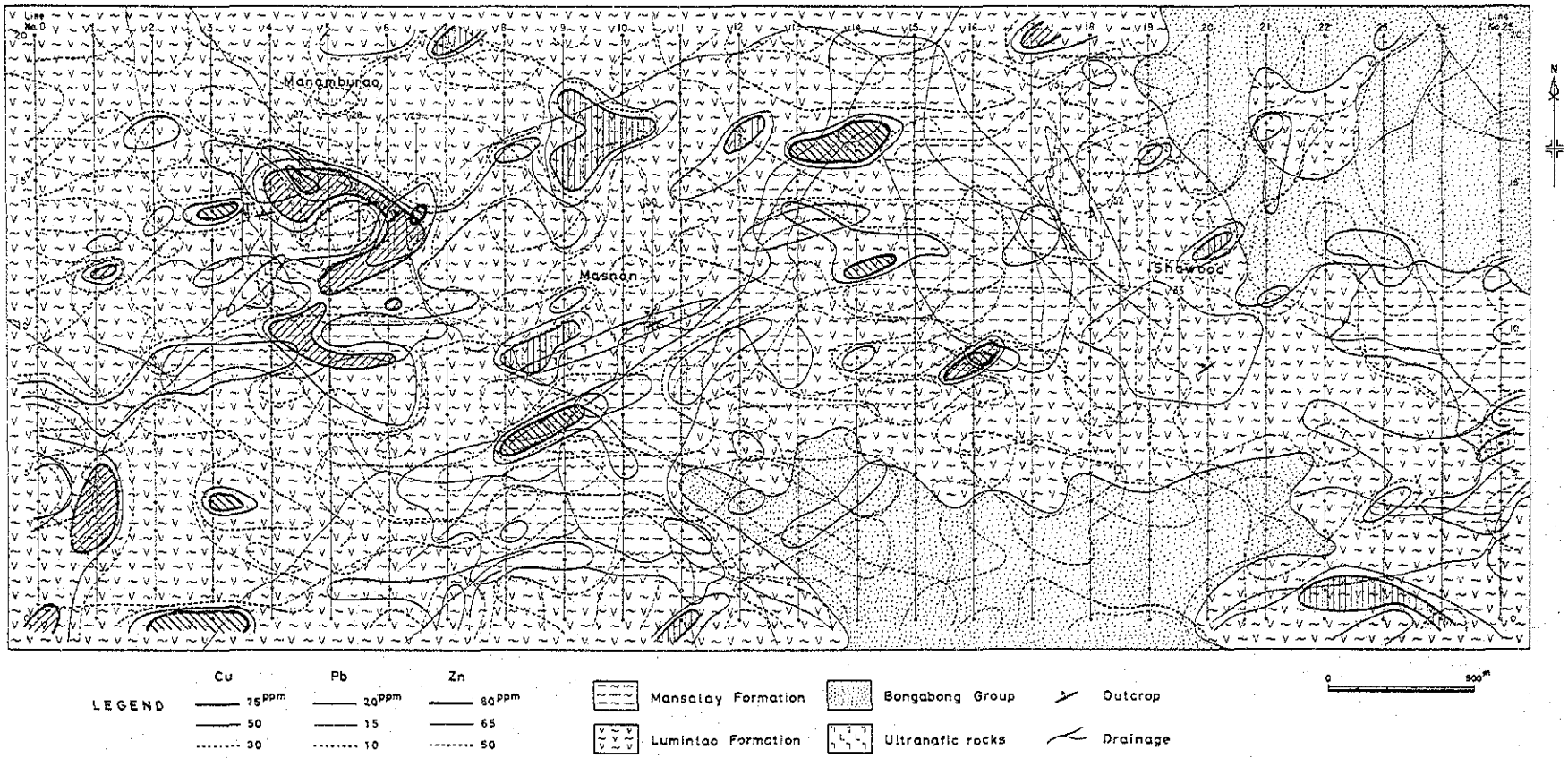

Fig. 25 Geochemical Anomalies in E-area (Soil)

(2) Manamburao では，１０％値以上の濃度帯がＮＥ－ＳＷ方向に伸びる傾向が見られる。鉱脈露頭は，Ｎ－Ｓ系，Ｅ－Ｗ系及びＮＥ－ＳＷ系の断層裂かを充塡したものであるが，地化学異常は，露頭を通るＮＥ－ＳＷ方向の弱線部に沿って現れていると考えられる。

(3) Masnon，Shawood の２鉱脈群は，細脈ながら高品位の Au 又は Cu を含有し，中には５０ｍ連続しているものがある。しかし，土壌中の３成分は，いずれもバックグランドに近い値を示しており，又，母岩の変質もほとんど認められないで，鉱化作用は，非常に局部的なものと考えられる。

第3章　重鉱物による地化学探査

3－1　探　査　方　法

ミンドロ全島の重鉱物の分布状況を明らかにするため，第1年次は，ほとんどすべての水系から，流速が急に減少する山ろく部において，１０５箇のパンニング試料を採取した。パンニングは，川底に沈積した一定量（2,０００m^3）の沢砂を対象とし，専門のパンナーが行った。濃縮物は，顕微鏡による立体観察や薄片又は研磨片観察及びX線解析により，クロム鉄鉱以下8種類の鉱物に分離することができた。

第2年次は，クロム鉄鉱の濃集区域を明らかにすることに重点を置き，超マフィック複合岩体内の各支流で採取した一定量（1,０００m^3）の沢砂から，パンニングによって１０１箇の試料を採取した。濃縮物は，磁石と重液（Clerici液）を使って磁性鉱物と軽鉱物を除去，最後に顕微鏡下でクロム鉄鉱を手選した。

3－2　データの処理及び結果

第1年次のパンニング試料は，結晶形態，透明度，色，光沢などの違いから，当初１３種類に細分したが，顕微鏡下の観察とX線による同定により，磁鉄鉱，クロム鉄鉱，黄鉄鉱，ザクロ石，輝石の5主要鉱物と，石英，斜長石，絹雲母の3副鉱物に区分した。

これらの鉱物のうち，重要と考えられる，磁鉄鉱，クロム鉄鉱，黄鉄鉱の分布状況は次のとおりである。

a）クロム鉄鉱

クロム鉄鉱は，西側より東側に濃集する傾向があり，しかも超マフィック岩類の分布域で，例外なく高い値を示している。又，Sablayan,Bongabong,Socorro層群の分布域でも異常が得られたが，これらの層群の構成メンバーである砂岩が超マフィック岩類の粒子を含んでいるためと考えられる。

b）磁鉄鉱

磁鉄鉱は，クロム鉄鉱と似た分布を示し，超マフィック複合岩類が分布する地域で高くなっている。一方，磁鉄鉱鉱床のあるMamburao川やPagbahan川で，多数の鉱石が在るにもかかわらず異常が出なかったのは，露頭位置に近過ぎて，鉱石が細粒化せず，採試料に小石として除去されたためであろう。

c）黄鉄鉱

黄鉄鉱は，Halcon変成岩類及びMansalay層の分布する地域で高い傾向があり，岩質によると考えられる。Siange　Cu-Zn異常帯付近の黄鉄鉱の濃集は，岩質のほかに鉱化作用に関係があるようである。

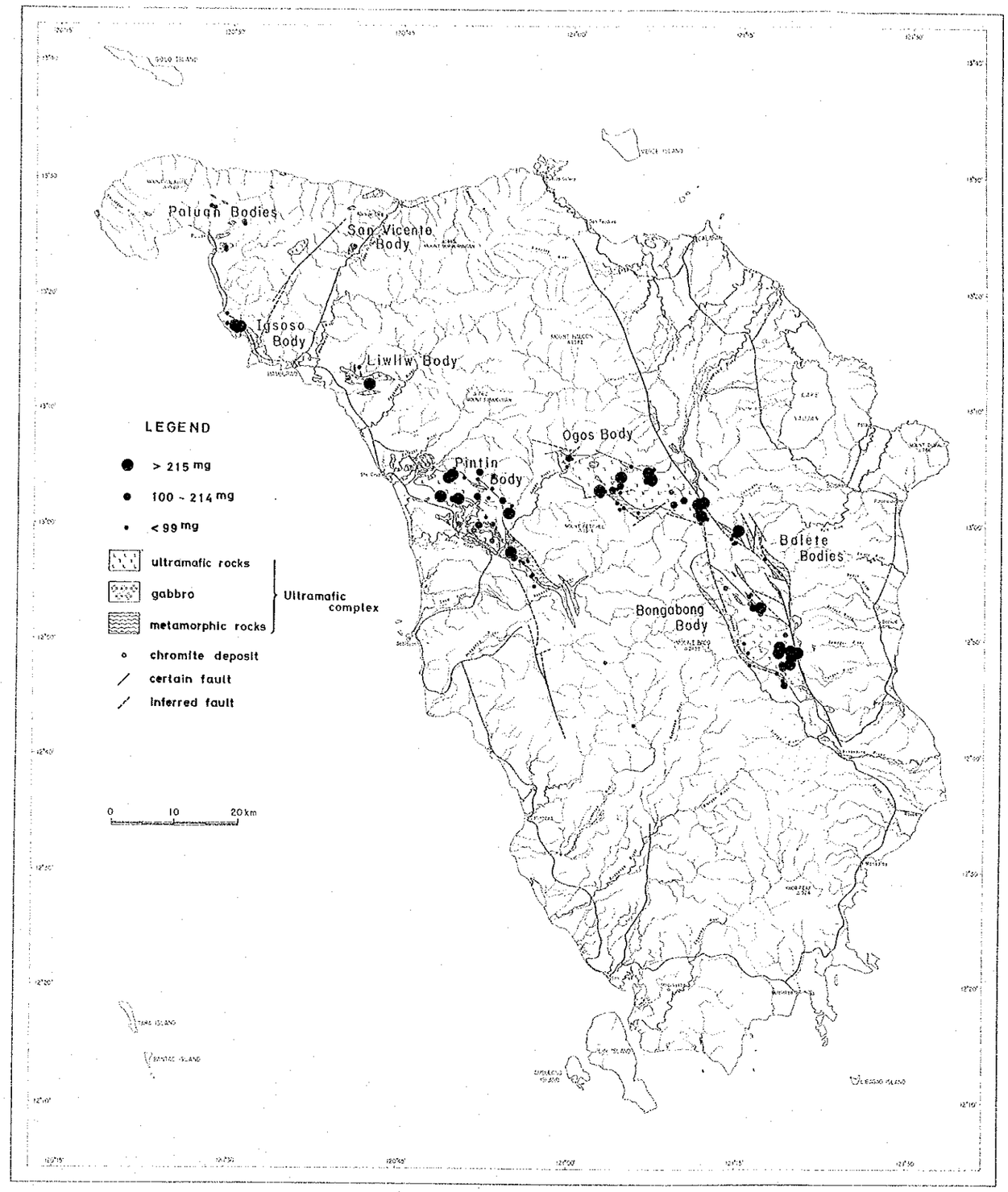

Fig. 26 Distribution of Heavy Mineral (Chromite)

d）その他

ミンドロ島の砂金は，丸みを帯びた0.5～1㎜大の中粒のものが多く，河床の巨礫の下の荒い砂中に含まれることが経験的に知られているが，今回の表層の砂を対象とした方法では，良い結果を得ることができなかった。

第2年次は，パンニング試料中のクロム鉄鉱の重量を測定した。Fig. 26に示すように，Ogos岩体中では，Ogos鉱床の沢で高い値が得られ，西側へ連続する様相を呈している。又，本岩体東端のAglubang川支流の異常域は，Ogos鉱床と異なる鉱層の存在を暗示していたが，その後の調査で網状脈が発見され，これに因ることが明らかになった。

Bongabong岩体では，クロム濃集域は東斜面に限られ，西斜面のBongabong川流域には，現れなかった。すなわち，Banus鉱床から5㎞南方のSumagui川上流にかけて高い濃縮が得られ，その後，小規模ながらクロム鉄鉱の鉱徴を把握した。

西側に分布する超マフィック岩体内でも，鉱徴とクロム鉄鉱の量との間に密接な関係が認められ，Pintin岩体では，岩体の西側より東側に濃集する傾向がある。

Ⅳ　結論及び勧告

第1章 結　　論

ミンドロ島全域について，3箇年にわたる地質調査，地化学探査及び磁気探査を実施した結果，次の結論が得られた。

1. 本地域の地質は大きくみると，中央部にNW－SE方向の隆起帯があり，基盤をなすジュラ紀以前の古期岩類を中核として，両外側に向かって順次若い地層が帯状に分布し，背斜構造を示している。最も顕著な地質構造線は，Mindoro断層やWasig断層に代表されるNW－SE系であり，中生代末の超マフィック岩類や古第三紀の閃緑岩類がこれに沿って貫入，各種の鉱化作用をもたらしている。

2. 主要鉱床には，砂金，銅，クロム，鉄，重晶石，石炭の6種類がある。

(1) 砂金はHalcon変成岩類又はBongabong層群に由来し，直接火成活動に伴う鉱化作用によるものではないと考えられる。砂金を採集している川の砂の量がそれほど大きくないので，Sluice box（俗称ねこ流し）とパンニングによる採鉱法が適当と思われる程度の鉱床と判断される。

(2) 銅の鉱化帯は，ジュラ紀以前の古期岩類中に発達した裂か充塡型で，古第三紀の閃緑岩類の貫入に関係している。Pula川上流の鉱化帯は，土壌地化学探査の結果，局部的であることが判明し，開発の対象にはならないと考えられる。

(3) クロム鉱化帯は超マフィック複合岩体中に賦存し，層状をなすタイプと塊状をなすタイプに分けることができる。東部中央の複合岩体は，ダイナト，ハルツージャイト及びレールゾライトから成り，層状構造が発達しているが，本調査で認められたOgos鉱床は，幅6.5 m，Cr_2O_3品位33%，走向長数10 mが期待される層状鉱体で，ダナイト中に賦存している。この鉱体の東方1 kmに位置する露頭（幅1.0 m，Cr_2O_3品位42%）もダナイト中にあって，Ogos鉱体とほゞ同一層準と考えられるため，Ogos鉱体の東方への連続が期待できる。

これ以外の鉱徴については，小規模で鉱量は100トン以下と考えられる。

(4) 鉄鉱床は，ジュラ紀又は第三紀の石灰岩中に貫入した第三紀の閃緑岩類による接触交代鉱床である。比較的規模が大きいと考えられるNagsabongan，Lasala，Lapa-aoの3鉱床につき簡易磁気探査を実施した結果，それぞれ1,200～3,600万トンの推定鉱量が期待されることが判明した。

(5) 南東部の重晶石鉱床は，ジュラ紀のMansalay層中の裂かを充塡した鉱脈型鉱床であり，第三紀の閃緑岩類に関係している。現在操業中のTaoga鉱床の近くのBaroc川の上流でBaの地化学異常帯（1,260～10,000ppm）が得られ，新鉱徴が期待されるが，周辺の状況から小規模と考えられる。

(6) 石炭鉱床は第三紀中新世の砂岩・泥岩互層中に挟まれた褐炭（発熱量（無水・無灰基）

6,100～7,100 kcal/kg）で，0.75～2.00 m の厚さの炭層が7層認められる。BMG資料（1955）による埋蔵鉱量は677万トンであるが①炭質が良くないこと，②炭層が30～40°に急傾斜していること，③褶曲による擾乱が予想されること等のために，現状での開発は困難と考えられる。

第2章　勧　　告

ミンドロ島には５３箇所の鉱徴地が報告されていたが，本調査によって新らたに１９箇所のクロム，鉄等の鉱徴地が把握された。

調査結果については，インベントリーマップ及びインベントリーテーブルにとりまとめてあるが，このうち，地質・鉱床学的見地から有望と考えられるクロム鉱床及び鉄鉱床については，今後の方針として次のことが考えられる。

1.　B地区のクロム鉱床地帯

Ogos鉱床はダナイト中に層状又は縞状に賦存し，本島内では，最も大きい鉱体（幅 6.5 m，Cr_2O_3品位３３％，走向長数１０mが期待される）である。地質状況から本鉱体の東方への広がりが予想されるので，その連続性を確認する探査が望ましい。探査方法としては，重機を利用したトレンチ調査等が考えられる。

2.　D地区の鉄鉱床地帯

Nagsabongan，Lasala 及び Lapa-ao の３鉱床は，それぞれ 1,000万トン級の鉱量が見込まれる。そのため，鉱体下部の鉱石品位を把握し，さらに精度の高い鉱量を確認するためのボーリング調査を行うことが望ましい。

Table 9 Inventory Table of the Survey Area

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alteration	Occurrence	Accessibility	Remarks
1*	Dulangan	13°28'06", 120°57'47" Dulangan, Ori. Middle courses of Dulangan R.	Gold	Placer	1 km along Dulangan R.	Fluvial dep.	Native Au	0.3 ~ 0.5 g/man/day	–	Matrix filling the interstice between large boulders is rich in gold. Gold comes from the Halcon Metamorphics.	10 mins ride from Puerto Galera and 5 mins hike.	Ore reserve estimation is difficult because of its peculiar occurrence.
2*	Binaybay	12°22'42"~24'36"N 120°54'24"~58'24"E Binaybay, Ori. Upper reaches of Binaybay R.	Gold	Placer	10km along Binaybay R.	Fluvial dep.	Native Au	0.5 ~ 1 g/man/day	–	do	30 mins ride from San Teodoro and 20 mins hike.	do
3*	San Jose	12°30'N, 121°07'E San Jose, Occ. Upper reaches of Labangan R.	Gold	Placer	2km along Labangan R.	Fluvial dep.	Native Au	0.2 ~ 0.5 g/man/day	–	do	30 mins ride from San Jose. A jeepable road leads to the panning site.	do
4	Balao	13°24'~25'N, 120°45'E Abra de Ilog, Occ. 5~6km SE of Abra de Ilog.	Copper	Vein	W: 0.02 ~ 0.2m	Hb-diorite	Py-Cp	Au: 1.0 g/T Cu: 0.14 ~ 0.18%	?	Py and rare Cp are in Qz veinlets and stringers. Green hornfels and garnet skarn are produced around diorite body.	?	
5*	San Andres	13°10'N, 121°05'E Naujan, Ori. Upper reaches of Bukayao R.	Copper	Vein	3 outcrops within 3.5km W: No.1, 0.5~2.0m No.2, 1.0m No.3, 2.0m	Mica schist (Halcon M.)	Py-Cp-Bo-Po-Qz	(BMG) Cu (JICA-MMAJ) Layang R. 5.99% Dacdan Ck 1.86% W=0.10m Bukayao Grand R. 0.95~5.95% Cu:0.15~0.37% Bukayao Munt 4.69~9.92%				
6* (a)	Mindoro Consol Mining Corp. (Masnon dep.)	13°01'15"N,121°14'30"E Socorro, Ori. 25km W. of Pinamalayan	Copper	Vein	4 outcrops in 50mx40m Massive sulphide lens W: 0.15~0.3m	Serpentinized peridotite	Py-Cp-Po-Mc-Chl	(BMG) Cu (JICA-MMAJ) O.C. No.1 2.95%~0.45 2 4.06%~2.05 3 4.38% 4 2.39%~2.77%(w=0.27m)	None	Massive sulphide lenses are developed along faults and sheared zone.	1 hr ride from Pinamalayan to Potol na Boto and 1.5 days hike by Pula R.	
6* (b)	do	13°01'20"N, 121°14'E do	Copper	Vein	4 outcrops in 600mm x 200m Qz. vein W: 0.2 ~ 2.2m	Basalt (Lumintao F.)	Py-Cp-Hm	(BMG) Cu (JICA-MMAJ) O.C. No.5 0.38% 6 0.17%~2.21%(w=1.10m) 7 0.27% 8 11.41% 9 0.17%~2.12%(w=0.20m)	None	Sulphide veinlets and dissemination are in quartz vein.	do	Cu-mineralization is considered to be very limited because of no alteration and geochemical anomalies.
6* (c)	do (Shawood dep.)	13°01'30"N,121°15'E do	Copper	Vein	2 outcrops 700mm apart (1) sheared zone W: 0.2m (2) Qz, vein and massive sulphide lens W: 1.6m	Serpentinized peridotite and basalt (Lumintao F.)	Cp-Py Cp-Py-Po-Hm	(BMG) (JICA-MMAJ) O.C. No.10 Cu 10.20%~15.33%(w=0.15m) Au 5.47g/t 11 1.39% ~0.45%(w=0.2m) 12 2.35% Au 1.90g/t	None	(1) Chalcopyrite vein along sheared zone. (2) Massive sulphide lenses occur in hematite rich gossan.	do	
7*	Zion Expl Corp. (Bambanon dep.)	13°00'N, 121°16'E Socorro, Ori. 22km W. of Pinamalayan	Copper	Vein	(1) Massive sulphide lens W: 0.1 ~ 0.3m (2) Qz, lens W: 0.5m	Serpentinized peridotite, basalt and slate (Lumintao F.)	Po-Py-Cp-Qz	Cu: 0.49% Cu: 0.42%	None	Massive sulphide lenses occur in peridotite, and Qz lenses with Py and Cp dissemination, in volcanics and sediments.	4 hrs hike from Putol na Boto Bambanon Ck., a branch of Mayo R.	Small scale ?

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alteration	Occurrence	Accessibility	Remarks
8	Buraboy	12°39'27"N, 121°07'24"E Sablayan, Occ. Upper reaches of Magasawangtubig R.	Copper	Vein	W: 0.2m Mineralized zone: 2m	Ser. schist (Halcon M.)	Py-Cp-Qz	N.D.	?	Mineralization along schistosity	?	
9*	Aglubang	12°59'25"N,121°10'E Sablayan, Occ. 35km W of Pinamalayan	Copper	Bedded	Floats (7 pcs.) max. 3x2x1m in size.	Phyllitic schist?	Py-(Cp)-Qz	(JICA-MMAJ) Float (massive) Cu : 0.40% Pb : 0.71% Zn : 8.52%	–	Strata-bound?	1 day hike along Aglubang R. from Villacervesa.	New bedded cupriferous pyrite deposits can be expected.
10	Acliang & Pajo	12°45'N, 121°15'30"E Bongabong, Ori. Middle courses of Bongabong R.	Copper	Vein	?	Ser-Chl-Amph-schist	Cp-Po-Py	N.D.	?	Sulphide veins and stringers are along the schistosity. Py and Cp disseminate in biotite quartz diorite.	1 hr ride from Bongabong bridge and a half day hike in the river.	Ore floats were collected but showing has not been checked by the survey team.
11	Amico Copper Co.	12°28'N, 121°11'E San Jose, Occ. 5.7km E of Hagdaman Peak	Copper	Vein	Very small	Interbeded sandstone, silty shale and mudstone (Sablayan G.)	Py-Cp	Cu: 0.04 ~ 0.05%	?	Sulphide veinlets, pockets and dissemination in the calcareous concretions in the shale.	?	Outcrops could not be found.
12*	Mariri	13°26'N,121°31'E Paluan, Occ. 5km NE of Paluan	Chromite	Ortho-magmatic	0.7mx0.7m	Serpentinite	Cr.	(JICA-MMAJ) Cr_2O_3 : 40.31%	Serp.	Massive ore deposit in small ultramaphic (serpentinite) body.	30 mins ride and 1hr hike from Paluan.	Small scale ?
13*	Mariil	13°24'15"N,120°28'45"E Paluan, Occ. 3km SE of Paluan	Chromite	Ortho-magmatic	Unknown (three ore deposits)	Harzburgite ≫ dunite gabbro, microdiorite	Cr.	(JICA-MMAJ) Stockpile Cr_2O_3 : 50.50% 45.82% Float Cr_2O_3 : 48.93%	Serp.	Not clear. The chromite ore is found as a gravel or breccia (cobble ~ pebble size) along the creek.	20 mins ride and 20 min hike from Paluan.	Stock pile : 2T Small scale ? Laterite thickness av. 1m (0.24% Ni).
14*	San Vicente	13°24'N, 120°40'E Abra de Ilog. Occ. 8km SW of Abra de Ilog.	Chromite	Ortho-magmatic	Small lens (5~6 bodies) maximum size L: 3m, W:0.1~0.5m Horizontal extension is more than 30m judging from destribution of outcrop and floats.	Harzburgite	Cr.	(JICA-MMAJ) Cr_2O_3 : 29.11% Al_2O_3 : 19.99%	Serp.	Ore bodies occur in sheared zone of harzburgite, trending N60°~65°E with 70°S~75°N dip. Ore is massive and rich in alumina.	10 mins ride and 20 mins hike from the Mamburao–Abra de Ilog high way.	Stock pile 3T and floats 8T. 9 trenches Ore reserve may not exceed 100T.
15*	Igsoso	13°16'45"N,120°30'30"E Igsoso, Occ. 10km NW of Mamburao	Chromite	Ortho-magmatic	No.1: 0.4x1.9x6.0m No.2: unknown	Dunite	Cr.	(JICA-MMAJ) Massive Cr_2O_3 : 43.00% Banded Cr_2O_3 : 34.14%, 38.85%	Serp.	Layered, disseminated and massive ore.	30 mins hike from the Paluan–Mamburao highway.	Pit, trench: 23 stock pile (No.2 outcrop):10T. Some extension and new deposits can be expected.
16*	Liw liw	13°12'30"N,120°40'45"E Mamburao, Occ. 8.5km E of Mamburao	Chromite	Ortho-magmatic	4 outcrops: No.1: 0.1~0.2x3.0x1.5m 15T No.2: 0.1x2.0x8m No.3: 0.1~0.4x3.0x12m 5T No.4: 0.05x1.0x5m	Harzburgite	Cr.	(JICA-MMAJ) Stockpile (massive) Cr_2O_3: 40.31%, 36.50%	Serp.	Layered and massive probably removed by shear, occurring in harzburgite near the boundary of dunite. Disseminated and massive ores.	30 mins ride and 10 mins hike from Mamburao.	Stock pile: 20T Geochemical anomaly was obtained on the east side.
17*	Barabon	13°04'N, 120°45'30"E Sta Cruz, Occ. 3km E of Sta Cruz.	Chromite	Ortho-magmatic	Lenticular W: 0.3 ~ 0.8m L: ?	Ultramafic complex	Cr.	N.D.	Serp.	Chromite deposit occurs along thrust faults in the Ultramafic rocks in the shape of pad and lens with steep dip.	10 mins ride from Sta Cruz.	Outcrops could not be found. very small ?

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alteration	Occurrence	Accessibility	Remarks
18*	Ogos No.1	13°04'30"N,121°06'30"E Sta Cruz, Occ. 40km W of Pinamalayan.	Chromite	Ortho-magma-tic	Thickness: 65m	Dunite	Cr.	(JICA-MMAJ) Margin (disseminated) Cr_2O_3: 29.99% Middle (dis~dense) 31.39% Center (dense spotted) 28.28% Top (weathered sandy) 37.05%	Serp.	Layered, massive and disseminated ore.	1 day hike along the Ogos R. from Villacervoza.	Extension cannot be checked by trenching, because of deep fluvial deposit.
19*	Ogos No.2	13°04'39"N,121°07'30"E Sta Cruz, Occ. 39km W of Pinamalayan	Chromite	Ortho-magma-tic	Lenticular W: 1m L: ?	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3 : 39.92%, 44.11%	Serp.	Layered and massive ore.	1 day hike along the Ogos R. from Villacervesa.	1 km E of No.1 showing.
20*	Ogos No.3	13°03'N, 121°09.E Sta Cruz, Occ. 36km W of Pinamalayan	Chromite	Ortho-magma-tic	Lenticular W: 0.1m L: ?	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3 : 37.20%	Serp.	Massive ore, striking N70° W and dipping 55° SW.	1 day hike along the Baraboi R. from Villacervesa.	
21*	Ogos No.4	13°01'N, 121°11'E Sablayan, Occ. 33km W of Pinamalayan	Chromite	Ortho-magma-tic	Network zone W: 5m + L: 2m	Harzburgite	Cr.	(JICA-MMAJ) Cr_2O_3 : 45.82%	Serp.	Chromite veinlets are in a network.	1 day hike along the Aglubong R. from Villacervesa.	
22*	Pintin west	13°00'N, 120°50'E Sta Cruz, Occ. 13km SE of Sta Cruz	Chromite	Ortho-magma-tic	2 outcrops No.1: small lenticular bodies. max. 1.0x0.2x0.2m No.2: 1.0x0.15x0.15m	Harzburgite	Cr.	(JICA-MMAJ) Cr_2O_3 : No.1 ... 39.81%, 38.93%, 38.14% 41.30% No.2 ... 40.19%, 39.92%	Serp.	Massive ore	1 hr ride and 10 mins hike from Sablayan.	Trenching work was conducted in this survey.
23*	Pintin central	o 12°59'30"N, 120°51'30"E o 13°00'N, 120°53'E o 12°58'30", 120°53'E Sta Cruz, Occ. 19km SE of Sta Cruz	Chromite	Ortho-magma-tic	1 outcrop and 5 sites of float Floats ϕ max. 0.4m	Harzburgite	Cr.	(JICA-MMAJ) Cr_2O_3: Outcrop ..... 51.40% Floats 50.03%, 53.55% 48.94%, 47.62%	Serp.	Massive ore	1 hr ride and 1 hr hike from Sablayan.	Trenching work was conducted in the past. Stockpile: 2~3T.
24*	Pintin east	12°57'N,120°54'30"E Sablayan, Occ. 20km NE of Sablayan	Chromite	Ortho-magma-tic	4 sites of float Floats ϕ max. 0.4m	Harzburgite	Cr.	(JICA-MMAJ) floats Cr_2O_3: 33.18%, 30.30%, 56.10%, 33.88%	Serp.	Massive ore	45 mins ride and 1hr hike from Sablayan.	2 sites show the high content of Al_2O_3.
25*	Masbo	12°54'30"N,121°14'E Sablayan, Occ. 25km W of Bansud	Chromite	Ortho-magma-tic	2 outcrops lenticular bodies max. 1.5x0.3m 1 site of float Floats ϕ max. 1m	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3: Outcrop ... 44.98%, 41.85% Floats 41.47%	Serp.	Massive ore, in the fracture zone trending NW--SE.	2 days hike along the Bongabong R. from Balete.	
26*	Banus No.1	12°53'N, 121°16'E Gloria, Ori. 20km W of Bansud	Chromite	Ortho-magma-tic	Lenticular W: 5cm L: 2m	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3: 41.23%	Serp.	Layered and massive ore.	4hrs ride by logging truck and 3.5hrs hike along the Banus R. from Bulbogan.	
27*	Banus No.2	12°52'30"N,121°16'45"E Gloria, Ori. 19km W of Bansud	Chromite	Ortho-magma-tic	Mineralized zone T: 3.5m L: 45m max. scale of one body T: 1m L: 4m	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3: 37.97%, 46.11%, 41.44% 43.50%, 36.05%, 43.43% 45.43%	Serp.	Layered and massive ore, with a gentle dip.	4hrs ride by logging truck and 3hrs hike along the Banus R. from Bulbogan.	Trenching work was conducted in this survey.
28*	Bansud	12°56'30"N,121°19'E Bansud, Ori. 15km W of Bansud	Chromite	Ortho-magma-tic	Mineralized zone T: 0.8m L: 30m max. scale of one body T: 0.2m L: 3m	Dunite	Cr.	(JICA-MMAJ) Cr_2O_3: 42.02%, 46.12%	Serp	Layered and massive ore, striking N47° W and dipping 25° SW.	1hr ride and 2hrs hike along the Bansud R. from Bansud.	

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alteration	Occurrence	Accessibility	Remarks
29	Igsoso	13°17'N, 120°30'E Igsoso, Occ. 12km NW of Mombulao	Nickel	Residual	very small	Ultramafic complex	Nickeliferous laterite	N.D.	Serp.	Secondary enrichment of Ni in the ultramaphic rocks.	0.5km hike from the Mamburao-Paluan highway.	No information could be gotten.
30*	Aglubang	13°05'N, 121°09'E Sablayan Occ. Near Villacervesa	Nickel	Residual	Ore reserve: 49 MT. (0.94% Ni) Thickness: 3~11m (av. 5.5m)	Ultramafic complex	Nickeliferous laterite	Ni: 0.94% (JICA-MMAJ) check samples 0.46%	Serp.	Laterite covers almost all the slope and floats of the ultramafic rocks.	30 mins hike from Villa-cervesa.	Explored by Anglo Philippine Oil Corp. Eagle Pass & Aglu-bang prospect are included in this area.
31*	Paragpagan	13°03'N, 120°50'E Sta Cruz, Occ. 12km E of Sta Cruz	Nickel	Residual	L: 1400m W: 800m Thickness: 0.3~6.0m	Harzburgite	Nickeliferous laterite	(BGM and others) (JICA-MMAJ) Laterite Ni: 0.82% 2.66% Laterite sand Ni: 0.79% 1.82%	Serp.	Secondary enrichment of Ni in the ultramafic rocks.	1 hr hike from the sublayan–Mamburao highway.	Ore reserve: 4~5MT (after BMG 19774)
32	Blueridge Mining Corp.	12°49'30"N,121°17'30"E Bongabong & Bansud Ori. 1.8km WSW of Bansud	Nickel	Residual	?	Ultramafic complex	Nickeliferous laterite	Geochemical samples Ni: 0.80~2.95%	Serp.	Secondary enrichment of Ni (and Co) in the ultramafic rocks.	?	
33	Baletero	13°29'N, 120°56'E Puerto Galera, Ori. 2.5km SW of Puerto Galera.	Iron	Contact	Thickness: 2m	Schist, marble (Halcon M.)	Mt-Hm-Spec-Mn	N.D.	?	Iron body, paralleled to the schistosity, is formed by replacement of marble in the schist.	?	No information on the deposit could be collected.
34	Batalong Bato	13°28'21"N,120°55'30"E Puerto Galera, Ori. 4km SW of Puerto Galera	Iron	Contact	Thin layer of Mt. Floats ϕ max. 1m	Marble (Halcon M.)	Mt.	N.D.	?	Floats are in limited amount.	?	do
35	Savoran	13°27'N,120°54'47"E Puerto Galera, Ori. 8km SW of Puerto Galera	Iron	Contact	No.1 W: 1.0m No.2 W: 0.01m	Mica schist (Halcon M.)	Hm-Mt-Lm-Mn	N.D.	?	Ore bodies tend to parallel to the schistosity.	?	do
36	Camarong	13°27'38"N,120°50'30"E Abra de Ilog. Occ. Camarong R.	Iron	Contact	Iron blocks (ϕ1.5m) are concentrated along a 2.5m length.	Xenolith of limestone in gneiss (Halcon M.)	Mt-Py	Fe: 49.21%	?	Iron floats are found along on N80° E direction on the southern slope.	?	No information was obtained.
37	Barayao	13°24'12"N,120°48'58"E Abra de Ilog, Occ. Head water of Obala R.	Iron	Contact	L: 5m W: 15m	Marble, Gneiss Schist (Halcon M.)	Mt	N.D.	Skarn	Similar to Dayap (50). Mt veins and pockets in garnet-epidote skarn, which is developed near the contact between gneiss and schist.	?	
38	Little Baguio	13°22'13"N,120°49'18"E Abra de Ilog, Occ. 15km SE of Abra de Ilog.	Iron	Contact	2 float areas: No.1 cobble size Mt in a small scale. No.2 iron blocks (ϕ1m)	Marble, (Sablayan G.)	Mt-Hm	N.D.	Skarn	The deposit is composed of two float areas. Several tunnels were driven.	?	
39*	Nagsabongan	13°22'12"N,120°48'36"E Abra de Ilog, Occ. Headwater of Mamburao R.	Iron	Contact	Extension L: 200m+ Thickness Upper, W: 20m+ Lower, W: 50m+	Marble, (Sablayan G.)	Mt-Hm	Shipping grade > 60% Fe (JICA-MMAJ) Fe: 56 ~ 70%	Skarn	There is a massive outcrop in limestone	2 days hike from Abra de Ilog by trail or from Cabacao along Mamburao R.	Ore reserve may be over 10 MT by magnetic survey. Elizalde Co, explored by means of dip needle, trench and drilling. No record has remained.

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alternation	Occurrence	Accessibility	Remarks
40*	Lasala	13°21'N, 120°47'E Abra de Ilog, Occ. Upper reaches of Mamburao R.	Iron	Contact	Extension: Ore outcrops and floats are chiefly observed in an area of 130m(EW)x 100m(NS).	Marble, skarn (Sablayan G.)	Hm-Mt-Py-Cp	(JICA-MMAJ) Banded Massive Fe: 28.23% 54～68%	Skarn	The deposits occur under the river bed on the western slope where epidote skarn is developed.	2 days hike from Abra de Ilog by trail or from Cabacao along Mamburao R.	Ore reserve is about 18MT based on magnetic survey result. Mayorga Minign Corp. also explored by dip needle, pit (2), trench (22), tunnel (2) and diamond drilling.
41*	Tiraca	13°21'50"N,120°49'E Abra de Ilog, Occ. 15km SE of Abra de Ilog	Iron	Contact	L: 7m W: 5m	Limestone (Sablayan G.)	Mt	(JICA-MMAJ) Float (massive) Fe: 59.73%	Skarn (weak)	Bedded, striking N50E, dipping 70E	3 days hike from Abra de Ilog or Cabacao.	Trenching: 7m Small scale.
42	Binaybay	13°21'24"N,121°00'E Binaybay Baco, Ori. 12km W of Baco	Iron	Contact	Floats (max. 1.5m in size) localized in 15mx15m	Schist and marble (Halcon M.)	Hm-Mt	Fe: 61.19%	Skarn	Floats or blocky concentration An adit exploration suggests the block concentration was connected to an ore body underneath.	?	No information was collected in Binaybay.
43*	Ak ak	13°21'15"N,120°48'E Abra de Ilog, Occ. 14km SE of Abra de Ilog	Iron	Contact	L: 10m W: 5m	Limestone (Sablayan G.)	Mt	Outcrop (massive) Fe: 51.55%	Skarn	Beddgd ? in limestone (N40°W, 20°S)	2 days hike along trail from Abla de Ilog or along Mamburao R. from Cabacao.	Small scale.
44	Aglombogan	13°20'25"N,120°49E Abra de Ilog, Occ. Headwater of Malaylay R.	Iron	Contact	Unknown	Marble, phyllite (Sablayan G.)	Hm-Mt	N.D.	Skarn	Mt has replaced marble along bedding planes as a lens.	?	
45	Tibano	13°21'00"N,120°54'24"E Mamburao, Ori Upper reaches of Malaylay R.	Iron	Contact	Massive iron blocks: W: 8m Floats: av. 1m in 1500x50m	Skarn (Halcon M.)	Mt-Py-Mn	Fe: 66.74%	Skarn	Iron deposit occurs in skarn at the contact between meta quartz diorite and schist.	?	
46	Bulos	13"20'N,120°51'08"E Puerto Galera, Ori. Upper reaches of Malaylay R.	Iron	Contact	Iron block: av. 1.5m	Marble, (Sablayan G.)	Mt-Hm	N.D.	?	Iron block.	?	
47*	Cobanga-on	13°19'25"N,120°47'38"E Abra de Ilog, Occ. Upper reaches of Mamburao R.	Iron	Contact	Small lense (7 bodies) maximum size L: 3m W: 2m max float is 7x7x2m in size	Marble, phyllite green phyllite (Mansalay F.) Diorite	Mt, Hm(Cp)	(JICA-MMAJ) Fe=55.36%	Skarn	The deposit consists of many small lenticular ore bodies and occurs in limestone lens-bearing green phyllite.	2 days going up along Mamburao R. from Cabacao.	Reserve may be small, because limestone is poorly developed in this area.
48	Lagnas	13°19'21"N,120°52'30"E Puerto Galera, Ori. Upper reaches of Malaylay R.	Iron	Vein, Dissemination	Extension: 1,300m	Basalt, phyllite (Sablayan G.)	Mt-Hm	Fe: 30～53%	Skarn	Four ore bodies crop out probody along a pre-ore fault of a N70°W direction which has controlled mineralization in this area.	?	
49*	Lapa-ao	13°18'54"N,120°47'E Abra de Ilog, Occ. Upper reaches of Mamburao R.	Iron	Contact	L: 350m+ Thickness: 44m,46m, 28m (3 layers)	Limestone, phyllite (Sablayan G.)	Mt	(JICA-MMAJ) Fe: 33～69%	Skarn	Ore bodies are massive and occur near boundary between diorite and Sablayan limestone. The ore contains skarn, often showing a banded structure.	2 days going up along Mamburao R. from Cabacao.	Reserve is about 35MT based on magnetic survey result.

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alternation	Occurrence	Accessibility	Remarks
50*	Dayap	13°17'41"N,120°48'38"E Mamburao, Ori. Upper reaches of Pagbahan R.	Iron	Contact	Outcrop, Thickness No.1=2m No.2=2m No.3=10m	Phyllite, skarn (Mansalay F.)	Mt-Py	(BMG) (JICA-MMAJ) Fe: 67.37% Fe:56.73% 70.43% 65.37%	Skarn	Bedded deposits occur in epidote-chlorite-skarn.	3 hrs ride along Pagbahan R. in dry season and 1 day hike.	Very poor accessibility.
51*	Taoga (Filhispano Inc.)	12°37'30"N,121°19'45"E Mansalay, Ori. 18km NW of Mansalay	Barite	Vein	Outcrops No.1 W: 0.50m No.2 W: 1.20m	Sandstone (Mansalay F.)	Ba-Py-Qz	(JICA-MMAJ) $BaSO_4$: 83.79%	Py, sil	Barite veins trend N45°E~N120°E with a dip of 55°~70°S.	A logging road of 80km from Mansalay reaches the mine site.	Reserve may be some thousands ton.
52	Wigan	12°33'N, 121°25'E Mansalay, Ori. 4km NW of Mansalay	Barite	Vein	Outcrop: 10x15m	Sandstone (Mansalay F.)	Ba	N.D.	?	Barite is exposed in several pits from 0.5–1.0m deep. Floats (ϕ:few cm) are scattered around the ridge.	?	
53*	Mansalay Mining Corp.	12°31'43"~12°33'29"N 121°21'03"~121°24'08"E Mansalay, Ori. 7km WNW of Mansalay	Barite	Vein	W: 1.2~1.9m H: 3m L: 17.5m	Sandstone (Mansalay F.)	Ba	N.D.	Py, chl	The vein striking N50°W dipping 78°S.	30 mins hike from logging road.	SE extension of the vein is recommended to be checked.
54*	Mansiol point	12°28'30"N,121°25'45"E Mansalay, Ori. 6km SSW of Mansalay	Barite	Vein	W: 1.6m (Max.) L: 90m (Float zone)	Sandstone (Mansalay F.)	Ba	N.D.	None	Barite floats are scattered in a N25°E direction.	20 mins hike from the Bulalacao –Mansalay highway.	Reserve is probably $1\sim2\times10^4$T above sea level. Under mining preparation.
55	Ligwayan	13°26'41"N,120°54'31"E Puerto Galera, Ori. 8.5km SSW of Puerto Galera	Feldspar	Dike Sill	Outcrops: No.1, L: 25~30m No.2, L: 8, H: 1.5m No.3, W: 1.5m	Gneiss, schist (Halcon M.)	Fd-Clay	N.D.	?	Deposit is composed of friable feldspar, clay or quartz-feldspathic schist.	?	
56	Wawa	13°27'35"~28'07"N 120°36'06"~37'03"E Abra de Ilog, Occ. 12km WNW of Abra de Ilog	Talc	Lens	No importance	Talc schist in serpentinite (Halcon M.)	Tc	N.D.	?	Talc schist are discontinuous lenses in serpentinite.	?	
57	Metropolitan Mining Corp.	13°27'30"~13°29'N 120°48'~120°49'E Abra de Ilog, Occ. 12km WNW of Abra de Ilog	Talc	?	?	Marble, schist (Halcon M.)	Tc-Cal	N.D.	?	Talc may have been contamination from the interlayered schist and/or developed in the marble.	?	Stockpile : 130T
58	Amico Copper Co.	12°28'N, 121°11'E San Jose, Occ. 19km NE of San Jose	Gypsum	Vein	Very small W: 1~10mm	Calcareous sediments (Sablayan G.)	Gy	N.D.	?	Selenite appears to represent minute bedding planes and fracture fillings in the sediments.	?	
59	Alitaytayan	12°26'30"N,121°09'E San Jose, Occ. 13.5km NE of San Jose	Gypsum	Vein	Very small	Shale (Sablayan G.)	Gy	N.D.	?	Thin veins of selenite disparse in the weathered shale.	30 mins ride and 3km's hike from San Jose.	No information was obtained.
60*	Polola	12°23'N,121°20'45"E Bulalacao, Ori. 6km N of Bulalacao	Gypsum	Vein	W: 1~2cm L: <5m ?	Siltstone (Sablayan G.)	Gy	N.D.	None	Fissure-filling.	Near the Mansalay–Bulalacao highway.	Very small scale.

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alternation	Occurrence	Accessibility	Remarks
61*	Mananao	13°30'20"N,120°35'E Paluan, Occ. 14km NE of Paluan	Gravita, (construction material)	Beach sand	L: 1km W: 20m H: 0.3m	Metamorphic rocks, segregated quartz (Halcon M.)	Qz, rock gravel	–	None	The beach sand is composed of quartz, mica schist, phyllite and green schist.	1.5 hrs from Wawa by boat.	Gravita and quartz gravel are being collected by sieve and hand picking.
62*	Maria Cristina Chemical Industries	13°29'30"N,120°39'40"E Abra de Ilog, Occ. 8km NW of Abra de Ilog	Silica	Beach sand	L: 1.2km, W: 20m H: 0.3m Positive reserve: 3,600T	Metamorphic rocks, segregated quartz (Halcon M.)	Qz	Qz=20%	None	Deposits consist of Qz-sand, pebbie, cobble and boulders.	0.5 hr from Wawa by boat.	do
63*	Mamburao	13°15'N,120°37'22"E Mamburao, Occ. 4km NE of Mamburao	Silica	Beach sand	1km along the beach	–	Qz	Qz < 30%	None	The beach sand is composed of Qz, Sh, Hb, Chl, Mt, Serp. fragments in the order of abundance.	Near Mamburao	Study is needed from an economic point of view.
64*	Barahan	13°01'N,120°46'E Sta Cruz, Occ. 7.5km SSE of sta cruz	Silica	Beach sand	2~3km along the beach.	–	Qz	Qz=40%	None	Components are Qz=slate ≥ green rock (10%) ≥ basalt > mica schist > Mt. Grain size of sand is getting bigger toward depth.	A jeepable road is leading to this place.	
65*	Mansalay Mining Corp.	12°31'43"~33'29"N 121°21'03"~24'08"E Mansalay, Ori. 7km WNW of Mansalay	Silica	Bedded	Outcrops: No.1 W: 1~3m,400ha No.2 W: 1~2m, L: 200m No.3 W: 2.5m. L: 15m	Arkose (Mansalay F.)	Qz	Average of 16 samples SiO_2: 74.5~86.8%	None	Bedded arkose bed in the Mansalay F.	Near the logging road to Taoga Barite mine.	As arkose is highly indulated, a study on quartz grain separation is needed from the technical and economical points of view.
66*	Falcon Mineral Inc.	12°33'N,121°25'N Mansalay, Ori. 3km NW of Mansalay	Silica	Bedded	H: 20m+,	Arkose (Mansalay F.)	Qz	(JICA-MMAJ) Refined stock pile SiO_2 : 82.40%	None	do	30 mins ride from Mansalay.	
67*	Marblecraft	13°29'N,120°55'E Puerto Galera, Ori. 5km SW of Puerto Galera	Marble	Bedded	L: 2km+(E-W) Thickness: 200m±	Pelitic schist (Halcon M.)	Marble	Good quality	Recryst.	Marble occurs in pelitic schist, striking E-W, dipping 0~20 N.	There is a truck road of about 10km long from Puerto Galera to mine site.	Marble craft Inc. reopened operation in April, 1983. Workers: 16 men.
68*	Dulangan	13°28'N,120°58'E Dulangan, Ori. 1km W of Dulangan	Marble	Bedded	Reserve: 110MT (provincial data, 1981)	Schist (Halcon M.)	Marble	Good quality	Recryst.	Marble are interbeded in green schist and mica schist.	Near the highway	Under operation $2m^3$/day
69*	Monte Cristy Mining Co.	13°14'N,120°49'E Mamburao, Occ. Upper reaches of Pagbahan R.	Jade	Vein	W: 2m	Limestone (Mansalay F.)	Jade	Good quality	Ser.	Champion jade vein with 2m wide occurs in limestone. All in all, there are 7 parallel veins, but others are in a low grade or on a small scale.	From the Sablayan--Mamburao highway 1.5hrs ride along Pagbahan R. in the dry season.	Operation Workers: 30 persons stockpile: about 10T.
70*	Alitaytayan	12°26'30"N,121°09'E San Jose, Occ. 13.5km NW of San Jose	Coal	Bedded	2 seams : upper: 0.6m thick lower: 1.05m thick, 18m extension	Sandstone, carbonaceous shale (sablayan G.)	Coal	(JICA-MMAJ) 12,624 BTU/lb (High-volatile C bituminous)	None	Two seams occur in interbeds of sandstone and carbonaceous silty sediments.	30 mins ride and 3km hike from San Jose.	Small scale ?

No.	Name of Deposit or Prospect	Location	Mineral Commodity	Type	Extension	Host Rock	Mineral Assemblage	Ore Grade	Alternation	Occurrence	Accessibility	Remarks
71*	Napisian Bulalacao	12°22'38"N,121°18'03E Bulalacao, Ori. 9km NNW of Bulalacao	Coal	Bedded	Thickness: 0.4~2.5m+ coal seams with 0.25m thick are 4. Reserve: 6,776,000T	Sandstone, shale (Sablayan G.)	Coal	(JICA-MMAJ) Samples taken from 3 outcrops show 11,587~12,652 BTU/lb, corresponding to high volatile C bituminous coal.	None	Coal measures consist of a heterogeneous succession of clastic materials, at least 10 coals and few impure limestone, shales and clay.	Near the Bulalacao–Mansalay highway.	Recently explored by BMG and CDCP. Some problems on the development may exist such as, (1) poor quality (2) steeply inclined (3) folded.
72*	Siay Bulalacao	12°21'57"N,121°21'40"E Bulalacao, Ori. 5km NE of Bulalacao	Coal	Bedded	Thickness: 1.4m, 1.0m 0.2m, 0.2m Reserve: 460,000T	Sandstone, shale (Sablayan G.)	Coal	(JICA-MMAJ) Two samples show 11,447 and 12,814 BTU/lb. (subbituminous -B, High ~ volatile C bituminous).	None	Seven or more coal seams with a 10cm+ thickness may present. 1 seam in Siay and 1 seam in Tambangan occur in mudstone or siltstone.	20 mins ride and 30 mins hike from the above highway.	Same problems as above are considered.

* : checked deposits or prospects

Abbreviation ; Cp : Chalcopyrite, Py : Pyrite, Po : Pyrrhotite, Bo : Bornite, Cc : Chalcocite, Mc : Marcasite, Cr : Chromite, Mt : Magnetite, Hm : Hematite, Spec : Specularite, Lm : Limonite, Chl : Chlorite, Epi : Epidote, Qz : Quartz.

Hb : Hornblende, Ser : Sericite, Mn : Manganese, Tc : Talc, Gy : Gypsum, sil : Silicification, py : Pyritization, Serp : Serpentinization, O.C. : Outcrop, N.D. : No Data

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APPENDICES

Table A—1 List of Larger Foraminifera

Species of Larger Foraminifera	Group or Formation Name	Sablayan Group																				Socorro Group											Halcon metamorphics		Mansalay F.			Sablayan G.
	Sample No.	WR–204	WR–41	WR–202	WR–203	HR–10	YR–09	WR–34	WR–201	WR–154	TR2–005	YR2–024a	YR2–025	YR2–034 (float)	YR2–036 (float)	TR2–029	TR2–039	TR2–127	TR2–137	YR2–002	HR–40	HR–205	HR–206	FR–05	WR–04	WR–30	WR–03	WR–37	FR–42	FR–111	YR–21	YR–22	WR–64	WR–42
	Location	Bugsanga R.	Bugsanga R.	Bugsanga R.	Bugsanga R.	North of Calintaan	Rayusan R.	Foot of Eplog Hill	Hagdanan Peak	West of Pocanil Bay	Tributary of Balangan R.	Tributary of Caguray R.	Tributary of Caguray R.	Tributary of Amnay R.	Epaz Point	Tributary of Mongpong R.	Tributary of Mongpong R.	Banus R.	Banus R.	Caguray R.	East of Sablayan	Labangan R.	Labangan R.	West of Maniburao	Caguray R.	NW of Buruncan Point	Caguray R.	NE of Magsaysay	Odala River	Subaang River	Rayusan R.	Rayusan R.	Balangan R.	Bugsanga R.
	Geologic Age	Eocene	Late Eocene	Early Eocene	Oligo.–Miocene	Miocene	Miocene	Miocene	Miocene	?	Late Eocene	Late Eocene	Late Eocene	Middle?–Late Eocene	Oligocene	Oligocene–Early Miocene	Oligocene–Early Miocene	Early–Late Miocene	Early–Late Miocene	?	Pleistocene	Pleistocene	Pleistocene	Pleistocene	Pleistocene	Pleistocene	Pleistocene?	?						
Acervulina inhaerens Schultze				X	X			X	X											X	X		X		X								
Alveolinids sp.					X					X																								
Amphistegina radiata (Fichtel and Moll)								X		X			X	X	X	X	X		X	X	X	X	X	X	X	X	X						
Asterocyclina sp.												X																						
Baculogypsinoides spinosus Yabe and Hanzawa																						X												
Biplanispira mirabilis (Umbgrove)		X									X	X																						
Borelis sp.																											X							
Calcarina delicata Todd and Post																				X	X		X	X										
C. spengleri (Gmelin)																									X									
Cycloclypeus sp.									X		X		X		X	X	X	X							X									
Discocyclina (Asterocyclina) sp.		X										X																						
D. cf. dispansa (Sowerby)											X																							
D. sp.																																		
Eorupertia sp.																					X													
Flosculinella sp.						X																												
Gypsina globulus (Reuss)					X		X			X	X				X	X	X		X						X		X							
G. vesicularis (Parker and Jones)										X		X			X		X										X							
Halkyardia minima (Liebus)	X												X																					
Heterostegina cf. borneensis Van der Vlerk															X																			
H. sp.				X						X				X																				
Homotrema rubrum (Lamarck)								X																										
Lepidocyclina (Eulepidina) cf. monstrosa Yabe															X																			
L. (Eulepidina) cf. planata (Oppenoorth)				X											X	X																		
L. (Eulepidina) sp.														X																				
L. (Mulitilepidina) luxurians (Tobler)																	X																	
L. (Nephrolepidina) angulosa Provale																		X																
L. (Nephrolepidina) ferreroi Provale																	X	X																
L. (Nephrolepidina) cf. isolepidinoides Van der Vlerk														X																				
L. (Nephrolepidina) japonica (Yabe)																X		X																
L. (Nephrolepidina) sumatrensis (Brady)																X	X																	
L. (Nephrolepidina) tournoueri (Lemoine and R. Douville)					X																													
L. (Nephrolepidina) sp.							X	X																										
Marginopora vertebralis Blainville									X																									
Miniacina miniacea (Pallas)																	X	X	X		X													
Miogypsina (Lepidosemicyclina) thecidaeformis Rutten)																X	X	X																
M. (Miogypsinoides) complanata (Schlumberger)																X																		
M. (Miogypsina) thecidaeformis Tan Sin Hok						X																												
M. (Miogypsina) sp.					X																													
Nummulites cf. fabianii (Priver)										X																								
N. fichteli (Michelotti)			X											X																				
N. sp.	X																																	
Operculina complanata Defrance			X																															
O. lina cf. complanata (Defrans)										X							X																	
O. venosa (Fichtel and Moll)																		X					X										
O. sp.				X				X															X											
Planorbulinella larvata (Parker and Jones)						X	X	X		X		X						X		X					X	X	X	X						
Rotalia sp.																																		
Rupertina? sp.										X					X	X	X																	
Sorites sp.						X																												
Spiroclypeus leupoldi Van der Vlerk																X																		
S. vermicularis Tan												X																						
S. sp.		X																																
Victoriella sp.								X																										

No Larger Foraminifera

Table A—2 List of Smaller Foraminifera

	Species of Smaller Foraminifera	Group or Formation Name	Marsilay F.	Salsayan G.		Bongabong Group										Socorro G.
		Sample No.	FR—20	YR—08	HR—207	YR3—015	HR—120	HR—114	WR—109	WR—110	WR—15	HR—112	HR—118	HR—101	YR2—006	YR2—007	HR—152
		Location	Abra de Ilog	Rayusan River	Labangan River	Cagusay River	Pula River	Balete River	Road to Balte Mine	Road to Balte Mine	Bongabong River	Balete River	Pula River	Tangon River	Caguray River	Caguray River	San Teodoro
Benthonic Foraminifera	Arenaceous	Cyclammina cf. pacifica Beck								X							
		C. sp.								X							
		Cribrostomoides sp.		X													
		Gaudryina udryina sp.		X													
		Haplophragmoides sp.		X													
		Martinottiella sp. p.		X													
		Plactina sp.		X													
		Trochammina sp.		X													
		Aren. Foram. gen. and sp. indet.		X						X							
	Calcareous	Ammonia sp.									X						
		Anomalina glabrata Cushman									X						
		Bolivina robusta														X	
		B. sp.															X
		Bolivinita quadrilatera														X	
		Bulimina cf. buchiana				X											
		B. marginata													X		
		B. striata													X	X	
		B. sp.		X													
		Cassidulina subglobosa														X	
		C. subglobosa Brady									X						
		C. cf. yabei Asano and Nakamura									X						
		C. sp.									X		X	X			
		Cellanthus craticulatum													X		
		Chilostomella oolina				X											
		Cibicides dorsopustutosus														X	
		C. praecintus													X		
		Clavulinoides sp.														X	
		Cymbaloporetta squammosa													X		
		Dentalina emaciata Reuss															X
		D. sp.		X			X				X	X		X			X
		Dorothia sp.														X	
		Eponides wubonatus (Reuss)					X				X	X	X	X			
		E. sp.					X				X	X	X				
		E. sp. p.		X													
		E. haidingerii (d'Orbigny)											X	X			
		Fissurina marginata segueza										X					
		F. sp.		X													
		Florilus boueanum				X											
		Gyroidina orbicularis d'Orbigny									X	X					X
		G. soldanii il													X		
		Hemicristellaria gemmata													X	X	
		Hoglundina elegans														X	
		Hyalinea balthica														X	
		Karreriella bradyi													X	X	
		Lagena striata (d'Orbigny)											X				
		L. sp.		X			X					X	X				
		Lagenonodosaria hirsuta														X	
		L. pauciloculata (Cushman)										X					
		L. sp.										X					
		Lenticulina kobulus Asano									X						
		L. nikobarensis (Schwager)										X					X
		L. orbicularis (d'Orbigny)									X						
		L. sp.										X					
		Marginulinopsis bradyi				X											
		Melonis pacificum (Cushman)											X				
		Nodosaria longiscata													X		
		N. sp.									X	X					

	Species of Smaller Foraminifera	Group or Formation Name	Marsilay F.	Salsayan G.		Bongabong Group										Socorro G.
		Sample No.	FR—20	YR—08	HR—207	YR3—015	HR—120	HR—114	WR—109	WR—110	WR—15	HR—112	HR—118	HR—101	YR2—006	YR2—007	HR—152
		Location	Abra de Ilog	Rayusan River	Labangan River	Cagusay River	Pula River	Balete River	Road to Balte Mine	Road to Balte Mine	Bongabong River	Balete River	Pula River	Tangon River	Caguray River	Caguray River	San Teodoro
Benthonic Foraminifera	Calcareous	Planulina ariminensis				X											
		P. wuellesatorfi (Schwager)			X		X	X			X	X	X	X			
		P. sp.			X			X			X						
		Planularia sp.	X														
		Pilenia bulloides (d'Orbigny)											X				
		P. sp.											X				
		Pseudorotalia schroeteriana														X	
		Quinqueloculina sp.															X
		Rectobolivina bifrons													X		
		Rotalia calcar													X		
		R. sp.												X			
		Sigmoilopsis schlumbergeri													X		
		Siphogenerina striata													X		
		Uvigerina aculeata d'Orbigny					X										
		U. ampullacea														X	
		U. canariensis													X	X	
		U. crassicostata Schwager											X				
		U. cushmani														X	
		U. excellens Todd			X		X										X
		U. peregrina													X	X	
		U. sp.			X									X			X
		Virgulina complanata Egger			X												
		Cal. Foram. gen. and sp. indet.		X			X			X		X		X			X
Planktonic Foraminifera		Catapsydrax dissimilis				X											
		C. unicavus				X											
		Cyclammina cancellata				X											
		Globigerina bulloides Blow													X	X	
		Globorotalia fohsi robusta Bolli									X			X			
		G. fohsi lobata Bermudez								X		X		X			
		G. menardii (d'Orbigny)			X		X			X	X	X	X	X			X
		G. menardii menardii (d'Orbigny)										X		X			
		G. sp.			X		X			X		X	X	X			X
		Globigerinoides conglobatus													X		
		G. obliquus													X		
		G. quadrilobatus group													X	X	
		G. trilobus (Reuss)			X		X			X	X	X	X	X			X
		G. rubra (d'Orbigny)								X		X	X		X	X	
		G. inmaturus Leroy								X		X	X		X		
		G. sp.		X	X					X	X	X		X			X
		Globigerina falconesis Blow								X		X			X		
		G. bulloides Blow					X	X	X	X			X	X			
		G. menardii (d'Orbigny)													X	X	
		G. praebulloides Blow									X	X					
		G. pseudopima														X	
		G. tosaensis														X	
		G. trilobus (Reuss)						X									
		G. tumida														X	
		G. sp.		X	X			X	X	X	X	X	X	X			X
		Globoqudrina sp.				X											
		Globorotalia crassaformis													X	X	
		Haplophragmoides compressa				X											
		Neogloboquadrina dutertrei													X		
		Orbulina universa d'Orbigny								X	X	X	X		X	X	
		Pla. Foram. gen. and sp. indet.		X	X		X			X		X	X				
		Pulleniatina obliquiloculata													X	X	
		P. primalis														X	
		Sphaeroidinella dehiscens													X		
	No Smaller Foraminifera		X														

Table A—3 Chemical Composition and C.I.P.W Norm

(1)

Rock Type		Ultramafic Complex (ultramafic rocks and associated rocks)																
		Pintin Body											Liwliw Body			Igsoso Body		
Location		Pintin R.	Pintin R.	Pintin R.	Pintin R.	Pintin R.	Pintin R.	Amnay R.	Amnay R.	Pintin R.	Pintin R.	Casiligan R.	Liwliw	Liwliw	Liwliw	Igsoso	Igsoso	Igsoso	Igsoso
Sample No.		KR2-020	KR2-021	KR2-026	KR2-033	KR2-040	KR2-048	SR1-038	YR1-005	KR2-030	KR2-036	SR2-140	KR2-54	KR2-077	KR2-078	KR2-061	KR2-063	KR2-064	KR2-066
Rock Name		harzburgite	dunite	ortho-pyroxenite	dunite	harzburgite	harzburgite	harzburgite	au hy gabbro	au hy gabbro	au gabbro	au hy gabbro	lherzolite	hornblendite	dunite	dunite	hb gabbro	au hb gabbro	au gabbro
Chemical Composition	SiO_2	39.50	40.60	43.80	39.40	42.30	38.80	33.51	47.89	44.00	41.40	46.20	40.30	44.30	42.50	41.50	46.90	48.80	54.50
	TiO_2	0.01	0.00	0.02	0.01	0.00	0.00	0.01	0.21	2.33	0.24	0.20	0.02	0.98	0.00	0.00	1.28	1.15	1.00
	Al_2O_3	0.76	0.47	1.26	0.56	0.54	0.49	0.80	20.55	14.40	16.90	19.20	1.55	12.00	0.34	0.26	16.30	15.00	15.20
	Fe_2O_3	8.28	7.46	5.56	7.46	6.46	7.94	4.35	0.84	8.24	5.08	3.46	7.44	7.69	7.34	6.82	4.69	6.55	8.15
	FeO	0.59	0.88	2.53	0.49	1.46	0.65	1.90	4.92	3.47	2.06	2.17	0.77	6.22	0.41	0.43	5.12	3.64	2.64
	MnO	0.13	0.13	0.14	0.12	0.13	0.09	0.09	0.12	0.26	0.13	0.12	0.10	0.48	0.11	0.05	0.23	0.20	0.20
	MgO	36.80	38.80	44.30	41.30	41.10	40.50	40.32	7.75	7.82	10.90	8.89	40.10	15.00	39.50	41.70	7.89	7.60	5.83
	CaO	0.81	0.37	2.12	0.63	0.94	0.38	2.02	13.93	12.60	15.20	12.00	0.93	9.91	0.36	0.31	13.80	9.31	4.26
	Na_2O	0.12	0.08	0.05	0.12	0.00	0.03	0.02	1.89	1.50	1.48	1.58	0.09	1.45	0.12	0.04	1.42	2.84	4.86
	K_2O	0.15	0.23	0.19	0.38	0.23	0.32	0.01	0.06	0.28	0.39	0.21	0.39	0.27	0.08	0.27	0.54	0.75	0.46
	P_2O_5	0.40	0.30	0.21	0.31	0.20	0.32	0.01	0.02	0.16	0.08	0.06	0.29	0.19	0.30	0.29	0.13	0.22	0.35
	Cr_2O_3	0.30	0.28	–	0.39	0.34	0.24	–	–	–	0.03	–	0.29	0.05	0.29	0.35	0.04	–	–
	NiO	0.23	0.23	–	0.24	0.24	0.59	–	–	–	0.01	–	0.20	0.02	0.26	0.35	0.01	–	–
	BaO	0.00	0.00	0.00	0.00	0.00	0.00	–	–	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	L.O.I	12.20	11.00	0.40	9.60	7.00	10.50	16.20	1.59	1.10	2.10	2.00	9.10	2.10	9.90	9.00	0.90	2.00	3.20
	Total	100.00	100.83	100.58	101.01	100.94	100.85	99.24	99.77	96.16	96.00	96.09	101.57	100.66	101.51	101.87	99.25	98.07	100.65
C.I.P.W. Norm	q									2.42		0.31						2.78	7.76
	c																		
	or	0.89	1.36	1.12	2.25	1.36	1.89	0.06	0.35	1.65	2.30	1.24	2.30	1.60	0.47	1.42	3.19	4.49	2.72
	ab	1.02	0.68	0.42	0.76		0.25	0.17	15.99	12.69	12.52	12.95	0.76	12.27	1.02		12.02	24.03	41.12
	an	1.09		2.65		0.79		2.06	47.41	31.73	38.32	44.90	2.67	25.44			36.51	25.94	18.30
	ne																		
	di wo	0.13		2.71	0.46	1.07		1.79	9.00	12.41	15.27	5.95	0.02	9.39			12.99	7.86	0.23
	di en	0.10		2.14	0.36	0.85		1.55	5.88	10.73	13.19	4.96	0.02	5.50			7.03	6.79	0.20
	di fs	0.02		0.27	0.04	0.10			2.50			0.23		3.43			5.51		
	hy fs	3.21	3.03	1.28	1.23	2.52	1.65		1.67			0.79	1.68	0.11	3.47	2.11	2.20		
	hy en	21.13	22.32	10.08	10.44	20.72	13.66	3.37	3.92	8.75		17.18	13.04	0.17	28.62	21.93	2.81	12.14	14.32
	ol fo	49.35	52.02	68.76	64.52	56.62	61.05	66.93	6.66				60.84	22.20	48.85	57.41	6.88		
	ol fa	8.26	7.80	9.66	8.38	7.59	8.14	0.03	3.12				8.66	15.25	6.52	6.10	5.94		
	mt							6.31	1.22	5.28	6.35	5.02						9.05	6.26
	hm									4.60	0.70							0.31	3.83
	il	0.02		0.04	0.02			0.02	0.40	4.43	0.46	0.38	0.04	1.86			2.43	2.28	1.90
	ru																		
	ap	0.93	0.70	0.49	0.72	0.46	0.74	0.02	0.05	0.37	0.19	0.14	0.67	0.44	0.70	0.67	0.30	0.51	0.81
	cc																		
	cr	0.44	0.41		0.57	0.50	0.35				0.04		0.43	0.07	0.43	1.25	0.06		
	tr	0.72	0.72		0.75	0.75	1.85						0.63	0.06	0.82	1.10	0.03		
	sp		0.12				0.13								0.08				
	MgO																		
	FeO																		
	Ic																		
	Total	87.31	89.16	99.62	86.62	93.33	89.71	82.31	98.17	95.06	89.34	94.05	91.76	97.79	90.98	91.99	97.90	96.08	97.45
S.I.*		80.10	81.77	84.17	83.02	83.45	81.92	86.52	50.13	36.70	54.75	54.51	82.19	48.97	83.25	84.65	40.13	35.53	26.57
MgOx100 /(FeO+MgO)		98.42	97.78	94.60	98.83	96.57	98.42	95.50	61.17	69.26	84.10	80.38	98.12	70.69	98.97	98.98	60.65	67.62	68.83

* S.I. = $MgOx100/(MgO+Fe_2O_3+FeO+Na_2O+K_2O)$

Rock Type		Ultramafic Complex															
		Bongabong Body							Ogos Body						Other Bodies			
Location		Bansud R.	Samagui R.	Samagui R.	Banus R.	Banus R.	Rosanna R.	Rosanna R.	Ogos R.	Ogos R.	Ogos R.	Ogos R.	Aglubang R.	Alagag R.	Paluan	Mariil	San Vicente	Binuangan R.
Sample No.		SR1–065	KR2–082	KR2–085	TR2–131	TR2–132	YR2–080	YR2–081	KR2–102	KR2–104	KR2–108	KR2–110	SR2–155	YR2–115	FR1–006	KR2–067	TR2–064	YR2–043
Rock Name		harzburgite	harzburgite	ortho-pyroxenite	lherzolite	dunite	harzburgite	dunite	harzburgite	dunite	dunite	harzburgite	dunite	dunite	harzburgite	harzburgite	harzburgite	dunite
Chemical Composition	SiO_2	40.12	41.00	43.10	37.20	34.80	43.30	34.20	45.10	40.00	37.50	42.50	38.60	36.10	38.48	39.80	40.30	40.10
	TiO_2	0.02	0.01	0.00	0.01	0.00	0.01	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.02	0.00
	Al_2O_3	1.52	1.33	0.41	0.85	0.20	1.16	0.14	1.71	0.24	0.20	1.07	0.69	0.33	1.76	1.06	1.42	0.72
	Fe_2O_3	4.12	7.14	5.03	6.71	7.39	4.70	5.93	5.66	6.91	6.61	5.51	6.56	4.75	6.99	7.98	7.46	5.22
	FeO	3.70	0.76	2.59	0.66	0.75	2.33	1.03	1.12	0.88	1.52	2.32	0.79	0.85	1.11	0.80	0.49	0.49
	MnO	0.12	0.14	0.13	0.11	0.12	0.12	0.10	0.13	0.11	0.12	0.13	0.11	0.11	0.12	0.11	0.12	0.10
	MgO	38.65	40.70	47.70	40.00	44.30	43.30	47.90	33.10	43.00	46.20	42.70	41.90	46.50	34.19	42.30	38.10	40.60
	CaO	1.21	0.30	0.58	1.61	0.41	1.43	0.31	9.78	0.60	0.45	1.28	1.01	0.36	4.60	0.27	1.07	0.51
	Na_2O	0.02	0.07	0.10	0.09	0.12	0.08	0.09	0.22	0.11	0.02	0.06	0.11	0.18	0.02	0.03	0.06	0.15
	K_2O	0.01	0.05	0.05	0.15	0.05	0.20	0.04	0.04	0.01	0.04	0.00	0.14	0.09	0.01	0.07	0.04	0.07
	P_2O_5	0.01	0.32	0.18	0.27	0.33	0.22	0.27	0.17	0.26	0.24	0.22	0.31	0.24	0.01	0.30	0.28	0.26
	Cr_2O_3	–	0.32	0.48	0.20	0.22	0.33	0.27	0.34	0.21	0.56	0.27	0.35	0.44	–	0.31	0.33	–
	NiO	–	0.22	0.25	0.21	0.24	0.22	0.26	0.13	0.22	0.24	0.21	0.23	0.01	–	0.23	0.22	–
	BaO	–	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	–	0.00	0.00	0.00
	L.O.I	10.11	10.00	1.00	11.50	9.70	2.80	9.90	3.80	12.00	6.20	4.00	9.90	10.00	12.44	9.50	10.00	7.10
	Total	99.61	102.36	101.60	99.57	98.63	100.20	100.44	101.37	104.55	99.90	100.27	100.70	99.96	99.76	102.76	99.91	95.32
C.I.P.W. Norm	q																	
	c																	
	or	0.06	0.30	0.30	0.89		1.18		0.24	0.06			0.83		0.06	0.41	0.24	0.41
	ab	0.17	0.59	0.85	0.76		0.68		1.86	0.93		0.51	0.93		0.17	0.25	0.51	1.27
	an	4.03		0.52	1.47		2.22		3.56	0.13	0.34	2.65	0.98		4.68		3.48	0.83
	ne					0.41		0.27			0.09			0.65				
	di wo	0.80		0.49	1.98		1.44		18.31	0.48	0.14	0.94	0.84	0.09	7.55			
	di en	0.67		0.40	1.58		1.15		14.39	0.38	0.11	0.75	0.67	0.07	6.52			
	di fs	0.02		0.04	0.18		0.12		1.88	0.04	0.01	0.09	0.07	0.01				
	hy fs	0.96	2.86	1.08	0.52		1.66		0.32	1.43		2.03	0.85			1.99	2.80	1.84
	hy en	25.94	23.17	10.64	4.53		16.02		2.42	12.43		17.07	7.80		16.58	15.08	21.54	19.16
	ol fo	48.81	54.00	75.52	65.54	74.05	63.54	74.28	45.99	66.07	80.13	62.04	67.20	78.14	43.48	62.62	51.41	57.37
	ol fa	2.00	7.35	8.41	8.39	9.35	7.26	7.27	6.63	8.55	9.67	8.12	8.07	6.72		9.10	7.37	6.08
	mt	5.97													3.88			
	hm														4.31			
	il	0.04	0.02		0.02		0.02		0.13						0.06			
	ru																	
	ap	0.02	0.74	0.42	0.63	0.76	0.51	0.63	0.39	0.60	0.56	0.51	0.72	0.56	0.02	0.70	0.65	0.60
	cc																	
	cr		0.47	0.71	0.29	0.32	0.49	0.40	0.50	0.31	0.82	0.40	0.52	0.65		0.46	0.49	
	tr		0.69	0.78	0.66	0.75	0.69	0.82	0.41	0.69	0.75	0.66	0.72	0.03		0.72	0.69	
	sp		1.62													1.30		0.13
	MgO					1.88		5.34			0.25			1.70				
	FeO					0.29		0.64			0.04			0.18				
	Ic					0.23		0.19			0.19			0.42				
	Total	89.49	91.81	100.16	87.45	88.04	96.98	89.84	97.03	91.90	93.10	95.77	90.20	89.22	87.31	92.63	89.22	87.69
S.I.*		83.12	83.54	85.99	84.02	84.20	85.56	87.11	82.46	84.46	84.94	84.40	84.65	88.79	80.79	82.65	82.56	87.26
MgOx100 /(FeO+MgO)		91.26	98.17	94.85	98.38	98.34	94.89	97.89	96.73	97.99	96.81	94.85	98.15	98.20	96.86	98.14	98.73	98.81

* S.I. = $MgOx100/(MgO+Fe_2O_3+FeO+Na_2O+K_2O)$

Rock Type		Ultramafic Complex									Lumintao Formation						Mansalay F.		Mamburao G.
		Other Bodies					Metamorphic Rocks				Volcanic Rocks			Associated Intrusive Rocks			Volcanic Rocks		Volcanic R.
Location		Balete R.	Balete R.	Balete R.	Mariil	San Vicente	BongabongR.	Rayusan R.	Ogos R.	Amnay R.	Lumintao R.	Lumintao R.	Igsoso	Pintin R.	Liwliw	Lumintao R.	Binunagin R.	San Vicente	Banilad Ck.
Sample No.		KR2-094	KR2-091	TR2-151	KR2-068	KR2-071	WR1-012	YR1-012	KR2-112	TR2-046	KR2-009	KR2-014	KR2-073	KR2-029	KR2-074	KR2-017	FR1-015	TR2-069	FR-017
Rock Name		harzburgite	ol hy gabbro	hb gabbro	diorite porphyry	trondhjo-mite	green schist	amphibolite	green schist	amphibolite	basalt	basalt	basalt	dolerite	dolerite	gabbro	basalt	basalt	basalt
Chemical Composition	SiO_2	41.00	49.30	43.40	60.60	68.90	50.38	50.84	47.10	47.60	48.00	48.80	50.00	50.80	47.20	45.50	46.37	46.30	50.52
	TiO_2	0.02	0.25	0.86	0.73	0.15	1.48	1.04	1.48	1.99	0.98	1.10	0.80	1.29	0.55	1.05	2.82	1.19	1.73
	Al_2O_3	1.93	17.50	14.20	16.30	12.30	15.21	15.92	14.10	16.90	15.60	14.90	15.20	14.90	14.10	16.50	15.20	15.60	15.77
	Fe_2O_3	6.95	4.02	6.25	2.03	1.36	2.80	2.38	7.44	7.74	7.91	6.94	7.15	8.59	5.36	6.35	4.87	6.65	5.99
	FeO	0.63	1.12	2.36	0.88	0.10	7.83	6.97	2.64	3.08	2.67	3.23	2.13	2.27	3.16	3.17	5.93	1.87	5.68
	MnO	0.12	0.15	0.16	0.05	0.01	0.18	0.16	0.21	0.39	0.18	0.18	0.17	0.18	0.19	0.18	0.13	0.18	0.22
	MgO	41.50	10.10	10.10	3.67	0.43	6.91	7.08	7.96	6.57	5.85	6.33	6.99	4.95	8.16	11.20	3.94	7.92	3.77
	CaO	0.81	12.40	9.72	4.81	4.25	11.16	10.48	12.00	8.22	9.91	9.93	9.63	8.43	14.40	8.16	9.81	7.83	7.65
	Na_2O	0.22	1.73	2.99	6.71	4.48	2.50	2.68	2.30	2.87	2.64	2.77	3.50	4.69	0.49	2.72	4.68	2.66	4.60
	K_2O	0.07	0.14	0.19	0.20	0.10	0.18	0.66	0.18	1.43	0.72	0.46	0.18	0.27	0.15	0.35	1.10	2.14	1.16
	P_2O_5	0.29	0.05	0.11	0.10	0.07	0.16	0.10	0.37	0.35	0.25	0.30	0.29	0.35	0.06	0.34	0.63	0.36	0.31
	Cr_2O_3	0.55	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	NiO	0.20	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	BaO	0.00	0.00	0.00	0.00	0.00	–	–	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	L.O.I	7.90	2.80	7.00	1.60	1.90	1.09	0.91	2.10	1.80	3.10	2.50	4.10	2.20	2.10	3.90	2.34	4.40	2.40
	Total	101.99	99.56	97.34	97.68	94.05	99.88	99.22	97.88	98.94	97.81	97.44	100.14	98.92	95.92	99.42	97.82	97.10	99.80
C.I.P.W. Norm	q		1.88		7.35	34.52	2.16	0.43	2.87	1.06	4.73	5.47	3.17	2.51	8.16				0.47
	c																		
	or	0.41	0.83	1.12	1.18	0.59	1.06	3.90	1.06	8.45	4.25	2.72	1.06	1.60	0.89	2.07	6.50	12.65	6.86
	ab	1.86	14.64	24.62	56.78	37.91	21.15	22.68	19.46	24.29	22.34	23.44	29.62	39.69	4.15	23.02	38.05	22.51	38.92
	an	2.12	39.57	24.76	13.77	13.16	29.75	29.46	27.62	29.01	28.59	26.86	25.23	18.81	35.83	31.78	17.22	24.31	18.96
	ne			0.37													0.84		
	di wo		9.03	9.49	3.94	1.24	10.26	9.14	12.32	3.96	7.91	8.53	8.62	8.66	14.70	2.71	6.08	5.09	7.09
	di en		7.80	8.21	3.41	1.07	6.16	5.61	10.64	3.42	6.83	7.38	7.45	7.48	12.33	2.34	4.42	4.40	4.92
	di fs						3.56	3.00							0.50		1.10		1.59
	hy fs	1.81					6.39	6.42							0.32				1.45
	hy en	15.73	17.36		5.73		11.05	12.02	9.18	12.94	7.74	8.39	9.96	4.85	8.00	13.92		7.64	4.47
	ol fo	60.92		11.88												8.16	3.78	5.39	
	ol fa	7.73															1.04		
	mt		3.37	5.64	0.88		4.06	3.45	4.90	5.43	6.35	7.78	5.10	4.16	7.77	7.76	7.06	3.17	8.68
	hm		1.69	2.36	1.42	1.36			4.06	3.99	3.53	1.57	3.63	5.72		1.00		4.47	
	il	0.04	0.47	1.63	1.39	0.23	2.81	1.98	2.81	3.78	1.86	2.11	1.52	2.45	1.04	1.99	5.36	2.26	3.29
	ru																		
	ap	0.67	0.12	0.25	0.23	0.16	0.37	0.23	0.86	0.81	0.58	0.70	0.67	0.81	0.14	0.79	1.46	0.83	0.72
	cc																		
	cr	0.52																	
	tr	0.63																	
	sp	1.00																	
	MgO																		
	FeO																		
	Ic																		
	Total	93.44	96.76	90.33	96.08	90.24	98.78	98.32	95.78	97.14	94.71	94.95	96.03	96.74	93.83	95.54	92.91	92.72	97.42
S.I.*		84.06	59.03	46.14	27.21	6.65	34.17	35.81	38.79	30.29	29.56	32.08	35.04	23.83	47.11	47.08	19.20	37.29	17.78
MgOx100 /(FeO+MgO)		98.50	90.02	81.06	80.66	81.13	46.88	50.39	75.09	68.08	68.66	66.21	76.64	68.56	72.08	77.94	39.92	80.90	39.89

* S.I. = $MgOx100/(MgO+Fe_2O_3+FeO+Na_2O+K_2O)$

Rock Type		Intrusive Rocks: Acidic to Intermediate Rocks				Halcon Metamorphics						
Location		Camarong R.	Mamburao R.	Sinambalan	Sinanbalan	Camarong R.	Agbuyi Ck.	Alag R.	San Teodoro	Puerto Galera	Paluan R.	Alag R.
Sample No.		FR1-041	FR1-024	TR2-107	TR2-111	FR1-039	FR1-113	FR1-103	SR1-090	TR2-161	YR2-039	FR2-073
Rock Name		grano-diorite	quartz diorite	diorite porphyry	quartz porphyry	gneiss	gneiss	green schist	green schist	mica schist	green schist	mica schist
Chemical Composition	SiO_2	71.27	58.81	48.60	61.10	72.64	70.18	62.42	45.24	71.30	57.60	57.30
	TiO_2	0.19	0.74	1.09	0.58	0.18	0.35	0.65	1.45	0.68	0.60	0.69
	Al_2O_3	16.13	16.62	17.10	15.60	15.02	15.24	14.90	15.34	14.20	13.50	16.30
	Fe_2O_3	0.59	2.56	7.08	4.30	0.52	0.51	3.44	2.24	2.42	5.55	5.75
	FeO	1.08	3.81	2.39	0.92	1.37	2.19	3.16	8.73	0.32	2.54	0.46
	MnO	0.02	0.10	0.13	0.08	0.06	0.06	0.16	0.21	0.00	0.23	0.09
	MgO	0.35	3.84	4.26	2.56	0.84	1.47	2.44	8.08	0.58	5.98	2.46
	CaO	2.92	3.87	7.20	2.18	1.57	2.41	5.07	8.83	0.31	2.85	2.22
	Na_2O	5.07	4.09	2.52	3.92	4.61	4.45	1.43	2.44	0.48	2.73	3.52
	K_2O	0.83	2.68	2.45	3.19	1.54	1.14	2.81	0.62	3.01	0.14	3.44
	P_2O_5	0.14	0.20	0.75	0.32	0.08	0.11	0.18	0.15	0.09	0.29	0.41
	Cr_2O_3	–	–	–	–	–	–	–	–	–	–	–
	NiO	–	–	–	–	–	–	–	–	–	–	–
	BaO	–	–	0.00	0.00	–	–	–	–	0.00	0.00	0.00
	L.O.I	0.69	1.82	2.00	3.10	1.06	1.19	2.00	4.29	3.70	5.10	2.80
	Total	99.28	99.14	95.57	97.85	99.49	99.30	98.66	97.62	97.09	97.11	95.44
C.I.P.W. Norm	q	31.66	9.86	5.49	18.50	34.67	31.46	30.16		55.71	36.98	16.39
	c	1.92	0.69		2.50	3.11	2.57	2.25	0.22	9.80	4.37	3.73
	or	4.91	15.84	14.48	18.85	9.10	6.74	16.61	3.66	17.79	0.83	20.33
	ab	42.90	34.61	21.32	33.17	39.01	37.65	12.10	20.65	4.06	23.10	29.79
	an	13.57	17.20	28.11	8.72	7.27	11.24	19.80	28.48	0.95	12.24	8.33
	ne											
	di wo			1.13								
	di en			0.98								
	di fs											
	hy fs	1.22	3.85			1.90	3.13	2.19	10.49			
	hy en	0.87	9.56	9.63	6.38	2.09	3.66	6.08	17.34	1.44	14.89	6.13
	ol fo								1.95			
	ol fa								1.30			
	mt	0.86	3.71	4.97	1.55	0.75	0.74	4.99	3.25		7.20	
	hm			3.65	3.23					2.42	0.59	5.75
	il	0.36	1.41	2.07	1.10	0.34	0.66	1.23	2.75	0.68	1.14	1.16
	ru									0.32		0.08
	ap	0.32	0.46	1.74	0.74	0.19	0.25	0.42	0.35	0.21	0.67	0.95
	cc											
	cr											
	tr											
	sp											
	MgO											
	FeO											
	Ie											
	Total	98.59	97.19	93.57	94.74	98.43	98.10	95.83	90.44	93.38	92.01	92.64
S.I.*		4.42	22.61	22.78	17.19	9.46	15.06	18.37	36.54	8.52	35.30	15.74
MgOx100 /(FeO+MgO)		24.48	50.20	64.06	73.56	38.01	40.16	43.57	48.07	64.44	70.19	84.25

* S.I. = $MgOx100/(MgO+Fe_2O_3+FeO+Na_2O+K_2O)$

Table A—4 Result of K-Ar Dating

Sample No.	Rock Name	K (%)	Rad ^{40}Ar (%)	Rad ^{40}Ar (scc/gm x 10^{-5})	Isotopic Age (m.y.)
FR-39	gneiss	1.27 1.27	63.5 63.8	0.121 0.125	24.7 ± 0.8
FR-41	granodiorite	0.61 0.61 0.61 0.61 0.61	56.9 59.4 61.1 60.9 59.2	0.079 0.084 0.094 0.106 0.118	40.2 ± 6.8 lowest value 33.0 highest value 49.1
FR-103	green schist	1.88 1.88	79.6 80.9	0.278 0.285	37.8 ± 1.1
FR-24	quartz diorite	2.47 2.47	80.6 81.8	0.293 0.295	30.4 ± 0.9
YR-12	amphibolite	0.73 0.73	51.5 50.1	0.071 0.073	24.6 ± 0.9

Remarks: The analyses were performed on whole rock material.

$$\text{Isotopic Age (m.y.)} = \frac{1}{\lambda\epsilon + \lambda\beta} \ln\left[\frac{\lambda\epsilon + \lambda\beta}{\lambda\epsilon} \times \frac{\text{Rad } ^{40}Ar}{^{40}K} + 1\right]$$

$\lambda\epsilon = 0.581 \times 10^{-10}\ yr^{-1}$

$\lambda\beta = 4.962 \times 10^{-10}\ yr^{-1}$

$^{40}K = 1.167 \times 10^{-4}$ atom per atom of natural potassium

Table A—5 Result of Rb-Sr Dating

Sample No.	Rock Name	Location	Rb (ppm)	Sr (ppm)	Rb/Sr	$^{87}Rb/^{86}Sr$	$^{87}Sr/^{86}Sr$
TR2—161	muscovite schist	Puerto Galera	150.4	54.5	2.76	7.98	0.71311 ± 0.00008
YR2—112	muscovite-chlorite schist	Catuiran River	66.4	153.8	0.43	1.25	0.71667 ± 0.00008
YR2—112 (mica)	muscovite	do	117.9	84.5	1.40	4.04	0.71678 ± 0.00009
TR2—046	amphibolite	Tributary of Amnay River	10.0	144.5	0.07	0.20	0.70866 ± 0.00010
TR2—047	amphibolite	do	36.7	155.8	0.24	0.68	0.70619 ± 0.00008
YR2—077	epidote amphibolite	Rosanna River	4.61	178.6	0.03	0.075	0.70293 ± 0.00010

Remarks: The model age calculated for the sample YR2—112 is 2.8 million years, using the data generated from the mica separate and whole rock material.

Table A—6 Assay Result of Ore Samples

(1)

	Sample No.	Location	Occurrence	Au g/T	Ag g/T	Cu %	Pb %	Zn %	Cr_2O_3 %	Ni %	Co ppm	Fe %	SiO_2 %	Al_2O_3 %	MgO %	S %	P %	Ca %	Ba %	Na %	K %	As %	TiO_2 %	V ppm
Gold and Copper Ores	FR1—034	Mamburao R.	Mal stained skarn (float)	0.1	1.0	0.75	—	—	—	—	—	7.48	—	—	—	0.23	—	—	—	—	—	—	—	—
	FR1—043	Odala R.	Py dissemination	0.1	1.4	0.12	—	—	—	—	—	21.39	—	—	—	18.23	—	—	—	—	—	—	—	—
	SR1—036	Abra de Ilog R.	silicified shale	0.0	0.8	0.00	—	—	—	—	—	3.99	—	—	—	2.35	—	—	—	—	—	—	—	—
	SR1—046	Matabong R.	Mal. stained amphibolite	0.0	1.6	0.13	—	—	—	—	—	7.13	—	—	—	0.22	—	—	—	—	—	—	—	—
	FR1—114	Binaybay R.	Qz-vein	0.0	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	FR1—115	do	do	0.0	0.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	FR1—116	do	do	0.0	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	FR2—078	do	do (float)	0.0	0.3	0.00	0.00	0.01	—	—	—	1.92	—	—	—	0.23	—	—	—	—	—	—	—	—
	FR2—079	do	Cp-Py network (do)	0.0	0.8	0.26	0.00	0.00	—	—	—	5.99	—	—	—	9.86	—	—	—	—	—	—	—	—
	WR1—142	Acliang & Pajo Dep.	Cp-Po vein	0.0	2.2	0.69	—	—	—	—	—	37.70	—	—	—	29.81	—	—	—	—	—	—	—	—
	WR1—183	San Andres Dep.	Cp-Py vein	0.0	1.3	0.37	—	—	—	—	—	7.63	—	—	—	1.81	—	—	—	—	—	—	—	—
	WR1—185	do	do	0.0	0.9	0.15	—	—	—	—	—	18.52	—	—	—	6.66	—	—	—	—	—	—	—	—
	FR2—024	Sibakay R.	massive Py ore (float)	0.00	4.2	1.41	0.01	1.05	—	—	—	39.18	—	—	—	39.68	—	—	—	—	—	—	—	—
	TR2—044	Amnay R.	massive Py ore (do)	0.00	12.9	0.42	0.12	0.81	—	—	—	44.36	—	—	—	44.70	—	—	—	—	—	—	—	—
	TR2—152	Dulangan R.	Cp-Py vein (do)	0.02	0.3	0.06	0.00	0.02	—	—	—	2.83	—	—	—	1.41	—	—	—	—	—	—	—	—
	TR2—157	do	Py-Qz vein (do)	0.02	0.1	0.00	0.00	0.00	—	—	—	1.20	—	—	—	1.45	—	—	—	—	—	—	—	—
	WR1—018	Taoga Dep.	chloritized sandstone	0.2	1.3	0.00	—	—	—	—	—	8.95	—	—	—	10.84	—	—	—	—	—	—	—	—
	WR1—021	do	argillized sandstone	1.5	2.5	0.00	—	—	—	—	—	10.55	—	—	—	10.54	—	—	—	—	—	—	—	—
	WR1—052	Bugsanga R.	Py-Cp vein	0.4	1.5	0.00	—	—	—	—	—	6.63	—	—	—	7.87	—	—	—	—	—	—	—	—
	WR1—130	Siange R.	Py-Qz vein	2.9	3.4	0.00	—	—	—	—	—	21.26	—	—	—	19.90	—	—	—	—	—	—	—	—
	SR2—127	Masnon Dep.	Cp-Po-Py vein	2.42	1.8	2.77	0.00	0.03	—	—	—	46.73	—	—	—	34.50	—	—	—	—	—	—	—	—
	FR3—030	do	do	tr	tr	0.45	0.10	0.20	—	—	—	40.86	—	—	—	23.61	—	—	—	—	—	—	—	—
	FR3—031	do	do	14.80	5.3	2.38	0.14	0.20	—	—	—	48.88	—	—	—	31.72	—	—	—	—	—	—	—	—
	FR3—032	do	do	3.70	1.6	2.05	0.13	0.20	—	—	—	46.69	—	—	—	29.34	—	—	—	—	—	—	—	—
	SR2—133	Manamburao Dep.	Cp-Py-Bo-He vein	0.11	4.7	2.12	0.01	0.05	—	—	—	19.59	—	—	—	20.04	—	—	—	—	—	—	—	—
	SR2—136	do	Cp-Py-Qz vein	0.90	1.9	2.21	0.00	0.15	—	—	—	14.58	—	—	—	9.24	—	—	—	—	—	—	—	—
	SR2—149	Shawood Dep.	Cp vein	5.47	3.0	15.33	0.00	0.12	—	—	—	24.17	—	—	—	19.55	—	—	—	—	—	—	—	—
	FR3—025	do	Cp-Po vein	8.33	4.5	11.93	0.16	0.20	—	—	—	21.99	—	—	—	15.24	—	—	—	—	—	—	—	—
	FR3—026	do	do	1.90	1.2	0.28	0.17	0.20	—	—	—	37.65	—	—	—	18.91	—	—	—	—	—	—	—	—
	FR3—034	do	do	tr	tr	2.49	0.10	0.20	—	—	—	11.67	—	—	—	4.74	—	—	—	—	—	—	—	—
	FR3—035	do	do	tr	tr	11.95	0.23	0.61	—	—	—	22.76	—	—	—	15.47	—	—	—	—	—	—	—	—
	FR3—023	Mayu R.	Py dissemination	tr	tr	0.36	0.12	0.20	—	—	—	22.37	—	—	—	15.42	—	—	—	—	—	—	—	—
	FR3—024	do	do	1.10	5.6	1.01	0.10	0.30	—	—	—	10.94	—	—	—	12.42	—	—	—	—	—	—	—	—
	SR2—165	Aglubang R.	massive Py ore (float)	0.44	20.7	0.40	0.71	8.52	—	—	—	28.27	—	—	—	37.63	—	—	—	—	—	—	—	—
	FR3—033	do	do	0.67	4.9	0.42	0.12	0.20	—	—	—	48.64	—	—	—	25.16	—	—	—	—	—	—	—	—

	Sample No.	Location	Occurrence	Au g/T	Ag g/t	Cu %	Pb %	Zn %	Cr_2O_3 %	Ni %	Co ppm	Fe %	SiO_2 %	Al_2O_3 %	MgO %	S %	P %	Ca %	Ba %	Na %	K %	As %	TiO_2 %	V ppm
Chrome Ore	FR1–007	Paluan Dep.	massive Cr ore (stockpile)	–	–	–	–	–	44.88	0.07	–	4.59	–	4.16	10.68	–	–	–	–	–	–	–	–	–
	FR1–008	do	peridotite	–	–	–	–	–	0.03	0.02	–	0.44	–	12.37	16.00	–	–	–	–	–	–	–	–	–
	KR2–069a	Mariri Dep.	massive Cr ore (stockpile)	–	–	–	–	–	50.50	0.02	4	10.14	4.48	6.69	4.38	–	–	–	–	–	–	–	–	–
	KR2–069b	do	do (do)	–	–	–	–	–	45.82	0.02	5	10.86	5.74	5.57	5.07	–	–	–	–	–	–	–	–	–
	KR2–070	do	do (float)	–	–	–	–	–	48.93	0.02	8	10.00	1.22	6.75	2.88	–	–	–	–	–	–	–	–	–
	YR2–037a	do	do	–	–	–	–	–	40.31	0.06	20	10.00	8.44	6.65	6.45	–	–	–	–	–	–	–	–	–
	KR2–060	Igsoso Dep.	banded Cr ore	–	–	–	–	–	34.14	0.08	26	8.57	13.14	5.88	14.14	–	–	–	–	–	–	–	–	–
	KR2–062	do	do	–	–	–	–	–	38.85	0.16	21	10.14	13.92	4.29	10.89	–	–	–	–	–	–	–	–	–
	KR2–065	do	massive Cr ore (stockpile)	–	–	–	–	–	43.00	0.07	28	11.29	3.66	9.66	5.99	–	–	–	–	–	–	–	–	–
	KR2–055a	Liwliw Dep.	do (do)	–	–	–	–	–	40.31	0.04	17	9.00	5.72	10.68	6.78	–	–	–	–	–	–	–	–	–
	KR2–055b	do	do (do)	–	–	–	–	–	36.50	0.03	13	7.86	7.78	9.39	9.37	–	–	–	–	–	–	–	–	–
	KR2–072	San Vicente Dep.	disseminated Cr ore (float)	–	–	–	–	–	5.23	0.36	164	10.29	34.14	1.38	31.45	–	–	–	–	–	–	–	–	–
	TR2–060	do	massive Cr ore	–	–	–	–	–	29.11	0.08	70	10.14	2.38	19.99	8.59	–	–	–	–	–	–	–	–	–
	YR1–030	Sibacoi R.	do	–	–	–	–	–	49.52	0.07	–	3.14	2.39	–	6.93	–	–	–	–	–	–	–	–	–
	KR2–050a	Pintin Dep.	do (float)	–	–	–	–	–	50.03	0.09	19	14.57	4.00	5.35	4.63	–	–	–	–	–	–	–	–	–
	KR2–050b	do	do (do)	–	–	–	–	–	53.55	0.07	16	15.29	2.24	4.69	2.42	–	–	–	–	–	–	–	–	–
	SR2–042	Paragpagan Dep.	laterite	–	–	–	–	–	1.87	0.69	422	22.43	9.46	3.38	10.79	–	–	–	–	–	–	–	–	–
	SR2–044	do	do	–	–	–	–	–	2.66	0.92	1,418	45.43	2.28	2.44	0.73	–	–	–	–	–	–	–	–	–
	FR3–013	Pintin Dep.	massive Cr ore	–	–	–	–	–	51.40	0.22	264	17.69	2.96	8.74	11.64	–	–	–	–	–	–	–	–	–
	KR3–005	do	do	–	–	–	–	–	33.18	0.16	207	9.86	6.78	26.06	18.74	–	–	–	–	–	–	–	–	–
	KR3–006	do	do	–	–	–	–	–	30.30	0.12	144	9.14	9.02	24.79	18.98	–	–	–	–	–	–	–	–	–
	KR3–007	do	do	–	–	–	–	–	56.10	0.25	3.00	11.88	6.34	8.76	13.64	–	–	–	–	–	–	–	–	–
	KR3–011a	do	do	–	–	–	–	–	48.94	0.17	274	13.81	6.76	12.38	12.44	–	–	–	–	–	–	–	–	–
	KR3–011b	do	do	–	–	–	–	–	47.62	0.25	314	19.33	8.65	7.76	9.08	–	–	–	–	–	–	–	–	–
	KR3–013	do (Tr, No.1)	do	–	–	–	–	–	39.81	0.32	336	26.63	10.91	6.28	6.97	–	–	–	–	–	–	–	–	–
	KR3–014	do (Tr, No.2)	do	–	–	–	–	–	40.19	0.23	230	14.89	11.26	11.63	14.49	–	–	–	–	–	–	–	–	–
	KR3–019a	do (Tr, No.1)	do	–	–	–	–	–	38.93	0.19	272	19.13	12.96	9.35	13.30	–	–	–	–	–	–	–	–	–
	KR3–019b	do (do)	do	–	–	–	–	–	38.14	0.14	240	15.05	18.00	10.62	15.84	–	–	–	–	–	–	–	–	–
	KR3–020	do (do)	do	–	–	–	–	–	41.30	0.31	323	26.89	5.46	6.68	6.77	–	–	–	–	–	–	–	–	–
	KR3–023	do (Tr, No.2)	do	–	–	–	–	–	39.92	0.16	254	14.80	10.11	12.63	15.41	–	–	–	–	–	–	–	–	–
	SR1–039	Amnay R.	peridotite	–	–	–	–	–	0.38	0.22	–	5.43	–	0.83	43.44	–	–	–	–	–	–	–	–	–
	SR1–060	do	do	–	–	–	–	–	0.38	0.21	–	5.43	–	1.31	38.40	–	–	–	–	–	–	–	–	–
	WR1–160	Aglubang Dep.	nikeliferous laterite	–	–	–	–	–	3.87	0.46	–	28.70	–	7.30	3.56	–	–	–	–	–	–	–	–	–
	KR2–105a	Ogos Dep.	disseminated Cr ore	–	–	–	–	–	29.99	0.10	68	14.14	9.80	7.75	14.32	–	–	–	–	–	–	–	–	–
	KR2–105b	do	dense spotted Cr ore	–	–	–	–	–	31.39	0.09	50	12.29	9.12	7.80	13.83	–	–	–	–	–	–	–	–	–

	Sample No.	Location	Occurrence	Au g/T	Ag g/T	Cu %	Pb %	Zn %	Cr_2O_3 %	Ni %	Co ppm	Fe %	SiO_2 %	Al_2O_3 %	MgO %	S %	P %	Ca %	Ba %	Na %	K %	As %	TiO_2 %	V ppm
Chrome Ore	KR2–105c	Ogos Dep.	weathered sandy Cr ore	–	–	–	–	–	28.28	0.07	26	10.86	6.22	7.55	11.82	–	–	–	–	–	–	–	–	–
	KR2–106	do	do	–	–	–	–	–	37.05	0.04	24	13.29	5.58	9.09	6.20	–	–	–	–	–	–	–	–	–
	FR3–015	do	massive Cr ore	–	–	–	–	–	45.82	0.20	265	14.00	6.61	9.49	15.17	–	–	–	–	–	–	–	–	–
	GR3–105	do	disseminated Cr ore	–	–	–	–	–	6.19	0.30	254	11.57	35.58	1.29	34.42	–	–	–	–	–	–	–	–	–
	KR3–051a	do	massive Cr ore	–	–	–	–	–	39.57	0.21	194	11.02	9.97	14.44	21.12	–	–	–	–	–	–	–	–	–
	KR3–051b	do	do	–	–	–	–	–	44.11	0.14	243	9.79	10.89	10.06	18.06	–	–	–	–	–	–	–	–	–
	KR3–052	do	do	–	–	–	–	–	35.23	0.15	575	29.34	5.89	9.97	6.29	–	–	–	–	–	–	–	–	–
	KR3–053	do (Tr.)	do	–	–	–	–	–	33.71	0.13	191	12.35	17.54	9.47	21.63	–	–	–	–	–	–	–	–	–
	KR3–054	do (do)	do	–	–	–	–	–	30.16	0.11	143	11.30	14.65	15.23	22.64	–	–	–	–	–	–	–	–	–
	KR3–055	do (do)	do	–	–	–	–	–	18.19	0.16	152	8.85	27.44	11.10	28.47	–	–	–	–	–	–	–	–	–
	KR3–056	do (do)	do	–	–	–	–	–	23.25	0.16	160	9.77	22.57	12.43	26.27	–	–	–	–	–	–	–	–	–
	KR3–058	do (do)	do	–	–	–	–	–	29.85	0.13	173	11.21	14.89	16.88	21.95	–	–	–	–	–	–	–	–	–
	KR3–059	do (do)	do	–	–	–	–	–	37.36	0.11	196	13.51	8.13	18.15	15.09	–	–	–	–	–	–	–	–	–
	KR3–060	do (do)	do	–	–	–	–	–	27.05	0.13	173	12.69	13.25	14.80	23.05	–	–	–	–	–	–	–	–	–
	KR3–064	do (do)	do	–	–	–	–	–	30.64	0.10	160	11.79	12.45	18.39	19.05	–	–	–	–	–	–	–	–	–
	YR3–150	do (Siyabu)	do	–	–	–	–	–	37.20	0.07	192	10.80	11.81	11.97	20.89	–	–	–	–	–	–	–	–	–
	TR2–130a	Bongabong (Banus)	do	–	–	–	–	–	34.50	0.05	46	12.43	11.80	6.42	19.56	–	–	–	–	–	–	–	–	–
	TR2–130b	do (do)	do	–	–	–	–	–	27.08	0.13	23	8.71	19.08	3.97	31.63	–	–	–	–	–	–	–	–	–
	YR3–114	do	do	–	–	–	–	–	42.02	0.10	184	11.65	8.02	10.09	19.79	–	–	–	–	–	–	–	–	–
	YR3–116	do	do	–	–	–	–	–	46.12	0.08	203	11.65	6.77	10.76	18.43	–	–	–	–	–	–	–	–	–
	YR3–120	do (Banus)	do	–	–	–	–	–	37.97	0.11	186	10.98	10.73	10.90	21.02	–	–	–	–	–	–	–	–	–
	YR3–121	do (do)	do	–	–	–	–	–	46.11	0.10	187	11.88	4.86	12.69	17.15	–	–	–	–	–	–	–	–	–
	YR3–122	do (do)	do	–	–	–	–	–	41.44	0.07	270	18.90	10.11	8.89	17.36	–	–	–	–	–	–	–	–	–
	YR3–123	do (do)	do	–	–	–	–	–	43.50	0.12	192	11.47	8.70	10.77	18.48	–	–	–	–	–	–	–	–	–
	YR3–135	do (Masba)	do	–	–	–	–	–	44.98	0.09	186	11.59	8.58	9.79	19.24	–	–	–	–	–	–	–	–	–
	YR3–140	do (do)	do	–	–	–	–	–	41.85	0.10	171	12.17	6.18	15.65	16.85	–	–	–	–	–	–	–	–	–
	YR3–142	do (do)	do	–	–	–	–	–	41.47	0.12	188	9.86	8.11	13.64	19.47	–	–	–	–	–	–	–	–	–
	YR3–161	do (Banus)	do	–	–	–	–	–	41.23	0.09	171	10.08	9.11	12.85	19.73	–	–	–	–	–	–	–	–	–
	YR3–165	do (do)	do	–	–	–	–	–	36.05	0.10	182	10.70	12.63	12.40	17.71	–	–	–	–	–	–	–	–	–
	YR3–166	do (do)	do	–	–	–	–	–	43.43	0.10	193	11.73	7.06	13.40	16.80	–	–	–	–	–	–	–	–	–
	YR3–167	do (do)	do	–	–	–	–	–	45.43	0.08	189	12.01	4.87	13.00	16.27	–	–	–	–	–	–	–	–	–
Iron Ore	FR2–036	Nagsabangan Dep.	massive Mt ore	–	–	–	–	–	–	–	–	61.36	0.98	0.30	–	0.07	0.023	–	–	–	–	0.011	0.011	–
	FR2–037	do	do	–	–	–	–	–	–	–	–	60.82	0.80	0.30	–	0.03	0.019	–	–	–	–	0.014	0.017	–
	KR3–028a	do	do	–	–	0.006	–	–	–	–	–	67.32	–	–	–	–	0.011	–	–	–	–	–	0.007	12
	KR3–028b	do	do	–	–	0.003	–	–	–	–	–	56.42	–	–	–	–	0.043	–	–	–	–	–	0.079	106

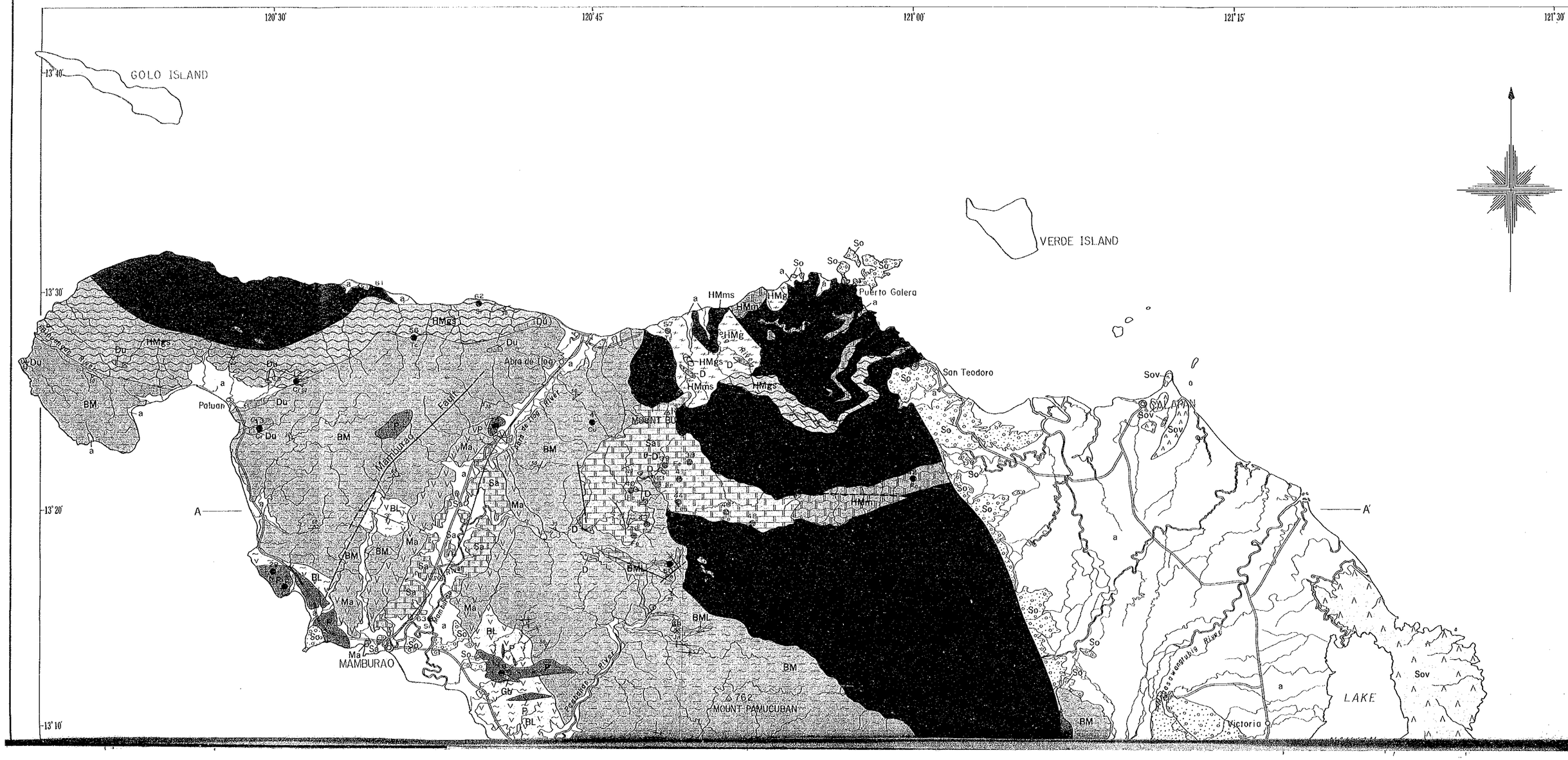
	Sample No.	Location	Occurrence	Au g/T	Ag g/T	Cu %	Pb %	Zn %	Cr_2O_3 %	Ni %	Co ppm	Fe %	SiO_2 %	Al_2O_3 %	MgO %	S %	P %	Ca %	Ba %	Na %	K %	As %	TiO_2 %	V ppm
Iron Ore	KR3–028c	Nagsabongan	massive Mt ore	–	–	0.044	–	–	–	–	–	69.46	–	–	–	–	0.006	–	–	–	–	–	0.012	11
	YR3–054	do	do	–	–	0.036	–	–	–	–	–	64.56	–	–	–	–	0.026	–	–	–	–	–	0.008	23
	YR3–064	do	do	–	–	0.011	–	–	–	–	–	69.92	–	–	–	–	0.017	–	–	–	–	–	0.020	28
	FR2–039	Tiraca Dep.	do	–	–	–	–	–	–	–	–	59.73	0.22	0.21	–	0.05	0.013	–	–	–	–	0.024	0.009	–
	FR2–041	Ak. Ak Dep.	do	–	–	–	–	–	–	–	–	51.55	6.18	0.23	–	0.26	0.032	–	–	–	–	0.003	0.028	–
	FR1–031	Lasala Dep.	massive He ore	–	–	–	–	–	–	–	–	54.13	2.44	0.25	–	0.20	0.000	–	–	–	–	0.021	0.024	–
	TR2–090	do	banded Mt-He-Qz ore	–	–	–	–	–	–	–	–	28.23	53.60	0.36	–	0.52	0.025	–	–	–	–	0.002	0.004	–
	TR2–093	do	massive Mt-Qz ore	–	–	–	–	–	–	–	–	49.09	19.88	0.25	–	0.02	0.055	–	–	–	–	–	–	–
	GR3–028	do	massive Mt ore	–	–	0.005	–	–	–	–	–	68.49	–	–	–	–	0.011	–	–	–	–	–	0.046	156
	GR3–030	do	do	–	–	0.198	–	–	–	–	–	54.87	–	–	–	–	0.125	–	–	–	–	–	0.052	47
	GR3–031	do	do	–	–	0.008	–	–	–	–	–	63.04	–	–	–	–	0.014	–	–	–	–	–	0.030	148
	YR3–040a	do	do	–	–	0.027	–	–	–	–	–	59.96	–	–	–	–	0.014	–	–	–	–	–	0.014	81
	YR3–040b	do	do	–	–	0.029	–	–	–	–	–	62.30	–	–	–	–	0.014	–	–	–	–	–	0.011	80
	YR3–041	do	do	–	–	0.006	–	–	–	–	–	57.90	–	–	–	–	0.030	–	–	–	–	–	0.010	51
	TR2–096	Lapa-ao Dep.	do	–	–	–	–	–	–	–	–	52.77	3.30	0.30	–	0.02	0.017	–	–	–	–	0.001	0.007	–
	TR2–097	do	do	–	–	–	–	–	–	–	–	54.00	6.10	0.40	–	0.35	0.076	–	–	–	–	0.000	0.011	–
	KR3–032a	do	do	–	–	0.024	–	–	–	–	–	55.41	–	–	–	–	0.007	–	–	–	–	–	0.005	22
	KR3–032b	do	do	–	–	0.003	–	–	–	–	–	63.85	–	–	–	–	0.004	–	–	–	–	–	0.010	71
	KR3–032c	do	do	–	–	0.003	–	–	–	–	–	60.24	–	–	–	–	0.007	–	–	–	–	–	0.010	71
	YR3–042a	do	Mt-skarn ore	–	–	0.024	–	–	–	–	–	30.74	–	–	–	–	0.018	–	–	–	–	–	0.017	70
	YR3–042b	do	do	–	–	0.024	–	–	–	–	–	33.11	–	–	–	–	0.024	–	–	–	–	–	0.016	73
	YR3–043	do	massive Mt ore	–	–	0.004	–	–	–	–	–	69.30	–	–	–	–	0.006	–	–	–	–	–	0.008	71
	TR2–109	Cobanga-on Dep.	do	–	–	–	–	–	–	–	–	55.36	7.72	1.02	–	0.02	0.060	–	–	–	–	0.000	0.028	–
	FR1–045	Dayap Dep.	do	–	–	–	–	–	–	–	–	50.48	14.06	0.81	–	0.24	0.000	–	–	–	–	–	–	–
	FR3–005	do	do	–	–	0.021	–	–	–	–	–	56.73	–	–	–	–	0.002	–	–	–	–	–	0.046	83
	FR3–006	do	do	–	–	0.022	–	–	–	–	–	70.43	–	–	–	–	0.013	–	–	–	–	–	0.016	33
	FR3–007	do	do	–	–	0.009	–	–	–	–	–	65.37	–	–	–	–	0.003	–	–	–	–	–	0.012	32
Others	SR1–091	San Teodoro	limonitized schist	–	–	–	–	–	–	0.14	–	4.05	–	–	–	0.15	–	–	–	–	–	–	–	–
	WR1–017	Mansalay	silica sand (stockpile)	–	–	–	–	–	–	–	–	0.45	82.40	5.05	–	–	–	–	–	0.35	2.54	–	–	–
	WR1–022	Taoga Dep	barite vein	–	–	–	–	–	–	–	–	0.12	2.55	0.00	–	–	–	0.01	49.30	–	–	–	–	–

Abbreviation : Cp: chalcopyrite, Mal: Malachite, Po: Pyrrhotite, Py: Pyrite, Cr: Chromite, Mt: Magnetite, He: Hematite, Qz: Quartz

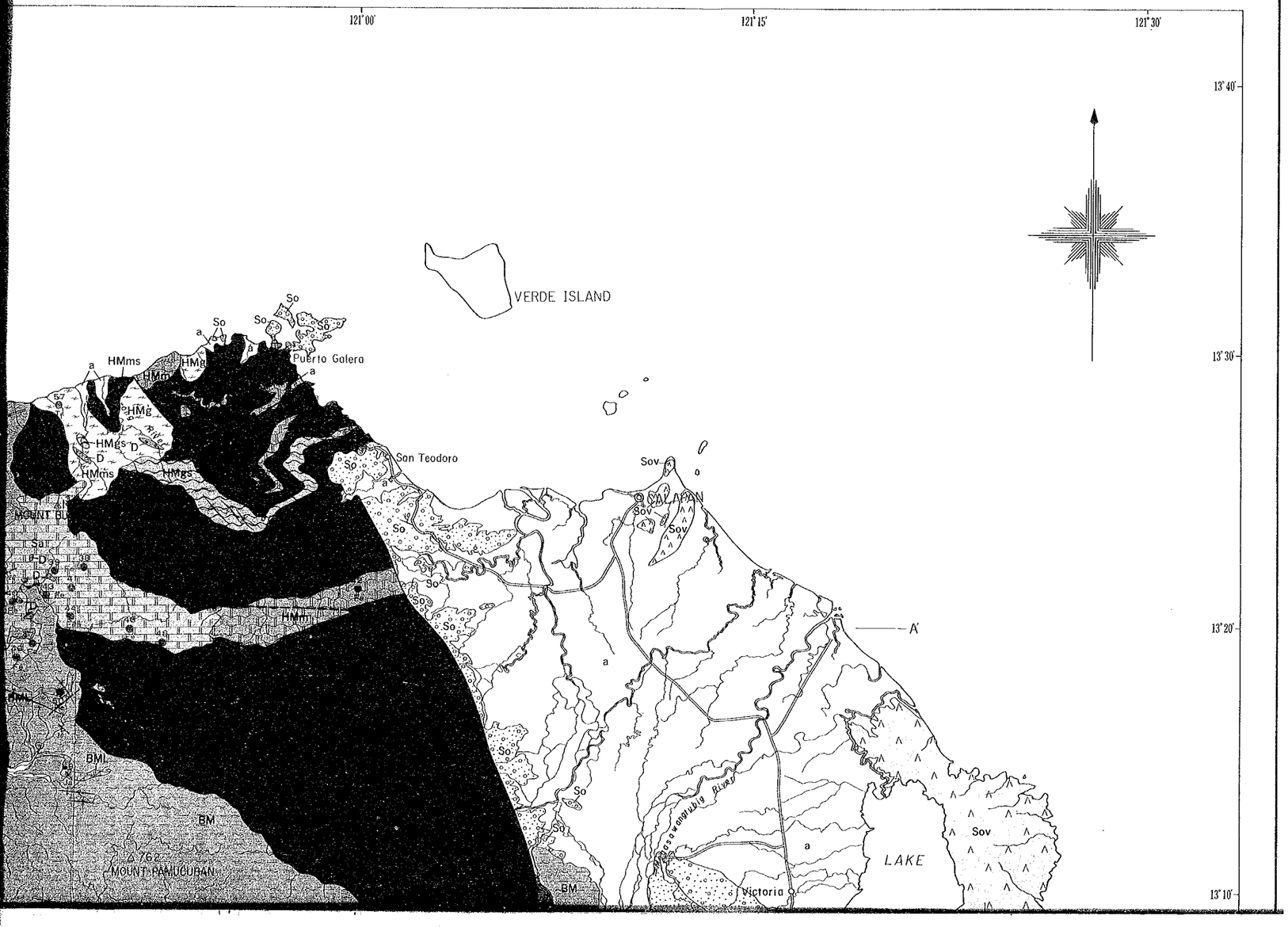
Table A—7 Result of Chemical Analysis of Coal

Sample No.	Location	Occurrence	Moisture (%)	Volatile matter (%)	Fixed Carbon (%)	Ash (%)	Moisture & Ash Free		B.T.U/ℓb	
							Volatile matter (%)	Fixed Carbon (%)	As a whole	Moisture & Ash Fee
HR1 – 204	Alitaytayan	coal seam of the Sablayan G.	18.0	39.4	36.0	6.6	52.3	47.7	9,452	12,624
FR2 – 045	Tambargan	do	18.7	37.7	32.3	11.3	53.9	46.1	7,684	11,120
FR2 – 046	Siay Creek	do	16.6	34.9	29.2	19.3	54.4	45.6	7,161	11,447
FR2 – 047	do	do	14.2	40.3	29.4	16.1	57.8	42.2	8,766	12,814
SR2 – 086	Napisian	do	11.1	32.9	28.6	27.4	53.5	46.5	6,872	11,587
SR2 – 098	do	do	15.2	40.5	33.4	10.9	54.8	45.2	8,911	12,201
SR2 – 099	do	do	13.5	43.4	36.8	6.3	54.1	45.9	10,083	12,652

GEOLOGICAL AND MINERAL INVENTORY MAP



L AND MINERAL INVENTORY MAP

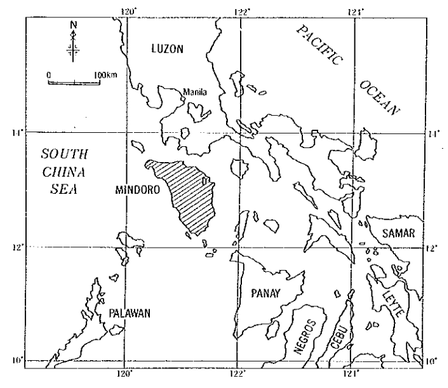


PL. 1

GEOLOGICAL SURVEY
OF
MINDORO ISLAND, PHILIPPINES

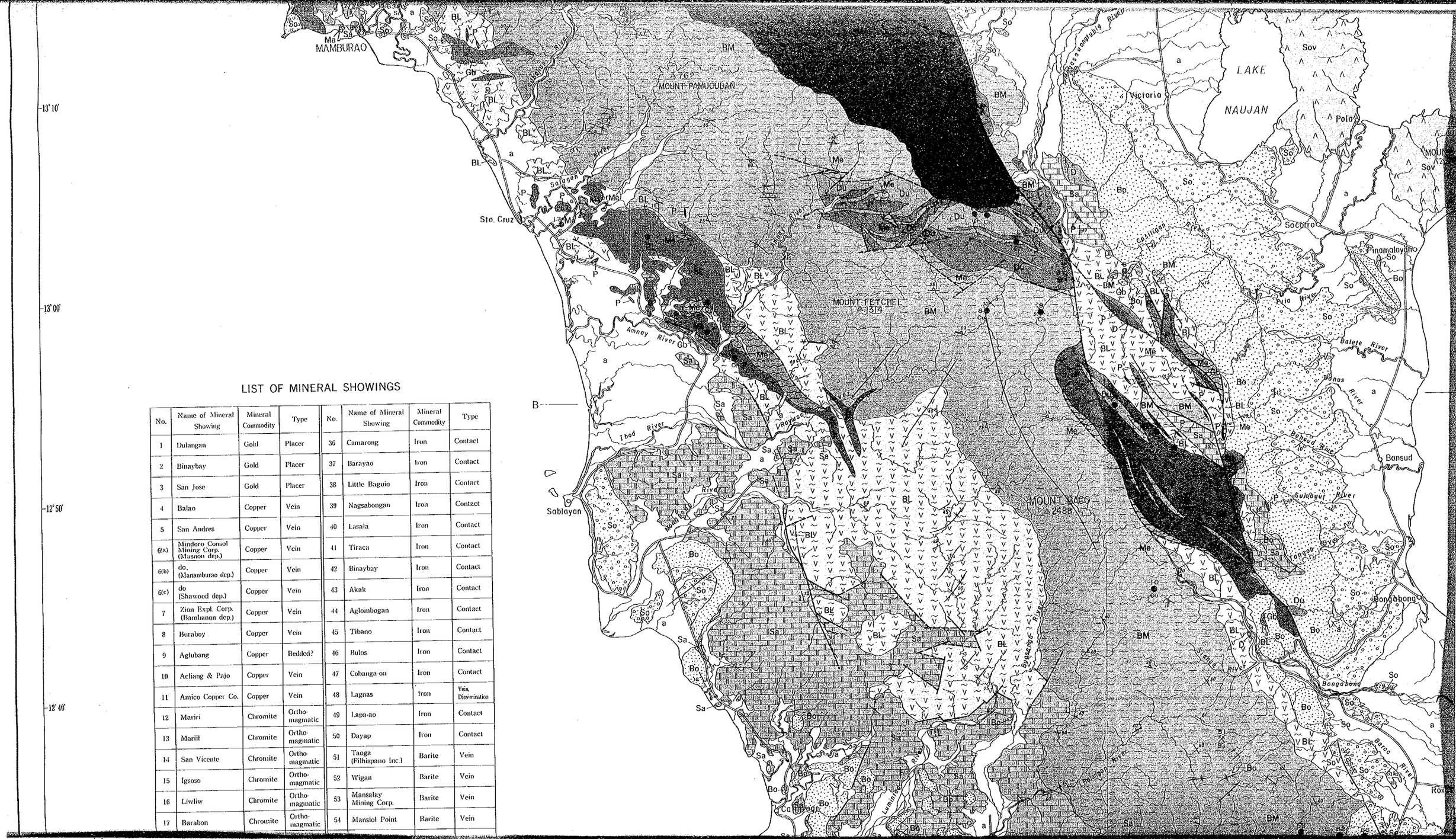
GEOLOGICAL AND MINERAL INVENTORY MAP

LOCATION INDEX



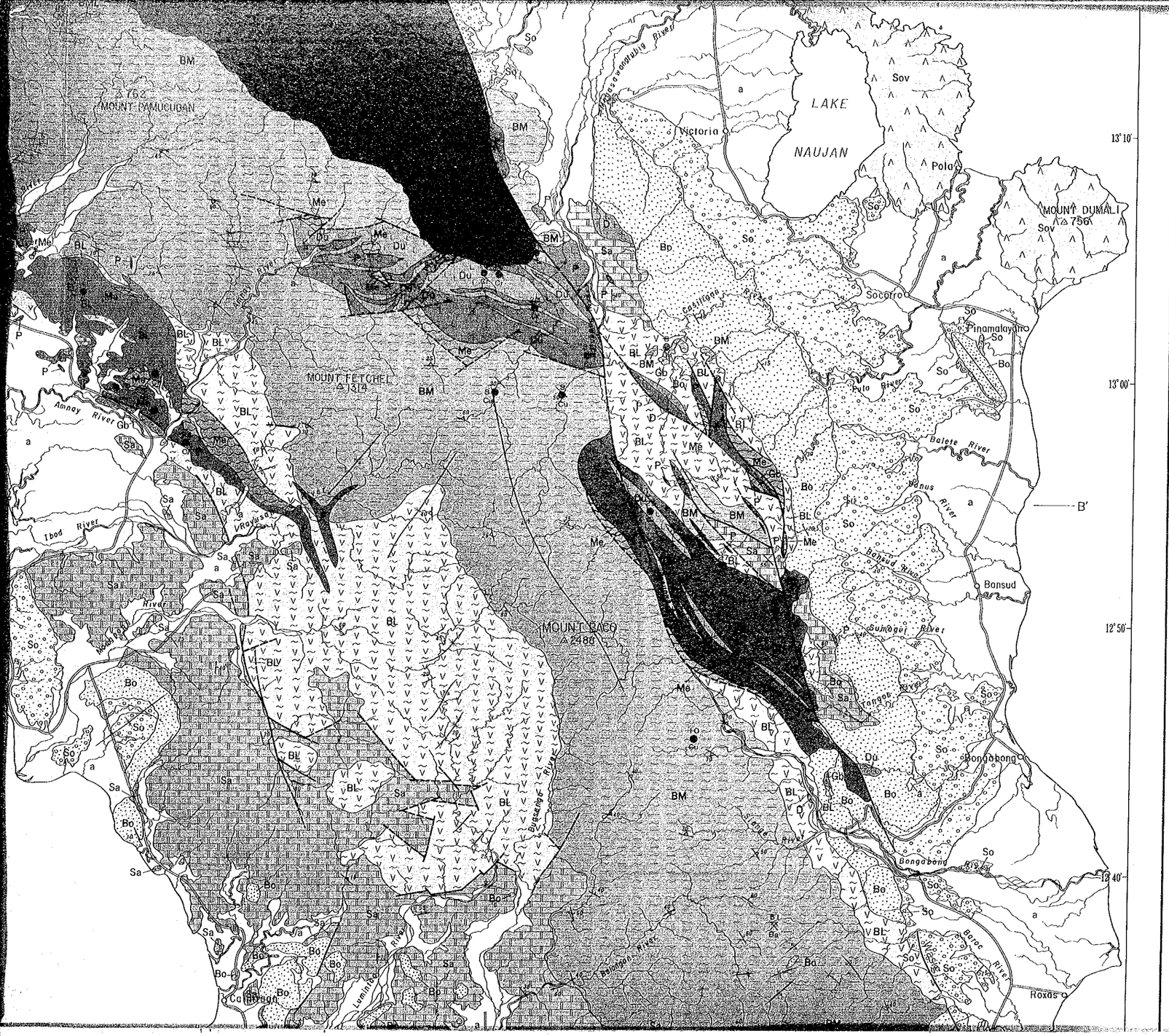
June 1984

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN



LIST OF MINERAL SHOWINGS

No.	Name of Mineral Showing	Mineral Commodity	Type
1	Dulangan	Gold	Placer
2	Binaybay	Gold	Placer
3	San Jose	Gold	Placer
4	Balao	Copper	Vein
5	San Andres	Copper	Vein
6(a)	Mindoro Consol Mining Corp. (Masnon dep.)	Copper	Vein
6(b)	do. (Manamburao dep.)	Copper	Vein
6(c)	do (Shawood dep.)	Copper	Vein
7	Zion Expl. Corp. (Bambanon dep.)	Copper	Vein
8	Buraboy	Copper	Vein
9	Aglubang	Copper	Bedded?
10	Aciiang & Pajo	Copper	Vein
11	Amico Copper Co.	Copper	Vein
12	Mariri	Chromite	Ortho-magmatic
13	Mariil	Chromite	Ortho-magmatic
14	San Vicente	Chromite	Ortho-magmatic
15	Igsoso	Chromite	Ortho-magmatic
16	Liwliw	Chromite	Ortho-magmatic
17	Barabon	Chromite	Ortho-magmatic
36	Camarong	Iron	Contact
37	Barayao	Iron	Contact
38	Little Baguio	Iron	Contact
39	Nagsabongan	Iron	Contact
40	Lasala	Iron	Contact
41	Tiraca	Iron	Contact
42	Binaybay	Iron	Contact
43	Akak	Iron	Contact
44	Aglombogan	Iron	Contact
45	Tibano	Iron	Contact
46	Bulos	Iron	Contact
47	Cobanga-on	Iron	Contact
48	Lagnas	Iron	Vein, Dissemination
49	Lapa-ao	Iron	Contact
50	Dayap	Iron	Contact
51	Taoga (Filhispano Inc.)	Barite	Vein
52	Wigan	Barite	Vein
53	Mansalay Mining Corp.	Barite	Vein
54	Mansiol Point	Barite	Vein



LEGEND

Quaternary	Alluvial deposits	a	silt, sand and gravel
	Socorro Group	So	terrace deposits (sand, gravel), tuffaceous silt and andesitic tuff
		Sol	limestone
		Sov	andesite and basalt
Tertiary	Bongabong Group	Bo	conglomerate, calcareous sandstone, calcareous siltstone to mudstone, with andesitic tuff
	Sablayan Group	Sa	limestone, calcareous sandstone, calcareous mudstone with andesite and andesitic tuff
		Sam	calcareous mudstone with limestone
	Mamburao Group	Ma	basalt
Jurassic	Baco Group, Lumintao Formation		basalt with basaltic tuff, sandstone, shale, slate to phyllite, green slate
	Baco Group, Mansalay Formation	BML	limestone
		BM	shale, sandstone, slate to phyllite, phyllitic sandstone with basalt and basaltic tuff
Jurassic to Jurassic	Halcon metamorphics		mica schist with green schist
		HMgs	green schist with mica schist
		HMm	marble