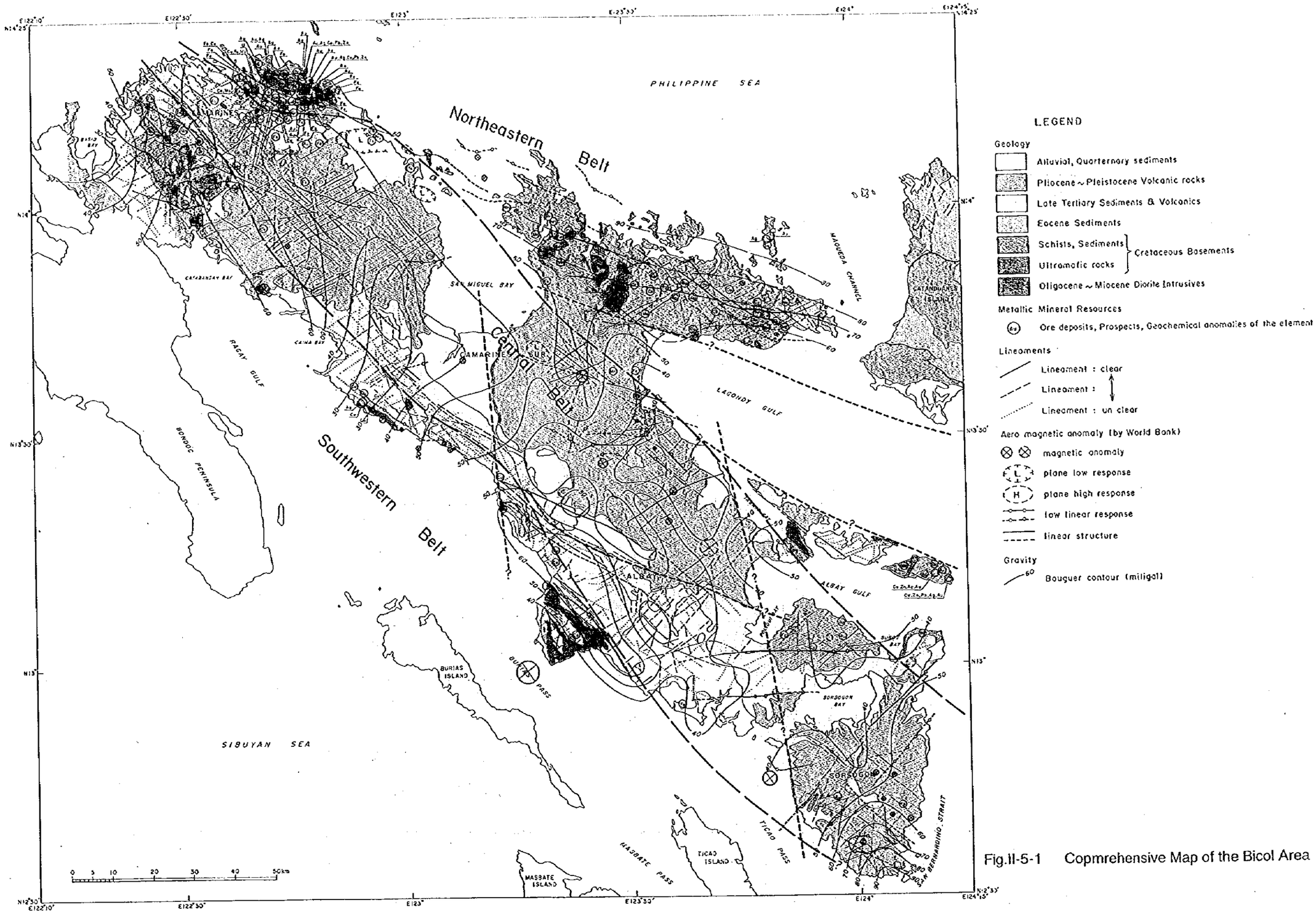
Chapter 5: Discussions

5.1 Geological Structure and Mineralization Characteristics and Control of Mineralization

The following is a general description of the geology of the Bicol Region in terms of age and distribution as indicated also in the geological map of Fig. II-5-1.

- Cretaceous system, constituting the basement rock: Late Cretaceous ophiolite sequence and late Cretaceous sedimentary rocks.
- Paleocene series to Eocene series: Sedimentary rocks.
- Oligocene series to early Pliocene series: Consists mainly of sedimentary rocks. Includes some volcanic rocks (Larap Volcano rocks and Ragay Volcano rocks) but no Pliocene volcanic rocks.
- Pliocene series to Pleistocene series and Holocene series: Consists of volcanic rocks without Pleistocene sedimentary rocks or alluvial strata.
- Oligocene series to Miocene series: Intrusive rocks, mainly consisting of diorite.

As can be seen in Fig. II-5-1, the geological distribution of the Bicol Region is characterized by the three different zones roughly parallel to the direction in which the Bicol Peninsula extends. On the northeast side along the direction in which the Bicol Peninsula extends there is distribution of basement rock consisting of the Cretaceous ophiolite sequence, into which Tertiary Oligocene to Miocene plutonic rock intrudes. At the same time there is also wide distribution of the Cretaceous ophiolite sequence and sedimentary rock in the vicinity of Mt. Cadig, and the ophiolite is partly to be seen on the Panganiran Peninsula as well. In view of the fact that in the ground truth survey distribution of greenschist in the eastern part of Paracale, was noted, basement rock basically the same as on the northeast side is distributed along the coast of the southwest side of the Bicol Peninsula. Furthermore, there is likewise distribution of Oligocene to Miocene diorite. However, there is more limited exposure of the basement rock on the southwest side than on the northeast side. That is considered to be due to the smallness of the areas of distribution of the basement rock and to the fact that on the southwest side the basement rock is covered by Oligocene to more recent sedimentary rock distributed in zonal fashion in the NW-SE direction. On the southeast side the distribution areas of such sedimentary rock widen along WNW faults, and the sedimentary rock becomes covered by young volcanic rock in the vicinity of Sorsogon Bay, making it no longer possible to trace its distribution. In the zone between the northeast side and the southwest side, there is distribution of Pliocene to recent volcanic rock. The distribution of the volcanic rock, is also arranged roughly parallel to the direction in which the Bicol Peninsula



LEGEND

Geology

- Alluvial, Quarternary sediments
- Pliocene ~ Pleistocene Volcanic rocks
- Late Tertiary Sediments & Volcanics
- Eocene Sediments
- Schists, Sediments } Cretaceous Basements
- Ultramafic rocks }
- Oligocene ~ Miocene Diorite Intrusives

Metallic Mineral Resources

- (Au) Ore deposits, Prospects, Geochemical anomalies of the element

Lineaments

- Lineament : clear
- Lineament :
- Lineament : un clear

Aero magnetic anomaly (by World Bank)

- ⊗ ⊗ magnetic anomaly
- (L) plane low response
- (H) plane high response
- low linear response
- linear structure

Gravity

- 60 Bouguer contour (miligal)

Fig.II-5-1 Copmrehensive Map of the Bicol Area

extends just as in the case of the rock of the other two zones. That is considered to have resulted from volcanic activity corresponding to subduction of the Philippine Sea plate at the Philippine Trench.

We have thus divided the Bicol Peninsula into the three belts; Northeastern Belt, Southwestern Belt, and Central Belt, on the basis of the above-mentioned geological characteristics (see Fig. II-5-1). The names given those belts are only a matter of convenience, and we use these names in the description below.

1. Northeastern Belt:

The belt from the northern part of Camarines Norte to the Caramoan Peninsula to Catanduanes Island to Rapu Rapu Island on the northeast side along the direction in which the Bicol Peninsula extends.

2. Southwestern Belt:

The belt extends along the coast on the southwest side of the Bicol Peninsula from Mt. Cadig in Camarines Norte to Pasacao and Balatan and on to the Panganiran Peninsula. Further extension on the southeast side is not clear, but it might possibly extend to the southern end of Sorsogon since there is distribution of high gravity areas in that area, which is indicative of comparatively shallow distribution of the basement rock.

In such division into zones the accent has been placed on the distribution of the basement rock. If attention were to be focussed on the Oligocene to more recent sedimentary rock covering it, it might have been more appropriate to place the boundary between the Southwestern Belt and the Central Belt along the WNW fault further inland, in which case extension of the southwest zone would stop somewhere between the Bacon-Manito area and the vicinity of Sorsogon Bay.

3. Central Belt:

The belt between Northeastern Belt and Southwestern Belt: This belt corresponds to the area of distribution of Pliocene to Quaternary volcanic rock. It is a zone of distribution of volcanos connecting Mt. Labo, Mt. Culasi, Mt. Isarog, Mt. Iriga, Mt. Malinao, Mt. Pulog (Bacon-Manito) and Mt. Bulusan. Around those volcanos is distributed somewhat older Pliocene to Pleistocene volcanic rock with developed topographical dissection.

Next looking at relationship between the geology and the metallic ore deposits and mineral showings distributed in the Bicol Region (Fig. II-5-1), one sees that each belt has characteristics reflecting its geology. The following is an outline description of the kinds of deposits and mineral showings to be found in each belt, with indication of expectations, if any, concerning mineralization.

Northeastern Belt:

In this belt there is exposure of the favorable level to bonanza, and therefore it has seen considerable prospecting in the past and discovery of many deposits and mineral showings. As a reflection of its geology, the mineralization of this belt can be roughly classified into mineralization derived from the ultrabasic rock, mineralization derived from greenschist, mica schist and other rock constituting the upper sequence of the oceanic crust and mineralization resulting from Miocene magma activity.

The Cr and Ni originate in the ophiolite sequence ultrabasic rock. The chromatite is of the podiform type and accompanies dunite. The nickel accompanies laterite. The Au, Cu, Fe and Mo have resulted from Miocene magma activity. Some of the Cu occurs in schist, and almost all of the Mn occurs in schist. Most of both comes from deposits of the porphyry and skarn types. There is most distribution of Au, Cu, Fe and Mo deposits and mineral showings resulting from Miocene magma activity in the Jose Panganiban-Paracale area, and the most Fe deposits and mineral showings are to be found in the Sta. Elena-Tabas area on the south side of that area, where there is also distribution of Cu and Au deposits and mineral showings.

According to Mitchell and Leach (1991), the gold deposits distributed in the Jose Panganiban-Paracale area are epithermal gold deposits originating in the Pliocene dacitic intrusive rock. But the results of the ground truth survey (see Chapter 3, "Ground Truth Survey", Paracale Area and Larap-Exiban Area) and data of existing literature show that the gold deposits of that area have the following characteristics. Besides gold, they are accompanied by lead, zinc, copper and other base metals in large quantities. Crustiform banding is not to be observed in the quartz veins, which consist of coarse and translucent quartz. The altered minerals at the edges of the veins and the altered minerals of pervasive alteration zones are mostly a combination of quartz and sericite. The fluid inclusion homogenization temperatures are 250-300°C, and the salinities are comparatively high 10-20 wt%. In view of those characteristics it is more probable that it is a matter of gold and base metal vein-type deposits distributed around deposits of the porphyry type or deposits of the pluton-related vein-type rather than epithermal veins. That is also pointed out by Sillitoe et al. (1990).

Most of those veins have a NE-SW direction (N10°E to N40°E), and it is possible that the system of fractures that controlled the mineralization related to Miocene intrusive rock was a NE system. However, the Tidi deposit and some other veins have a NW direction, which is roughly parallel to the strike of the Universal formation.

As for the gold deposits accompanying veins observed in the placer deposit areas of the western part of the Caramoan Peninsula, they are thought to originate in mesothermal veins occurring in shear zones in the greenschist and mica schist. Considering the mode of occurrence, gold mineralization is also noted in quartz veins thought to be segregation veins in the metamorphic rock. The copper deposits and mineral showings distributed in the schist are volcanic massive sulfide deposits, and on Rapu Rapu Island there are such deposits that used to be developed. The copper mineral showings distributed in the eastern part of the Caramoan Peninsula are of the same type, occurring roughly parallel to the schistosity of the schist. They consist mostly of pyrite, with accompanied by chalcopyrite. As for manganese, it is possible that manganese deposits produced at the surface of the oceanic crust became fixed in the accretionary prism. The deposits and mineral showings accompanying the schist are basically concordant with the schistosity and structure of the schist. This zone is practically entirely covered by mining areas that have been established.

Southwestern Belt:

There are several known copper mineral showings in this belt, with distribution as well of gold mineral showings accompanying the copper. They are either chalcopyrite and bornite accompanying quartz veins in diorite and andesite or mineralization noted in shear zones or along faults in the andesite. It is difficult to specify the type of mineralization because of the small scale of the mineral showings, insufficient surveying and scant data. However, in view of distribution of diorite in the vicinity of such copper and gold mineral showings it is thought to be possible that there is endowment of deposits of the porphyry type or of the mesothermal vein-type relating to plutonic rock. Furthermore, in view of distribution of limestone older than the time of intrusion of the diorite rock bodies there are expectations of Carlin type gold deposits as well as existence of skarn type deposits. However, the deposit endowment potential is considered to be low in view of the small areas of distribution of the limestone.

Almost all of this zone is covered by applications for FTAA status. Not all the mining areas applied for concern metallic ore deposits: some are for limestone.

Central Belt:

Except for the Nalesbitan deposit, there is no distribution of metallic ore deposits in this belt. There were only gold and copper mineral showings and indications on the geochemical anomaly level. Around the Quaternary volcanos, some older volcanic rocks are distributed, and it is clear that there is development of alteration zones of the steam-heated type in that zone. In view of distribution of young geological bodies, this belt has not yet eroded to the level of occurrence of deposits, but shallow phenomena of epithermal system are to be observed. It is surmised that at some places fluid from deep down has come up to near the ground surface, and there are zones with considerable possibility of existence of epithermal gold deposits deep underground. Recent geothermal areas are also included in this zone. Most of the present geothermal systems have NW faults as reservoir. Except for the Nalesbitan area and Bacon-Manito area, prospecting for metallic ore deposits has not been carried out in this belt, which means that there are still areas in it that have not been established as mining claims.

5.2 Selection of Promising Areas

Fig. II-5-1 shows geology, the distribution of deposits and mineral showings, lineaments and regional gravity and airborne magnetic anomalies in the Bicol Area superimposed each other. The ground truth survey was carried out on the basis of such data and the selection criteria defined in Chapter 3 to the extent that the schedule allowed. It should be noted, however, that although the area from the central to the eastern part of the Caramoan Peninsula has a high potential for volcanogenic massive sulfide deposits and was also extracted as a promising area in the lineament analysis, it was not included in the scope of the ground truth survey this time because of very poor access and poor security conditions.

The areas in which the ground truth survey was carried out can be divided into three zones as indicated in Table II-5-1. After completion of the ground truth survey, areas considered to be promising were selected while the mission was still in the Philippines. Fig. II-5-2 gives a simple flow of that process. Twelve promising areas were selected as indicted in Fig. II-5-2 and Fig. II-5-3. The areas selected at that time as being promising are areas in which alteration and mineral showings were observed to a certain extent and for which the modes of occurrence and characteristics thereof indicate the possibility of existence of deposits (see Chapter 3, "Ground Truth Survey", for the details).

The order of priority for those twelve areas was set at completion of the ground truth survey. In setting the order of priority, emphasis was placed on the situation regarding status of mining

Table II-5-1 Qualitative features of the three belts

	Northeastern belt	Southwestern belt	Central belt
geology	Basement Cretaceous Ophiolite Cretaceous sediments Oligocene-Middle Miocene diorite Eocene sediments	Basement Cretaceous Ophiolite Cretaceous sediments Oligocene diorite Eocene sediments Oligocene-Pliocene sediments	Oligocene-Pliocene sediments Pliocene-Pleistocene volcanic rooks
feature of alteration	sericite, illite-quartz, skarn	sericite, illite-quartz	cristobalite-kaolinite-alunite, quartz-minamiite
temperature	high	high, low	low
salinity	high	moderate, low	low
eroded level	deep	deep, partly shallow	shallow
existing mineralization	porphyry type, skarn type, mesothermal vein, VMS,(epithermal)	porphyry type? pluton-related vein?	unknown except for Nalesbitan (high-sulfidation epithermal)
chemical features	high Au, base metals	moderate Au, base metals	low Au, base metals
ground truth areas	Paracale Larap-Exiban Mt.Bagacay Bulala Siruma Peninsula Tamban-Olas Western Goa	Western Pasacao Eastern Pasacao Balatan Nagas-Pio Duran Pilar-Donsol	Nalesbitan Mt. Labo Kilbay Mt. Culasi Calabanga-Tinenbac Iriga-Baao Buhi-Western Mt. Malinao Tiwi-Mt. Malinao Bacon-Manito Magallanes-Mt. Bintacan Bacolodo Irosin-Gabao-Bulan San Roque-Mt. Malobago Gate Mountains
expected mineralization	porphyry, skarn, VMS, peripheral vein of porphyry system	skarn, pluton-related vein,	epithermal
mining rights	FTAA, MPSA	FTAA, MPSA	mostly vacant

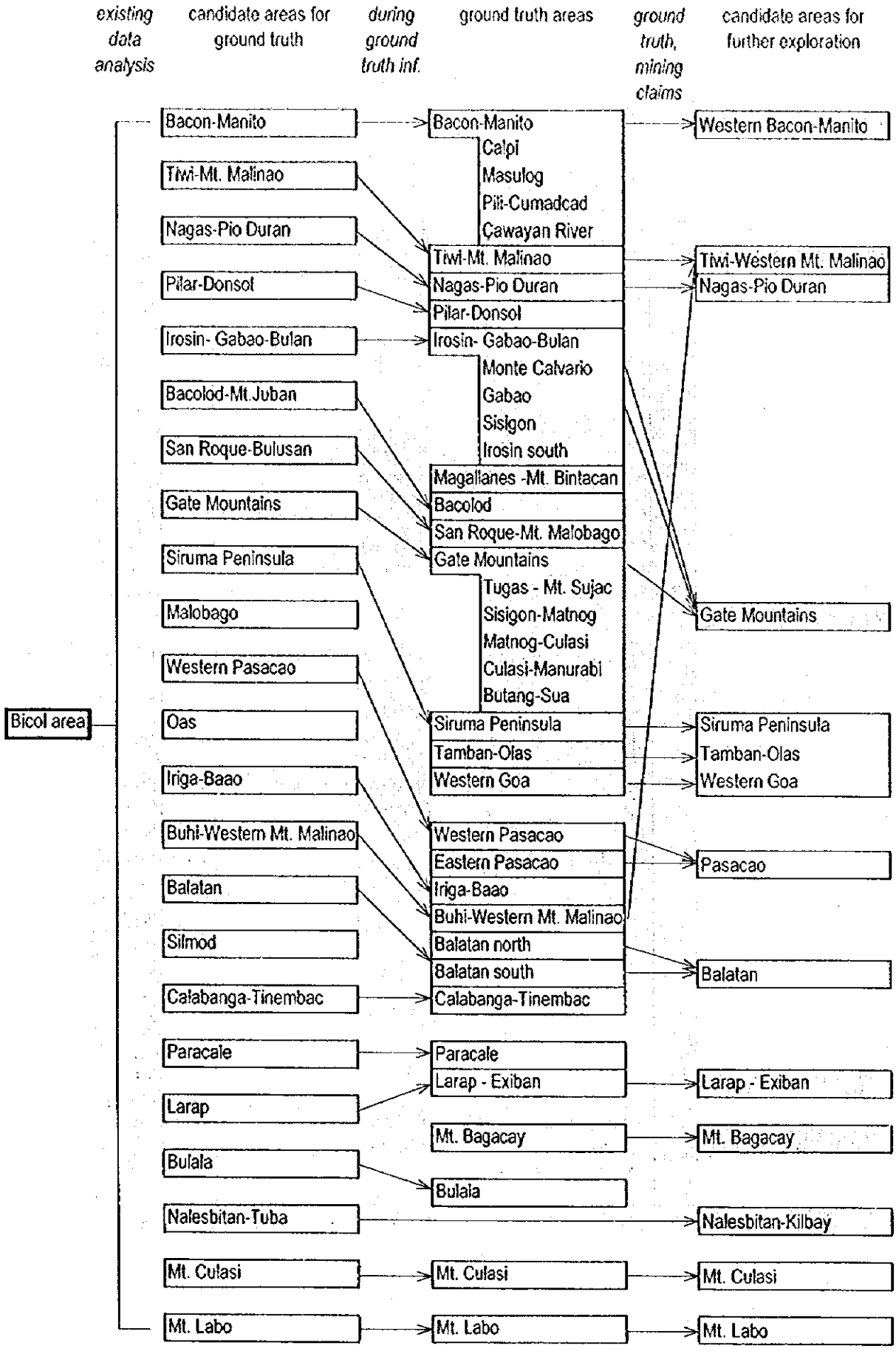


Fig. II-5-2 Process of the selection of promising areas from the ground truth survey

claims from the standpoint of favoring areas where further surveying can be carried out in the future on an intergovernmental basis, which means that areas without any established mining claims or application therefor and areas for which MPSA status has been applied for were given higher priority. Regarding the different types of minerals, highest priority was given to gold and copper, and regarding types of mineralization, highest priority was give the porphyry type and epithermal deposits (Table II-3-2, Fig. II-5-3).

In the Northeastern Belt and the Southwestern Belt, where the deposit-hosting level outcrops, first priority was given to areas including know deposits and where surveying on an intergovernmental basis will be possible in view of the situation concerning status of mining claims (the Larap-Exiban area and the Mt. Bagacay area), and in the Central Belt first priority was given to areas with comparatively large alteration zones suggestive of epithermal deposits and in which no mining claims have been established or that are PNOC geothermal development mining claims (Tiwi-Mt. Malinao, Bacon-Manito, Irosin-Gabao-Bulan, Gate Mountain, Kilbay). Furthermore, first priority was also given in case of existence of known deposits even if a mining claims has already been established (Nalesbitan).

No basic change was subsequently made in selection of promising areas after studying the results of chemical analysis and X-ray diffraction. The promising areas are selected as indicated below on the basis the results of laboratory tests and newly acquired information. The criteria for selection and the criteria concerning order of priority are the same as at the time of completion of the ground truth survey. As mentioned in the preceding section, the areas in the Northeastern Belt for which there are expectations of porphyry copper, gold deposits, and vein type gold and base metal deposits are the Mt. Bagacay area and the Larap-Exiban area. As mentioned in Chapter 3, many porphyry copper and gold mineral showings, skarn type deposits and vein type gold and base metal deposits are distributed in proximity to the Tertiary intrusive rocks. Both indicate the possibility that iron skarn deposits and vein type gold and base metal deposits are related to porphyry type copper and gold deposits in term of their origin. A detailed survey has been carried out by the United Nations (1987), and prospecting by private sectors has been implemented, however, from that viewpoint it is considered that there is plenty of leeway for further prospecting for the purpose of taking a closer look at those areas again. Of course, the Paracale area also has high potential, but it has been given a low priority in view of the fact that it has the only operational gold mine in the Bicol Region and gold is already being mined there by small-scale miners as well in the surrounding area and because of other circumstances such as the situation concerning mining claims.

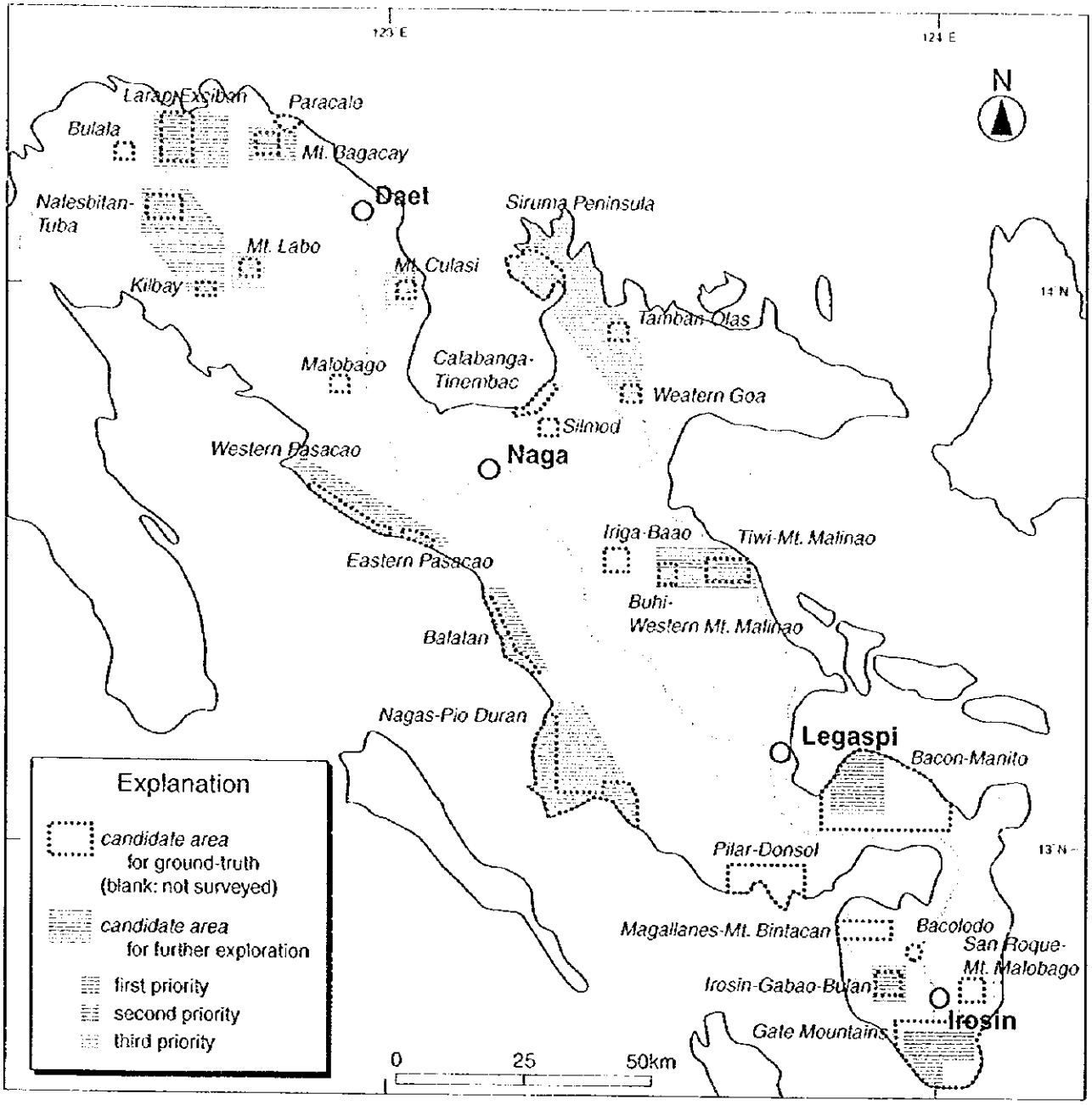


Fig.II-5-3 Promising areas from the ground truth survey

In the eastern part of the Caramoan Peninsula there is a small volcanogenic massive sulfide deposit, but that area was not included in the scope of the ground truth study because of the fact that FTAA status has been applied for the area and the fact that both poor security conditions in it and less accessibility to it. However, according to the latest information received from BMG Region V, another volcanogenic massive sulfide deposit has been discovered by BMG in its surveying, and the situation regarding security conditions and accessibility has been improved. That being the case, that area can be considered a candidate area for the ground truth survey in the second phase.

The promising areas in the Southwestern Belt are the Pasacao area, the Balatan area and the Nagas-Pio Duran area, which have known mineral showings and distribution of Cretaceous intrusive rock. However, as mentioned in the preceding section, the priority is not so high in view of the small scale of the mineral showings and the fact that an FTAA mining claim has been applied for. As for the Tuba area, it is not possible to give it the same level of priority as other areas in view of the fact that it did not undergo ground truth surveying this phase, but it can be considered a candidate area for the survey in the next phase for the following reasons. Since the geological setting of the Tuba area is similar to that of the Paracale area, there is possibility of distribution in it of the fairly high-temperature vein type gold and base metal deposits that are to be found in the Paracale area. Since most of vein type deposits in the Paracale area represent occurrence of mineralization in NE fractures, it is desirable to place the emphasis in the survey in the Tuba area, too, on places that have distribution of lineaments in that same direction. Another possibility is existence of epithermal deposits of the same kind as the Nalesbitan deposit. That is because although the area, with distribution of basement rocks, is geologically included in the Southwestern Belt, it is very close to areas of distribution of Pliocene volcanic rock, and therefore, assuming development there of fracture systems as in the Nalesbitan area, there is a possibility of development of Pliocene hydrothermal systems in it by pass of such fractures.

In the Central Belt there is thick surface cover in areas of distribution of Quaternary volcanic rock in which the volcanic body topography has been preserved. Except for the Nalesbitan area, which has a comparatively advanced degree of erosion, it will be difficult to find deposits on the surface level. Instead, it will be necessary to look for them deep underground in the vicinity of alteration zones. The following four areas in the Central Zone have high priority:

- The Tiwi-Mt. Malinao area: the northwest part of the Tiwi geothermal area
- The Bacon-Manito area: the western part of the Bac-Man geothermal area
- The Gate Mountains area: the south side of the Irosin caldera

- Southwest part of Mt. Labo to Kilbay: southwest side of the Labo geothermal development area

Except for the area from the southwest part of Mt. Labo to Kilbay, which was not included in the ground truth survey this time, in the other three of the above-mentioned areas there is extensive alteration zones indicative of the shallow part of epithermal systems. Many of them are steam-heated acidic alteration zones. In them silicified veins and hydrothermal brecciated veins crop out. At some places the deep fluid rises to near the surface, and in some cases that has resulted in anomaly values for gold and copper. That being the case, there is possibility that epithermal gold mineralization has taken place deep underground.

In geothermal drilling, it has been confirmed that mineralization of the low-sulfidation type has occurred deep underground in the Tiwi geothermal area. Since the older volcanic is distributed in the northwest part of the neighboring Tiwi-Mt. Malinao area, it is possible that the same type of fossil-geothermal system was developed there.

The steam-heated acidic alteration zones developed in the Bacon-Manito area are characterized by alunite, which is indicative of a comparatively strong acidic environment. Furthermore, there is also distribution of silicified rock and hydrothermal brecciated veins consisting of quartz-alunite or quartz-minamiite assemblages. They are considered to represent higher-temperature acidic alteration and to have been formed by fluid with considerable influence of volcanic gas. The fact that anomalous values for gold (maximum of 25 ppb Au) and copper (maximum of 434 ppm Cu) have been noted indicates the possibility that volcanic gas rose directly to near the surface. In such an environment it is possible that mineralization of the high-sulfidation type has occurred deep underground. The PNOC has carried out an IP survey, and it might be possible to surmise hydrothermal activity zones from low resistivity zones.

In the Gate Mountains area values of 150 ppb Au and 36 ppm Mo have been obtained from silicified rock distributed in alteration zones, and some samples also have copper anomalies (maximum of 212 ppm Cu). The ground truth survey suggests the possibility that the hydrothermal activity has been controlled by fractures in the NW-SE direction.

Because of insufficient information and the schedule it was not possible to carry out ground truth surveying in the Kilbay area this time. However, in view of the fact that the volcanic rock distributed in it is hornblende andesite to dacite (means hydrous magma), there is possibility of development of hydrothermal systems. Since the kaolin clay deposits distributed in the area are

surmised to be a shallow phenomenon of hydrothermal systems, there is considered to be considerable possibility of existence of hydrothermal deposits deep underground. The area is considered to be promising in view of such considerations, and therefore has been selected as a candidate area for the ground truth survey in the next phase.

As already mentioned, Nalesbitan is very promising, but as stated in Chapter 3 of Part I, the project is in progress, which makes its priority lower than that of other areas. However, that does not change the fact that areas along the NW-SE trend, including Nalesbitan, are promising.

Summarizing the above, the following eight areas have been selected as candidate areas for the ground truth survey in the next phase. They are indicated in Fig. II-5-4.

Northeastern Belt: The Mt. Bagacay area, the Larap-Exiban area and the area comprising the eastern part of the Caramoan Peninsula

Southwestern Belt: The Tuba area

Central Belt: The northwestern part of the Tiwi-Mt. Malinao area, the western part of the Bacon-Manito area, the Gate Mountains area and the Kilbay area.

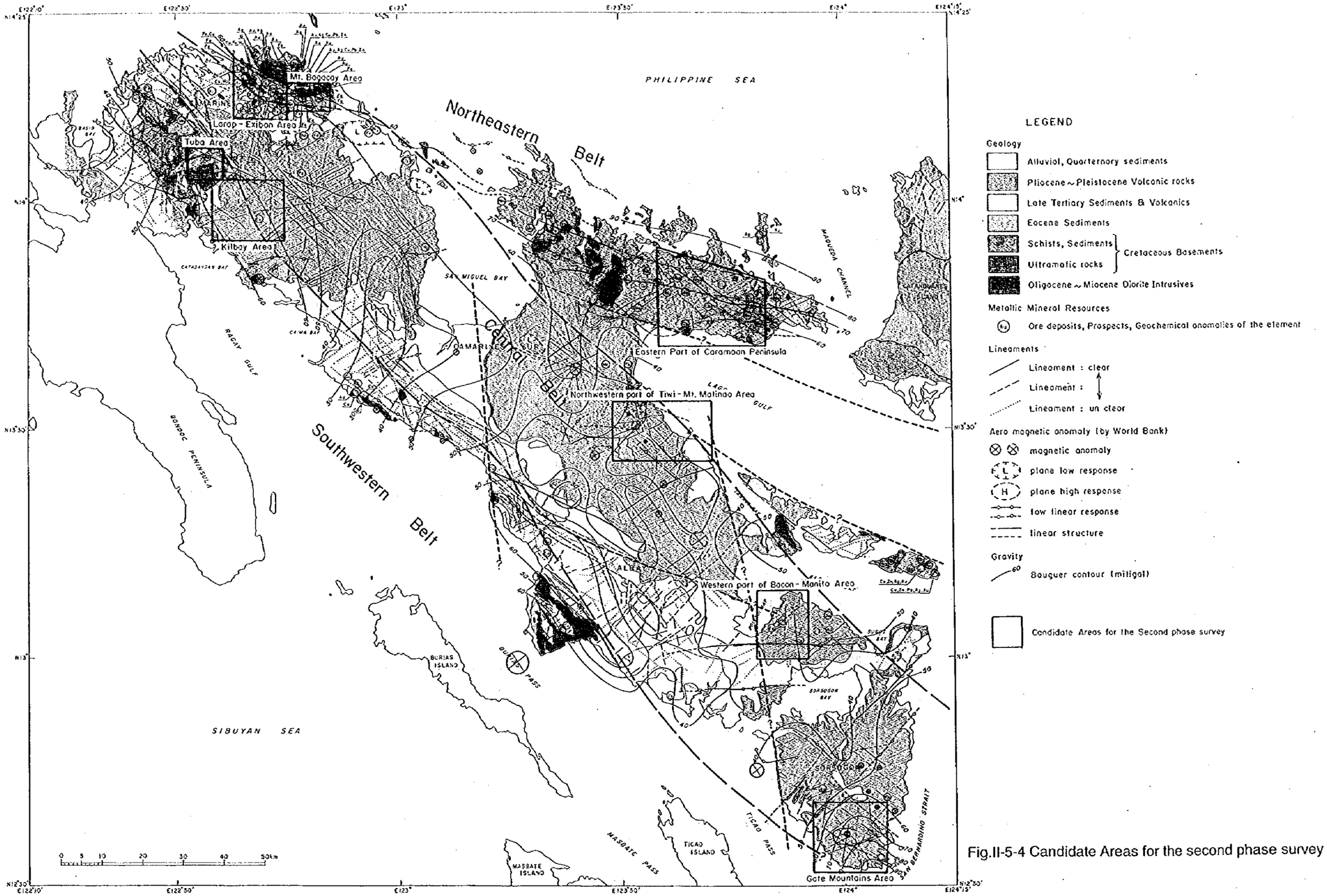


Fig.II-5-4 Candidate Areas for the second phase survey

PART III CONCLUSION AND PROPOSALS

Chapter1: Conclusion

The survey conducted in this phase has revealed the followings:

In terms of geological structure the Bicol Region can be roughly divided into three zones: the Northeastern Belt, the Central Belt and the Southwestern Belt. They lie roughly parallel to the direction in which the Bicol Peninsula extends.

The Northeastern Belt and the Southwestern Belt are characterized by distribution of Cretaceous basement rock and Tertiary intrusive rock, and the Central Belt is characterized by Pliocene to recent volcanic rock. The deposit-favorable level have been exposed and many deposits and mineral showings are reported in the Northeastern Belt and the Southwestern Belt. The types of deposits concerning which there are expectations are porphyry type copper and gold deposits, skarn type deposits and volcanogenic massive sulfide deposits. Because of distribution of recent geological bodies in the Central Belt, the eroded level has not reached the deposit-favorable level except for the northwest end, but there is possibility of epithermal gold deposit in the depth.

On the basis of the results of study of existing literature, satellite image analysis and the ground truth survey and taking into account the situation regarding establishment of mining claims, the following areas are considered to be promising:

- Northeastern Belt: The Mt. Bagacay area in Camarines Norte, the Larap-Exiban area and the eastern part of the Caramoan Peninsula

- Central Belt: The Kilbay area in Camarines Sur, the northwest part of the the Tiwi-Mt. Malinao area in the vicinity of the border between Camarines Sur and Albay, the western part of the Bacon-Manito area near the border between Albay and Sorsogon and the Gate Mountains area in the southern part of Sorsogon

- Southwestern Belt: The Tuba area

Chapter2: Proposals for the Phase II Study

It is desirable that the following kinds of surveys be implemented in the phase II in the promising areas identified in the preceding section, "Conclusion."

Regarding the promising areas in the Central Belt, it is possible that there are epithermal gold deposits in them in the depths. It is therefore necessary to carry out surveys that make it possible to surmise the places and depths of possible existence of deposits. For instance, it might be possible to determine places of up-welling of deep hydrothermal fluid by analysis of the chlorine content of the altered rock from the shallow part of epithermal systems. At the same time, there should be detailed study of areas of distribution of fracture systems with the same direction as that of fracture systems constituting reservoir of nearby active geothermal systems. It is also a good idea to considering drilling for the purpose determining trend of alteration zones at different depths, their temperature gradient and whether or not there is possibility of mineralization.

It is also necessary to survey in detail the areas in the vicinity of existing mineral showings in promising areas lying in the Northeastern Belt and the Southwestern Belt.

Attention should be given to the following points in surveying the different areas:

The Mt. Bagacay area:

This area includes several iron skarn deposits and mineral showings, and on the south side there are gold and base metal mineral showings of the vein type. They suggest the possibility of existence of porphyry type deposits. It is needed that systematic study of existing skarn mineral deposits and mineral showings, the assemblage of ore minerals and fluid for the purpose of depicting the temperature structure within the area. Intrusive rock stocks will also be looked for detailed surveying in their vicinity. In the United Nations (1987) survey of the Tabas area, biotite, wollastonite and andalusite were reported as altered minerals, and two of the samples contained pyrophyllite. They represent acid alteration in which a porphyry system is developed nearby. It is therefore desirable that the Tabas area also be included in the survey.

The Larap-Exiban area:

Since this area is comparatively extensive and has distribution of many deposits and mineral showings in it, it will be difficult to narrow down the areas to be surveyed. Since Philex Corp., Altas Corp. and other companies have done prospecting in it, that data should be obtained as far as possible so that it can be analyzed as a means of narrowing down the area of the survey.

Furthermore, since there is distribution of many intrusive rock stocks in this area and since it is considered that most of the deposits and mineral showings in it were formed in connection with such intrusive rock, it is desirable to get a precise idea of its distribution and to undertake detailed surveying in the vicinity of it.

Eastern part of the Caramoan Peninsula:

This area was not included in the ground truth survey this year because of its situation regarding mining claims and because of poor access. However the latest information received from BMG Region V indicates that those problems have been solved. In this area there is distribution of mineral showings of the volcanogenic massive sulfide type deposit in the greenschist and mica schist, and they are characterized by mode of occurrence roughly concordant with the schistosity of such schists. It is therefore thought to be necessary to determine its structure, horizons and facies at existing mineral showings so as to be able to estimate extension thereof.

The Tuba area:

In the Tuba area it is necessary to survey veins and alteration zones at known mineral showings to determine whether it is a matter of the vein-type deposits as in the Paracale area or epithermal deposits. If they are determined to be of the vein-type, the vicinity of the intrusive rock thought to belong to the Tertiary period and the fracture systems in the vicinity of existing mineral showings and with the same direction will be surveyed. If they are determined to be of the epithermal type, in view of the connection with the Nalesbitan deposit in terms of position fracture systems that both have in common will be surveyed.

The Kilbay area:

This area was not included in the ground truth survey this year because of insufficient information and the schedule. However, it is considered to be a promising area in terms of possibility of pervasive hydrothermal systems since the volcanic rock distributed in it is hornblende andesite and it is surmised that the magma involved in deposit formation contained more water than other volcanic rock zones. Therefore it is desirable that it be surveyed in the phase II of the present study.

The northwestern part of the Tiwi-Mt. Malinao area:

The existence of alteration zones was confirmed on the basis of floats in this year's survey. From the state of distribution it is surmised that the alternation zones lie at the upper reaches of the Santa Cruz River and the Cayohoson Creek. The NE-SW system of faults (Kagumihan fault, Tiwi fault and Naglagbong fault) forming the main reservoir of the Tiwi geothermal development area

and the NW-SE Tutsan-Bolo fault are the main ones. In this area there is also extensive NW-SE and NE-SW lineaments. The area of distribution of such fracture systems is considered to be important because of the fact that the intersection of those two lineaments just about coincides with the upper reaches of the Santa Cruz River and the Cayohoson Creek.

The western part of the Bacon-Manito area:

The low resistivity area from the Cawayan River to Calpi is surmised to have a comparatively high gold potential. The upper reaches of the Cawayan River are situated in the Bac-Man fault zone, which has an E-W direction. Furthermore, since the slope of the upper plane of the Calpi steam-heated alteration zone is roughly parallel to the river's present hydraulic gradient, it is surmised that the upflow region is situated on the further upstream side of Calpi creek. That upstream side is superimposed upon the Bac-Man fault zone, and it is therefore necessary that the survey be centered on that fault zone.

Gate Mountains area:

Since the results of the ground truth survey this year point to the possibility that the hydrothermal activity in the area extending from the vicinity of Tugas north of Mt. Sujac to Culasi on the southeast side was controlled by fractures in the NW-SE direction, surveying along those fractures is considered necessary. Furthermore, many floats of silicified rock and altered rock were noted along the coast in the southwest part of the Gate Mountains area. Although it is not yet clear which fracture controlled the hydrothermal system that caused such alteration, it is considered necessary to survey the upstream side of the creek considered to be the source of those floats.

In the above three areas, the airborne magnetic survey will be supposed to conduct. The survey will shows us the alteration zones and fracture systems. After checking the alteration zone against the result of the ground truth survey, we could draw the route that we should do the survey. Moreover, it is also considered to be important to determine the age of the volcanic rock and the alteration and mineralization, which it was not possible to do adequately in this year's survey.

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APPENDICES

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Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
1	AL/SR-01	exploration, geology, geochemical, Au	Results of reconnaissance and follow-up geological and geochemical survey in Bacon-Manito geothermal reservation, Sorsogon and Albay.	1990	PNOC-EDC	PNOC-EDC internal Report	p.13/Fig.1 13°00'-12°10'N, 123°40'-124°00'E	Result of geochemical survey(Au,Ag,As,Sb,Zn,Cu anomalies	1
2	AL/SR-02	exploration, geology, geochemistry, alteration	Geology of Bacon-Manito Geothermal Project.	1985	PNOC	PNOC internal report	Bacon-Manito geothermal area		2
3	AL/SR-03	mineral deposit, sulfur	Report of the sulphur deposit in Manito, Albay.	1951	Cruz, D.P.	Bureau of Mines and Geo-Sciences internal report	Manito, location map in 1:50,000	AL-74RA in MGB	3
4	AL/SR-04	geology, stream sediments geochemistry, Cu, Pb, Zn, Mo, regional survey	Reconnaissance geological and geochemical survey of Sorsogon province and Manito, Albay.	1979	Bandon, S.V.	Bureau of Mines and Geo-Sciences internal report	Sorsogon, Manito, regional	geochemical anomaly map in 1:250,000	4
5	AL/SR-05	Bacon-Manito, well PAL-10D, max Temp. 326°C, Pocdol Volcanics, altered, silicified	PAL-10D Geology Report	1984	R. C. GONZALEZ	PNOC-Energy Development Corporation internal report (Bacon-Manito Geothermal Project)	Palayang Bayan area, Sorsogon		5
6	AL/SR-06	Bacon-Manito, well MO-1, acid alteration zone	Petrology of well MO-1, Bacon-Manito Geothermal Field, southern Luzon, Philippines	n/a	H. O. AMOETO	PNOC-Energy Development Corporation internal report (Bacon-Manito Geothermal Project)	Malangto area (Bacon-Manito Geothermal Field)		6
7	AL/SR-07	Bacon-Manito, well MO-1, geology	MO-1 Geologic Report	1982	MATEO M. DE LEON	PNOC-Energy Development Corporation internal report (Bacon-Manito Geothermal Project)	Malangto area (Bacon-Manito Geothermal Field)		7
8	AL/SR-08	Bacon-Manito, drilling, Permeability, Gayong fault, Outflow Region, San Lorenzo Fault, Cawayan Intrusive Complex	Geology of PAL-9D	1984	A. C. LICUP, JR.	PNOC-Energy Development Corporation internal report (Bacon-Manito Geothermal Project)	Palayang Bayan area, Sorsogon		8
9	AL/SR-09	Bacman I, geothermal area, Geology, Reservoir Chemistry, Field Geophysics, Reservoir Engineering, Hydrogeological flow model, Reserve, Development	A REVIEW OF THE 110 MWe BACMAN I DEVELOPMENT STRATEGY	1995	Geoscientific and Production Departments, Geothermal Division, PNOC-Energy Development Corporation	PNOC-Energy Development Corporation internal report (Bacon-Manito Geothermal Project)	Albay/Sorsogon		9
10	AL/SR-10	Bacman Geothermal Project, Resource Re-assessment	PNOC Energy Development Corporation-Bacon Manito Geothermal Project Resource Re-assessment	1995	KRTA Limited (New Zealand)	KRTA Limited Report by the request of PNOC-EDC	Albay/Sorsogon		10
11	AL-01	geology, volcanology, Mayon volcano	Lava-pyroclastic-epiclastic lithofacies associations of Mayon volcano: modern terrestrial sedimentation in a central-vent volcanic environment.	N/A	Ruelo, H.B. and Radiel, K.B.	N/A	Mayon volcano		11
12	AL-02	gravity, Tiwi, fault structure	Report on the gravity survey of Tiwi, Albay.	1984	Teodio, C.F.	Bureau of Mines and Geo-Sciences internal report	Tiwi area	bouguer map in 1:5,000, residual map in 1:5,000, AL-470 in MGB	12
13	AL-03	resistivity, Tiwi, alteration zone	The application of the resistivity method at Tiwi Hot Springs, Tiwi, Albay.	1985	Morel, D.A. and Abarquez, O.E.	Bureau of Mines and Geo-Sciences internal report	Tiwi area, profile line map in 1:20,000	resistivity map in 1:5,000, AL-474 in MGB	13
14	AL-04	resistivity, Tiwi, hydrothermal layer	Report on the resistivity survey of Tiwi Hot Springs, Tiwi, Albay.	1984	Miranda, E. and Morel, B.A.	Bureau of Mines and Geo-Sciences internal report	Tiwi area, station map	AL-484 in MGB	14
15	AL-05	exploration, gypsum, pyrite, dacite	Report on an investigation of a crystal deposit in Hagas and Cagrararay, Cas, Albay.	1958	Cruz, A.	Bureau of Mines and Geo-Sciences internal report	Cagrararay, geological map in 1:25,000	geological map in 1:25,000, AL-295 in MGB	15
16	AL-06	mineral deposit, sulfur, silicification, pyrite, kaolinite	Geological investigation of the sulfur deposits in Mt. Malinao, Tiwi, Albay.	1989	Jagolino, R.B. and Zapata, Z.C.	Bureau of Mines and Geo-Sciences internal report	Mt. Malinao, index map	geological map in 1:5,000, AL-457 in MGB	16
17	AL-07	exploration, hot spring, Tiwi	Report on the geological investigation of the Tiwi Hot Springs.	1950	Cruz, D.P. and Domingo, C.R.	Bureau of Mines and Geo-Sciences internal report	Tiwi	AL-74RA in MGB	17
18	AL-08	mineral deposit, clay, Tiwi	Preliminary report on some ceramic raw materials of Tiwi.	N/A	Belanches, C.	Bureau of Mines and Geo-Sciences internal report	Tiwi	AL-133RA in MGB	18
19	AL-09	Tiwi hot spring, sketch	N/A	N/A	N/A	Bureau of Mines and Geo-Sciences internal report	Tiwi hot spring	sketch plan in 1:2,500, AL-74 in MGB, map only	19
20	AL-10	mineral deposit, Hg	Geologic investigation of the reported mercury deposits in Busdeivedo, Legaspi city.	1948	Guzman, R.A.	Bureau of Mines and Geo-Sciences internal report	Legaspi city	AL-739 in MGB	20
21	AL-11	prospect, Cu, diorite, serpentinite, limestone, chalcopyrite, bornite	Examination of the copper property of Tetuan Mining Corporation in Ligao, Albay.	1951	Tupas, M.H.	Bureau of Mines and Geo-Sciences internal report	Ligao, index map	AL-808 in MGB	21
22	AL-12	geology, hot spring, Tiwi	Report on the geology of Tiwi Hot Springs, Tiwi, Albay.	1948	Cruz, D.P.	Bureau of Mines and Geo-Sciences internal report	Tiwi, index map	AL-84RA in MGB	22
23	AL-13	exploration, geothermal, gravity, magnetic, resistivity, short drilling	Geothermal exploration work in the Tiwi thermal area, Albay, Luzon.	1965	Palmason, G.	under the auspices of the united nations special fund	Tiwi	AL-[illegible] in MGB	23
24	AL-14	ore deposit, volcanogenic sulfide	The GCI volcanogenic sulphide deposit at Rapu-Rapu island, Albay, Philippines.		Domingo, B.B.	Journal of the geological society of Philippines	Rapu-Rapu isl		24
25	AL-15	core logging, tunnel project, X-ray	Petrographic report on the diamond drill core samples of the Lake Bato-Pantao Bay diversion channel/tunnel project.	1980	Favre, B.B.	Bureau of Mines and Geo-Sciences internal report	Lake Bato, Pantao Bay		25
26	AL-16	Tiwi geothermal field, NE-SW fault, silica-sinter	Development History of the Tiwi Geothermal Field, Philippines	1993	David T. Gambill, Domingo B. Beraquit	Geothermics, Vol.22, No.5/6, pp.403-416	Albay province, northeastern flank of Mt.Malinao	Location and Geologic Map	26
27	AL-17	Tiwi geothermal field, calcite, anhydrite, illite, epidote, K-feldspar, wairakite, pyrite, [illegible]	Geochemical analyses of fluid-mineral relations in the Tiwi geothermal field, Philippines	1997	Carol J. Bruton, Joseph N. Moore, Thomas S. Powell	Twenty-second Workshop on Geothermal Reservoir Engineering, Stanford University, [illegible]	Albay province, northeastern flank of Mt.Malinao	Map of the Tiwi geothermal system	27

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
28	AL-18	Tiwi, hydrothermal alteration, fluid inclusion, 40Ar/39Ar of adularia, 0.32Ma, 0.25Ma	Hydrothermal Alteration and Fluid-Inclusion Systematics of the Reservoir Rocks in Matalibong-25, Tiwi, Philippines	1997	Joseph N. Moore, Thomas S. Powell, David I. Norman and Orion W. Johnson	Twenty-second Workshop on Geothermal Reservoir Engineering, Stanford University, in press	Albay province, northeastern flank of Mt.Malinao	Map of the Tiwi geothermal system	28
29	AL-19	Tiwi, fracture, permeability	Fracture Permeability in the Matalibong-25 Corehole, Tiwi Geothermal Field, Philippines	1996	Dennis L. Nielson, Wilson C. Clemente, Joseph N. Moore and Thomas S. Powell	Proceedings, Twenty-First Workshop on Geothermal Reservoir Engineering, Stanford University	Albay province, northeastern flank of Mt.Malinao	Map of the Tiwi geothermal system	29
30	AL-20	Tiwi, geothermal power plant, PGI	Geothermal Energy		Philippine Geothermal, INC.	PGI pamphlet	Albay province, northeastern flank of Mt.Malinao		30
31	AL-21	Geology, Copper deposit, Rapu Rapu island, Albay	Geology of the Copper Deposits of the Hixbar Gold Mines Inc., Rapu Rapu island, Albay	1956	Arthur I. Kinkel, Jr., Sesenando Samaniego	Bureau of Mines Special Projects Series Publication no.9 Copper	Rapu-Rapu island, Albay	Geologic Map in 1:5,000	31
32	AL-22	Geology, Coal resources, Batan island, Albay	Geology and coal resources of Batan island, Albay	1955	Oscar Crispin, J. Marvin weller, Jose F. Vergara	Bureau of Mines Special Projects Series Publication No.3 Coal	Batan island, Albay	Geologic Map in 1:15000	32
33	BI-01	ore deposit, base metal	Base metals mineral resources of the Bicol region.	1987	Bureau of Mines and Geo-Sciences	Bureau of Mines and Geo-sciences	Bicol peninsula		33
34	BI-02	geology, highway	Report on the geological survey of Luzon southern Maharlika highway, Malong, Sorsogon to Manila.	1982	Escalada, P.P.	report of the Bureau of Mines and Geo-sciences	Bicol peninsula	geological map in 1:1,000,000, SG-6001 in MGB	34
35	BI-03	mineral deposit, phosphate, pyrite	Preliminary report on phosphate and pyrite deposits of Camarines Sur, Catanduanes and Albay.	1960	Cruz, D.P., Correa, F.A., Domingo, C.R. and Feliciano, Z.	Bureau of Mines and Geo-Sciences internal report	Camarines Sur, Catanduanes, Cagraray Isl., Rapu Rapu Isl., index map in 1:500,000	sketch-maps, AL-4 in MGB	35
36	BI-04	geology, groundwater resources	Geology and groundwater resources of Region V.	N/A	N/A	Bureau of Mines and Geo-Sciences internal report	Region V	5010 in MGB	36
37	BI-05	ceramic, raw materials	Report on ceramic raw materials ore reserves in Bicol region.	1985	Ramos, J.N. and Magpantay, A. Jr.	Bureau of Mines and Geo-Sciences internal report	Bicol peninsula	CS-5085 in MGB	37
38	BI-06	geology, groundwater resources	Ground-water geology of Bicol peninsula.	1973	Dumagat, P.T.	Bureau of Mines and Geo-Sciences internal report	Bicol peninsula	CS-1008 in MGB	38
39	BI-07	exploration, Au, quaternary volcanics, silicified, pyrite, alteration, kaolinite, chalcedonic quartz veinlet, cristobalite	Preliminary report on the "gold in quaternary volcanic areas" in the Bicol region.	1989	Carranza, E.J.M. and Sliva, P.C.	DENR internal report	Cililanga-Tinanao-Gata area, Bulan-Bulan area		39
40	CN-01	ore deposit, Fe	The Larap iron deposit.	(1940)	Kinstead, F.H.	(Philippine mining year book, A.I.M.E.)			40
41	CN-02	ore deposit, Cu, Mo	Verification of geologic reserves of the Bessemer pit area of Philippine iron mines, Inc., in Larap, J. Panganiban, Camarines Norte.	1974	Cajeon, P.C.	Bureau of Mines Internal Report for Golden River Mining Corporation	122°30'00"E, 14°19'00"N	CN-1404 in MGB	41
42	CN-03	ore deposit, placer Au	Geological investigation and mineral verification of twelve(12) placer claims of Golden River Mining Corporation at Malaguit, Paracale, Camarines Norte.	1973	Ramos, C.V.	Bureau of Mines Internal Report for Golden River Mining Corporation	14°16'-14°18'N, 122°45'-122°48'E The watershed area of Malaguit River	CN-1307 in MGB	42
43	CN-04	exploration, geology, geophysics, Au, Cu, Te	Exploration of the Exciban gold-copper-tellurium vein system, Camarines Norte, Philippines.	1990	James, L.P. and Fuchs, W.A.	Journal of Geochemical Exploration, 35	p.264/Fig.1, Exciban		43
44	CN-05	ore deposit, high-sulfidation, Au, Nalesbitan	An acid-sulphate-type lode gold deposit at Nalesbitan, Luzon, Philippines.	1990	Sillitoe, R.H., Angeles, C.A., Comia G.M., Antioquia E.C. and Abeya R.B.	In; J.W. Hedenquist, N.C. White and G. Siddeley (Editors), Epithermal Gold Mineralization of the Circum-Pacific: Geology, Geochemistry, Origin and Exploration, I. J. Geochem. Explor., 35; 387-411	Nalesbitan		44
45	CN-06	geology, mineralization, Au	Geology and mineralization of Jose Panganiban Gold Rush Area, Camarines Norte.	1987	Juan, B.A., Carranza, E.J.M. and Domingo, W.F.	In: GOLD '87 in the Philippine setting proceedings Vol.II	The Jose Panganiban Gold District		45
46	CN-07	geology, alteration, mineralization, Au, Nalesbitan	Geology and alteration-mineralization characteristics of the Nalesbitan gold deposit, Camarines Norte, Philippines.	1987	Angeles Jr, C.A, Antioquia, E.C. and Comia, G.M.	GOLD'87 in the Philippine setting proceedings vol.I, The Philippine Institute of Mining Metallurgy and Geology	Nalesbitan		46
47	CN-08	geology, geochemistry, ophiolite	Geology and geochemistry of the mafic rock series of the Camarines Norte Ophiolite Complex.	1996	Tamayo, R.A. Jr., Yumul, G.P. Jr. and Jumawan, F.	Journal of Geological Society of the Philippines, Vol.LI, Nos.3&4, pp.131-152	p.133/Fig.1 the offshore island NE of Paracale		47
48	CN-09	ore deposit, geology, Au, Ag, Cu, Pb, Zn	Memorandum report on the geological verification of twenty four(24) mining claims applied for lease by Mr. Jesus Paraole in Paracale, Camarines Norte.	1976	Juan, R.A. and Mendo, V.P.	memorandum report in Bureau of Mines-Region 5	14°17'18"-14°18'29"N, 122°46'11"-122°47'15"E, Paracale		48
49	CN-10	ore deposit, United Paracale, Au, Ag	The report on the mineral verification of mining claims applied for lease by United Paracale Mining Company.	1982	Mendo, V.P.	Bureau of Mines and Geo-Sciences internal report	14°15'20"-14°17'20"N, 122°46'40"-122°48'20"E, Paracale		49
50	CN-11	ore deposit, evaluation, Au, Ag	Report on the evaluation of Lingon Gold Property of Metals Exploration Asia, Inc. located at Paracale, Camarines Norte.	1977	Fajardo, D.F. and Sumadco, A.P. Jr.	Bureau of Mines and Geo-Sciences internal report	14°15'-14°18'N, 122°45'-122°54'E, Paracale		50
51	CN-12	ore deposit, F/S, Au, Ag, Cu, Mo, Fe	Project feasibility study of the mines national apprenticeship school.	1983	Bureau Mines and Geosciences	Bureau Mines and Geosciences	Larap		51
52	CN-13	ore deposit, Nalesbitan, Au	Nalesbitan-maps.					survey plans	52
53	CN-14	ore deposits, United Paracale	Summary and detailed discussion of the exploration and development work made and schedule of Activities for placing the area into production. & Geologic Investigation Report of the area applied for lease.	1980	United Paracale Mining Company	Report From United Paracale Mining Co. to Bureau of Mines and Geo-Sciences	United Paracale	report submitted for MGB	53
54	CN-15	ore deposits, United Paracale	United Paracale Mining Company - Report of independent certified public accountants.	1980	United Paracale Mining Company	United Paracale Mining Company Annual Report	United Paracale	Annual report of United Paracale	54

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
55	CN-16	United Paracale, operating agreement	Operating agreement between Metals Exploration Asia, Inc., United Paracale Mining Co., Inc., and Marsman & Co., Inc.	1976		OPERATING AGREEMENT	Paracale		55
56	CN-17	annual report, Metals Exploration Asia, Inc.	Metals Exploration Asia, Inc., annual report 1979	1977		Annual Report of Metals Exploration Asia, Inc			56
57	CN-18	ore deposit, San Antonio, Au, Ag	Report on the geological verification of nine (9) mining claims applied for lease by Mr. Emilio C. Villa located at San Antonio, Sta. Rosa Norte, Jose Panganiban, Camarines Norte.	1983	Manuel, E.M.	Bureau of Mines and Geo-Sciences internal report	14°17'35.427"-14°18'14.489"N, 122°42'04.600"-122°42'34.823"E, San Antonio, Sta. Rosa Norte, Jose Panganiban		57
58	CN-19	geology, marble, mine evaluation	Report on the geological verification of five(5) mining claims applied lease by Penafrancia mining and development corporation located at Iging, San Rafael, Jose Panganiban, Camarines Norte	1983	Manuel, E.M.	Bureau of Mines and Geo-Sciences internal report	122°40'48.80"E-122°41'08.82"E, 14°17'44.92"N-14°18'16.20"N	CN-5016 in MGB	58
59	CN-20	ore deposit, Nalesbitan, Au, Ag	Report of verification of mineralization of six(6) mining claims of gold fields Philippines corporation in Nalesbitan, Labo, Camarines Norte.	1985	Jose, A.F.	Bureau of Mines and Geo-Sciences internal report	Nalesbitan cf. Fig.2	CN-5070 in MGB	59
60	CN-21	ore deposit, Au	Report on the mineral verification of mining claims applied claims for lease by United Paracale Mining Company.	1982	V. P. Nando	Bureau of Mines and Geo-Sciences internal report	122°46'40"E-122°48'20"E, 14°15'20"N-14°17'20"N	CN-5011 in MGB	60
61	CN-22	ore deposit, Au, Ag	Report on the geological verification of twelve(12) mining claims applied lease by Marsman and company located at Malaguit, Paracale, Camarines Norte.	1983	Manuel, E.M.	Bureau of Mines and Geo-Sciences internal report	122°47'19.877"E-122°48'07.151"E, 14°15'29.263"N-14°13.533"N	CN-5015 in MGB	61
62	CN-23	ore deposit, United Paracale, Cu, Zn, Pb, Ag	Report on the valuation of the property of United Paracale Mining Company at Paracale, Camarines Norte.	1951	Abad, L.F., Quema, J.C. and Jongco, C.P.	Bureau of Mines and Geo-Sciences internal report	Paracale, cf. Plate2	CN-11 in MGB	62
63	CN-24	ore deposit, Calaburnay, Fe	Report on the valuation of the property of Gabun-Paracale Mining Company at Calaburnay, Paracale, Camarines Norte.	1951	Quema, J.C., Jongco, C.P., and Mateo A.L.	Bureau of Mines and Geo-Sciences internal report	In the barrio of Calaburnay, town of Paracale		63
64	CN-25	ore deposit, Paracale-Malaguit placer, Au	Report on the valuation of the Paracale-Malaguit placer property of the Coco Grove Mining Company, Paracale, Camarines Norte.	1951	Abad, L.F., Quema, J.C. and Jongco, C.P.	Bureau of Mines and Geo-Sciences internal report	Paracale, cf. Claims map	CN-52RA in MGB	64
65	CN-26	exploration, radiometric survey, stream sediment	Preliminary Report on the Radiometric Survey in the Bulawan and Igang-Iyawan Area, Batobalane, Paracale, Camarines Norte.	1977	Peneda, O.M., Santiago, N.G., and Revilles, P.B. Jr.	Bureau of Mines and Geo-Sciences internal report	14°11'-14°14'N, 122°41'-122°44'E in Bulawan and Iyang-Iyawan area, Batobalane, Paracale, Camarines Norte	CN-110 in MGB	65
66	CN-27	ore deposit, Tigbinan, Mn	Geologic investigation of the manganese deposits in Bani, Tinambac, Camarines Sur and Tigbinan, Jabo, Camarines Norte.	1958	Baniea, C.B. and Pulcon, E.H.	Bureau of Mines and Geo-Sciences internal report	Tigbinan, cf.Fig.1	CN-272 in MGB	66
67	CN-28	mineral prospect, Kalbario, Cu, Sorela, Fe	Preliminary geological investigation of iron prospects in Iwasi bay area, Camarines Sur, manganese prospect and iron-titanium prospect in Albay and copper and iron prospects in Camarines Norte.	1960	Crispin, O.A.	Bureau of Mines and Geo-Sciences internal report	Manito(Albay),Plate2, Lamit bay area(Camarines Sur),Plate3, Kalbario(Camarines Norte),Plate4	CN-318 in MGB	67
68	CN-29	mineral prospects, Tigbinan: Fe, Pinagbarayan: Fe	Report on the Geological investigation of Iron Ore Prospects at Tigbinan, Labo, and at Pinagbarayan, Paracale, Camarines Norte.	1961	Crispin, O.A.	Bureau of Mines and Geo-Sciences internal report	Plate 1 & 2	CN-340 in MGB	68
69	CN-30	exploration, Fe	Memorandum report in the geological investigation of iron prospects in Calaburnay, Tacas, Napangasan-Pinagbarayan area and area incorporated (San Felipe Mines) in Paracale, Camarines Norte.	1961	Crispin, O.A. and Pérez, J.E.	Bureau of Mines and Geo-Sciences internal report	SE of Paracale, cf. Location map	CN-342 in MGB	69
70	CN-31	mineral prospect, Submalun, Cu, Pb, Zn, Fe, Mo, alteration	Geology of the Submalun prospect area, Paracale, Camarines Norte, Philippines.	1963	Bryner, L.	Bureau of Mines and Geo-Sciences internal report	Submalun, Paracale	CN-449 in MGB	70
71	CN-32	ore deposit, Paracale-Gumaus Mine, Au, Cu, Pb, Zn, Bleaching	Geology of the Paracale-Gumaus Mine 350-Level, Camarines Norte	1963	Bryner, L.	Report by the Institute of Applied Geology in response to a request by the Philippine Bureau of Mines	Fig.3 Paracale-Gumaus Mine	CN-450 in MGB	71
72	CN-33	exploration, geophysics(magnetic), Fe	Geophysical survey of the iron prospects in Paracale, Camarines Norte.	n/a	Caleon, P.C., Abanquez, O.E. and Manalang, E.M.	Bureau of Mines and Geo-Sciences internal report	14°10'00"N-14°25'00"N, 122°45'00"E-122°56'00"E	CN-581 in MGB	72
73	CN-34	mineral deposit, fire clay, kaolinite, alunite, alteration, silica sinter	The geology of the fire clay deposits in Bulala, Capalonga, Camarines Norte.	1968	Zapeda, Z.C.	Bureau of Mines and Geo-Sciences internal report	122°25'00"E, 14°17'00"N, cf. attachment	CN-788 in MGB	73
74	CN-35	exploration, Malaque prospect, Fe, Cu	Geologic Investigation of Malaque Iron-Copper Prospect, Capalonga, Camarines Norte.	1970	Zarda, R.H. and Mercado, M.P.	Bureau of Mines and Geo-Sciences internal report	Index Map and Geologic Map, Barrio Malaque, Municipality of Capalonga, Camarines Norte	CN-970 in MGB,	74
75	CN-36	exploration, Fe, Cu, diorite	Geological investigation and verification of lease survey of BAVS Group of Mining claims situated at Malaque, Capalonga, Camarines Norte.	1970	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	14°12'00"N, 122°30'00"E, cf. Plate1	CN-1036 in MGB	75
76	CN-37	exploration, Fe, skarn	Geological investigation of "Liaf" and "Punng FR" mining claims of Mr. Pedro D. Lamadrid situated at Sitio Napagasan, Barrio Pinagbarayan, Paracale, Camarines Norte.	1970	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	14°15'00"N, 122°50'00"E, cf. plate1	CN-1054 in MGB	76
77	CN-38	exploration, Cu, Fe	Geological Investigation of the Mining Property of Century Iron Mines Company, Incorporated Situated at Barrio Malaque, Capalonga, Camarines Norte.	1970	Caleon, P.C.	Bureau of Mines Internal Report for CENTURY IRON MINES COMPANY, Inc.	Geologic and Location Map Malaque, Capalonga, Camarines Norte	CN-1075 in MGB,	77
78	CN-39	exploration, vein-type, Cu, Fe, replacement	Geological investigation of the mineral claims of Amistong Mining and Industrial Corporation situated at Barrio Malatu, Capalonga, Camarines Norte.	1971	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	14°12'00"-14°13'00"N, 122°29'00"-122°30'00"E, cf. plate1	CN-1091 in MGB	78
79	CN-40	exploration, Au, Cu, vein-type, granodiorite	Report on the geological investigations at the mineral properties of La Suerte Resources and Industries, Incorporated, Jose Panganiban, Camarines Norte.	1973	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	14°16.5'-14°18'00"N, 122°42'00"-122°42'00"E, cf. Fig.3	CN-1417 in MGB	79
80	CN-41	exploration, Au, Ag, Cu, Pb, Zn	Mineral investigation and verification of twenty-two(22) lode claims applied for lease by Mr. Felix M. Antonio in Bo. Bulalacao, Jose Panganiban, Camarines Norte.	1973	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	122°42'00"-122°43'00"E, 14°18'00"-14°19'00"N	CN-1431 in MGB	80
81	CN-42	mineral deposit, fire clay, kaolinite, alunite	Geologic reserves of the fire clay property of Firestone Ceramics, Inc. at Bulala, Capalonga, Camarines Norte.	1974	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	122°25'00"-122°28'00"E, 14°11'00"-14°14'00"N, cf. plate1	hydrothermal acid alteration, CN-1513 in MGB	81

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
82	CN-43	ore deposit, Golden Rock Mine, vein, Au, Ag, Cu, Pb, Zn	Geologic Investigation and Estimate of Geologic Reserves of the Mineral Property of Golden Rock Mines, Incorporated at Labng, Paracale, Camarines Norte.	1975	Caleon, P.C.	Bureau of Mines internal report for Golden Rock Mines, Inc.	14°15'-14°17'N, 122°48'-122°51'E at Labng, Paracale, Camarines Norte	CN-1329 in MGB.	82
83	CN-44	exploration, dacite plug, Hg, S, kaolinite	Report on the Investigation of the Reported Mercury and Sulphur Occurrence in Barrio Cubas, Mercedes, Camarines Norte.	1975	Balce, G.R.	Bureau of Mines and Geo-Sciences internal Report	13°55'30"N, 123°01'00"E Barrio Cubas, Mercedes, Camarines Norte	CN-1607 in MGB	83
84	CN-45	core logging, radiometric, U	Radiometric logging of the diamond drill cores in the Bureau of Mines uranium exploration project, Larap, J. Panganiban, Camarines Norte.	1976	Almogera, D.H. and Samonte, C.S.	report of the Bureau of Mines and Geo-sciences	18,000E-18,200E, 14,300N-14,500N, cf. attachment	CN-1654 in MGB	84
85	CN-46	exploration, radiometrics, stream sediments, U	Geologic and radiometric survey of Paracale-Nacional area.	1977	Paramo, B.M.	Bureau of Mines and Geo-Sciences internal report	122°42'00"-122°45'00"E, 14°18'00"-12°15'00"N, cf. attachment	CN-1764 in MGB	85
86	CN-47	exploration, vein, Au, Ag, Cu, Pb, Zn	Memorandum report on the geological verification of twenty four(24) mining claims applied for lease by Mr. Jovito Palado in Paracale, Camarines Norte.	1978	Juan, R.A. and Nando, V.P.	Bureau of Mines and Geo-Sciences internal report	14°17'16"-14°18'29"N, 122°46'11"-122°47'15"E Barrio Parang, Paracale, Camarines Norte	CN-1675 in MGB	86
87	CN-48	exploration, placer, Au	Mineral investigation and verification of eleven (11) placer mineral claims applied for lease by River Bed Mining Exploration, Inc., in Labo, C., Norte.	1973	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	14°07'-14°12'N, 122°30'-122°46'E (plate 1) in Labo, Camarines Norte	CN-5000 in MGB	87
88	CN-49	exploration, placer, Au, vein	Geologic report of nine(9) load claims applied for lease by Mr. Jose Robles.	1981	Sandoy, S.V.	Bureau of Mines and Geo-Sciences internal report	14°11'30"-14°13'00"N, 122°38'00"-122°39'30"E with in the jurisdiction of Bo. Exciban, Labo, Camarines Norte		88
89	CN-50	ore deposit, Golden River Mine, placer, vein, Au	Report on the geology of the mining property of the Golden River Mining Corporation in Paracale, Camarines Norte.	1977	Cruz, M.P.	Bureau of Mines and Geo-Sciences internal report	14°16'N, 122°46'E in the barrios of Batobalani, Tawig, Talusan, Pinagbirayan, etc.	CN-5005 in MGB	89
90	CN-51	exploration, vein, Au, Ag, Cu, Pb, Zn	Report on the geological verification of twelve(12) mining claims applied for lease by Republica Panel located at San Antonio, Sta Rosa Norte, Jose Panganiban, Camarines Norte.	1983	Manuel, E.M.	Bureau of Mines and Geo-Sciences internal report	14°17'33"-14°17'55"N, 122°41'16.97"-122°47'16.20"E, at about half a kilometer NE of the town proper of Jose Panganiban		90
91	CN-52	exploration, Au, K-Ar, fluid inclusion	Strengthening the government capability in gold exploration.	1987	United Nations	p.43	Camarines Norte		91
92	CN-53	fluid inclusion, quartz vein, Au, Ozcram Mine	Temperatures of gold-quartz vein formation at Olecram Mining Corporation, Jose Panganiban, Camarines Norte as indicated by fluid inclusions.	1985	Cornish, E.C., Jesus, C.V.D. and Marcelo, T.R.	The Philippine Geologist, pp.35-47.	Olecram Mine, Camarines Norte		92
93	CN-54	exploration, Au, vein, Exciban gold deposit	Report on verification of mineralization of three(3) mining claims upon request of Mr. Pablo P. Gallego, consultant/geologist of Golden Star Mineral Corporation.	1987	Aniceto, L.R.	Bureau of Mines and Geo-Sciences internal report	Exciban, 14°12'30"N, 122°40'00"E	CN-4673 in MGB, geologic map	93
94	CN-55	exploration, Fe, hematite, magnetite, diorite, pyrite, chalcopyrite	Report on the evaluation of the iron property of Yolanda Vial at Pinagbibayan Malatu, Paracale, Camarines Norte.	1978	Escandor, B.B.	Bureau of Mines and Geo-Sciences internal report	Paracale, 14°14'00"-14°14'30"N, 122°47'30.00"-122°48'00.00"E	CN-5001 in MGB, geological map in 1:50,000	94
95	CN-56	exploration, limestone	Mineral investigation and verification of three (3) mineral claims applied for lease by Mr. Vincente S. Rafanan in Sitio Namulusan, Barrio Dagui, Labo, Camarines Norte.	1973	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	Barrio Dagui, Paracale, 14°11'N, 122°41'E	CN-1319 in MGB, geological map in 1:4,000	95
96	CN-57	exploration, dolomite	Mineral investigation and verification of eighteen (18) placer mineral claims applied for lease by Minerals Processing and Supply (Phil.) Inc. situated at Basud, Camarines Norte.	1973	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	Basud, 13°58'00"-14°02'00"N, 122°57'00.00"-123°00'00.00"E	CN-1320 in MGB, geological map in 1:25,000	96
97	CN-58	exploration, Fe, skarn, alteration	Geological investigation of the mineral properties of Peninsula Natural Resources Corporation (PENARCO) situated in Jose Panganiban and Paracale, province of Camarines Norte.	1974	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	Jose Panganiban, cf. location map in 1:50,000	CN-1441 in MGB, geological map in 1:50,000	97
98	CN-59	ore deposit, Larap Mine, skarn, Fe, Cu, Mo, U, Pb	Verification of geologic reserves of the Bessemer Pit Area of Philippine Iron Mines, Inc., in Larap, J. Panganiban, Camarines Norte.	1974	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	Bessemer Pit Area, Larap, 14°15'N, 122°39'E	CN-1464 in MGB, idealized section, plan of sublevel 3, geological map of Larap pit	98
99	CN-60	exploration, Au, quartz vein, ore reserves	Geological investigation and estimate of geologic reserves of the mineral properties of Metals Exploration Asia, Incorporated situated in the municipalities of Paracale and Jose Panganiban, Province of Camarines Norte.	1974	Caleon, P.C.	Bureau of Mines and Geo-Sciences internal report	Jose Panganiban, Paracale, 14°15'-14°20'N, 122°40'-122°50'E	CN-1526 in MGB, geological plan map in 1:5,000	99
100	CN-61	ore deposit, La Suerte Gold, Au, Ag, Cu, Pb, Zn	Report on the evaluation of geologic reserves of La Suerte Gold Mining Corporation in Sta. Rosa Norte, Jose Panganiban, Camarines Norte.	1978	Pineda, O.M.	Bureau of Mines and Geo-Sciences internal report	Jose Panganiban, 14°15'30"-14°18'30"N, 122°40'30"-122°45'10"E	CN-1637 in MGB, route map in 1:2,000, plan map of the mine	100
101	CN-62	exploration, Au, geology, geochemical, Au in soil, geophysical survey, IP	Geological investigation of the gold prospect of Manamco Mineral Corporation Paracale, Camarines Norte.	1976	Ferrer, H.P.	Bureau of Mines and Geo-Sciences internal report	Paracale, 14°18'N, 122°45'E	CN-1674 in MGB, geochemical anomaly map, geological map in 1:5,000	101
102	CN-63	exploration, Au, vein	Geological investigation of the UPMC's Tagpo Group of Mining claims at Bo. Tagpo, Paracale, Camarines Norte.	1981	Ferrer, N.	Bureau of Mines and Geo-Sciences internal report	Tagpo, 14°16'30"N, 122°48'45"E	CN-2133 in MGB, detailed geological map	102
103	CN-64	exploration, Au, geology, radiometric, geochemical, Paracale Nacional	Geologic and radiometric investigation of Paracale Nacional, Jose Panganiban, Camarines Norte.	1977	Rosa, S. Jr.	Bureau of Mines and Geo-Sciences internal report	Paracale Nacional, 14°15'N, 122°43'E	CN-1773 in MGB, route map, geochemical map in 1:5,000	103
104	CN-65	exploration, geology, radiometric	Geologic and radiometric survey of Paracale-Nacional area.	1977	Pantaleon, L.E.	Bureau of Mines and Geo-Sciences internal report	Paracale Nacional, 14°15'N, 122°43'E	CN-1790 in MGB, route map in 1:5,000	104
105	CN-66	exploration, Au, geothermal	Memorandum report on the geological verification of six (6) mining claims applied for lease by Golden ... Mining Co., Inc. situated in Sitio Bernal, Barrio of Malogon, Labo, Camarines Norte.	1980	Samson, B.B.	Bureau of Mines and Geo-Sciences internal report	Labo, 14°08'00"-14°09'00"N, 122°46'00"-122°47'30"E	CN-2012 in MGB, geological map	105
106	CN-67	exploration, Cu, Mo, Fe, porphyry type mineralization, Larap, diorite, skarn, geochemical, IP	Base metal exploration in Larap, Jose Panganiban and vicinity.	1972	Ugarte, H.M.	Jour. geol. soc. Philippines, 26, p.37-49,	Larap	geochemical anomaly map, IP anomaly map	106
107	CN-68	F/S, Philippine Iron Mine, U	Technical feasibility study on the possible re-opening of the CPMI project of PIM (mining aspect) and the exploration program (uranium project) at Larap, Jose Panganiban, Camarines Norte.	1976	Bureau of Mines and Geosciences	Bureau of Mines and Geo-Sciences internal report	Larap	history	107
108	CN-69	exploration, radiometric survey, Bulawan, Igang-Iyasan	Preliminary report on the radiometric survey in the Bulawan and Igang-Iyasan area Batobalani, Paracale, Camarines Norte.	1977	Pineda, O.M., Santiago, N.G. and Aoncillo, P.B. Jr.	Bureau of Mines and Geo-Sciences internal report	Bulawan, Igang-Iyasan	CN-5013 in MGB	108

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
109	CN-70	verification claims	Report on the field survey verification of approved and published nine (9) mineral claims applied for lease by E.G. Vila located at San Antonio, Jose Panganiban, Camarines Norte.	1983	Anda, F.S.	Bureau of Mines and Geo-Sciences internal report	San Antonio, Jose Panganiban	CN-5018 in MGB	109
110	CN-71	exploration, Au, vein	Mineral investigation of the mining claims of Golden Reef Mining Corporation in Paracale, Camarines Norte.	1989	Escalada, P.P.	Bureau of Mines and Geo-Sciences internal report	Paracale, 14°18'20"N, 122°44'50"-122°47'30"E	CN-5024 in MGB, geological map in 1:50,000, pictures	110
111	CN-72	exploration, alteration, kaoline, silicification	Geological investigation of "RDRFMR No. 1 mineral claim", LLA 6005-D of Reina Cortez, situated in Pobiacion, Jose Panganiban, C. Norte.	1989	Calaen, P.C.	Bureau of Mines and Geo-Sciences internal report	Poblacion, 1.5km north of Jose Panganiban	CN-899 in MGB, plan sketch map	111
112	CN-73	ore deposit, evaluation	Report on the valuation of the property of San Mauricio Mining Company at Jose Panganiban, Camarines Norte.	1951	Abad, L.F., Quema, J.C. and Jongco, C.P.	Bureau of Mines and Geo-Sciences internal report	north of Jose Panganiban	CN-62RA in MGB	112
113	CN-75	exploration, alteration, kaoline, silicification, pyrite, alunite	Geological investigation of the 13 mining claims (PLA-4612-D to PLA-4624-D) in Barrio Bulala, Capalonga, Camarines Norte for Fosstone Ceramic Incorporated.	1971	Llave, O.A.	Bureau of Mines and Geo-Sciences internal report	Barrio Bulala, Capalonga	CN-1112 in MGB, geological map in 1:10,000	113
114	CN-76	hydrogeology	Assessment of possible adverse effect of Benguet Corporation Mining activities on Pallic Watershed, Jose Panganiban, Camarines Norte	1987	Cruz, E.C.	Bureau of Mines and Geo-Sciences internal report	Pallic Watershed, Jose Panganiban	CN-5072 in MGB, hydro-geomorphological map in 1:4,000	114
115	CN-76	exploration	Ma' Geologic map of mining claims applied for lease by United Paracale, scale 1:4,000.		Narido, V.P.	Bureau of Mines and Geo-Sciences internal report	Paracale	CN-5010 in MGB, geological map, map only	115
116	CN-77	exploration, Au	Report on the geological verification of two (2) mining claims applied for lease by Mr. Agustin C. Jimenez located at Tugos, Paracale, Camarines Norte.	1987	Sabas, P.C. and Jose, A.F.	Bureau of Mines and Geo-Sciences internal report	Tugos, Paracale, 14°16'00"-14°17'00"N, 122°46'30"-122°47'00"E	CN-5021 in MGB, pictures, geologic map in 1:4,000	116
117	CN-78	exploration, Au, quartz vein	Report on the geological verification on twelve (12) mining claims applied for lease by Mr. Jovito Palado located at Bo. Parang, Paracale, Camarines Norte.	1984	Domang, W.F.	Bureau of Mines and Geo-Sciences internal report	Bo. Parang, 1km north of Paracale	CN-5019 in MGB, sample map in 1:4,000	117
118	CN-79	exploration, Au, vein, galena, sphalerite, chalcopyrite, pyrite	Report on the geological investigation of the copper-lead prospect at Barrio Palang, Paracale, Camarines Norte	1970	Calaen, P.C.	Bureau of Mines and Geo-Sciences internal report	Bo. Palang, 1km north of Paracale, 14°17'00"-14°18'00"N, 122°46'00"-122°47'00"E	CN-1014 in MGB, geologic map in 1:50,000	118
119	CN-80	exploration, Au, quartz vein	Mineral verification of three lode mining claims on Barrio Malacbang, Paracale, Camarines Norte.	1976	Llave, O.A.	Bureau of Mines and Geo-Sciences internal report	Bo. Malacbang, 14°17'N, 122°46'00"-122°47'00"E	CN-1240 in MGB, geological map in 1:12,500	119
120	CN-81	exploration, clay, kaoline	Memorandum report on the geological investigation of clay prospects in Barrio Dagot, Labo, Camarines Norte.	1988	Llave, O.A. and Yabenda, J.P.	Bureau of Mines and Geo-Sciences internal report	Bo. Dagot, Labo	CN-5003 in MGB, no plan	120
121	CN-82	exploration, sulfur, silicification, pyrite dissemination	Report on the geological investigation of "WPIP-II and WPIP-I" mining claims applied for Mr. Spencer K.C. Liu located at Cuas, Mercedes, Camarines Norte.	1990	Jose, A.F.	Bureau of Mines and Geo-Sciences internal report	Cuas, Mercedes, 13°58'00"-13°58'30"N, 123°02'30"-123°03'30"E	geological map	121
122	CN-83	exploration, Fe, basemetals	Preliminary report on the assessment of laterite resources for Pig Iron in the Bicol region.	1992	Dizon, D.R.	DENR, Mines and Geo-Sciences Development Service	14°17'30"-14°17'00"N, 122°46'00"-122°47'00"E, cf. location map	geological maps	122
123	CN-84	exploration, Cu, prospect, replacement, hematite, magnetite, chalcopyrite	Geologic investigation of Malaque copper prospect Capalonga, Camarines Norte.	1979	Zarda, R.R. and P., cab, M.	Bureau of Mines and Geo-Sciences internal report	Bo. Malaque, Capalonga		123
124	CN-85	exploration, ophiolite, thrust	Preliminary report on the geology and mineral resources of Mount Cadig	1987	Manuel, R.M.	Bureau of Mines and Geo-Sciences internal report	Mt. Cadig, cf. location map	theoretical ophiolite suite sequence	124
125	CN-86	Ore deposit, La Suerte Mine, Luna Palang vein	Alteration and Mineralization at La Suerte Mine, Camarines Norte, Philippines	1989	E.J. Manuel-Dugor, K. Tarree, E.G. Domingo, A.C. Duroy, F. Janer, R.A. Juan, E.C. Lacsamana, G.M.F. Pingue	The Reports of the Faculty of Science, Kagoshima University No 22	14°15'-14°18'N, 122°44'-122°45'E, Barrio Sta. Rosa Norte, about a kilometer from the town of Panganiban, Camarines Norte	Study of alteration minerals associated with the gold mineralization	125
126	CN-87	Exploration, Geochemical Survey, Stream Sediment, Mt Bagacay, Cu, Zn, Pb, Fe	Reconnaissance geological and geochemical survey of part of Mt Bagacay, Labo, Camarines Norte	1985	Gregorio A. Castro, Danilo P. Sindac, Laura D. Pabalan (Geology Student Trainees'85)	Bureau of Mines and Geo-Sciences Region V internal report	14°11'15"N-14°15'45"N, 122°46'30"E-122°51'15"E Mt Bagacay	geological map in 1:25,000 Geochemical Anomaly Map	126
127	CN-88	Geology, Labo, Fe, diorite	Geology of the Labo Iron Prospect, Labo, Camarines Norte	1995	unknown	Bureau of Mines and Geo-Sciences internal report	unknown	diagram print	127
128	CN-89	Tingga Prospect, Qz vein, Au, Ag, Pb, Cu, Zn, Contact zone of Od & Serpentine	Tingga Prospect, Paracale, Camarines Norte	unknown	JOHN Y. PASANA	unknown	Tingga, 1 km west of Paracale	brief report	128
129	CN-90	Exploration, Geochemical Survey, Stream Sediment, heavy minerals, Cu, Mo, silicification, Pyritization, sericite, diorite, Porphyry-Cu	Detailed Geological, Geochemical and Radiometric Survey of Submakin and Igang-Iyman areas, Paracale, Camarines Norte	1979	Geology Student Trainees '79	Bureau of Mines and Geo-Sciences internal report (PM-Radioactive Mineral Development Project, Larap, Jose Panganiban, Camarines Norte)	14°15'N, 122°47'E Batobalani, Paracale, Camarines Norte	geological, geochemical (Cu, Pb, Zn) and radiometric anomaly map in 1:10,000	129
130	CN-91	Geochemical Survey, Radiometric Survey, Diorite, hydrothermal biotite, sericite, Cu, Fe, Mo, Au	Geochemical, Radiometric and Radon Gas Anomalies at Paracale-Nacional, Sta Rosa Sur, Jose Panganiban, Camarines Norte	1977	HERMES P. FERRER	Bureau of Mines and Geo-Sciences internal report	14°16'N, 122°39'E Sta. Rosa Sur, Jose Panganiban, Camarines Norte	Grid Geochemical Soil Survey Map, Grid Radiometric Survey Map in 1:3,000	130
131	CN-92	Fe prospect	Report on the geological-geological canvassing of the iron deposit of Camarines Norte	1966	unknown	Bureau of Mines and Geo-Sciences internal report	Paracale, Panganiban, Capalonga, Labo	[illegible]	131
132	CN-93	Ore deposit, evaluation of ore reserves, Cu, Mo, Fe	Re-evaluation of the Ore Reserves at the Dawahan Drilling Area	1978	Reynaldo A. Juan, Hermes P. Ferrer, Bellasanto O. Balon	Bureau of Mines and Geo-Sciences internal report	Dawahan and Maculabo drilling area, the vicinity of Larap, Jose Panganiban, Camarines Norte	Location Map of Diamond Drill Holes in 1:1,200 and 1:1,500	132
133	CN-94	Fe, Mn, stockpile	Evaluation of Iron-Manganese Ore Stockpile in Barrio Submakin-Batobalani, Paracale, Camarines Norte	1980	Jose Z. Tabas, JR., Sulpicio B. Bernardo III	Bureau of Mines and Geo-Sciences Region V internal report	14°17'30"N-14°17'00"N, 122°43'30"E-122°44'00"E Barrio Submakin and Barrio Batobalani in the municipality of Paracale		133
134	CN-95	Larap, Core-Logging	Progress Activity Report on Drill Core Logging in Connection with the Bureau of Mines Uranium Project in Larap, Jose Panganiban, Camarines Norte	1976	Clarence L. Gapasin, Pedro Ravidas, JR., Emmanuel M. Manalang	Bureau of Mines and Geo-Sciences internal report	in Larap, Jose Panganiban, Camarines Norte,	Location Map of Diamond Drill Holes in 1:1,200	134
135	CN-96	Mt Labo Geothermal Project, Resource assessment, multiple magmatic intrusions, low resistivity	Mt Labo geothermal project resource assessment update (draft report)	1995	M.C. Zaide-Delfin, P.F.Garma, D.B Layugan, O.O Malulgo, D.O Pastue, C.C.Panem, J.B Rosell, N.D.Salonga	PNOC Energy Development Corporation Report	Mt Labo	Resource Assessment Report	135

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ©	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
136	CN-97	Mineral prospect, Ranking system	Mineral Prospects in Camarines Norte: Ranking System (Paper presented during the Mining Summit held at Wiltan Hotel, Daet, Camarines Norte on December 6, 1996)	1996	Valentin F. Hondo	Paper presented for the Mining Summit	Camarines Norte		136
137	CS-01	geology, geochemistry, geochronology, ophiolite	Geology, geochemistry, geochronology and structures of the ophiolites in southern Luzon, Philippines.	1996	David Jr, S.D., Stephan, J., Delteil, J., Bellon, H. and Sajona, F.G.	J. Geol. Soc. Philippines	Bicol peninsula		137
138	CS-02	exploration, geology, Au	Geologic investigation of the gold property of Rajar Luky Mining company at Gata, Caramoan, Camarines Sur.	1978	-	-	123°48'30"E-125°48'30"E, 13°54'30"N		138
139	CS-03	exploration, Central Caramoan Copper Belt, radiometric survey	A report on the radiometric survey at Magna Rosa Project of Copper Belt Mining Corporation in Central Caramoan peninsula, Camarines Sur.	1977	Tengonan, M.F.	Copper Belt Mining Corporation internal report	Lagonoy, Camarines Sur	radiometric survey	139
140	CS-04	exploration, mineral, kaoline	Memorandum report on the investigation of ceramic raw materials in Camarines Sur and Camarines Norte.	1954	Cruz, J.R.D.	Bureau of Mines and Geo-Sciences internal report	Siruma peninsula, 123°54'00"E, 13°57'00"N	CS-1282 in MGB	140
141	CS-05	exploration, white clay, kaoline, quartz veinlet	Memorandum report on the geological investigation of a portion of the white clay mineral reservation (proclamation No 563) as surveyed for Marcelo Steel Corp. (BM PLAN No. BSM73) in Bo. Bahao, Siruma, Camarines Sur.	1971	Llave, G.A.	Bureau of Mines and Geo-Sciences internal report	Siruma peninsula, map in 1:50,000	CS-1172 in MGB, geological map in 1:50,000	141
142	CS-06	exploration, gypsum, bleaching pyrite, limestone, andesite, diorite	Mineral investigation and verification of eleven(11) mining claims applied for lease by Dr. & Mrs. Jose Abalo in Buio and Balatan, Camarines Sur.	1971	Calaon, P.C.	Bureau of Mines and Geo-Sciences internal report	Balatan-Buio area, 13°22'00"N, 123°13'00"E	CS-1167 in MGB, geological map in 1:50,000	142
143	CS-07	exploration, Cu, pyritization, silicification, chalcopyrite massive lenses	Geological investigation and verification of six(6) lode mining claims applied for lease by Mrs. Teresita D. Ong in Bo. Pating-Belen, Caramoan, Camarines Sur.	1971	Calaon, P.C.	Bureau of Mines and Geo-Sciences internal report	Caramoan peninsula, 123°48'E, 13°46'N, geological map in 1:50,000	CS-1146 in MGB, geological map in 1:50,000	143
144	CS-08	exploration, white clay, quartz veinlet	Geological investigation of a portion of the Siruma white clay mineral reservation applied for ...	1971	Calaon, P.C.	Bureau of Mines and Geo-Sciences internal report	Siruma, 123°20'E, 14°00'N, location map in 1:50,000	CS-1140 in MGB, location map of white clay deposit	144
145	CS-09	exploration, Cu, andesite, diorite, limestone	Geological investigation of copper prospects at Bario Tinalmud, Pasacao, Camarines Sur.	1976	Mercado, M.P.	Bureau of Mines and Geo-Sciences internal report	Pasacao copper prospect, 13°33'00"-13°28'00"N, 123°50'00"-125°7'N	CS-991 in MGB, geological map in 1:25,000	145
146	CS-10	exploration, white clay, short drilings		1955	Cruz, J.R.D.	Bureau of Mines and Geo-Sciences internal report	Siruma, 123°20'00"E, 14°01'00"N, map in 1:4,000	CS-192 in MGB, plan map and cross section in 1:4,000	146
147	CS-11	exploration, white clay, tonnage estimates	Preliminary report on the geology of white clay deposits of Hapu and Fundao, Siruma and Sugsugon, Suguitan, and San Vicente, Tinambac, Camarines Sur.	n/a	Cruz, A.	Bureau of Mines and Geo-Sciences internal report	Siruma	CS-190 in MGB, plan map in 1:4,000 (3 pieces)	147
148	CS-12	exploration, gypsum, andesite, limestone, diorite	The gypsum deposits of southwestern Albay and Camarines Sur.	n/a	Cruz, O.P. and Domingo, C.R.	Bureau of Mines and Geo-Sciences internal report	Oas, Nabua	CS-48AA in MGB, geological maps in 1:50,000	148
149	CS-13	exploration, white clay	Report on the mineral character of the land areas applied for by Vicente S. Tuason and Orasco Chavacano on Siruma, Camarines Sur.	1950	Cruz, O.P. and Domingo, C.R.	Bureau of Mines and Geo-Sciences internal report	Siruma, location map in 1:50,000	CS-48AA in MGB	149
150	CS-14	geology, contact relationship	Contact relationship of different rock types in Caramoan Peninsula, Camarines Sur.	1991	Prestillero, C.G.	Bureau of Mines and Geo-Sciences internal report	Caramoan peninsula	CS-350 in MGB, reconnaissance geological map in 1:250,000	150
151	CS-15	exploration, gypsum, limestone, andesite, porphyry, anhydrite	A geological investigation of gypsum claims in Balatan, Camarines Sur.	1953	Cruz, A.J.	Bureau of Mines and Geo-Sciences internal report	Balatan, 13°20'N, 123°25'E	CS-348 in MGB, reconnaissance geological map in 1:50,000	151
152	CS-16	exploration, clay	Mineral verification of clay deposit within "LANDICHO" mining claim in Tabon Nunk, Del Gallego, Camarines Sur.	1987	Bemowa, R.K.	Bureau of Mines and Geo-Sciences internal report	Bo. Tabon Munk, 13°57'00-13°57'30N, 123°30'00"-123°39'30"E		152
153	CS-17	exploration, clay				Bureau of Mines and Geo-Sciences internal report	Eastern Del-Gallego, 13°47'30"N, 122°48'00"E, geological map in 1:25,000	CS-6001 in MGB, geological map in 1:75,000	153
154	CS-18	mineralogy, clay, Siruma, silica, kaolinite, smectite	Mineralogical study of clay in the Siruma silica deposit from Siruma peninsula, Camarines Sur, Philippines.	1982	Nabaro, T.V., Tardo, A.R., Martinez, E.R., Calzada, C.V., Guzman, A.A., Banda, B.A. and Shimosaka, K.	Journal of the geological society of Philippines, vol. 28, no.3, pp.1-14.	Siruma		154
155	CS-19	geochemical map, stream sediment, soil, lithology, Cu	Ms. reconnaissance geochemical map of the Nabua Forest Reserve, Balatan, Camarines Sur. (in 1:10,000).	1970	Belos, G.R. and Reyes, F.T.	Bureau of Mines and Geo-Sciences internal report	Balatan	CS-1857 in MGB, limited geochemical survey	155
156	CS-20	exploration, Cr, ultramafic rocks	Report on the geologic investigation of chromite-laterite prospect, Lagonoy, Camarines Sur.	1970	Zarda, R.R. and Mamalang, E.M.	Bureau of Mines and Geo-Sciences internal report	Bario Himagtocon, 13°47'00"-13°51'00"N, 123°27'00"-123°31'00"E	CS-1008 in MGB, geological map in 1:50,000	156
157	CS-21	exploration, Cr, Ni, ultramafic rocks	Report on the "geologic verification of chromite-nickel prospect of three(3) mining claims in Bo. Himagtocon, Lagonoy, Camarines Sur.	1979	Tabora, J.Z. Jr. and Escuadro, B.B.	Bureau of Mines and Geo-Sciences internal report	Bario Himagtocon, 13°46'30"-13°47'00"N, 123°28'30.00"-123°30'00.00"E	CS-1914 in MGB, geological map in 1:5000	157
158	CS-22	exploration, clay, map, another place, pyrite	Geological investigation of the clay deposits in sitios Bambanon and Ilaquing, Bario Libora, Ragay, Camarines Sur.	1973	Velasquez, C.A.	Bureau of Mines and Geo-Sciences internal report	Bambanon, Kaquinton	CS-1790 in MGB, geological map in 1:50,000	158
159	CS-23	exploration, clay, kaolinite, chrysotiles, smectite	Mineral verification of Victoria mining claim applied for lease by Mr. Fausto Contreras in Bo. Tabon Munk, Del Gallego, Camarines Sur.	1987	Hondo, V.F.	Bureau of Mines and Geo-Sciences internal report	Del Gallego, location map in 1:4,000	CS-6006 in MGB	159
160	CS-24	exploration, Cr, Ni	Report on the geologic investigation of chromite and nickel prospect in Sitios Banguet and Tigbao, Barrio Himagtocon, Lagonoy, Camarines Sur for Lagonoy Consolidated Mines, Inc.	1971	Cruz, J.R.	Bureau of Mines and Geo-Sciences internal report	Himagtocon	CS-5004 in MGB, geological map in 1:25,000	160
161	CS-25	exploration, white clay, quartz veinlet	Report on the geological investigation of white clay deposit of one(1) mining claim applied for lease by Mr. Jose C. Francisco at Siruma peninsula, Camarines Sur.	1982	Sandan, B.V.	Bureau of Mines and Geo-Sciences internal report	Siruma, 13°58'30"-13°58'00"N, 123°18'00.00"-123°18'30.00"E	CS-2182 in MGB, pictures	161
162	CS-26	geology, geochemical survey, stream sediment, soil, Cu	Geological-geochemical survey of Caramoan peninsula, Camarines Sur.	n/a	Miranda, F.E.	Bureau of Mines and Geo-Sciences internal report	Caramoan peninsula	CS-1830 in MGB	162

Table 1-1 The literature and plans registered through this survey

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
163	CS-27	mineral prospect, sulfur	Report of investigation of the sulphur prospect in Mt. Isarog, Goa, Camarines Sur.	1961	Fernandez, H.B.	Bureau of Mines and Geo-Sciences internal report	Mt. Isarog	CS-360 in MGB	163
164	CS-28	exploration, Au, vein, quartz, pyrite, galena, chalcopyrite	Geological verification of Rayah Lahuy Mining Company property at Lahuy island, Caramoan, Camarines Sur.	1977	Cabanting, A.V.	Bureau of Mines and Geo-Sciences internal report	Lahuy island	CS-1749 in MGB, geological map in 1:12,500	164
165	CS-29	ore deposit, Cr, Lagonoy Consolidated Mine	Report on the activities of Lagonoy Consolidated Mines on its chromite deposit in Lagonoy, Camarines Sur.	1976	Crispin, O.A.	Bureau of Mines and Geo-Sciences internal report	Lagonoy, 13°47'00"-13°49'00"N, 123°27'45.00"-123°30'00.00"E	CS-1458 in MGB, geological map in 1:25,000	165
166	CS-30	geology, geochemical, Cu, limestone, diorite, meta-andesite, propylitic alteration, silicated, quartz vein, chalcopyrite, barite	Geological and geochemical investigation of copper prospects in the Haibul Forest Reserve, Camarines Sur.	1970	Reyes, F.T. and Balce, G.R.	Bureau of Mines and Geo-Sciences internal report	13°20'N, 123°15'E		166
167	CS-31	exploration, Au, vein	Geologic investigation of the gold prospect of Rayah Lahuy Mining Company at Gata, Caramoan, Camarines Sur.	n/a	Torres, M.A.	Bureau of Mines and Geo-Sciences internal report	Lahuy island, 13°34'36"N, 123°48'30.00"-123°50'30.00"E	CS-5002 in MGB, tunnel sketch	167
168	CS-32	geology, mineral resources, stream sediment, soil, geochemical, Cu	The geology and mineral resources of Caramoan peninsula, Camarines Sur, Philippines.	1978	Miranda, F.E.	Jour. geol. soc. Philippines, 30, pp.16-54	Caramoan peninsula	regional geochemical map, geological map, mineral distribution map	168
169	CS-33	exploration, Cr, Ni	Mineral verification of twelve (12) chromite-nickel lode claims in Bo. Himagtocon, Lagonoy, Camarines Sur.	1978	Manalang, S.M.	Bureau of Mines and Geo-Sciences internal report	Bo. Himagtocon, Lagonoy, 13°46'15"-13°50'08"N, 123°29'15"-123°29'45"E	geological map	169
170	CS-34	exploration, Cr	The chromite deposits in Camarines Sur.	1969	Javier, F.O.	Bureau of Mines and Geo-Sciences internal report	Northern Himagtocon, Lagonoy, 13°45'00"-13°55'00"N, 123°27'30"-123°32'30"E	geological map of the area	170
171	CS-35	exploration, pyritization, silicification, porphyry, Cu, Au, hydrothermal	Report on the preliminary geological investigation and evaluation of the mineral claims "Ernesto-1", "Ernesto-2" and "Ernesto-3" of Ernest S. Alvarez, located in the Barrio of Bulalacao, Municipality of Pasacao, Province of Camarines Sur.	1980	Bautista, R.N.	Bureau of Mines and Geo-Sciences internal report	Bo. Bulalacao, Pasacao, 13°42'00"-13°43'00"N, 123°46'00"-123°47'00"E	geological map	171
172	CS-38	exploration, Cr	Preliminary report on the ... geochemical survey for chromite exploration in the Bicol region	1987	Castañeda, E.J.	Bureau of Mines and Geo-Sciences internal report	Himagtocon, Lagonoy, 13°46'30"-13°48'00"N, 123°27'38"-123°29'27"E		172
173	CS-37	geology, middle miocene diorite, lower miocene limestone	Accomplishment report on the geological survey of northwestern part of Pasacao, Camarines Sur.	1972	Castaneda, O.C.	Bureau of Mines and Geo-Sciences internal report	Naga city, 13°31'-13°50'N, 122°45'-123°00'E		173
174	CS-36	geology, copper prospect, silicification, argillization, Cu prospect, Qz vein, clay prospect	Progress report on the regional geology and mineral canvassing of Ragay-Del Gallego, Camarines Sur.	1972	Castaneda, O.C. and Encina, O.C.	Bureau of Mines and Geo-Sciences internal report	Ragay-Del Gallego		174
175	CS-39	geology	Progress report on the Mandao and Libmanan quadrangle.	1972	Castaneda, O.C. and Encina, O.C.	Bureau of Mines and Geo-Sciences internal report	Mandao, Libmanan		175
176	CS-40	geology	Progress report on the Daet-Mercedes quadrangle.	1972	Castaneda, O.C.	Bureau of Mines and Geo-Sciences internal report	Daet, Mercedes		176
177	CS-41	Exploration, Cr, Ni	Geologic Verification of Chromite-Nickel Prospect of Three(3) Mining Claims in Bo. Himagtocon, Lagonoy, Camarines Sur	1979	Jose Z. Tabora, JR., Benjamin B. Escandor	Bureau of Mines and Geo-Sciences internal report	13°46'30"N-13°47'00"N, 123°28'30"E-123°30'00"E Barrio Himagtocon, Municipality of Lagonoy, Camarines Sur	Geologic Map in 1:5,000	177
178	CS-42	geology, Caramoan Peninsula, Olistostrome	The Tabgon Flysch and Rajah Point Olistostrome in the Caramoan Peninsula: nature, age, structures and their tectonic implications	1994	Sevillo D. David Jr., Jean-Francois Stephan, Jean Delteil, Carla Muller, Jacques Butterlin	Journal of the Geological Society of the Philippines,1994	Caramoan Peninsula	Simplified geological map	178
179	CS-43	geology, Iron prospect, Copper prospect, Clay deposit	General Geology of Northwestern Camarines Sur	1972	Castaneda, O.C.	Bureau of Mines and Geo-Sciences internal report	Northwestern Camarines Sur		179
180	CS-44	Geology, Mineral Resources, Camarines Sur	Geology and Mineral Resources of Camarines Sur	1981	Bureau of Mines and Geo-sciences	Bureau of Mines and Geo-sciences Report of Investigation No.105	Camarines Sur	Geology and Mineral Resources Map of Camarines Sur 1:250,000	180
181	CS-45	Geology, Geochemistry, Caramoan Peninsula, Camarines Sur	Geological-Geochemical Survey of Caramoan Peninsula, Camarines Sur	1977	Bureau of Mines	Bureau of Mines Report of Investigation No.86	Caramoan Peninsula	Geological Map and Sections in 1:250,000	181
182	CT-01	exploration, geology, geochemistry, drilling, Au, Cu	フィリピン共和国カタンドゥアネス地域資源開発協力基礎調査 総合解析図説明書 [Report on the cooperative mineral exploration in the Catanduanes area, the Republic of the Philippines, in Japanese]	1990	JICA/MMAJ		Catanduanes island		182
183	PH-01	geology, Philippines	Geology and mineral resources of the Philippines vol.1.	1986	Bureau of Mines and Geo-sciences		Philippines		183
184	PH-02	ore deposit, Philippines	Mineral resources assessment of the Philippines	1994	Clark, A.L.	Asian Development Bank Mineral Sector Study T. A. No.1894-PHI	Philippines		184
185	PH-03	epithermal Au, geological feature	Geological features of some epithermal gold systems, Philippines.	1990	Mitchell, A.H.G. and Balce, G.R.	J.Geochem Explor., 35, p.241-296			185
186	PH-04	exploration, ophiolite, Cr, Ni, PGM, massive sulfide	Ophiolites and ophiolitic complex in the Philippines as viable exploration targets.	1993	Yumul, Jr., G.P., Balce, G.R. and Datuin, R.T.	J. Geol. Soc. Phil., v.48, nos.1-2, 35-54	Philippines		186
187	PH-05	ore deposit, geology setting, tectonic setting, Cu, Cr	Geology and tectonic setting og copper and chromite deposits of the Philippines.	1984	Zamora, A.S., Domingo, E.G. Bacuta, G.C. and Almeda, A.L.	Geol.Soc.Japan Report, No.263, p.209-233			187
188	PH-06	ore deposit, porphyry Cu, tectonic setting	フィリピンのポーフィリーカッパー鉱床―その構造的背景と開発の現状― [Porphyry copper deposits in the Philippines -their tectonic setting and present status of their development-, in Japanese]	1977	茂木 睦 [Mogi, M]	鉱山地質 [Resource Geology], 27, 221-230	Philippines		188
189	PH-07	geology, Philippines, metamorphic belt	フィリピン群島の地質構造発達史 [Evolution of geology of Philippine Island, in Japanese]		鈴木尉元 [Suzuki, Y]	地質ニュース [Chishitsu-NEWS]	Philippines		189

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No	REGISTERED No	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
190	PH-08	mineral resources, Philippines	Geology and mineral resources of the Philippines vol 2.	1986	Bureau of Mines and Geosciences	Bureau of Mines and Geo-Sciences internal report	Philippines		190
191	PH-09	geology, economic geology, Philippines	The Philippines -A Prospectus for the International Mining Industry.	1992	the Philippines Mines and Geosciences Bureau and the United Nations Department of Technical Cooperation for Development(UNDTCD)	the prospectus for the industrial Mining Industry, which was prepared by The Mining Journal Ltd	Philippines		191
192	PH-10	geology, economic geology, Philippines	平成2年度地質解析委員会報告書-東南アジア・オセアニア島嶼地域-金、銅、モリブデン- [Report of the committee for geological analysis -South East Asia and Oceania archipelago region-gold, copper, molybdenum-, in Japanese]	1991	MRIC	Report of The Committee for Geological Analysis	Philippines		192
193	PH-11	tectonic, geology, Philippines	The Philippine Mobile Belt, a complex plate boundary.	1991	Rangin, C.	Journal of Southeast Asian Earth Sciences, vol 6 No.3/4 pp 209-220,1991	Philippines		193
194	PH-12	tectonic, geology, Philippine Fault	The Philippine Fault in the Late Cenozoic tectonic evolution of the Bondoc-Masbate-N. Leyte area, Central Philippines.	1991	Aurelio, M.A., Barrier, E., Rangin, C. and Muller, C.	Journal of Southeast Asian Earth Sciences, vol 6 No.3/4 pp 221-238,1991	Philippines		194
195	PH-13	tectonics, Mindanao, collision	The Mindanao Collision Zone: soft collision event within a continuous Neogene strike-slip setting.	1991	Pubellier, M., Quebral, R., Rangin, C., Deffontaines, B., Muller, C., Butterlin, J. and Manzano, J.	Journal of Southeast Asian Earth Sciences, vol 6 No.3/4 pp 239-248,1991	Mindanao		195
196	PH-14	ore deposit	Ore deposits of the Philippines mobile belt.	1971	Gervasio, F.C.	Jour. geol. soc. Philippines, 25, no.3, pp.1-24	Philippines	regional data	196
197	PH-15	data compilation, Landsat data	フィリピン共和国鉱物資源基本図調査報告書 [The mineral exploration - Mineral deposits and tectonic of two contrasting geologic environment, in Japanese]	1986	JICA/MMAJ	p.72	Philippines		197
198	PH-16	data compilation	フィリピン共和国鉱物資源基本図調査報告書 [The mineral exploration - Mineral deposits and tectonic of two contrasting geologic environment, in Japanese]	1985	JICA/MMAJ	p 174	Philippines	geological map, aeromagnetic survey excess, gravity anomaly map	198
199	PH-17	Mining Philippines 97, Nalesbitan Gold Project	MINING PHILIPPINES 97 (about Nalesbitan, title:Nalesbitan Gold Project-Camarines Norte)	1997	MINING PHILIPPINES 97 Committee (about Nalesbitan: Mr. Robert McLennan, Mr. Manuel Acenas-Geological Exploration mining Services Philippines, Inc)	MINING PHILIPPINES 97	Philippines including Nalesbitan		199
200	PH-18	Geology of the Philippines, vol.1, 1996Edition, draft	Geology and mineral resources of the Philippines vol.1 1996 edition	1996	LGO GOP editorial team	Geology and mineral resources of the Philippines vol 1 1996 edition first draft	Philippines		200
201	PH-19	Copper deposit,Philippines	Copper deposits of the Philippines	1958	Arthur r. Kinkel, Jr., Luis m. Santos-Yiengo, Sixmundo Samaniego, Oscar Crispin	Bureau of mines special projects series publication no.16 copper	Philippines		201
202	PH-20	Philippines, mining, mineral resource development	フィリピンの資源開発環境 [The Environment of development for mineral resource in the Philippines, in Japanese]	1997	Metal Mining Agency of Japan	Report of MMAJ	Philippines		202
203	PH-21	Philippines, epithermal gold, metallogenesis, geology, geothermal systems	epithermal gold in the philippines: island arc metallogenesis, geothermal systems and geology.	1981	Mitchell, A.H.G. and Leach, T.M.	Academic Press, p 457	Philippines		203
204	R-01	exploration, Far Southeast	Exploration and discovery of base- and precious-metal deposits in the circum-pacific region during the last 25 years.	1985	Sillitoe, R.H.	MMAJ	Far Southeast		204
205	R-02	ore deposit, mineralogy, fluid inclusion, Au, Ag	Gold-silver quartz vein type deposits of Japan and the Philippines: a comparative study of their geology, ore mineralogy and fluid inclusions	1982	Comsti, E.C.	Department of Mineral Resources Development Engineering Graduate School of Engineering, Hokkaido University, Sapporo, Japan.			205
206	R-03	structure, alteration, mineralization, Au, Cu	SW Pacific rim Au/Cu systems: structure, Alteration and mineralization	1995	Corbett, G.J. and Leach, T.M.	Exploration Workshop "SW Pacific rim Au/Cu systems; structure, Alteration and mineralization"			206
207	R-04	epithermal Au, geochemistry	Southwest Pacific epithermal gold: a rock-geochemical perspective.	1990	Clarke, D.S. and Govett, G.J.S.	In: J.W. Hedenquist, N.C. White and G. Siddeley (Editors), Epithermal Gold Mineralization of the Circum-Pacific: Geology, Geochemistry, Origin and Exploration, I. J. Geochem. Explor., 36: 225-240			207
208	R-05	exploration, guidelines, epithermal Au	Epithermal environments and styles of mineralization: variations and their causes, and guidelines for exploration.	1990	White, N.C. and Hedenquist, J.W.	In: J.W. Hedenquist, N.C. White and G. Siddeley (Editors), Epithermal Gold Mineralization of the Circum-Pacific: Geology, Geochemistry, Origin and Exploration. J. Geochem. Explor., 36: 445-474			208
209	SR-01	exploration, geology, geochemistry, Au	Preliminary technical report on the follow-up detailed geological-geochemical survey of Bulan area, Sorsogon province.	1997	Carranza, E.J.M.	Bureau of Mines and Geo-Sciences internal report	12°42'17"N-12°43'23"N, 123°58'E-123°57'E, Bulan		209
210	SR-02	exploration, geology, Au	Preliminary report on the detailed geological investigation of the gold prospect in Bulan, Sorsogon.	1991	Rivi, M.R.M	Bureau of Mines and Geo-Sciences internal report	123°56'25"E-123°57'00"E, 12°41'13"N-12°42'54"N, Bulan		210
211	SR-03	exploration, microscope, Au	Microscopic analysis of vein mineral sample in Monte Calvario-Paganas areas, Bulan, Sorsogon.	1993	Rivi, M.R.M	DENR, Mines and Geo-Sciences Development Service	12°41'13"N-12°42'54"N, 123°56'25"E-123°57'00"E, Bulan		211
212	SR-04	geothermal exploration, geology, geophysics	Evaluation summary of the Mt. Bulusan geothermal exploration.	1988	Delfin, F.G., Fragata, J.J., Layugan, D.B., Panem, C.C. and Villasenor, L.B.	PNOC-Energy Development Corporation internal report	Mt. Bulusan		212
213	SR-05	geothermal exploration, geochemistry	Geothermal Report: Mt. Bulusan Geothermal Prospect.	1988	Villasenor, L.B.	PNOC-Eergy Development Corporation internal report	Mt. Bulusan		213
214	SR-06	mineral deposit, sulfur, limestone, chemical analysis	Report on the sulphur and limestone deposits at sorsogon and Bacon Rowre province of sorsogon.	1962	Pitao, J.R.	Bureau of Mines and Geo-Sciences internal report	map in 1:50,000 attached	SO-378 in MGB	214
215	SR-07	exploration, hydrogeologic, water resource	Memorandum report on the hydrogeologic investigation of Palhi Spring Resort, Capuy, Sorsogon, Sorsogon.	1965	Sandoval, M.P. and Samaniego, S.L.	Bureau of Mines and Geo-Sciences internal report	map in 1:25,000 attached	SO-518 in MGB	215
216	SR-08	geology, landslide	Report on the investigation of the landslides in Bulan and Matnog, Sorsogon.	1957	Fernandez, N.S. and Samaniego, S.L.	Bureau of Mines and Geo-Sciences internal report	map in 1:50,000 attached	SO-736 in MGB	216

Table 1-1 The literature and plans registered through this survey.

No	REGISTERED ID	KEYWORD	TITLE	DATE	AUTHOR	SOURCE	LOCATION	NOTE	No
217	SR-09	geology, Sorsogon province	Geology of Sorsogon province.	1974	Travaglia, C. and Baes, A.F.	report of Soil and Land Resources Appraisal and Training Project, UNDP	Sorsogon province, index map	geological map in 1:100,000, SO-[illegible] in MOB	217
218	SR-10	mineral deposit, sulfur	A report on the sulphur deposits in northern Sorsogon, Barrio Rizal, Sorsogon.	1963	Basco, E.M.	Bureau of Mines and Geo-Sciences internal report	index map in 1:200,000	location map of sulfur deposit in 1:15,000, SO-115 in MOB	218
219	SR-11	geology, mineral deposit	Report on the geology and mineral resources of Sorsogon.	1966	Cannon, L.M. and Gat[illegible], A.R.	report of Soil and Land Resources Appraisal and Training Project, UNDP	Sorsogon province	geology and inventory map in 1:100,000, SO-[illegible] in MOB	219
220	SR-12	exploration, sulfur, white clay	Reports on the preliminary investigation of sulfur and white clay prospects in Bacon and Sorsogon.	1958	Ubao, G.A.	Bureau of Mines and Geo-Sciences internal report	Sorsogon, Bacon, index map	sketch map of prospects, geological map in 1:50,000, SO-[illegible] in MOB	220
221	SR-13	geology, mineral resources	Geology and mineral resources of Sorsogon province.	1973	project team of MOB	Bureau of Mines and Geo-Sciences internal report	Sorsogon province		221
222	SR-14	clay deposit, Bulawan, Gatbo, pyrite	Geologic report on the field verification of clay deposit found in the vicinity of "[illegible]" claims in Bulawan and Gatbo, Irosin, Sorsogon.	1983	Santos, B.B.	Bureau of Mines and Geo-Sciences internal report	Irosin, index map in 1:000,000	geological map in 1:10,000	222
223	SR-15	mineral prospect	title: index map of Sorsogon showing the distribution of principal mineral and nonmetallic commodities.	n/a	n/a	Bureau of Mines and Geo-Sciences internal report	Sorsogon province	SO-[illegible] in MOB, map only	223
224	SR-16	Geology, Mineral Resources, Sorsogon	Geology and mineral resources of SorsogonProvince	1974	Bureau of Mines	Bureau of Mines Report of Investigation no.76	Sorsogon province	Geology and mineral resources map in 1:250,000	224

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Registered ID	Prospect	Location	Main commodities	Type of ore deposit	Setting and texture	Form and dimension	Ore minerals	Gangue minerals
cn1			Fe					
cn2			Fe					
cn3	Villa Aurora	Upper Del Pilar River	Fe					
cn4		Upper Pulalan River, Tigbinan	Mn					
cn5	Malali prospect	Bano Malali, Capalonga 14°12'N to 14°13'N and 122°29'E to 122°30'E	Cu,Fe	vein type controlled by faults, replacement type located within fault and shear zone	the main structure is confined along northwest and northeast faults, contact between basalt and diorite is characterized by filamentous and gougy materials	vein or tabular	pyrite, chalcopyrite, hematite, magnetite, chalcocite, covellite	
cn6		Upper Del Pilar River, Kanapuan	Cu,Fe					
cn7		Upper Santol River	Ni					
cn8		Upper Bosigon River, Mount Cadig	Mn					
cn9		Upper Bosigon River, Mount Bulalan	Fe					
cn10		near junction of Upper Bosigon River and Sandiguan Creek	Cu					
cn11		Upper Bosigon River, Mount Nalesbitan	Au					
cn12		Upper Macogon River No.1	Au					
cn13	Mayon Mine (Tamisan, Labo)	Macogon River No.1, NW of Dagut	Au,Cu	a sulfide-quartz vein system, mineralized breccia body, locally with banded texture, open space filling and high gold grades	mineralization system occurs along and near NNE normal faults 1km west of the Tamisan diorite intrusion, locally comprising the contact between andesites and volcanic siltstones		pyrite, pyrrhotite, chalcopyrite, troilite, arsenopyrite, native gold, Bismuth tellunde	quartz, calcite, dolomite, kaolinite, smectite, anatase
cn14	Larap Philippine Mine (Phil-CPhil deposit)	Larap, Jose Panganiban (122°36'00"E, 14°17'45"N)	Fe,Cu	Contact metasomatic type, occurs as pockets, patches, lenses and dissemination within the host rock	ENE faults, Iron Ore with Copper localized within the altered sediments and at their contact with the Larap Volcanics		magnetite, pyrite, chalcopyrite, molybdenite, Zoning a) magnetite b) chalcopyrite c) low temperature gold - quartz - calcite vein zone	quartz, calcite
cn15	Larap Macalinec Mine	S of Larap, NW of Santa Elena	Fe					
cn16		Santa Elena	U					
cn17	Capacuan	Tumbaga, S of Jose Panganiban	Fe					
cn18		near Tumbaga, Upper Pasulabay River	Au					
cn19		Upper Malaguit River, N of Dagut	Cu					
cn20		Upper Malaguit River, NE of Dagut	Fe					
cn21		Calnac, Upper Malaguit River	Fe					
cn22	(Sabibalani pit 1)	Bani, Upper Pasulabay River	Fe					
cn23		Near Tinanyo, Upper Malaguit River	Au					
cn24	Polo Mine	Near Cafegahagan, NE of Dagut	Fe					
cn25		Dagang	Fe					
cn26		Talubatib beside Malasbong River	Fe					
cn27		near Pinagapuan, N of Jose Panganiban	Ni					
cn28		near Fabrica N of Jose Panganiban	Au					
cn29	Barbara Mine	Sta. Barbara, barangay Luklukan Sur, near Gumaus, NE of Jose Panganiban (14°18'15"N, 122°41'54"E)	Au	vein-type	northern most part of the Sta. Ana Vein System, trending NE dipping SE steeply	Sta. Ana Vein System is more than 500m long with average 1.4m in thickness	sphalerite, galena, chalcopyrite	Some portions of the vein are massive, but other portions exhibit vuggy texture
cn30	Paracale-Gumaus Mine	Gumaus	Au	vein type, mesothermal?	veins are along with north-northeast faults	is first wide in outcrop but thin in depth	sphalerite, galena	
cn31		Gumaus	Au					
cn32		Palendage, NNW of Paracale	Zn					
cn33		Ongos, E of Jose Panganiban	Au					
cn34	Meranco	Upper Malaimalo River, approximately 5km east of Paracale, 14°18'N and 122°45'E	Au,Cu	vein type in primary and secondary enrichment might occur near surface	controlled by faults and the cooling joints trending N10W to N30E		sphalerite, galena, pyrite, chalcopyrite and minor covellite, bornite	quartz, base metal sulphide
cn35	Parang gold-silver base metal prospect, within the former Tinggo Prospect	Parang, near Paracale, beside Malaimalo River (14°17'18"-14°18'29"N, 122°46'11"-122°47'15"E)	Au,Ag,Cu,Pb,Zn	Vein-type. Space filling deposition of low temperature (epithermal) gold-silver-copper-lead-zinc veins	Faults that have been occupied by Qz veins(N15°-18°E with vertical dip)	Veins are generally NE trend and max. of thickness is 80cm consisting of a 15cm galena-sphalerite	Galena, sphalerite, chalcopyrite, malachite, bornite	quartz, pyrite
cn36		approximately 1km northwest of Paracale between Salabasbas Creek and Casalugan River	Au	vein type	a vein contains low grade of gold trends northwest	width is limited and varies suddenly		quartz and minor pyrite
cn37	Longos	Longos, E of Paracale (14°17'N, 122°48'E)	Au	Vein-type	Several northeasterly trending fractures cut the granodiorite		chalcopyrite, bornite, galena, gold	Qz vein (sugary, vuggy with Py dissemination)
cn38	Malaguit	S of Paracale, W of Calaburnay, beside Malaguit River (14°15'N, 122°47'E)	Au	Vein-type	Several northeasterly trending fractures cut the granodiorite		chalcopyrite, bornite, galena, gold	Qz vein (sugary, vuggy with Py dissemination)
cn39	Calaburnay, Tabas	SSW of Paracale, beside Malaguit River	Fe					
cn40		Maglaluyong, NE of Santa Rosa Sur	Au					
cn41		Dagang, SW of Paracale, beside Malaguit River	Au					
cn42	Agusan Mine	Inagnayan, S of Paracale, WNW of Mt. Bagacay	Fe					
cn43		Inagnayan, S of Paracale, W of Mt. Bagacay	Au					
cn44	Labnig Golden Rock Mine	Calaburnay, SE of Paracale	Au					
cn45	Napalpasan-Pinagbirayan	Tabas	Fe					
cn46	Calaburnan, Paracale	S of Tabas, Mt. Bagacay	Fe					
cn47	Malachang, Paracale	headwaters of Malachang river, west-southwest flank of Mt. Bagacay, 14°13'02.59"N and 122°47'5.61"E	Au	vein type, hydrothermal deposit	mineralization indicated by silicification and pyritization situated in shear zones while those show no preferred orientation	filling fracture, up to 1m wide		quartz, pyrite, chalcopyrite, other sulphides
cn48		S of Dagut, Upper Macababala Creek	Fe					
cn49	Dalas, Labo	Labo, beside Labo River	Fe					
cn50	Mabilo, Labo	S of Tulay na Lupa, N of Mt. Labo	Fe					
cn51	Aguit-it Sabang Indan	Del Carmen, E of Vinzons	Fe					
cn52		ENE of Talisay, beside Talisay River	Fe					
cn53	Talisay-Vinzon	San Jose, beside Talisay River	Fe					
cn64		Mambulago, Mercedes	Fe					
cn65	Culasi, Mercedes	Culasi, W of Culasi Peak	Hg					
cn66		Mt. Nalesbitan, Upper Bosigon River	Au					
cn67	San Vicente	Bagong Silang, Upper Madagat Creek, N of Tagkawayan	Cu					
cn68		Upper Ramban River, Mt. Nalesbitan, S of 364m peak	Pb					
cn101		Minasag, Upper Pulalan River	Fd					
cn102	Bulala	Barrio Bisla, Capalonga, Camarines Norte, 14°11'N to 14°14'N and 122°25'E to 122°28'E	Fdy	hydrothermal acid alteration	permeability cont. of the zone of alteration		kaolinite	
cn103		Upper Tigbi River, S of Larap	Fd					
cn104	Dagut, Labo	Dagut	La					
cn105		San Isidro, Upper Balabalona River, S of Jose Panganiban	Mbl					
cn106		Gumaus, NW of Paracale	Wdy					
cn107		Mt. Pulantuna, Eastern Mt. Labo	Dia					
cn108	Basud	Upper Baclac River, SSE of Basud	Dia					
cn109		Mt. Culasi	S					
cn110		Culasi, E of Culasi Peak	Fdy					
cn111		Upper Kabibihan River, S of Mt. Cadig	Grp					
cn112		Mt. Tuba	Pl					
cn113	Sta. Cecilia, Tagkawayan	Tagkawayan	S					
cn114	Abi	W of Tagkawayan	S					
cn115		San Rafael, N of Del Gallego, Upper Cabaluban River	Wdy					
cn201	LA BUERTE Copper Prospect	Santa Rosa, Jose Panganiban, 122°43'E, 14°16'30"N	Cu,Pb,Au	Vein type, mineralization occurs as fracture filling within the hostrocks	Deposition structurally controlled by NW-trending thrust fault and high angle tensional fault varying from N10°E to N30°W		sphalerite, galena, pyrite, chalcopyrite, bornite, covellite	
cn202	The Bessemer Pit Area	south of the Bussar area of the iron mining operations within Larap Peninsula (122°36'E, 14°15'N)	Cu,Mo	pyrometasomatic type, deposits are partly lithologic and partly structural, tending to localize at the contact between the meta-volcanic and meta-sedimentary rocks. The copper and molybdenum minerals occur as pockets, patches, lenticular beds and as disseminated particles in the host rock	fault trending east northeast, transects Larap Peninsula. Bedding in the sedimentary trend NW and dips northeast. Ore zones are concentrated in the skarn formations following the bedding horizons.		chalcopyrite, molybdenite, magnetite, pyrite, ullanite(concentrated in molybdenite)	garnet, epidote, apatite
cn203	Tamisan Mine (Exciban, Labo)	Macogon River No.1, N of Dagut	Au	a sulfide-quartz vein system, mineralized breccia body, locally with banded texture, open-space filling and high gold grades	mineralization system occurs along and near NNE normal faults 1km west of the Tamisan diorite intrusion, locally comprising the contact between andesites and volcanic siltstones		pyrite, pyrrhotite, chalcopyrite, troilite, arsenopyrite, native gold, Bismuth tellunde	quartz, calcite, dolomite, kaolinite, smectite, anatase
cn204	Nalesbitan lode Au deposit	Upper Pulalo River No.1, Nalesbitan, Dumagmang, Labo, 14°06'08"N, 122°38'04"E	Au	acid-sulphate type(high-sulphidation type), porphyry type?	linear bodies of hydrothermal breccias; steep, north-west striking fault zone, most of the andesite porphyry dikes follow the northwest direction	Hydrothermal breccia dykes and Qz-limonite stockworks are common, 1300m-long body of Au-bearing rock ranging from 12 to 145m wide	hypogene mineralization is typified by a high pyrite content and high sulphidation Cu and Cu-Fe sulphide (chalcocite, bornite, covellite, chalcopyrite, energite), free gold and possibly Au-Ag tellurides	chalcedonic quartz and pyrite
cn205	Paranal, Luklukan Norte	within the military reservation under the Philippine Air Force. 3km via an asphalt road from Panganiban town, at a moderate topography which rises to 220m (14°18'27"N, 122°43'30"E)	Au	vein type	NW trending thrust(SW dip) occur between the contact of the ultramafic with the Paracale Granodiorite. Joint system in the Paracale Granodiorite is ENE trend; major fractures healed by quartz are N-NNE trend	The Sta. Inez vein, N-trend Qz vein with 0.3-0.5m thickness, more than 150m. The Sta. Monica veins: N10-30°E trending, more than 500m	sphalerite, galena, pyrite, chalcopyrite	quartz(grayish color)
cn206	Sta. Elena	Sta. Elena, 2km SW of Larap, near Tigbe River mouth (14°18'38"N, 122°38'23"E)	Au	vein type	the main vein trends N60°E and dips 53° SE	the main vein measures from 15cm to 70cm	galena, sphalerite, chalcopyrite	quartz with pyrite and calcite; quartz vein is generally massive with occasional vuggy portions
cn207	Tali	Tali, Sta. Rosa Sur, is situated on two hills rising to an elevation of 40-50	Au	vein type	the most prominent quartz veins trends N40°W and dips 80° SW, barite locally attains thickness of 1m and it is found on footwall side of main quartz veins; Breccia texture	Qz vein, 0.5 to 1m in thickness and forms a ridge on the Tali Hill for more than 200m	barite, pyrite, chalcopyrite, galena, sphalerite	quartz vein is massive, with occasional vugs, barite, pyrite, chalcopyrite, galena, sphalerite, pale yellow gold was shown in the concentrate of pyrite grains and cubes and fine galena crystals)
cn208	Sitio Maligaya, San Isidro	99m southeast of Sta. Elena, 2km SW of Larap, near Tigbe River mouth (14°18'24"N, 122°38'52"E)	Au	vein type	the main vein trends N70°E and dips 75° SE	the main vein measures from 15cm to 30cm and traceable from 60 to 130m	pyrite and galena with minor chalcopyrite and sphalerite	
cn209	San Antonio	Sitio San Antonio, Sta Rosa Norte, Jose Panganiban (14°17'25"-14°18'14"N, 122°42'05"-122°42'35"E)	Au,Ag	vein type	the major veins have a NNE and NE strikes and steep dips; Sta. Ana vein	the veins vary in thickness from 0.05-2.00m and pinch out and swell along the strike	chalcopyrite, galena, sphalerite	quartz, limonite, iron oxide
cn210	Malaguit	Malaguit, Paracale (14°19'29.28"-14°19'13.53"N, 122°47'19.7"-122°48'07"E), eastern part of cn-38	Au,Ag	the primary vein-type deposit, the secondary placer-type or residually weathered deposit of oxidized zone	the trend of the major quartz veins are disposed in a NNE to NE pattern, these NNE to NE trending veins are the main loci of mineralization	main veins vary in thickness from few centimeters to 5 meters	pyrite, chalcopyrite and some minute specks of gold that occur in iron oxides	
cn211	Calaburnay	Calaburnay, east of Malaguit river	Fe		magnetite lens		magnetite, hematite	
cn212	Mt. Magkanding	Southern Mt. Magkanding, Upper Calaburnay, the Malatk Creek, south of the boundary of Agusan Iron Mines	Fe		magnetite lens		magnetite, hematite	
cn213	Tigbinan Manganese Deposit	Deposit, Tigbinan Labo	Mn	concentrations of manganese oxides in residual soil formed on top of slightly altered porphyritic andesites			manganese oxides	

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Prefixed ID	Prospect	Geology (host rocks and related igneous rocks)	Dating data	Alteration	Geochemical data	Historical circumstances	Owner	Note	Reference
cn1									MGB?
cn2									MGB
cn3	Ville Aurora								PH-16 MGB
cn4									PH-16 MGB
cn5	Metals prospect	Basaltic volcanic rocks probably Miocene and diorite			samples taken from outcrops show values varies from 0.05% to 20.25% copper		24 claims of CNCS group 25 claims of STAGS group 72 claims to KOEs group		PH-16 MGB CN-38
cn6									PH-16
cn7									MGB
cn8									PH-16
cn9									PH-16 MGB
cn10									PH-16 MGB
cn11									PH-16 MGB
cn12									PH-16 MGB
cn13	Mayon Mine(Exiban, Labo)	Universal Formation(calcareous siltstone, andesite tuff breccia); diorite						The presence of daughter minerals in fluid inclusions suggests relatively high salinity fluids of probable magmatic origin deposited the ores.	PH-16 CN-6
cn14	Larap Philippine Mine (PM-CPM deposit)	Calcareous Sandstone (Universal Formation)		argillization, calcification, silicification	Fe 10.3%, Cu 0.29%				PH-16 MGB BI-1, CN-67, CN-68
cn15	Larap Macalinec Mine								PH-16 MGB
cn16									PH-16 MGB
cn17	Capacuan								PH-16 MGB
cn18									PH-16 MGB
cn19									PH-16
cn20									PH-16
cn21									PH-16
cn22	(Batobalani?)								PH-16
cn23									PH-16 MGB
cn24	Potot Mine								PH-16 MGB
cn25									PH-16
cn26									PH-16
cn27									MGB
cn28									MGB
cn29	Barbara Mine	Paracale Granodiorite(gneissose body,W-NW trend pre-cretaceous); Ultramafic rocks(serpentinized harzburgite, in thrust with the Paracale granodiorite, cretaceous); schists(talc-chlorite schist)			Assay of 2 samples; 9.25g/t Au, 14.36g/t Ag, 0.52% Cu, 0.34% Pb, 1.62% Zn			small scale miners	PH-16 MGB CN-6 CN-32
cn30	Paracale-Gumaus Mine	Bi-g anodiorite, aplite, trap, peridotite		bleaching, pyrite disseminations and veinlets	best gold value occur where sphalerite and galena are abundant				PH-16 MGB CN-32
cn31									PH-16 MGB
cn32									PH-16 MGB
cn33									PH-16 MGB
cn34	Maramoo	Granodiorite in contact with ultra mafic rocks			the best result of soil and rock chip samples is 2.52g/t gold, 1.40g/t silver, 1.18% copper, 2.18% lead, 5.34% zinc		Maramco Mineral Corporation in 1976		PH-16 MGB, CN-62
cn35	Panang gold-silver-base metal prospect, within the former Tinggo Prospect	Granodiorite in contact with serpentinized peridotite		silicification, argillization, pyritization	channel samples across and along the veins in Tunnel 1 & 2; 0.3-32g/t Au, 0-630g/t Ag, 0.13-1.5% Cu, 0.36-2.52% Pb, 0.69-8.56% Zn	This area was known as Tinggo Prospect(Pb) in pre-war time; geological investigation survey of Tunnel 1&2 in 1970	Mr. Jovito Palado in Paracale		MGB BI-1,CN-9, CN-47, CN-79, CN-80
cn36		granodiorite and ultramafic rocks nearby			rock and soil samples contain up to 1.3g/t gold and up to 1.5g/t silver		Mr. Jovito Palado in 1984		PH-16 MGB, CN-78
cn37	Longos	Granodiorite in contact with serpentinized peridotite		silicification	Longos vein & Western Tomas vein (182,537t, 10.46g/t Au), ACR vein (87,258t, 12.79g/t Au), Contact vein (60,719t, 9.76g/t Au), Saturts (230,500t, 12.53g/t Au), average grade of Longos Area is 14.13-15.26 g/t Au and 23.15-23.17 g/t Ag	established in 1970, merger of United Asia Resources and geothermal Corp. and Abcar Paragon Mining Corp. in 1990	United Paragon Mining Corporation (United Paracale Mining Company→Metals Exploration Asia, Inc.)		MGB,PH-20,CN-10,CN-11, CN-60
cn38	Malaguit	Granodiorite in contact with serpentinized peridotite		silicification	quartz vein in Sta. Martha claim, (7.5g/t Au, 10g/t Ag), quartz vein in Jupiter Fr. Claim, (1g/t Au, 2g/t Ag), quartz vein in Tulisan claim, (1g/t Au, 2g/t Ag), quartz vein in Wyoming claim, (31.5g/t Au, 37.5g/t Ag)	established in 1970, merger of United Asia Resources and geothermal Corp. and Abcar Paragon Mining Corp. in 1990	United Paragon Mining Corporation (United Paracale Mining Company)		PH-16 MGB CN-10
cn39	Calburnay, Talbed								PH-16
cn40									PH-16 MGB
cn41									PH-16 MGB
cn42	Aguisan Mine								PH-16 MGB
cn43									PH-16 MGB
cn44	Labnig, Golden Rock Mine								PH-16 MGB
cn45	Napaignon-Pinagbayan								PH-16
cn46	Calaborman, Paracale								PH-16
cn47	Malacbang, Paracale	meta volcanic rocks		silicification	3 samples taken from old trench show value ranging from 5.5g/t to 21.5g/t gold				PH-16, CN-60
cn48									MGB
cn49	Dalas, Labo								PH-16
cn50	Mabilo, Labo								PH-16
cn51	Aguit-it-Sabang Indan								PH-16
cn52									MGB
cn53	Talisay-Vinzon								PH-16 MGB
cn54									PH-16 MGB
cn55	Culasi, Mercedes								PH-16
cn56									PH-16 MGB
cn57	San Vicente								PH-16
cn58									PH-16 MGB
cn101									PH-16 MGB
cn102	Bulala	lava and pyroclastic rocks with interbeds of tuffaceous sediments consisting of shale, sandstone, conglomerate and small lenses of limestone		pyritized silicified rock, limonitization, alunite			Firestone Ceramics, Inc.	silica sinter, spring deposit	PH-16 MGB, CN-34, CN-42, CN-74
cn103									PH-16 MGB
cn104	Dinguit, Labo								PH-16
cn105									PH-16 MGB
cn106									MGB
cn107									PH-16 MGB
cn108	Basud								PH-16
cn109									MGB
cn110									MGB
cn111									PH-16 MGB
cn112									PH-16 MGB
cn113	Sta. Cecilia, Tagkawayan								PH-16
cn114	Abi								PH-16
cn115									MGB
cn201	LA BUERTE Copper Prospect	Granodiorite that is in contact with a serpentinized peridotite		silicification and argillization	Ore assay ;1.34%Cu, 1.71%Pb, 1.9-16.0g/t Au, 22g/t Ag				BI-1
cn202	The Bessemer Pit Area	metamorphosed sedimentary (Universal formation) and volcanic rocks(Larap Volcanics), and intrusive dikes and sills of diorite		skarnization and silicification	mineable reserve in property is 24.6 million dry metric tons of ores, average grade is 0.36%Cu, 0.038%Mo, 12.3%Fe. Spot-check samples; 0.12-0.44%Cu, 0.002-0.342%Mo		Philippine Iron Mines, Inc.		CN-2
cn203	Tamisan Mine (Exciban, Labo)	Universal Formation(calcareous siltstone, andesite tuff-breccia), diorite							CN-4
cn204	Nalesbitan lode Au deposit	Pliocene andesitic volcanic rocks transected by a northwest striking, steeply west dipping, sinistral strike-slip fault zone, oldest to youngest; marine sediment, dacitic agglomerate, basaltic andesite, andesitic agglomerate and tuff(gold mineralization occurs), feldspar crystal tuff(post silicification and mineralization)(CN-20)		advanced argillic alteration (quartz,kaolinite,alunite,sericite,diaspore,illite), trending NW-SE	5 million tonnes averaging 1.6ppm Au is estimated ; Au,As,Cu,Mo,Sb anomaly in soil samples; assay results of rock samples taken from mineralized exposures; 0.401-4.437 g/t Au, wall rock; 0.412-1.029 g/t Au	Gold Fields Asia Limited first recognized Nalesbitan's bulk-mineable Au potential in 1975 and from 1985 detailed survey were undertaken.	Gold Fields Asia Limited	containing a minimum of about 15 tonnes of Au; fluid inclusion temperature 223-255°C	CN-5 CN-7,CN-20
cn205	Panand, Lukbkan Norte	Paracale Granodiorite(gneissose body,W-NW trend pre-cretaceous), Ultramafic rocks(serpentinized harzburgite, in thrust with the Paracale granodiorite, cretaceous), schists(talc-chlorite schist)		alteration away from the quartz veins are narrow. Quartz, calcite, illite, plagioclase				small scale miner	CN-6
cn206	Sta. Elena	Universal Formation(massive gritty wackes), dacitic porphyry		silicification, chlorite, pyrite, smectite, smectite-illite layered and mixed chlorite-illite	a sample shows 134.6g/t Au, 14g/t Ag, 4.11% Pb, 1.77% Zn, 0.08% Cu			small scale miner	CN-6
cn207	Tait	Universal Formation(interbedded wackes, siltstone, mudstone), dacite porphyry, andesite porphyry/diorite		the vein material is quartz with associated barite, illite, chlorite	assay values showed 0.25-1.15g/t Au and 2-29g/t Ag			small scale miner	CN-6
cn208	Sitio Malignya, San Isidro	Universal Formation(trachytic rock unit), dacitic porphyry		alteration is confined within a few meters of the fracture system, quartz, K-feldspar and illite	assay values showed 7-54g/t Au, and 5-14g/t Ag, trace unit of Cu and Pb and minor Zn(0.05%)			small scale miner	CN-6
cn209	San Antonio	Granodiorite that is in contact with a serpentinized peridotite		silicification, argillization(white clay minerals)	assay results; trace-0.343 g/t Au, 1.714-3.977 g/t Ag		Mr. Basilo G. Villo	CN-51 is describing the prospect adjacent to	CN-18, CN-5, CN-70
cn210	Malaguit	the granodiorite and the serpentinized peridotite		argillization and silicification in the granodiorite; serpentinization and chloritization in the peridotite	assay results; 0.343-8.857 g/t Au, 0.343-85.716 g/t Ag	1934-1941 drilling, tunneling, cross-cuts by Marsman & Company, United Paracale Mining Company; 1953-1953 rehabilitation, development; 1970-1973 partial rehabilitation of mine workings; 1975 operating agreement between United Paracale Mining Company and Metals Exploration Asia; 1980-1981 pre-production activities by Philippine Eagle Mines, Inc.	Marsman & Company, United Paracale Mining Company		CN-22
cn211	Calaburnay	metamorphosed sedimentary, metavolcanics and hornblende diorite, the ore bodies all occur in the metamorphosed sediments and volcanics			assay results; 66.27-67.12% of iron content		Gatbun-Paracale Mining Company		CN-24
cn212	Mt. Magkanaing	metamorphosed sedimentary, metavolcanics and hornblende diorite, the ore bodies all occur in the metamorphosed sediments and volcanics			assay results; 66.27-67.12% of iron content		Gatbun-Paracale Mining Company		CN-24
cn213	Tigbinan Manganese Deposit						Forty Miners Company, Inc.		CN-27

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Prospect ID	Prospect	Location	Main commodities	Type of ore deposit	Settings and features	Form and dimension	Ore minerals	Gangue minerals
cn214	Sorita	North of Mangkan, Jose Panganiban	Fe	epigenetic in altered volcanic rock	limonite coating ranges in thickness from ... to 10 centimeters		limonite	
cn215	Kalbaso	North of Mangkan, Jose Panganiban	Cu	copper bearing silicified fragments along a fault zone	the fault trends N50W		chalcopyrite and pyrite	
cn216	Tigbinan Group	Upper Tigbinan River	Fe	lenticular specular hematite ore bodies		lenses irregular ranges in width from 0.20 to 1.5 meters	specular hematite with small amounts of magnetite and pyrite	
cn217	Napangsian Group	8 km south of Paracale	Fe		principal ore body is one meter wide trends N10E dips about 70NE		limonite, magnetite	
cn218	Calabunay prospect	Calabunay, east of Malaguit River	Fe	oxidation of pyrite and magnetite	many veins are parallel and trending N40E, dipping steeply to SE	vein or veinlet	limonite, magnetite, pyrite	
cn219	Tabas prospect	Tabas hill, upper of Tabas river	Fe			one ore body is one meter in width	limonite, magnetite	
cn220	Napangsian Pinagbirayan prospect	near bank of Napangsian creek, south of Paracale	Fe	replaced wall rock material	N50E, vertical	the ore body is about 20 meters wide	magnetite	
cn221	San Felipe Mines	about 4 km south of Paracale	Fe	replaced and/or bedding along wall rock	trends N40E and dips 50SE which is parallel to the bedding of the wall rock	tabular, 10 meters thick and exposed for about 20 meters nearly along the strike	magnetite	
cn222	Submarine prospect (Star prospect, Era Prospect)	two and half kilometers south southeast of the village of Balud, 14°12'30"N to 14°13'30"N and 122°43'30"E to 122°44'30"E	Cu, Pb, Zn, Fe, Mo, Mn	not mentioned but vein type?			chalcopyrite, tetrahedrite, quartz, limonite, iron oxide-rich gossan, pyrite	
cn223	Malaguit prospect	Barrio Malaguit, Municipality of Capalonga, 14°12'N, 122°30'E	Fe, Cu	pyrometasomatic replacement type	controlled by a series of north northwest trending faults	one outcrop is followed for 100 meters along its strike	hematite, magnetite, pyrite, chalcopyrite with minor bornite, chalcocite, specular hematite	
cn224	Luis and Puting ... mining claim	WNW slope of Mt. Bagasay, 14°15'N, 122°50'	Fe	pyrometasomatic replacement type	controlled by tension fractures trend N-S	lenses or tabular, the largest exposure measures 1.0 meter wide, trends N10E and dips 50 NW	hematite, magnetite, pyrite, pyrrhotite	
cn225	La Suerte Mine	1.5km east of Jose Panganiban, 14°18.5'N to 14°18'N and 122°42'E to 122°43'E, within the area 14°15'30"N to 14°18'35"N and 122°40'30"E to 122°45'10"E	Au, Cu	vein type	trend north to northeasterly and dip steeply	vein	pyrite, chalcopyrite, galena, sphalerite, covellite and gold and silver as fine disseminations	quartz with hematite and limonite
cn226	Labnig prospect	Labnig, Paracale, 14°16'N to 14°17'N and 122°49'E to 122°51'E	Au, Ag, Cu, Pb, Zn	vein type	mineralization is controlled by north to northeast trending faults	vein	pyrite, galena, sphalerite	quartz
cn227	Culasi	Barrio Culasi, Mercedes, 13°55'22"N and 123°04'30"E, accessible through the logging trail to Mana-supra Creek	S, Kao (Hg?)	hydrothermal alteration	sulphur bearing mass stands out as a narrow NW trending spur and is approximately 1,000 meters length and 100 meters width	disseminations		
cn228	Exciban lode mineral claim	Barrio Exciban, Labo, 14°11'30"N to 14°13'00"N and 122°38'30"E to 122°39'30"E	Au, Ag	vein type, hydrothermal	tension fractures show no preferred orientation while numerous fault could be observed running in NW and NE	vein, up to several ten centimeters wide		quartz, pyrite
cn229	Golden (including Gem)	Malaguit River, 3km south of Paracale, bounded by approximately 14°15'20"N and 122°44'55"E to 122°47'30"E	Au	vein and placer		vein		
cn230	Chacran Mine	northwestern part of the Paracale-Jose Panganiban Mining District	Au	mesothermal and epithermal gold deposit	northeast trend	vein		quartz pyrite, quartz sphalerite-chalcopyrite-galena
cn231		Pisa Namuluanan, Barrio Dogut, Labo, 14°11'N and 122°41'E	Le					
cn232	Mangilet deposit	within the mineral claims bounded by 13°58'N to 14°02'N and 122°57'E to 123°00'E	Dia					
cn233	Bolbol deposit	within the mineral claims bounded by 13°58'N to 14°02'N and 122°57'E to 123°00'E	Dia					
cn234	Mocong deposit	within the mineral claims bounded by 13°58'N to 14°02'N and 122°57'E to 123°00'E	Dia					
cn235	Mangili deposit	within the mineral claims bounded by 13°58'N to 14°02'N and 122°57'E to 123°00'E	Dia					
cn236	Pamplona deposit	within the mineral claims bounded by 13°58'N to 14°02'N and 122°57'E to 123°00'E	Dia					
cn237	Dawayan area, Dawahan (Panaroc Mine?)	14°16.5'N, 122°40.5'E, 14°15'30"N to 14°17'00"N and 122°40'00"E to 122°41'00"E	Cu, Fe, Mo	pyrometasomatic replacement type	controlled partly by lithology and partly by structure			
cn238	Capacuan area	14°15'N, 122°42'E, 14°15'00"N to 14°15'30"N and 122°42'30"E to 122°43'30"E	Fe	pyrometasomatic replacement type			hematite with minor magnetite	
cn239	Pinagbirayan area	14°14.5'N, 122°46'E, 14°13'00"N to 14°14'00"N and 122°46'15"E to 122°47'00"E	Fe	pyrometasomatic replacement type	controlled partly by lithology and partly by structure			
cn240	Bessemer Pit Area	immediately south of the main pit (BUSSAP), Larap, Jose Panganiban	Fe, Cu	pyrometasomatic replacement type	controlled partly by calcareous lithology and partly by structure such as faults, folds and shear-joints, and concentration of values are present along the contact between the meta-volcanic and meta-sedimentary rocks	tabular, horizontal along bedding, 1,500 feet extent in strike with 500 feet thick	chalcopyrite, molybdenite with subordinate amounts of magnetite, pyrite and probably gold	
cn241	Togos group of claims	Bo. Togos, 1km west-southwest of Paracale town proper, 14°16'20"N, 122°48'45"E	Au	vein type	controlled by high tensional fractures, angle faults and shear zones	vein, 250m long and 1.5m wide at surface		quartz
cn242	Gervacio prospect	headwaters of Maisey Creek, 5km west-southwest of Labo town, bounded by 14°08'N to 14°09'N and 122°46'E to 122°47'30"E	Au	might be skarn related to intrusion of diorite				
cn243	RDRFNP No.1 mineral claim	approximately 1.5 kilometers north of Jose Panganiban town proper	Kao	might be supergene of hydrothermal mineralization				[illegible]
cn244	WPIPI	approximately 3 km west of Barrio Culasi, Mercedes, 13°56'05"N and 123°33'10"E	S		occurs as crystalline in-filling in the rock fractures and as absorbed grains on the andesite		crystalline native sulphur	
cn245	Tuaca	5km east of Barrio Tuaca, which in turn is 15km south of Basud	Cly			stratiform, 30cm of white clay, 150m long along the strike		
cn246	Malanlang		Cu	porphyry copper				
cn247	Pangpang North		Au	vein				
cn248	Igang Mine		Cu	porphyry copper				
cn249	Bulawan Creek Mine		Au	vein				
cn250	Mayowayan Mine		Cu	porphyry copper				
cn252	Tagkawayan	Barrio Santa Cecilia and Mahinta, Tagkawayan, 13°58'30"N to 13°59'30"N and 122°31'30"E to 122°32'30"E	Si (bull quartz)	late injection of hot silicate melt squeezed from a solidifying magma	quartz veins in diorite laid bending	vein		
cs1		Cauyan, near 306m peak, ESE of Tinalmud	Au					
cs2	Tinalmud, Pasacao	Bollaya, W of Mt. Caguibang, ESE of Tinalmud, 13°34'30"N, 122°54'00"E	Cu	vein-type, boxwork type, disseminated type	shear zone trending N60°W with deep dips, N25°E fault localizes a vein. And also within conjugate system of shears and fractures	Outcrop of quartz vein in shear zone, 5m wide and 50m long. N25°E quartz vein 2m wide, 7m high and 21m long	quartz vein contains pyrite (marcasite) with chalcopyrite, limonite staining, stains of malachite	quartz, calcite
cs3		Hamuraon, beside Bagoalio River, N of Balatan	Cu					
cs4	Nabua, SI-1	Camagahan, Balatan (13°20'N, 123°15'E)	Cu	vein-type, stockwork type and disseminated type	Numerous faults with right lateral displacements NE and NW. Specifically N40°W, 50°NE		chalcopyrite, bornite, malachite	quartz, kaolinite
cs5		Sagnay	Fe					
cs6		San Miguel, N of Sagnay	Fe					
cs7	Malatigao	Eastern Mt. Isarog, W of Tigaon	Mn					
cs8	Guikon, Sirona	Southern Siruma Bay, W of Buruan	Mn					
cs9	Bani	E of Bani, N of Loac River	Mn					
cs10		Carinogan, W of Loac River	Mn					
cs11	Pantat	Upper Cogonan Creek, NW of Cogonan	Fe					
cs12	Mapid	SW of Cogonan	Fe					
cs13		SW of Cogonan	Fe					
cs14	San Vicente, Maslog	Upper Bayang River, E of Kalilog	Cu					
cs15		Upper Bayang River, E of Buenavista	Mn					
cs16	Tinambac	N of Tinambac, Upper Ipagan River, E of Union	Fe					
cs17		Upper Guinatagan River, near junction of Tibgas Creek, S of Mt. Suguilan	Cr					
cs18		Upper Guinatagan River, near junction of Tibgas Creek, S of Mt. Suguilan	Ni					
cs19		Western Mt. Pulaney	Fe(Ni)					
cs20	Mayon Mine	Upper Casilaonab River, Calinigan Mountain, Mayon Mine	Cr					
cs21	Mt. Pulaney	Mt. Pulaney	Cr					
cs22		Upper Guinatagan River, eastern Mt. Pulaney	Cr					
cs23		Upper Sipaco River, Southern Mt. Pulaney	Mn					
cs24		[illegible]	Cu					
cs25	Cagiacan	NE of Lagonoy, beside Dalhogan Creek	Mn					
cs26		Upper Sipaco River, on the central mountain chain of Caramoan Peninsula near 702m peak	Pb					
cs27		Upper Dalhogan Creek	Ag					
cs28	Del Pilar	S of Bahi, Upper Bahi River, on the central mountain chain of Caramoan Peninsula near 563m peak	Mn					
cs29		On the watershed of Dalhogan Creek and Salog River between 578m peak and 852m peak	Au					
cs30	Maagnao	Maagnao	Cu					
cs31	Magne Loma	Upper Salog River, S of Garchitorena	Pb					
cs32		Upper Panasoin Creek, on the central mountain chain of Caramoan Peninsula	Cu					
cs33		Eastern Calinigan Mountains near 722m peak, on the central mountain chain of Caramoan Peninsula, Upper Pili River	Cu					
cs34	Naiba Cupriferous Pyrite Deposit	Sitio Nalba, San Jose, Caramoan, E of Poloan, Upper Tabgon River (123°47'30"E 13°47'30"N)	Cu	Mineralization occurs as veins localized along a fault	Fault trending N70°W, 30° to 70° dips	Zone of mineralization 3 to 20 ft. wide, for over one km long	pyrite, chalcopyrite, Zoning : from surface characterized : highly limonitic gossan to massive hard fine-grained pyrite to chalcopyrites	quartz, limonitic gossan characterize the surface
cs35		Upper Tabgon River, S of Poloan, on the central mountain chain of Caramoan Peninsula, near 486m peak	Zn					
cs36	Poteg-Balen	Upper Dracosoc River, S of Poloan, on the central mountain chain of Caramoan Peninsula, S of 486m peak	Cu					
cs37	Pili-Pagsangahan, Pandan	[illegible]	Cu					
cs38	Malabo	Upper Manapot River, NE of Triple Peak	Cu					
cs39	Pandanan	Upper Manapot River, W of Salvacion	Fe					
cs40	Panman	Oros-Cristo, S of Bikal	Mn					
cs41	Salvacion, Caramoan	Mines, W of Guijalo	Mn					
cs42	Lahuy Is.	Lahuy Island, S of Gaogan	Au					
cs43		Lahuy Island, N of Gata	Ag					
cs44	Rapu Lahuy, Treasure island	Gata, Lahuy Island, Caramoan, 13°54'30"N to 13°56'00"N and 123°48'30"E to 123°49'30"E	Au		some parallel veins within the bedding plane of sedimentary rock trend N40W and dip steeping to the southwest, and the other one in silicified andesite trends northwest - southwest and dips 40 to 90 to the north			quartz, chalcopyrite, pyrite, amethyst
cs101		San Juan, E of Del Gallego	Bnt					
cs102		Sinuknipan, E of Del Gallego	Bnt					
cs103	Libobo, Ragay	Cali, S of Ragay	Cly					
cs104		Casay, N of Del Rosario	Cly					
cs105		Babgon, S of Bango	Grp					
cs106		Bangon, SE of bango	Grp					
cs107		Lubigan, SW of Sipocot	Grp					
cs108	Sigamot, Libmanan	Bundod, S of Sipocot	Grp					
cs109	Bical, Libmanan	Camaligang, S of Sipocot	LS					
cs110		NE of Mambalo, E of Pamplona	Grp					
cs111	Puygaey, Libmanan	SW of Pitog, S of Sipocot	Grp					

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Registered ID	Prospect	Geology (host rocks and related igneous rocks)	Dating data	Alteration	Geochemical data	Historical documentation	Owner	Note	References
cn214	Sorsogon				ore sampling contains 40.75% Fe iron				CN-28
cn215	Nalbalo	andesite			a sample contains 4.12% grams per ton of gold and 22.5g/t of silver				CN-28
cn216	Tigbinan Group	meta volcanic rocks and interrelated with meta sedimentary rocks and these are overlain by shale			a sample from outcrop contains 64.10% of iron				CN-29
cn217	Napangasan Group	interrelated meta volcanic rocks and meta sedimentary rocks and a later phase of the diorite is observed			a sample from outcrop contains 47.50% of iron				CN-29
cn218	Calaburnay prospect, Eco Fe				a sample taken from piles contains 51.44% iron and a limonite vein sample taken from test pit contains 48.20% iron				CN-30
cn219	Talisay prospect				chip samples contain from 51.01% to 58.37% iron				CN-30
cn220	Napangasan-Pinagmaygan prospect				chip samples contain up to 59.12% iron and 1.53% sulphur				CN-30, CN-55
cn221	San Felipe Mines	altered metasedimentary rock			one grab sample contains 52.35% iron and 1.36% sulphur		Ores Inc.		CN-30
cn222	Subvasion prospect (Star prospect, Ella Prospect)	andesite and diorite as float		pyritization and argillic alteration and possible sericitic alteration	not sufficient in grade		Philippine Iron Mining Inc.		CN-31, CN-43, CN-54
cn223	Malaguit prospect	volcanic rocks, most probably altered andesite and diorite			the samples taken from one outcrop show assay values varying from 0.2% to 5% of copper, some samples show value varies from 0.11% to 0.50%		the parts of the prospect are owned by Century Iron Mines Company, Inc.		CN-35, CN-36, CN-38, CN-64
cn224	Luis and Pining Fe mining claim	metavolcanic metasedimentary rock		argillic alteration	up to 15.5 oz/t of gold				CN-37
cn225	La Suerte Mine	granodiorite and/or the contact with the ultramafic rocks			15 rock chip samples show the value ranging between trace and 33.50g/t gold and between under detection limit and 54.20g/t silver	La Suerte Resources and Industries, Inc. and the company executed an Assignment of Operating Agreement with Lepanto Consolidated Mining Company around 1978	Benguet Corporation in 1953		CN-40, CN-61, CN-66
cn226	Laking prospect	granodiorite		alteration minerals in one quartz vein consist of quartz, mica, feldspars and kaolinite with minor amounts of dolomite, calcite, gypsum, anhydrite and mixed layer clay minerals	ten samples taken from old working show value varies from 5.5 to 8.0 g/t of gold		Golden Rock Mines, Inc. in 1975		CN-43
cn227	Culasi	altered biotite dacite domes are situated near the prospect			the value of altered rocks varies from 0.58% to 30.03% sulphur, from 24 to 44ppm of copper, from 48 to 73ppm of zinc and is under the detection limit of mercury			Hg mineralization was formerly reported but it never found and it believed to be oxidized and hydration of pyritic material	CN-44
cn228	Escuban lode mineral claim	volcanic rocks that consist of andesite flows intercalated with basalt and tuff adjacent to intrusive bodies of diorite		pyritization and silicification	samples taken from old working and outcrops show value up to 13g/t of gold and 29.5g/t of silver		Mr. Jose Robles in 1981		CN-43, CN-54
cn229	Golden (including Gem)	granodiorite (Paracale granodiorite)			57,568,010 cubic meters of reserve is estimated		Golden River Mines, Inc. in 1977		CN-50
cn230	Clevram Mine	granodiorite stock (Paracale granodiorite)					Clevram Mining Corporation	homogenization temperatures to fluids inclusions in quartz indicate deposition troughout the vein systems in the range 190°C to 230°C	CN-53
cn231							Mr. Vicente S. Raneses in 1973		CN-56
cn232	Mangilat deposit								CN-57
cn233	Botbot deposit								CN-57
cn234	Mocong deposit								CN-57
cn235	Mampili deposit								CN-57
cn236	Pamalotan deposit								CN-57
cn237	Dawayan area, Dawahan (Panarico Mine?)	sedimentary rock, volcanic rock, diorite			geologic ore reserves of 4,502,445 metric tons are averaging 0.22% copper, 0.02% molybdenum and 17.35% of iron in study in 1978		Peninsula Natural Resources Corporation in 1974, Philippine Iron Mining Inc. in 1979		CN-58, CN-83
cn238	Capacuan area	sedimentary rock, volcanic rock, diorite			iron ore reserves of 2,300,000 metric tons averaging 48% Fe was estimated based on DDHs		Peninsula Natural Resources Corporation in 1974, Philippine Iron Mining Inc. in 1979		CN-58, CN-83, CN-63
cn239	Pinagbirayan area	sedimentary rock, volcanic rock, diorite					Peninsula Natural Resources Corporation in 1974, Philippine Iron Mining Inc. in 1979		CN-58, CN-83
cn240	Bessemer Pit Area	meta sedimentary rocks		hydrothermal alteration	approximately 96.8 million metric tons, averaging 0.135% copper and 0.0206% molybdenum were calculated as the geologic reserve		The Philippine Iron Mines, Inc.		CN-58
cn241	Togos group of claims	granodiorite within ultra basic rocks			up to 2.5g/t gold and up to 7.5g/t silver for 8 rock chip samples, up to 62g/t gold and up to 483g/t silver for 11 samples for another survey				CN-83, CN-77
cn242	Gervacio prospect	lower Miocene sedimentary sequence consist of conglomerates, sandstones, shale and limestones and diorites are distributed			selected soil and rock chip samples contain gold up to 20.57g/t				CN-66
cn243	RDRFMR No 1 mineral claim	pyroxene peridotite, serpentinite, chlorite schist and granodiorite		silicification, kaolinization, pyritization and chloritization, quartz veinning					CN-72
cn244	WPIPI	the area is underlain by the andesite portion of the Labo Volcanics and possibly basement might be exposed somewhere		argillization with minor silicification and pyritization	approximately 20,231 tons of ore	Yellow Resources Mining Company exploited the area when they were still operating in the area			CN-82
cn245	Tuaca	underlain by 50cm of carbonaceous shale							CS-4
cn246	Matanlang	andesite							UN
cn247	Pangpano North								UN
cn248	Igang Mine								UN
cn249	Bulawan Creek Mine								UN
cn250	Meycauayan Mine								UN
cn252	Tagkawayan	quartz diorite			very high amount of silica, around 96%, and low amount of alumina and iron oxide		Bespana Mining Co.		CS-38
cs1									MGB
cs2	Tinalmud, Pasacao	Altered porphyritic andesitic volcanic rocks intruded by hornblende diorite		silicification, pyritization	0.47% copper				PH-16, MGB, B-1, CS-09, CS-43
cs3									MGB
cs4	Nabua, B-1	Diorite and metamorphosed andesite		silicification, kaolinization, propylitization	0.63%Cu(N40°W,50°N Vein, 4.20m wide and 40m along its strike)				PH-16
cs5									PH-16, MGB
cs6									PH-16, MGB
cs7	Malatigao								PH-16
cs8	Guibon, Sirona								PH-16
cs9	Bani								PH-16
cs10									PH-16, MGB
cs11	Pantal								PH-16
cs12	Mapid								PH-16
cs13									MGB
cs14	San Vicente, Maslog								PH-16
cs15									PH-16, MGB
cs16	Tinambac								PH-16, MGB
cs17									PH-16
cs18									PH-16
cs19									PH-16
cs20	Mayon Mine								PH-16
cs21	Mt. Pulanay								PH-16
cs22									MGB
cs23									PH-16, MGB
cs24									PH-16, MGB
cs25	Cagiocan								PH-16
cs26									PH-16, MGB
cs27									PH-16, MGB
cs28	Del Pilar								PH-16, MGB
cs29									PH-16, MGB
cs30	Maagnas								PH-16
cs31	Magna Loma								PH-16, MGB
cs32									MGB
cs33									PH-16, MGB
cs34	Naiba Cupriferous Pyrite Deposit	Sandstone in the gangue rock associated with pyrite and chalcopyrite)		Silicification	Cu: 8-10.48%				MGB, B-1
cs35									PH-16, MGB
cs36	Palag-Baton								PH-16
cs37	Pili-Pagsangahan, Panuboan								PH-16
cs38	Malaiba								PH-16
cs39	Pandanan								PH-16
cs40	Panaman								PH-16
cs41	Salvacion, Caramoan								PH-16
cs42	Lahuy Is.								PH-16
cs43									PH-16, MGB
cs44	Rajah Lahuy, Treasure island	andesitic volcanic flows, sedimentary rocks		silicification, pyritization	up to 96.56g/t of gold and up to 37.02g/t of silver		Rajah Lahuy Mining Company		MGB, CS-28, CS-31
cs101									PH-16, MGB
cs102									PH-16, MGB
cs103	Libobo, Ragay								PH-16, MGB
cs104									PH-16, MGB
cs105									MGB
cs106									PH-16
cs107									MGB
cs108	Sigamot, Libmanan								PH-16
cs109	Bical, Libmanan								PH-16, MGB
cs110									PH-16, MGB
cs111	Pay-gay, Libmanan								PH-16, MGB

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Prospect ID	Prospect	Location	Main commodities	Type of deposit	Setting and features	Form and dimension	Ore minerals	Gangue minerals
cs112		E of Bolo-gon, NW of Mt. Bernacio	Ls					
cs113		Northern Mt. Bernacio	Grp					
cs114		Tagnac, SW of Mt. Bernacio	Ls					
cs115		Calugcon, Eastern Mt. Cagsikang, E of Tinalmud	Grp					
cs116		Burabalong, near Tarawan	Ls					
cs117		Macad, beside Caramoan River, NW of Pasacao	Grp					
cs118		Anunang, beside Caramoan River, NW of Pasacao	Grp					
cs119		SW of Pili	Grp					
cs120		Mogedap, SW of Pili	Grp					
cs121		NW of Salingogan, E of Pasacao	Ls					
cs122	Caraan	Camarobalen, SEW of Pili	Grp					
cs123	Balatan Bula	Buruhod, beside Tagnon River, N of Balatan 13°22'N and 123°13'E	Gyp		fine grained massive lense and the stringer trends N40-55W and dips 45-70 NE		gypsum	pyrite
cs124		Cacusuan, N of Balatan	Ls					
cs125	A-seyan Agdagnan Bula	Anayan, SE of Pili	Ls					
cs126		E of Baao	Per					
cs127		Western Mt. Vizcaya, N of Iriga City	Per					
cs128		Western Mt. Vizcaya, N of Iriga City	Per					
cs129		South-western Mt. Vizcaya, NW of Iriga City	Per					
cs130	Sibubo	Tigman, beside Tigman River, S of Sagacay	Cly					
cs131	Purisima San Vicente	Barrio Purisima, Siruma and San Vicente, Tinambac, Upper Siuarg Creek, S of Tandoc	Wcly		along west - northwest direction controlled by structural control		fine quartz and clay	
cs132	Bahao-Fundado	Upper Calalo River between Barrios Bahao and Fundado	Wcly	replacement by acid hydrothermal water		10m wide, 20m long, 1/2 to 2m thick		
cs133	Vito	Upper Colibig River, 1.5 kilometers northeast of Vito	Wcly (Pyrophyllite)		along a N10E direction			
cs134		Manamoc, beside Lagonoy River	Mbl					
cs135	Lagonoy	N of Omalo, S of 645m peak, W of BURABOD	Mbl					
cs136		N of Maagnas, Southern Calinigan Mountains	Mbl					
cs137	Boglon	Upper Guipangpang River	Py					
cs138	Malan	Calinigan Mountains, Upper Guipangpang River	Py					
cs139		South-eastern Calinigan Mountains, N of A.Agnao	Mbl					
cs140		WE of Pasacao, Upper Pili River	Mbl					
cs141		SW of Bikal	Grp					
cs142	San Sebastian-Bulalacao	Guijalo	Mbl					
cs143	Limang, Paraman	ENE of Caramoan	Ls					
cs144	Paraman	E of Caramoan	Grp					
cs145		NE of Guijalo	Ls					
cs146		Paleg, W of Cabacongan	Fcly					
cs147		SW of Cabacongan	Fcly					
cs148		Lahuy Island, S of Gorgon	S					
cs149		Lahuy Island, Oring						
cs150	Mt. Isarog, Goa	upper Malcon River, northwestern slope of Mt. Isarog, west of Goa, 13°41'N and 123°24'E	S	sublimation deposit	fill cracks and/or crevices of rocks			
cs200	Bani Manganese Deposit	Malobago-Mayocacao, Bani, Tinambac	Mn		tabular bodies made up mostly of psilomelane and some pyrolusite lying within a sequence of metavolcanic and meta-tuffbreccias sedimentary rocks with associated chert	horizontal along the strata		
cs201	(Northern Paleg-Balen)	Barrio Paleg-Balen, 7 kilometers west of Caramoan town proper, 13°46'N and 123°48'E	Cu	massive sulphide, replacement	the outcrops contain unreplaced host rock strikes N50W and dips 45NE, and defined by sharp wallrocks	massive lense, 2.0 meters thick	chalcopyrite	
cs202		between Barrios Pundad and San Vincente, Siruma and Tinabac respectively, 14°00'N and 123°20'E	Wcly		the outcrops have quartz veinlets			
cs203	Tinalmud I	Barrio Tinalmud, 30km south of Naga city	Cu		[illegible]		chalcopyrite?	sulphides
cs204	Tinalmud II	Barrio Tinalmud, 30km south of Naga city	Cu		[illegible]		chalcopyrite?	sulphides
cs205	Tinalmud III	Barrio Tinalmud, 30km south of Naga city	Cu		[illegible]			sulphides
cs206	Tinalmud IV	Barrio Tinalmud, 30km south of Naga city	Cu		[illegible]			sulphides
cs207	Siramag deposit, and so on	southwest of Cabanbanan barrio site, Balatan	Gyp	supergene or mixing of carbonate rich-ground water and sulfurous water related to hot spring activity	fissure filling of faults and joints trend generally N45W and dip steeply but irregular	fissure filling, from few inches to 2 feet width of vein	gypsum	pyrite, anhydrite
cs208	Caorasan deposit	Barrio Caorasan, Nabua	Gyp	supergene	trending N10E and dipping 15-30NW	fissure filling, 3 feet wide zone of ore and 40 meters wide zone of mineralization		pyrite
cs209	Landicho	Barrio Tabon Munti, western base of Mt. Labo, 7km northeast of del Gallego, 13°57'N to 13°57.5'N and 122°39'E to 122°39.5'E	Cly	hydrothermal		lenticular		
cs210	Lagunoy (Lagoncy), Himaglucan (Himagtocon)	Barrio Himagtulon, Lagunoy, the area is bounded in the north by Tinaldan River and at the south by headwaters of Tambang River	Cr, Ni	magmatic, secondary enrichment	Ni is in lateritic soil		chromite	
cs211	Banbanon	Sitio Banbanon, Barrio Libod, Ragay, south base of Mt. Labo	Cly	sedimentary ?	parallel beds striking N55W and dipping 45NE, narrow lenses that wedge out along periphery of the basin	stratiform, approximately 5 meters thick		
cs212	Kuquinon	Sitio Kuquinon, Barrio Libod, Ragay, south base of Mt. Labo	Cly	sedimentary ?	narrow lenses that wedge out along periphery of the basin	stratiform		
cs213	Victoria (Sta. Rita)	Barrio Sinuknipan, western base of Mt. Labo, 7km northeast of del Gallego, 13°58'30"N to 13°57'00"N and 122°38'45"E to 122°39'15"E	Cly	hydrothermal and weathering			kaolinite, cristobalite and smectite	
cs214		one hour walk from San Vincente, Siruma area, 13°58'30"N to 13°59'00"N and 123°18'00"E to 123°18'30"E	Wcly		bull-quartz occurs as vein fillings in the country rock		siliceous white clay	
cs215	Ernesto S. Alamira	Barrio Bulalacao, southern portion of Caramoan Peninsula fronting Lagunoy Gulf, 13°42'00"N to 13°42'30"N and 123°48'00"E to 123°47'30"E	Cu, Au	porphyry Cu-Au?			copper oxide, copper sulphide	
cs216	Aswigan	east of Barrio Maquiaway and north of Barrio Bagong Silang, Del Gallego, 13°58'00"N to 14°00'00"N and 122°38'30"E to 122°44'00"E	Cu, Au	hydrothermal vein, hot spring	mineralized quartz veins is trending generally NE with steep dips and some are situated in shear zone	quartz vein occurs up to 10cm thick while alteration zone pyrite disseminated occurs up to 20m wide	chalcopyrite, bornite, marcasite	quartz
cs218	Omon	Sitio Talong Parang, Omon, Ragay, seashore about 13.5km west of Ragay town proper	Fe	vein	N75E 70SE and N15W 50SW and those are oblique to the general trend of schistosity and the shear zones	vein, 1.5m thick	specular hematite	
al1		NE of Macabugos, Upper Macabugos River	Cu					
al2		Caguscos, N of Pantao	Cu					
al3		Cawayan, SW of Manito	Fe					
al4		Rapu Rapu Island, S of Morocbarocan	Ib					
al5		Rapu Rapu Island, E of RAPU-RAPU, Western Mount Rapu Rapu	Ag					
al6	Dupont-Champion	Rapu Rapu Island, Agajo-Buenavista	Cu					
al7		Rapu Rapu Island, WNW of Binosauan, SW of Tafeny Point	Au					
al8	BCI volcanogenic sulphide deposit	Rapu Rapu Island, Binosauan, barrio Pagcolbon, N of barrio Malobago (121°12'27"E, 15°10'40"N)	Cu, Au, Ag, Zn, Pb	Besshi type (bedded cupriferous iron sulfide deposit)	large anticline or anticlinorium with crenulations of drag-fold nature, within these subordinate crenulations where the sulphide deposits occur, the foliation of the schists strikes N40°W	stratiform, BCI orebody is thin, 10-20m wide, about 150m from the top to bottom, and exposed 300m in the tunnel	Pyrite, Chalcopyrite, Covellite, Tetrahedrite, Bornite, Sphalerite	
al9	Hixbar Mine	Rapu Rapu Island, N of Karaglog, Eastern Mount Rapu Rapu	Cu	Besshi type, secondary copper enrichment	the ore occurs along flatly-plunging drag folds near the footwall of a band of quartz-sericite schist	stratiform, 60 meters in thickness	primary copper sulphide and oxide copper	pyrite
al101		E of Aoud, NE of Nagas, Upper Rawis River	Grp					
al102	Nagas, Oas	E of Nagas, Upper Nagas River	Grp					
al103		Tobgon, W of San Vicente	Gyp					
al104		SW of Guinobatan	Grp					
al105		NE of Jovellar, beside Talodong River	Ls					
al106		ESE of Guinobatan, beside Tagaytay River	Ls					
al107	Basa	S of Legaspi City, E of Jomapon	Per					
al108		S of Legaspi City, W of Maslog	Pum					
al109	Legaspi	Poro, S of Legaspi City	Per					
al110		Sogod, NW of Tiwi	Wcly					
al111		Putsan, Say bay, Puchero, Bolo, N of Tiwi	Cly	Weathering of andesite			native sulfur associated with pyrite and hydrothermal clay	
al112		Eastern Mt. Malinao, SW of Tiwi	S		The major fault line is trending northeast		native sulfur associated with pyrite and hydrothermal clay	
al113		Upper watershed area of Malinao River, W of Malinao, Eastern Mt. Malinao	S		The major fault line is trending northeast			
al114		Northern Cagraray Island, W of Tambongon	Grp					
al115		Western Batan Island, E of Tinalisayan	Grp					
al116		Western Batan Island, Upper Hungo River	Coal					
al117		Western Batan Island, W of Caracaran	Grp					
al118		Central Batan Island, Mount Bilbao	Coal					
al119		Central Batan Island, Mount Vizcaya	Coal					
al120		Eastern Batan Island, E of Kalanaga	Coal					
al121		Eastern Batan Island, NE of Batan	Coal					
al201	Calpi Au Anomaly	Western Bacon-Manito, Albay	Au	Epi-thermal Gold Deposit	New Bac-Man Fault Zone(E-W strike), 2 sets of dominant fault orientation(N-W trend and NW-SE trend)			
al202	Apad Cu prospect	Apad, E of Maligan, Albay	Cu			"buff" quartz body striking east-west and dipping 55 degrees north	chalcopyrite	"buff" quartz body, quartz silicified rock vein with limonite stain, chalcopyrite-bearing
al203	Kapulak Cu prospect	Kapulak, E of Maonon, Albay	Cu			an irregular body of "buff" quartz, three feet thick, which trends northwest-southeast	chalcopyrite, bornite	quartz body (chalcopyrite bornite contains)
al204	Banvied Cu prospect	Sitio Banvieno, N of Maonon, Albay	Cu			2 feet quartz chalcopyrite vein, which strikes north 60 degrees west and dips 60 degrees northeast	chalcopyrite(spotty)	
al205	Tapd deposit	Sitio Tapil, Oas	Gyp	supergene	information of various occurrences suggests that it is trending north-south	lenticular and mass in pyritic altered zone	gypsum	pyrite
so1	Donsol	Donsol	Fe					
so2		SW of Manlabong, beside Manlabong Creek, E of Sawanga	Ag					
so3	Santa Fe Prospect	W of San Bartolome, N of Sta. Magdalena	Fe					
so101		Banuangurang, N of Donsol	Ls					
so102	Pilar-Donsol	W of Abas, N of Pilar, Upper Ogod River	Ls					

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Registered ID	Prospect	Geology (host rocks and related granitic rocks)	Dating data	Alteration	Geochemical data	Historical circumstances	Owner	Note	References
cs112									PH-16 MGB
cs113									PH-16 MGB
cs114									PH-16 MGB
cs115									PH-16 MGB
cs116									PH-16 MGB
cs117									MGB
cs118									PH-16
cs119									PH-16 MGB
cs120									PH-16 MGB
cs121									PH-16 MGB
cs122	Caracan								PH-16 HCB
cs123	Esteban Bulis	bleached and fractured andesite porphyry while the area underlain by limestone, andesite porphyry, quartz diorite, partly consolidated sediments							PH-16 MGB, CS-9
cs124									PH-16 MGB
cs125	Anayan Agdangan B.A.								PH-16
cs126									PH-16
cs127									PH-16 MGB
cs128									MGB
cs129									PH-16 MGB
cs130	Sorbo								PH-16
cs131	Panama-San Vicente	clay deposit area is underline by schist							PH-16 MGB, CS-10, CS-11
cs132	Bal-ac-Fundado	metamorphics consist of quartz-sericite and talc-chlorite schists		veinlets, bull quartz, kaolinitization, pyritization			Marcelo Steel Corporation in 1971		PH-16 MGB, CS-5
cs133	Vito						Mr. Salva in 1956		PH-16 MGB
cs134									PH-16
cs135	Lagnoy								PH-16 MGB
cs136									PH-16 MGB
cs137	Bagtos								PH-16
cs138	Melon								PH-16
cs139									PH-16 MGB
cs140									PH-16 MGB
cs141									MGB
cs142	San Sebastian-Bulalacao								PH-16 MGB
cs143	Limang Paniman								PH-16 MGB
cs144	Paniman								PH-16 MGB
cs145									PH-16 MGB
cs146									PH-16 MGB
cs147									PH-16 MGB
cs148									PH-16 MGB
cs149									PH-16 MGB
cs150	Mt. Isarog, Goa	andesitic volcanic rocks							PH-16, CS-27
cs200	Bani Manganese Deposit	metavolcanic and sedimentary rock							CS-27
cs201	Northern Palag-Belen	low-grade chlorite schists and sedimentary rocks		pyritization, silicification			Mrs. Tercsita D. Ong in 1971		CS-7
cs202							Pacific Ceramic Manufacturing Company in 1971		CS-8
cs203	Tinalmud I	altered andesitic volcanic rocks		pyritization					CS-9
cs204	Tinalmud II	altered andesitic volcanic rocks		pyritization					CS-9
cs205	Tinalmud III	altered andesitic volcanic rocks		pyritization					CS-9
cs206	Tinalmud IV	altered andesitic volcanic rocks		pyritization					CS-9
cs207	Sirmag deposit, and so on	fractured limestone, andesite porphyry, pre-Tertiary meta-volcanics, mainly andesite, intrude by diorite and used be overline by Pliocene limestone, andesite porphyry is the host rock		pyritization		operation of the Sirmag deposit started in 1950 under Gypsum Mining and Manufacturing Company but the mine was no longer in operation in 1951			CS-12, CS-15
cs208	Caurasan deposit	pre-Tertiary meta-volcanics, mainly andesite, intrude by diorite and used be overline by limestone		pyritization		operation started in 1937 under management of Guzman, Flores and Company but terminated at the war			CS-12
cs209	Landicho	quartz diorite dated as Paleogene, meta sedimentary rocks dated as lower to middle Miocene, tuffaceous sediments, hydrothermally altered Pliocene to Quaternary pyroclastics		silicified, glassy, conchoidal, flinty and argilized					CS-16, CS-17
cs210	Lagunoy (Lagonoy), Hinagtucon (Hinagtocon)	the area is underline by schist, metavolcanics and metasediments, ultramafic complex, gabbro and andesite			around 50% of chromic oxide, up to 0.21% of Nickel		Dalamar Minig Co. Inc. in 1970, Lagunoy Consolidated Mines in 1976, CAM-META Minerals, Inc. in 1979		CS-20, CS-21, CS-24, CS-29, CS-33, CS-41
cs211	Sambaron	biotite andesite, hornblende andesite, graywacke sandstone							CS-22
cs212	Kuquinan	biotite andesite, hornblende andesite, graywacke sandstone			carbonaceous clay				CS-22
cs213	Victoria (Sta. Rita)	the area is underline by shale sandstone, conglomerate, lenses of chert, carbonaceous-clay-sedimentary rocks dated Eocene to Miocene and pyroclastics of Mt. Labo		hydrothermal argilization and silicification, and weathering		the operation was terminated in 1984			CS-23, CS-38, CS-43
cs214		the area is generally underline by chlorite schist							CS-25
cs215	Ernesto S. Alamira	the area is underline by cretaceous sedimentary-volcanic sequence intruded by andesite-diorite porphyry supposed to be Eocene to Oligocene		pyritization, silicification, sericitization	sample from oxidized diorite porphyry show the value varies trace to 0.77% copper and 0.1 to 1.2g/t gold				CS-35
cs216	Alawijao	altered andesite pyroclastics, porphyritic andesite		silicification, argilization, pyritization, chloritization (propylitic)	up to 0.11% copper, up to 2.6% Zn	private mining company was exploring the area in 1972			CS-38, CS-43
cs218	Oman	the area is underline by altered schist intruded by hornblende dike		silicification, chloritization, epidotization					CS-43
al1									PH-16, MGB
al2									PH-16 MGB
al3									PH-16 MGB
al4									MGB
al5									MGB
al6	Cuyoni-Champion								PH-16 MGB
al7									MGB
al8	BCI volcanogenic sulphide deposit	Mesozoic or older strongly foliated metamorphosed schists, Cretaceous peridotite, Miocene limestone and sandy calcareous tuffs				1981- Exploration(Benguet Co. & Ungay Malobago Mins.) 1994- Exploration(Benguet Co. & TVI)	Benguet Corporation	Upper body: 1,850,000t(Cu 1.85%, Au 3.03g/t, Ag 41.46g/t) Lower body: 1,020,300t(Cu 2.03%, Au 3.46g/t, Ag 40.03g/t)	PH-16, PH-20, AL-14, AL-21
al9	Hixbar Mine	quartz-sericite schist			9% of copper from surface to 30m below, and ore reserves were estimated at 229,400 metric ton averaging 2.4% copper and 30% sulphur	the mine was been rehabilitating and developing in 1955 after the operation was interrupted by WWII	Hixbar Gold Mines, Inc.		PH-16, AL-21
al101									PH-16 MGB
al102	Nagas, Oas								PH-16 MGB
al103									PH-16 MGB
al104									PH-16 MGB
al105									PH-16 MGB
al106									PH-16 MGB
al107	Baao								PH-16 MGB
al108									MGB
al109	Legaspi								PH-16 MGB
al110									PH-16 MGB
al111		Volcanic flow rocks with some agglomeratic phases		Weathering of andesite					PH-16 MGB, AL-6
al112		porphyritic andesite flow and the talus and gravel deposits emplaced in a characteristic alluvial fan							MGB, AL-6
al113		porphyritic andesite flow and the talus and gravel deposits emplaced in a characteristic alluvial fan			S 8.38 ~ 10.45%				PH-16, AL-6
al114									PH-16 MGB
al115									PH-16 MGB
al116									PH-16 MGB
al117									PH-16 MGB
al118									PH-16 MGB
al119									PH-16 MGB
al120									PH-16 MGB
al121									PH-16 MGB
al201	Calpi Au Anomaly	the San Lorenzo sedimentary sequence, Pocdol Volcanics and diorite porphyry which is referred to as the Ranges Intrusives		advance argillic alteration, silicification, argillic alteration (alunite–kaolinite–silica–sulfur)	Au 0.15ppm and 0.27ppm from panned soil		PNOC Geothermal Development Area		AL/SR-1
al202	Aped Cu prospect	a variety of basic rocks and metamorphics intruded by later diorite (serpentinite, chlorite, pyroxenite, quartzite, diorite, dioritic metamorphics) and Lower Eocene limestone					Tolosa Mining Corporation		AL-11
al203	Kapulak Cu prospect	a variety of basic rocks and metamorphics intruded by later diorite (serpentinite, chlorite, pyroxenite, quartzite, diorite, dioritic metamorphics) and Lower Eocene limestone			Cu 15.53% and 25.48%(picked samples)		Tolosa Mining Corporation		AL-11
al204	Bantad Cu prospect	a variety of basic rocks and metamorphics intruded by later diorite (serpentinite, chlorite, pyroxenite, quartzite, diorite, dioritic metamorphics) and Lower Eocene limestone					Tolosa Mining Corporation		AL-11
al205	Tapil deposit	pre-Tertiary meta-volcanics, mainly basalt, intrude by diorite and used be overline by limestone				was operated by the Panafrancia Gypsum Mining Company before WWII			CS-12
so1	Donsol								PH-16 MGB
so2									MGB
so3	Santa Fe Prospect								PH-16 MGB
so101									MGB, SR-13
so102	Pilar-Donsol								PH-16, SR-13

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Registered ID	Prospect	Location	Main commodities	Type of ore deposit	Settings and features	Form and dimension	Ore minerals	Gangue minerals
so103	Pilar, Sorsogon	Santa, W of Pilar	Ls					
so104		Upper Calungan River, N of Pilar	Grp					
so105		N of Sevilla, beside Pulao River	Grp					
so106		N of Macapias Bay, SE of Pilar	Ls					
so107		N of Maya, W of Castilla	Pum					
so108		Marinta, SW of Castilla	Pum					
so109	Putting Sato, Northern Sorsogon	[illegible]	S	fumaroles and hot spring deposits				
so110	Dalipay	Puting Sato, Upper Rizal River, N of Dalipay, 13°02'30"N and 123°56'30"E	Cly (Kao)					
so111	Gumapon	Upper Cawayan River, N of Gumapon, Sorsogon, 13°01'30"N and 123°57'20"E	S	fumaroles and hot spring deposits		7m wide and 50m long		
so112	Osiao	near the peak of "Bulusan Mountain" Pangas Crater, SW of Barrio Osiao Bacon 13°03'15"N and 123°57'30"E	S	fumaroles				
so113	Bacon	Pulog, S of Osiao	Fely					
so114	Sorsogon	Northwestern coastal strip, Sorsogon	Ls					
so115		Buenavista, N of Gubat	Coal					
so116	Gubat	E of Sale, Upper Maaging River	Wdy, Coal					
so117	Gubat, Bacon	Upper Sabang River, NW of Gubat	Coal					
so118	Casiguran	San Antonio, SE of Casiguran	Per					
so119		Cogon, SE of Casiguran	Pum					
so120		SW of P&, Upper Cadlaan River, E of Magallanes	Per					
so121		Northern Mount Bintacan, SE of Magallanes	Per					
so122		Colomayon, N of Bulan	Si					
so123	Calpi & Dulos, Bulan	Bulan	Si					
so124		Mount Sujac, W of Matnog	Grp					
so201	Osiao Au Anomaly	Osiao, Little Osiao River, North-Eastern Bacon Manito	Au	Epithermal Gold Deposit	Near Bac Man Fault Zone(E-W strike), 2 sets of dominant fault orientation(N-W trend and NW-SE trend)			
so202	Upper Little Osiao River Au Anomaly	W of Palayang Bayan, Upper Little Osiao River, Bacon Manito	Au	Epithermal Gold Deposit	Near Bac Man Fault Zone(E-W strike), 2 sets of dominant fault orientation(N-W trend and NW-SE trend)			
so203	Manulog Cu Anomaly	Manulog, Bacon-Manito	Cu		Near Bac Man Fault Zone(E-W strike), 2 sets of dominant fault orientation(N-W trend and NW-SE trend)			
so204	Sorsogenic Claim	Barrio Bulawan, Gubat, 12°42'30"N to 12°43'30"N and 123°57'30"E to 123°59'00"E	Kao	shallow hydrothermal alteration of andesite				
so205	Dalipay	Dipay Creek, Upper Cawayan River, Barrio Osiao, Bacon	Cly (Kao)			7 meters wide and 50 meters wide		
so206	Maunus, Yellow Mercedes claims	Upper Cawayan (Cawayan) River, Basud, Sorsogon	S	fumaroles and hot spring deposits	in-filling fractures of volcanic rocks			
so207		13°05'00"N and 123°59'30"E	Cly (Kao)					
so208		12°54'30"N and 124°04'00"E	Cly (Kao)					
so209	Monte Calvario, Gagamas	12°41'13"N to 12°42'54"N and 123°56'00"E to 123°57'00"E	Au	advanced argillic alteration			pyrite, hematite	quartz, alunite, smectite

note 1), MGB's internal report unpublished

Table 1-2 The mines, prospects, and occurrences of mineral resources in the Bicol Area registered through this survey

Registered ID	Prospect	Geology (host rocks and related igneous rocks)	Dating data	Alteration	Geochemical data	Historical circumstance	Owner	Note	References
so103	Pilar Sorsogon								PH-16, SR-13
so104									MGB
so105									PH-16 MGB
so106									MGB, SR-13
so107									MGB
so108									MGB
so109	Pulang Bato, Northern Sorsogon	Pliocene volcanic formation (basaltic andesite). Flows of andesite and dacite rocks			the run of mine ore showed 40.75% sulphur and the concentrated ore showed 10.36%		Sorsogon Mining Lease 45-A		PH-16, AI/SR-3, SR-13, SR-10
so110	Calsay	hornblende andesitic volcanic rocks							PH-16, SR-13
so111	Gurlayon	recent volcanic rocks			10.[illegible]% S				PH-16, SR-13
so112	Osiao	porphyritic hornblende andesite flows overlain by beds of conglomerate, sandstone and shale							PH-16, SR-13, SR-12
so113	Bacon								PH-16
so114	Sawanga								PH-16, SR-13, SR-4
so115									MGB
so116	Cabo								PH-16 MGB
so117	Cabo, Bacon								PH-16 MGB
so118	Campuran								PH-16
so119									MGB
so120									PH-16 MGB
so121									PH-16 MGB
so122									MGB
so123	Cdo. & Dulon, Bulan								PH-16
so124									PH-16 MGB
so201	Osiao Au Anomaly	the San Lorenzo sedimentary sequence, Pocdol Volcanics and diorite porphyry which is refered to as the Pangas Intrusives		advance argillic alteration, silicification, argillic alteration (alunite+kaolinite+silica+sulfur)	Au 0.77ppm from stream sediment		PNOC Geothermal Development Area		AI/SR-1
so202	Upper Little Osiao River Au Anomaly	the San Lorenzo sedimentary sequence, Pocdol Volcanics and diorite porphyry which is refered to as the Pangas Intrusives		advance argillic alteration, silicification, argillic alteration (alunite+kaolinite+silica+sulfur)	Au 0.25ppm from stream sediment		PNOC Geothermal Development Area		AI/SR-1
so203	Manuling Cu Anomaly	the San Lorenzo sedimentary sequence, Pocdol Volcanics and diorite porphyry which is refered to as the Pangas Intrusives		silica-clay-pyrite alteration	Cu 500ppm from hydrothermally altered rock		PNOC Geothermal Development Area		AI/SR-1
so204	Socorrano Claims	volcanic breccia, intercalated porphyritic andesite and amygdaloidal basalt and pyroclastic rocks		argillic, vein-like silicified structure, pyritization					SR-14
so205	Daguy	hornblende andesitic volcanic rocks overlain by beds of sandstone and shale					Jose Cordova in 1958		SR-12
so206	Maurice, Yellow, Mercedes claims						Manuel Cordova in 1962		SR-12, SR-6
so207					10.46% sulphur				SR-11
so208									SR-11
so209	Monte Calvario, Daganas	basaltic to andesitic volcanic rocks		silicified, argillized, propylitic					SR-1, SR-2, SR-3

note *1, MGB's internal report unpublished

Table 2-1 Sample description sheet

ID	sample	prospect	coordination lat.	coordination long.	rock type	description	instrumental analyses TS	PS	XI	CA	CA	WA	PI	KAO	others	remarks
101	KY05	Pio Duran-Kapulati			quartz-vein	white sooty colored massive Qtz-vein within silicified diorite adjacent to ultra mafic rock				x						
102	KY06	Pio Duran-Kapulati	13.02393	123.23582	micro diorite	micro diorite occur as dike in 2m width within strongly white colored altered foliated ultra mafic rock	x				x					
103	KY08	Pio Duran-Kapulati	13.02321	123.23450	diorite	weak greenish dark gray colored medium grained diorite having Ep-Chl	x				x					
104	KY10	Pili anomaly	13.00232	123.50265	andesite	gray colored platy jointed lava flow of medium grained Hbl-Px Pl-andesite	x									
105	KY11a	Pili anomaly			quartz-vein	smoky white colored Qtz-vein in 2cm width lenticular Qtz-vein having gray colored lenticular thin layer				x						
106	KY11b	Pili anomaly			altered andesite, float	white colored acidic(?) altered andesite, that is host rock of KY11a			x							
107	KY12	Pili anomaly	13.00298	123.50307	silicified andesite, float	weak pale gray colored moderate silicified andesite with hardness scale chalcedonic Qtz-veinlets veinlet					x					
108	KY13	Pili anomaly	13.00423	123.50317	silicified rock, float	dark gray colored silicified rock having nuggy patch partly and very fine grained Py dissemination		x	x	x						
109	KY14	Pili anomaly			silicified rock, float	reddish colored strongly silicified rock Qtz network occure				x						
110	KY15	Pili anomaly			silicified andesite, float	dark gray to white colored silicified andesite with very fine grained Py dissemination and white patch			x		x					
111	KY16	Pili anomaly	13.00414	123.50295	least altered andesite	gray colored weak argillic andesite with white patch (Kln?) originally from Pl			x		x					
112	KY18	Pili anomaly	13.00409	123.50254	silicified rock	silicified rock with very fine grained Py dissemination, remains of andesite texture and Pl into yellowish green Sme					x					
113	KY20	Pili anomaly	13.00278	123.50222	silicified/argillic rock	white gray colored silicific and argillized with supergene Kln?			x		x					
114	KY21	Pili anomaly	13.00245	123.50185	quartz-vein	weak brownish gray colored opaline massive Qtz-vein in white gray silicified/argillic rock in 1 to 7cm width per 10 to 20cm spacing				x						
115	KY22	Cawayan river	13.03255	123.51111	andesite	black green gray colored andesite with Chl from Px	x				x					
116	KY23	Cawayan river			argillic rock	gray colored strong argillic altered rock like clays are almost 5m white moderate Py dissemination					x					
117	KY24	Cawayan river	13.03115	123.51126	argillic rock	gray colored moderate argillic altered rock with Py dissemination originally recent(?) Lahar deposit			x		x					
118	KY26a	Cawayan river			volcanic quartz-pyrite	white to dark gray complicated colored veinlike Qtz-Py in 3m width, trending N80W and dipping 80N, within argillic rock (KY26b)				x						
119	KY26b	Cawayan river			argillic rock	gray colored strong argillic altered, Py dissemination, host rock of KY26a			x		x					
120	KY27	Cawayan river	13.03067	123.50583	argillic rock	weak greenish gray colored weak argillic rock, originally from two-Px andesite volcanic breccia overline by propylitic andesite lava resemble KY22			x		x					
121	KY28a	Pio Duran-Kapulati			diorite	weathered medium to coarse grained diorite					x					
122	KY28b	Pio Duran-Kapulati			diorite	diorite having mica mineral with copper oxide and Go stain				x						
123	KY29	Pio Duran-Kapulati			diorite	deep greenish gray colored altered coarse grained diorite	x				x	x				
124	KY30a	Pio Duran-Kapulati			quartz-vein	white mat clear Qtz-vein, network or sometimes -thin layer, 2cm to 1mm wide per about 20cm space				x			x			
125	KY30b	Pio Duran-Kapulati			diorite	deep greenish gray colored diorite hosting Qtz-veins (KY30a), immediately beside of the vein										
126	KY30c	Pio Duran-Kapulati			diorite	deep greenish gray colored diorite hosting Qtz-veins (KY30a), far from the vein	x									
127	KY31	Bulawan, Gabao			argillic rock	pale greenish gray colored moderate argillic rock originally from andesite with 20% of Py dissemination and remain of Pl			x		x					
128	KY32	Bulawan, Gabao			basalt or andesite	blackish gray colored compact least altered lava of basalt to andesite	x									
129	KY33	Bulawan, Gabao			argillic rock	pale gray colored moderate argillic altered rock originally probably from pumice tuff			x		x					
130	KY34	Bulawan, Gabao			silicified rock	white gray colored silica seam in weak silicified rock originally from tuff				x						
131	KY35	Bulawan, Gabao			altered pumice tuff	pale gray colored argillic very coarse grained pumice tuff; matrix is rather strongly argillized with Py dissemination	x				x					
132	KY36	Bulawan, Gabao			argillic rock	pale gray colored strong argillic rock with much Py dissemination			x		x					
133	KY37	Bulawan, Gabao			least altered pumice tuff	yellowish brownish colored weathered and weak argillic rock originally from pumiceous tuff					x					
134	KY38	Rowas, Gabao	12.44410	123.55452	non welded pyroclastic flow deposit	Hbl-Px-andesitic to dacitic containing fragments of pale green gray colored altered Px-Hbl-andesite or tuff										
135	KY39	Rowas, Gabao	12.44177	123.55335	andesite	deep green colored least altered compact lava flow of andesite with Chl from mafic minerals trending N80E and dipping from 63S to flat	x				x					
136	KY40	Matnog-Gulasi	12.34395	124.04282	silicified rock float	pale gray colored opaline silicified rock, maybe originally from lapilli tuff, with 10% dissemination of Py					x					
137	KY41	Matnog-Gulasi			argillic rock	highly weathered argillic altered tuff breccia			x		x					
138	KY42	Matnog-Gulasi			silicified rock float	gray colored silicified rock with Py dissemination					x					
139	KY43	Matnog-Gulasi			silicified rock float	gray colored silicified rock with Py dissemination and silica seam or veinlet having margin to Py layer			x		x					
140	KY44	Matnog-Gulasi			argillic/silicified rock	argillic and/or silicified rock maybe from lapilli tuff its matrix altered					x					
141	KY45	Southern Irosin			basalt or andesite	weak greenish dark gray colored weak altered dike or lava of basalt or andesite with flimlike Py stain along the fracture	x				x					
142	KY46	Southern Irosin			argillic rock float	whitish gray colored moderate argillic rock with limonite network and without dissemination of Py					x					
143	KY47	Southern Irosin			argillic rock	pale gray colored moderate argillic altered rock with 2 to 5 percent of dissemination of Py			x		x					
144	KY48	Southern Irosin			argillic rock	weak blcish gray weak to moderate altered andesitic tuff breccia			x		x					
145	KY49	Southern Irosin			andesite	very weak altered andesite lava underline by tuff breccia (KY48)	x				x					
146	KY53	Irige-Baao	13.29220	123.24236	andesite	weak weathers light grey colored lava flow(?) of Hbl-Bt-bearing Px andesite with relic groundmass	x									
147	KY56	Irige-Baao	13.29283	123.23557	basaltic andesite	blackish gray colored basaltic andesite brecciated lava flow	x									
148	KY57a	Eastern Pasacao	13.29403	123.04210	andesite	dark brownish colored medium to weak weathered andesite breccia	x									
149	KY57b	Eastern Pasacao	13.29403	123.04210	argillic rock	yellowish brownish colored weathered and argillic altered andesite same as KY57a				x		x				
150	KY57c	Eastern Pasacao	13.29403	123.04210	quartz-vein	white Qtz-vein of 1cm wide wedging out easily within altered andesite					x	x				

Table 2-1 Sample description sheet

ID	sample	prospect	coordination lat.	coordination long.	rock type	description	instrumental analyses TS	PS	M	CA	CA	WA	FI	KAr	others	remarks
151	KY57d	Eastern Panacao	13.29403	123.04210	silica vein	white gray colored ginched silica vein of 1 to 3cm wide					x					
152	KY58a	Eastern Panacao			silicified rock float	brownish gray colored strong silicified rock with copper oxide stained Cp Otz network				x						
153	KY58b	Eastern Panacao			silicified rock float	partly blackish, brownish gray colored strong silicified rock with copper oxide stain and Cp(?)-Otz vein network of 4 mm wide per 2cm spacing		x		x						
154	KY58c	Eastern Panacao			silicified rock float	blackish brown colored strong silicified rock with Otz-veinlet, Cu ox stain and quite minor Py		x		x						
155	KY59a	Eastern Panacao	13.29212	123.04382	silicified boulder sized float	blackish brown colored strong silicified rock with quite weak oxidation		x			x					
156	KY59b	Eastern Panacao	13.29212	123.04382	silicified rock float	weak silicified rock										
157	KY59c	Eastern Panacao	13.29212	123.04382	quartz vein float	white nonclear Otz vein having ruggy silicified rock fragment occurring as irregular form and wedging out in part				x			x			
158	KY59d	Eastern Panacao	13.29212	123.04382	diorite float	blackish weak to medium silicified diorite(?) as host rock(?)	x				x					
159	KY60a	Eastern Panacao			quartz vein	Otz vein or network of 1cm wide in 1m spacing				x			x			
160	KY60b	Eastern Panacao			argillic rock	yellowish colored weathered argillic rock with Cu ox stain hosting KY60a			x		x					
161	KY61	Eastern Panacao			schist	layering of green and white colored schist with quite few amount of dissemination of Py					x					
162	KY62	Eastern Panacao	13.29150	123.04414	schist	intercalcating of green part and white part with minor foldings	x									
163	KY63a	Southern Balatan			diorite float	deep greenish gray colored porphyritic altered diorite with minor dissemination of Py										
164	KY63b	Southern Balatan			basalt float	weak greenish black colored basalt (or andesite) with Chl from Pl										
165	KY63c	Southern Balatan			altered rock float	greenish colored strong altered rock with Py(-Po?) dissemination		x								
166	KY65a	Southern Balatan			diorite float	weak greenish colored altered Bt-Hbl diorite	x									
167	KY65b	Southern Balatan			andesite float	weak brownish green colored porphyritic andesite	x									
168	KY65c	Southern Balatan			altered andesite float	dark green colored medium altered andesite with minor dissemination of Py-Cp	x				x					
169	KY65d	Southern Balatan			andesite float	gropyritic altered andesite (or basalt)	x									
170	KY66a	Western Goa	13.44541	123.26249	quartz vein	white colored non-clear massive homogeneous Otz-vein of 1 to 0.3m in width and trending N30E, dipping vertically				x						
171	KY66b	Western Goa	13.44541	123.26249	quartz vein	taken from wall side part of KY66a and showing gray colored and having weak dissemination of Py		x		x			x			
172	KY66c	Western Goa	13.44541	123.26249	mica schist	mica schist host rock just beside Otz-vein KY66b	x									
173	KY67a	Western Goa			quartz vein	smoky white colored Otz-vein in center of clay band				x						
174	KY67b	Western Goa			clay	white to yellowish colored clay resemble to fault gauge with limonite			x							
175	KY67c	Western Goa			argillic mica schist	whitish gray colored medium argillic altered mica-schist			x		x					
176	KY68	Bulala			"flint clay"	"flint clay" representative samples, greenish to white colored half transparent compact clay										
177	KY68a	Bulala	14.11494	122.26580	altered andesite	reddish brown colored moderate argillic altered andesite with Kln from Pl			x							
178	KY68b	Bulala	14.11494	122.26580	argillic rock	strong argillic rock with much dissemination of Py				x						
179	KY69	Bulala			sandstone	pale gray colored massive weak silicified and weak argillized medium grained sandstone with Otz-Hem stain or film										
180	KY70	Bulala			green schist and aplite	green schist injected by mica-aplite										
181	KY71	Bulala	14.12082	122.26558	argillic altered andesite	reddish brown colored weak argillic altered andesite with Kln										
182	KY72	Bulala	14.12213	122.26486	argillic altered andesite	argillic altered andesite with strong stain of Lm and dissemination of Kln and Py			x		x					
183	KY73	Bulala			argillic altered andesite	dark gray colored altered andesite with white colored patch of Kln										
184	KY74	Bulala	14.12262	122.26358	argillic altered andesite	pale gray colored moderate silicified and weak argillic altered andesite with fine grained dissemination of Py, Lm-film and precipitation of Kln			x		x					
185	KY75	Bulala			argillic altered andesite	whitish colored argillic altered andesite with Lm-veinlet, Kln, Otz and Smc										
186	KY76a	Panacale			quartz vein	very coarse grained crystalline umbigues Otz-vein with Lm-stain										
187	KY76b	Panacale			argillic altered rock	pale white colored clay beside Otz-vein KY76a										
188	KY77a	Panacale			argillic altered rock	pale white colored clay beside Otz-vein				x						
189	KY77b	Panacale			argillic altered diorite or granodiorite	white colored argillic altered granodiorite	x									
190	KY77c	Panacale			quartz vein	Otz-vein or silica-vein with dissemination of Py					x					
191	KY78a1	Panacale			quartz vein	intersection between 112.10 and 112.20m of SADH-13, white colored non-clear partly clear and dense Otz-vein with Cp-Ga-Py				x			x			
192	KY78a2	Panacale			quartz vein	intersection between 112.90 and 113.00m of SADH-13, white colored non-clear Otz-vein with pale white argillic altered fragment							x			
193	KY78b	Panacale			altered granodiorite	intersection between 122.80 and 122.95m of SADH-13, moderate altered granodiorite with Otz-Cp-Py-veinlet								x		
194	KY78c	Panacale			altered granodiorite	intersection between 134.00 and 134.30m of SADH-13, weak altered granodiorite with Chl from Bt and Hbl(?)	x									
195	KY78d	Panacale			quartz vein and clay	intersection at 250.0m of SADH-2, Otz-vein veinlets with pale white colored clay				x				x		
196	KY79	Panacale			Sp-Ga-Cp ore	Sp-Ga-Cp ore with greenish colored matrix showing foliated fabric		x					x			
301	SM01	Masuog			clay altered rock	black to gray colored steam heated argillic altered rock with Smc, from Kawayan Crater										
302	SM02	Pantao-Najas-Cabarian	13.10484	123.19041	diorite	dark gray to gray colored diorite partly gabbroic, many Hbl cryst at 5mm in diameter, Bt at 2 to 3mm in diameter, from Bantayan	x						x	x		
303	SM03	Pantao-Najas-Cabarian	13.09565	123.18439	diorite	diorite with aplite vein, pegmatitic Pl at 1 to 2cm in diameter, Hbl at 2 to 3cm in diameter, aggregates of Hbl, from Talin Talin	x						x			
304	SM04	Pantao-Najas-Cabarian	13.09409	123.18370	intrusive rock	strongly weathered fine grained andesite or micro diorite, orange to brown colored, from Tayal	x						x			

Table 2-1 Sample description sheet

ID	sample	prospect	coordination lat.	coordination long.	rock type	description	instrumental analyses FS	PS	XI	CA	CA	WA	FI	KU	others	remarks
305	SM05	Pantao-Nagas-Cabarian	13.04546	123.18092	gypsum ore	Gp ore with Py zone, host rock is gray to dark gray clay altered (Kln?) diorite or gabbro, from Tagol					x					
306	SM06	Pantao-Nagas-Cabarian			gypsum ore	Gp ore with Py zone, host rock is gray to greenish gray clay altered diorite or gabbro, from stock pile at Tagol										
307	SM07	Pantao-Nagas-Cabarian	13.01133	123.19190	diorite	copper occurrence, diorite with Qtz-vein (3 to 8cm), Qtz vein, orange colored having Cu-oxide and Cu-sulphate, host rock: diorite, gabbro, mixing facies, partly silicified, from		x		x			x			
308	SM08	Pantao-Nagas-Cabarian	13.01159	123.30498	diorite or gabbro	diorite or gabbro with silicified clay-vein and Gp and Qtz-veinlet, andesite intrusive, from Cabarian										
309	SM09	Masulog			altered andesite	silicified and/or gray clay altered rock, having Py-Ep, yellow greenish yellow clay alteration (320 degrees C), intersection of PAL-10 between 2640 and 2645m										
310	SM10	Masulog			porphyritic andesite	strong silicified rock, porphyritic andesite or diorite?, intersection between 2104 and 2106m of PAL-8D										
311	SM11	Masulog			porphyritic andesite	green or greenish gray altered rock, weak silicified, Chl-Ep, intersection between 2104 and 2106m of PAL-8D										
312	SM12	Masulog			andesite lava	host rock: Qtz-Chl-Py-Anh-Cly-Kfs, vein: Anh-Qtz-Py, intersection between 1256.7 and 1258.3m of MO-1										
313	SM13	Masulog			altered volcanic rock	light greenish colored, hard, highly altered, without discernible texture, alteration mineral assemblage, Qtz-Ep-Chl-Py-Anh-Kfs-Cu sulphide, vein: Anh-Py-Chl, intersection between										
314	SM14	Masulog			altered volcanic rock	intersection at 1545m of CP-6D										
315	SM15	Masulog			silicified rock	white argillic and/or medium silicified rock, from Masulog			x		x					
316	SM16	Masulog			altered volcanic rock	dark gray colored altered rock, weakly Smc argillic, Py dissemination, from Masulog										
317	SM17	Masulog			altered volcanic rock	reddish colored argillic and/or weakly silicified rock, from Masulog			x		x					
318	SM18	Masulog			altered volcanic rock	gray colored altered rock with Smc clay and Py dissemination, from Masulog										
319	SM19	Masulog			altered volcanic rock float	gray colored altered rock with Smc clay and Py dissemination, from Masulog										
320	SM20	Cawayan river	13.03400	123.50420	altered volcanic rock	wealy to medium Smc-argillic rock, Py dissemination										
321	SM21	Cawayan river	13.03310	123.31038	altered volcanic rock	strongly silicified rock with Alu(?), Gp(?), and Py dissemination			x		x					
322	SM22a	Cawayan river	13.03304	123.51093	altered volcanic rock	strongly silicified rock, reddish colored alteration, without Py dissemination			x		x					
323	SM22b	Cawayan river	13.03304	123.51093	altered volcanic rock	strongly silicified rock, gray colored alteration, with Py dissemination			x							
324	SM23	Cawayan river			altered volcanic rock float	strongly to medium silicified rock, Py-veinlet or -film, Alu(?)			x		x					
325	SM24	Cawayan river			altered volcanic rock	white clay (Smc?), weakly to medium silicified rock, with Fe-oxide										
326	SM25	Cawayan river	13.03421	123.50519	altered volcanic rock float	big float of dark gray to black colored alteration, medium to weakly silicified with white clay (Kln?)			x		x					
327	SM26	Cawayan river			altered volcanic rock float	big float of dark gray colored alteration, Alu(?)-veinlet, Py dissemination										
328	SM27	Tiwi			silica sinter	until quite recently active hot spring with geizer, Cararayan					x					
329	SM28	Tiwi			dacite	dacite dome, Bt-Hbl-dacite, dated as 3.2Ma, Puetan	x					x		x		
330	SM29	Tiwi			least altered andesite	hard, massive, dark green to gray andesite, Cal-Ep-Qtz, intersection at 7804ft of MAT-25			x		x					
331	SM30	Tiwi			quartz vein within altered andesite breccia	andesite breccia with Qtz-vein, partly strongly silicified zone with Cal-Ep(?), host rock propyritic altered, Ep-Ca-Sp-Adu-Ca-Py-Chl, intersection at 6905ft of MAT-25		x	x		x		x			
332	SM31	Tiwi			altered andesite breccia	gray to greenish gray massive andesite breccia, propyritic alteration with Qtz-Ca-veinlet, weakly silicified, Chl-Ca-Qtz-Py, intersection at 5840ft of MAT-25			x		x		x			
333	SM32	Tiwi			altered andesite	host rock: propyritic alteration, Ep-Chl-Ca-Qtz-Py, vein: Ca-Qtz-Ep-Py-Chl, intersection at 5093ft of MAT-25			x		x		x			
334	SM33	Tiwi			altered andesite breccia	weakly to medium propyritic altered andesite breccia / Ca-Chl-Ep-Hem, intersection at 3922ft of MAT-25										
335	SM34	Tiwi			altered andesite	weakly to medium propyritic altered andesite breccia / Ca-Chl-Qtz-Py-Hem, intersection at 2983ft of MAT-25			x		x		x			
336	SM35	Tiwi	13.24453	123.39075	altered rock float	strongly silicified rock with Kln and sulphur, partly orange to reddish color, (Fe-oxide stain), Mt. Marinao			x		x					
337	SM36	Sisigon			older andesite float	gray color Px-andesite, porphyritic, Salvacion										
338	SM38	Sisigon			altered rock float	floats of white/red color Kln argillic, medium to strongly silicified rock with Py dissemination			x		x					
339	SM39	Sisigon			pyroxine andesite	Px-andesite, pophyritic, many Px-phenocryst, Px at 5mm in diameter, Casini-Sisigon	x					x		x		
340	SM40	Sisigon			brecciated pyroxine andesite	Px-rich-andesite, brecciated, Casini-Sisigon										
341	SM41	Sisigon			altered rock float	strongly silicified reddish to orange color altered rock with Py dissemination, others: Hbl-dacite, N-S Creek at Casini-Sisigon			x		x					
342	SM42	Sisigon			altered rock float	moderately silicified, strong Fe-oxide-stain, red to orange color altered rock, Bacolod			x		x					
343	SM43	Sisigon			hornblende bearing pyroxine andesite float	floats of Qtz-bg-Hbl-Px-andesite or dacite, gray to light gray, porous, San Roque	x					x				
344	SM44	San Roque-Mt. Malobago			altered rock float	moderately silicified, Kln-argillic, white color rock with Fe-oxide stain, San Roque			x		x					
345	SM45	San Roque-Mt. Malobago			altered andesite float	quite a few, strongly silicified rock with orange to reddish purple color Fe-oxide-stain, San Roque										
346	SM46	San Roque-Mt. Malobago			dacite	gray to light gray porous dacite dome, Qtz-Pl-Bt-Hbl, San Roque	x					x		x		
347	SM47	San Roque-Mt. Malobago			altered andesite float	red to orange color strongly silicified rock with dissemination of Py, partly gray colored, strong Fe-oxide-stain, San Roque			x		x					
348	SM48	San Roque-Mt. Malobago			altered rock float	quite a few, weakly to moderately silicified gray color altered rock with Py dissemination, San Roque										
349	SM49	San Roque-Mt. Malobago			dacite	light gray to white color Bt-Px-dacite or dacitic tuff, porous, Qtz at 5mm in diameter at the most	x					x				
350	SM50	Matnog-Culasi	12.35281	124.04452	altered tuff breccia	yellow to yellowish white clay altered tuff breccia, Smc argillic			x		x					
351	SM51	Matnog-Culasi			clast in pumice tuff breccia	hornblendite? Many Hbl-phenocryst in the clast in pumiceous tuff breccia or sandy tuff, Manhumland	x									
352	SM52	Matnog-Culasi			pumice tuff	weak to very weak white to yellow white argillic (Kln) pumice tuff, the clasts are andesite, Busing										
353	SM53	Matnog-Culasi			altered tuff breccia or volcanic breccia	reddish argillic (Kln) weakly silicified altered tuff breccia or volcanic breccia with weakly silicified zone (Gt, Sd), Calpi			x		x					
354	SM54	Matnog-Culasi			altered andesite float	white to reddish colored argillic (Kln), strongly to moderate silicified rock, Alu?, Calpi										

Table 2-1 Sample description sheet

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ID	sample	prospect	coordination lat.	coordination long.	rock type	description	Instrumental analyses TS	PS	XR	CA	CA	WA	PI	KA	others	remarks
355	SM55	Mashag-Culasi			altered rock float	quite fine amount of floats of weakly silicified, white Kln argillic, partly Fe-oxide stain, Balogan			x		x					
356	SM56	Mashag-Culasi	12 36545	124 03091	altered tuff breccia	weakly reddish to white or yellowish white argillic (Kln) tuff breccia, Bolo										
357	SM57	Mashag-Culasi	12 36182	124 03199	altered andesite	reddish to white colored weakly to moderately argillic (Kln) andesite with Lm stain, Pange			x							
358	SM58	Butag-Sua			least altered pumice tuff	pumice tuff, pumice at 1cm in diameter at the most, rounded or sub-rounded, Sua										
359	SM59	Butag-Sua			olivine basalt or pyroxine andesite	Sua	x				x					
360	SM60	Butag-Sua			altered rock float	strongly or moderately silicified and Kln argillic altered rock, partly Otz chalcedony, Fe-oxide stain, Py, Sua			x		x					
361	SM61	Butag-Sua			altered rock float	white Kln argillic, moderately to strongly silicified rock, Fe-oxide stain, Py, Tagbangan			x		x					
362	SM62	Butag-Sua			olivine pyroxine andesite or basalt	lava flow of Otz-bearing Px andesite or basalt, joint partly filled with Smc, partly yellow to orange altered, Bagrada										
363	SM63	Butag-Sua			basalt	least altered basalt with Fe-oxide stain and Smc-veinlets or net work, Bagrada										
364	SM64	Butag-Sua			altered rock float	white to orange colored Kln argillic, weakly to moderately silicified, Aguinaldo										
365	SM65	Butag-Sua			altered tuff breccia	white to reddish argillic (Kln), strongly to moderately silicified tuff breccia, partly strongly Fe-oxide stained, Aguinaldo			x		x					
366	SM66	Butag-Sua			altered rock	white Kln argillic, weakly to moderately silicified rock, partly Lm-stain, Marinab			x		x					
367	SM67	Bacolodo			hot spring deposit	clay alteration, weak to moderate silicification, Banyo hot spring			x		x					
368	SM68	Lake Buhi			pyroxine andesite	gray to dark gray colored slightly weathered Px-andesite, porphyritic	x					x				
369	SM69	Lake Buhi			altered rock float	small float of orange to white argillic and weakly silicified rock										
370	SM70a	Lake Buhi			altered rock float	gray to dark gray colored Kln argillic, weakly silicified, Py dissemination										
371	SM70b	Lake Buhi			altered rock float	white Kln argillic, moderately silicified			x							
372	SM70c	Lake Buhi			altered rock float	reddish to brown colored altered, strongly silicified rock, Fe-oxide stain and partly rugay			x		x		x			
373	SM71a	Lake Buhi			altered rock float	Kln argillic, strongly silicified			x							
374	SM71b	Lake Buhi			altered rock float	strongly silicified, Py dissemination, red to reddish brown color, Otz chalcedony, rugay					x		x			
375	SM71c	Lake Buhi			altered rock float	orange to white colored altered rock, rugay Otz-vein										
376	SM72	Lake Buhi			altered rock float	white to light gray weakly silicified, weakly Kln-argillic altered rock, structure still remain			x							
377	SM73	Western Pasacao			pyroxine andesite	porphyritic, Pl at 5mm across at the most, Fe at 3mm across at the most, Pinich, Wagas	x					x		x		
378	SM74	Western Pasacao			silicified rock	reddish to orange colored chalcedonic Otz, host rock porphyritic andesite, Wagas			x		x					
379	SM75	Western Pasacao			quartz vein	bluish white color chalcedonic Otz-vein at 2cm wide at the most, host rock tuff breccia, Wagas					x		x			
380	SM76a	Western Pasacao			dike intrusive	white to light gray felsic rock, granodiorite? Gp-veinlet or net-work, Dalupan	x									
381	SM76b	Western Pasacao			dike intrusive	dark gray felsitic intrusive, weakly propyritic altered, Dalupan										
382	SM77	Cagraan, Balatan			quartz vein	green copper qtz-vein, Cu-oxide and Cp dissemination, Fe-oxide stain, Cagraan										
383	SM78	Cagraan, Balatan			quartz vein	green color Otz-vein, Fe-oxide stain, Cagraan		x	x	x			x			
384	SM79	Cagraan, Balatan			altered diorite	diorite, Hbl and Bt change into Chl, weak clay alteration, mica?, weak Py dissemination, Cagraan	x					x		x		
385	SM80	Cagraan, Balatan			gypsum ore	white Py banded Gp-ore, altered volcanic fragment occur partly, Cagraan					x					
386	SM81	Cagraan, Balatan			altered volcanic rock	Chl-Ep, dark green color propyritic alteration, Cagraan			x		x					
387	SM82	Cagraan, Balatan			silicified volcanic rock	orange color Fe-oxide stain, Kln-clay alteration, dark gray flesh part remain partly, Cagraan			x		x					
388	SM83	Balatan	13 21455	123.16026	altered rock	host rock laminated medium to coarse grained sandstone, white caly (Kln?), strongly silicified, Fe-oxide-stain, Cal, "clastic"?										
389	SM84	Balatan	13 21455	123.16026	altered rock	white colored strongly argillic altered (Kln?), "clastic"?										
390	SM85	Balatan	13 20577	123.15074	gypsum ore	banded Gp-ore, white color, fine grained, partly reddish purple, banded Py, Cabanbanan					x					
391	SM86	Balatan	13.20577	123.15074	gypsum ore	white colored Py-banded Gp-ore, partly green colored Cu-oxide-stain, Cabanbanan					x					
392	SM87	Balatan	13 20577	123.15074	altered rock	yellowish brown to yellowish green, reddish brown color moderately silicified white clay altered rock, Fe-oxide, Cabanbanan			x		x					
393	SM88	Balatan	13 20577	123.15074	altered volcanic rock	dark gray to greenish gray colored Chl-altered volcanic rock, probably basalt, Py dissemination, Cabanbanan										
394	SM89	Balatan			gypsum ore	white, fibrous Gp-crystal with dark gray Py-band, Py at 3mm across at the most, partly green colored portion (not sure Cu-oxide or alaso?), Cabanbanan					x					
395	SM90	Balatan			altered rock	yellowish to dark gray colored clay alteration and weakly silicified altered volcanic rock with strong dissemination of Py, propyritic alteration, Cabanbanan			x							
396	SM91	Balatan			silicified rock	orange to yellowish brown colored strongly silicified rock, partly chalcedonic, Cabanbanan					x					
397	SM92	Mt. Culasi			altered tuff breccia	weakly to moderately silicified and white to orange colored Kln-Smc argillic acidic tuff breccia, Manasopre Creek			x							
398	SM93	Mt. Culasi	13 55464	123.03171	silicified rock float	strongly silicified without Py dissemination, a part of boulder sized float of highly silicified and fractured dacite with Py-band and Kln-clay, Manasopre Creek					x		x			
399	SM94	Mt. Culasi	13 55464	123.03171	silicified rock float	same as SM93 but with Py dissemination			x		x					
400	SM95	Mt. Culasi			dacite	gray to light gray dacite with oriented mafic phenocryst, Manasopre Creek	x					x		x		
401	SM96	Mt. Culasi			altered dacite	yellowish altered dacite with strong Lm-stain, reddish to brown color, Manasopre Creek			x							
402	SM97	Mt. Culasi	13 55399	123.04170	hornblende andesite	dark gray porphyritic Hbl-andesite, Hbl at 10 by 5mm across, Manasopre Creek	x					x				
403	SM98	Mt. Labo	14 00223	122.46224	biotite hornblende dacite	Bt-Hbl-dacite, porphyritic, gray color, Hbl at 6mm across at the most, Bt at 13mm across at the most, Pl at 10mm across at the most, site B	x					x		x		
404	SM99	Mt. Labo			altered dacite	altered dacite, grey colored, Py dissemination, Cls, partly Smc-argillic, near site B			x							

Table 2-1 Sample description sheet

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ID	sample	prospect	coordination lat.	coordination long	rock type	description	instrumental analyses TS	PS	KI	CA	CA	WA	FI	KN	others	remarks
405	SM100	Mt. Labo			altered rock	yellowish to white colored weakly silicified, Lm-stain, Smc-argillic rock, partly dark gray Smc-altered with Py dissemination, near site A			x		x					
406	SM101	Mt. Labo	13.59492	122.47030	altered rock	strongly to moderately silicified reddish brown colored Fe-oxide stained vein, host rock: white to gray Smc-argillic with Py dissemination, site A			x		x					
407	SM102	Mt. Labo			altered rock float	strongly to moderately silicified white to gray colored Fe-oxide stain, partly Py dissemination, Wala River					x					
408	SM103	Mt. Labo			altered rock float	orange colored weakly to moderately silicified rock, Kln?, Fe-oxide stain, Tao River					x					
501	TH01	Pilar-Dorsal			calcareous siltstone	yellow to yellowish brown, soft, shell-bearing, Ba: Bayasong										
502	TH02	Pilar-Dorsal			coarse reef limestone	calcite crystal, white, Ba: Bayasong										
503	TH03	Pilar-Dorsal			calcareous siltstone	crystalline, Ba: Bayasong										
504	TH04	Pilar-Dorsal			beach sand	Mag-Px-hbl-Ol-Qtz-Pl, lithic fragment, Ba: Rawis, Dorsal										
505	TH05	Pilar-Dorsal	12.59120	123.40098	coarse reef limestone											
506	TH06	Calpi	13.05017	123.52090	pyroxine andesite	dark gray to black, two-Px-Pl-phyric andesite	x					x				
507	TH07	Calpi	13.05110	123.52110	altered andesite	boulder float at 5m across, white to yellowish brown, weak silicified, Lm-stained (Jar), Py										
508	TH08	Calpi	13.05070	123.52100	silicified andesite breccia	shearing fracture, rounded breccia, white to yellowish white			x		x					
509	TH09	Calpi	13.04480	123.52117	argillized rock	white to gray, strong argillization, moderately silicified, near old adit, beneath the silicified zone, Py, Smc			x							
510	TH10	Calpi	13.04480	123.52117	silicified rock	opaline silicified, white, old adit entrance, moderately silicified, Py			x		x					
511	TH11	Calpi	13.04250	123.51550	vein-like quartz	4 veins? Qtz, 1 to 2cm wide, strikes NNW, dips 45NE, silicification, adit 1					x					
512	TH12	Calpi	13.04250	123.51550	silicified and/or argillized rock	weakly silicified sugary silica, silicification, argillization: acid leaching? adit 1			x		x					
513	TH13	Calpi	13.04240	123.51540	silicified Limonite-stained rock	Lm-stained sugary silica, silicified, brown: acid leaching? adit 2					x					
514	TH14	Calpi	13.04240	123.51540	silicified rock	yellowish brown, strongly silicified, sugary silica, acid leaching? adit 2			x		x					
515	TH15	Calpi	13.04240	123.51540	silica vein	silica and Alu?, supergene, adit 2			x							
516	TH16	Calpi	13.04235	123.51450	silicified rock	float, weakly silicified, opaline silica alteration, Py										
517	TH17	Calpi	13.04225	123.51460	argillized rock	strong argillization, Smc, Py			x							
518	TH18	Calpi	13.04250	123.51550	silica vein	chalcedonic Qtz-veinlet, 2mm wide, Kln? adit 2					x					
519	TH19	Calpi			silicified argillized tuff	weakly silicified, white, Kln-alteration, Alu?			x		x					
520	TH20	Calpi			silicified argillized andesite	white, pink-reddish white, Kln-Smc-altered?, weakly silicified, moderately argillized, Py										
521	TH21	Calpi			pyrite-silica vein	hydrothermal brecciation?, rounded silicified volcanic fragments, Py			x		x					
522	TH22	Calpi			pyrite-silica vein	hydrothermal brecciation?, rounded cahecsdonic fragments, Py			x		x					
523	TH23	Calpi			silicified rock	along joint face, silica-vein, old adit					x					
524	TH24	Calpi			andesite	least altered, two-Px-andesite, Ot-bearing	x					x				
525	TH25	Calpi			silicified andesite?	float, weakly to moderately silicified, Py					x					
526	TH26	Monte Calvario			silicified rock	white, yellowish brown, strongly silicified as same as the Nanaetau-type silica body, Kln-Alu-alteration, Py, native sulphur, 149 peak			x		x					
527	TH27	Monte Calvario			silicified and/or argillized rock	yellowish to brown, Kln-Alu-altered?, weakly silicified, 149 peak			x							
528	TH28	Monte Calvario			silica-clay-vein	grey, 5cm wide, strikes NNW, dips 70E, Py			x		x					
529	TH29	Monte Calvario			limonite-vein	brown, 1 to 2cm wide, Smc-alteration			x		x					
530	TH30	Monte Calvario			silicified andesite	moderately silicified, Py-dissemination										
531	TH31	Monte Calvario			Px-andesite	partly Py-disseminated, very weakly altered	x									
532	TH32	Monte Calvario			tuff breccia	partly Py-disseminated, weakly altered										
533	TH33	Monte Calvario			volcanic or tuff breccia	grey, volvanic or tuff, little Py, very weakly altered			x							
534	TH34	Monte Calvario			tuff	pale gray, weakly Py-disseminated, weakly altered			x		x					
535	TH35	Monte Calvario			tuff breccia or volcanic breccia	minor alteration in matrix										
536	TH36	Monte Calvario			andesite	very weakly altered, minor Py-dissemination along the joint	x									
537	TH37	Monte Calvario			silica vein float	60cm across, banding, Py, brecciated					x					
538	TH38	Magallanes			volcanic breccia	white to reddish brown, andesite volcanic breccia, polylithologic nature indicates pyroclastic flow deposits? Kln-Smc-altered, Hb-andesite clasts, very weak hydrothermal			x		x					
539	TH39	Magallanes			volcanic breccia	polylithologic in nature indicates pyroclastic flow deposits? Subangular or subrounded, light gray andesite purple andesite, black basalt, 0.2mm to 60cm across			x		x					
540	TH40	Magallanes			pyroxine andesite float	black colored Px-andesite	x					x				
541	TH41	Mt. Cintacan			pyroxine andesite float	weakly weathered Px-andesite, face hill of the mountains	x					x				
542	TH42	Tugas			argillized andesite	yellowish to light brown, Kln-Smc-argillic, host andesite			x		x					
543	TH43	Tugas			pyroxine andesite	pale purplish black, vitreous matrix	x					x				
544	TH44	Tugas			pyroxine andesitic volcanic breccia or lava flow	volcanic breccia or auto brecciated lava? black color	x									
545	TH45	Tugas			least altered pyroxine andesite	volcanic breccia or auto brecciated lava? Yellow to brown color, weak argillic										
546	TH46	Tugas			silicified pyroxine andesite	fresh andesite and slightly silicified rock float, Kln-Alu-silicification?, Py			x		x					

Table 2-1 Sample description sheet

sheet No. 6/7

ID	sample	prospect	coordination lat.	coordination long.	rock type	description	instrumental analyses TS	PS	XI	QA	CA	WA	FI	KN	others	remarks
647	TH47	Tugas			weak argillic andesite	pale greenish gray, Py-disseminated, weak argillic, Smc-altered, Py			x							
648	TH48	Tugas			silicified rock float	near to surface, strongly silicified, Py-disseminated, native sulphur					x					
649	TH49	Tugas			silicified rock	breaching, originally flow banded andesite?, strongly silicified			x		x					
650	TH50	Tugas			silicified andesite	moderately to strongly silicified, Py-disseminated			x							
651	TH51	Tugas			silicified andesite	water fall outcrop, moderately to strongly silicified, Py-disseminated			x		x					
652	TH52	Manurabi			basaltic andesite float	aphyric basaltic andesite	x									
653	TH53	Manurabi			basaltic andesite	gritty joint, basaltic andesite	x									
654	TH54	Gnahlam			basaltic andesite	basaltic andesite	x					x		x		
655	TH55	Gnahlam			tuff	accretionary lapilli, silica and Chl-vein cuts the lapilli			x		x					
656	TH56	Conut			basaltic andesitic volcanics	basaltic andesite clast within volcanic breccia	x									
657	TH57	Sibobo			silicified rock	moderately to strongly silicified breccia fragment within hydrothermal breccia, white, silica, Kln?			x		x					
658	TH58	Sibobo			matrix of hydrothermal brecciation	matrix of hydrothermal breccia, white to light brown, Kln? Smc-supergene			x		x					
659	TH59	Sibobo			argillized rock	Boundary between hydrothermal breccia and argillized zone, yellow to purple or brown, Smc-alteration			x							
660	TH60	Sibobo			silicified rock	weakly silicified rock, white, Kln			x		x					
661	TH61	Sibobo			pyroxine andesite float	fine grained, young volcanics, laharic deposit?	x									
662	TH62	Sibobo			argillized hornblende andesite	weak argillization, Smc-alteration, Kln?			x							
663	TH63	Sibobo			hornblende andesite	fresh part of argillization, representative sample of host rock	x					x		x		
664	TH64	Sibobo			argillized rock	argillization and/or silicification, sugary silica, Kln?, Alu?			x							
665	TH65	Sibobo			silicified and/or argillized rock	moderate silicification, moderate argillization, sugary silica, hydrothermal breccia			x		x					
666	TH66	Sibobo			silicified and/or argillized rock	moderate silicification, moderate argillization, steam heated acid leached zone? Py-disseminated, native sulfur					x					
667	TH67	Sibobo			silicified rock	moderately to strongly silicified rock, tabular an hexagonal Alu-crystal occur in the vug, probably supergene and possibly hypogene			x					x		
668	TH68	Sibobo			silicified rock and silica vein	silica-vein within strongly silicified rock, 0.2 to 1.5cm wide, gray colored					x					
669	TH69	Sibobo			pyroxine andesite	weakly argillized, host rock of argillization and silicification, different from TH61 andesite	x					x				
670	TH70	Sibobo			silicified and argillized rock	moderately silicified and argillized, overline by TH57, continues to the hydrothermal breccia			x							
671	TH71	Siruma	14.00090	123.16570	quartz veinlet	within the weathered green schist, parallel to the schistosity		x			x					
672	TH72	Siruma	13.59543	123.17307	quartz veinlet in green schist float	Qtz-veinlet within the green schist (chlorite schist?), parallel to the schistosity, no alteration halo		x			x					
673	TH73	Siruma	13.59537	123.17456	white clay	pale green-ish gray colored clay, Smc(?), schistosity still remains, from white clay Mine, lit-Kln(?)-Smc(?)			x							
674	TH74	Siruma	13.59537	123.17456	quartz vein	Qtz-vein in schist, parallel to schistosity					x		x			
675	TH75	Siruma	13.59537	123.17456	quartz vein clast and white clay	taken from a zone of rounded Qtz-fragment parallel to schistosity, lit-Kln(?)			x		x			x		
676	TH76	Siruma	14.00437	123.16432	chlorite schist	amphibole(?), Ep(?)	x									
677	TH77	Siruma	14.00437	123.16432	quartz vein float	ridge					x					
678	TH78	Siruma	14.00529	123.16554	quartz vein	in the green schist, parallel to the schistosity, strikes N72W, dips vertically, taken from old shafts					x					
679	TH79	Southern Siruma Bay	14.00037	123.14011	chalky fine stone	chalky fine stone with Qtz-veinlets, maroon to pale purplish gray, Qtz-vein has no alteration halo	x									
680	TH80	Southern Siruma Bay	14.00037	123.14011	mica schist	white mafics rich schist with green copper (Mal?)	x									
681	TH81	Southern Siruma Bay	14.00037	123.14011	quartz veinlet in schist	Qtz-veinlet in the schist, green copper (Mal?)					x					
682	TH82	Southern Siruma Bay	14.00037	123.14011	quartz veinlet in schist	MnO2-crystal(?), Qtz-veinlets within high grade Mn-ore										
683	TH83	Northern Siruma Bay	14.01180	123.15025	epidote schist	Ep-rich part within green schist, Qtz-veinlet occurs parallel to schistosity without alteration halo	x									
684	TH84	Popoot	13.57343	123.15028	argillized schist	argillized schist, schistode structure still remains, Py-rich	x		x		x					
685	TH85	Popoot	13.57310	123.15067	argillized rock	argillized schist, schistode structure still remains, lit(?)			x							
686	TH86	Tamban-Otao	13.53121	123.29431	green rock	along creek Ep-Py, original rock: basalt or gabbro	x					x				
687	TH87	Tamban-Otao	13.53121	123.29431	quartz vein	in the TH86 green rock, along shear zone, strikes N40W, dips steeply					x					
688	TH88	Tamban-Otao	13.53102	123.29256	green schist	amphibole schist(?)	x									
689	TH89	Tamban-Otao	13.53102	123.29256	calcite quartz vein	Cal>Qtz-vein, banding, green schist fragment, Py					x					
690	TH90	Mt. Bagacay	14.12567	122.47068	hornblende andesite	large Hbl-phenocryst, hbl-fresh	x					x		x		
691	TH91	Mt. Bagacay			quartz vein float with altered host rock	druse Qtz-crystal, Py			x		x		x			
692	TH92	Mt. Bagacay			andesite or sandstone hornfels	fine grained andesite or sandstone hornfels, host rock of Qtz-vein	x									
693	TH93	Mt. Bagacay	14.12551	122.47129	andesitic pyroclastics hornfels	host rock, pyroclastics, rounded clast at 2 o 20cm across	x									
694	TH94	Mt. Bagacay	14.12591	122.47129	quartz vein with host rock	Qtz-vein along joint or shear zone, 2cm wide, (lit-altered(?), Py					x					
695	TH95	Mt. Bagacay	14.12591	122.47129	quartz vein	waxie, Cp, Qtz-crystal, Py					x		x			
696	TH96	Agusan Mine	14.13435	122.46514	magnetite ore			x								

Table 2-1 Sample description sheet

ID	sample	prospect	coordination lat.	coordination long.	rock type	description	instrumental analyses TS	PS	XI	CA	OA	WA	FI	KAr	units	remarks
697	TH97	Agusan Mine	14.13435	122.46514	andesite pyroxene ore	host rock, fine grained andesite pyroxenite(?), hornfels, Py-Mag(?)		x								
698	TH98	Agusan Mine	14.13435	122.46514	andesite(?) hornfels	host rock, coarse grained, hornfels	x									
699	TH99	Agusan Mine	14.13435	122.46514	grade copper	oxide copper, chalcanite or chrysocolla					x					
700	TH100	Tuk Mine site	14.15251	122.43326	silicified rock	silicification, supergene alteration overprinting, Py-Cp(?)-Cov(?), taken from hanging wall					x					
701	TH101	Tuk Mine site	14.15251	122.43326	argillized sandstone	weak Smc(?)-argillic, supergene overprinting, taken from footwall, yellowish			x							
702	TH102	Bessemer Pit	14.17127	122.39216	argillized diorite	Smc(?)-argillic, supergene alteration overprinting, yellowish color, mafic changes into Mag			x							
703	TH103	Bessemer Pit	14.17127	122.39216	pyrite magnetite ore	aggregate of Py, rounded crystal of Py		x								
704	TH104	Bessemer Pit	14.17127	122.39216	magnetite ore	layered Mag intercalate with Qtz vein		x								
705	TH105	Bessemer Pit	14.17127	122.39216	hydrothermal biotite	host Bt with Qtz crystal, occur in druse part			x				x			
706	TH106	Bessemer Pit	14.17127	122.39216	molybdenite with quartz crystal	occur in druse part same as hydrothermal Bt		x								
707	TH107	Bessemer Pit	14.17127	122.39216	magnetite with biotite	hydrothermal Bt occure in magnetite ore										
708	TH108	Bessemer Pit	14.17127	122.39216	biotite host	occur in druse with Qtz crystal and molybdenite								x		
709	TH109	Bessemer Pit	14.17127	122.39216	magnetite ore	Mag vein occur in the druse such as TH108		x								
710	TH110	Mabaro	14.15437	122.39064	dacite intrusion	Pl-phenocryst, Smc-altered(?)	x		x							
711	TH111	Pangang	14.14090	122.39514	andesite hornfels	host rock of the mineralization in the Pangang Prospect, same as one of Larag Mine area, dark green-ish, hornfels, Py, silicification	x				x					
712	TH112	Exban Mine site	14.11545	122.39267	silicified rock	silicification, in old adit			x		x					
713	TH113	Exban Mine site	14.11545	122.39267	shear zone matrix	supergene alteration overprinting, in old adit			x		x					
714	TH114	Exban Mine site	14.11545	122.39267	silicified rock	host rock, resembles TH111, in old adit		x								
715	TH115	Exban Mine site	14.11545	122.39267	vein material	taken from waste, Qtz-Py-Cp-Apy(?)		x								

<notes>

coordination: ddd°mm'ss.s"-> ddd.mmsss

analyses: TS; thin section, PS; polished thin section, XI; X-ray diffraction, CA; geochemical grade assay of principal 33 elements, OA; ore grade assay of principal 23 elements,

WA; whole rock analyses major and trace element, KAr; K-Ar dating, I; polish, F; fluid inclusion homogenized temperature