REPORT
ON
THE COOPERATIVE MINERAL EXPLORATION
IN
THE CHIANG KHONG, DOI CHONG, RATCHABURI AREA
THE KINGDOM OF THAILAND

PHASE Ⅲ

MARCH 1997

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

REPORT
ON
THE COOPERATIVE MINERAL EXPLORATION
IN
THE CHIANG KHONG, DOI CHONG, RATCHABURI AREA,
THE KINGDOM OF THAILAND

PHASE Ⅲ

MARCH 1997

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

Preface

In response to the request of the Government of the Kingdom of Thailand, the Japanese Government decided to conduct a Mineral Exploration in the Chiang Khong - Doi Chong - Ratchaburi Area Project and entrusted to survey to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

The JICA and MMAJ sent to the Kingdom of Thailand a survey team of Dr. Hiroyuki Takahata from September 01, 1996 to January 18, 1997.

The team exchanged views with the officials concerned of the Government of the Kingdom of Thailand and conducted field surveys in the Chiang Khong, Doi Chong, Ratchaburi areas. After the team returned to Japan, further studies were made and the present report has been prepared.

We hope that this report will serve for the development of the project and contribute to the promotion of friendly relations between our two countries.

We wish to express our deep appreciation to the officials concerned of the Government of the Kingdom of Thailand for their close cooperation extended to the team.

February, 1997

Kimio Fujita
President
Japan International Cooperation Agency

Shozaburo Kiyotaki
President
Metal Mining Agency of Japan

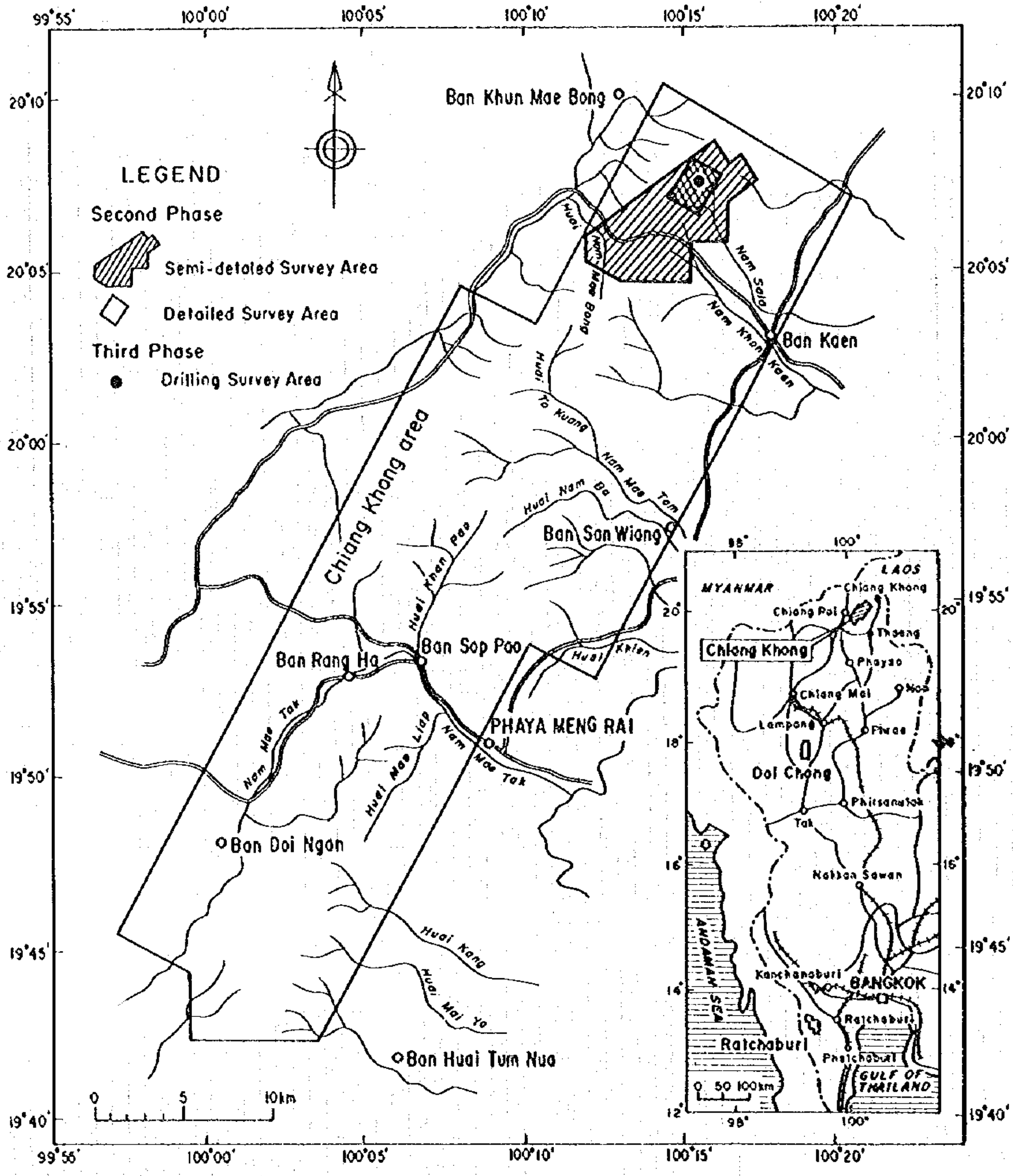


Fig. I-1-1 Location Map of the Survey Area

Summary

The present survey constitutes the third year of the basic resources development survey conducted in the Chiang Khong, Doi Chong and Ratchaburi Areas of Thailand. The survey results from the previous two years show the likely existence of gold deposits accompanying hydrothermal alteration in the upper reaches of the Huai Nam Sala in the Chiang Khong Area. In the present survey, two holes were drilled in a promising area to check the assumption that there was favorable gold mineralization at a lower level where a low resistivity zone that continues as far as the deep zone and Hg and As geochemicaa to chheck the assumption that there was favorable gold mineralization at a lower level where a low resistivity zone that continues as far as the deep zone and Hg and As geochemical anomaly zones indicative of Au mineralization overlap along a branch fault on a N-S trend.

The drilling survey showed the existence of a hydrothermal alteration zone characterized by mineral assemblage, quartz - chlorite - sericite - ankerite - calcite, along a reverse fault on a N-S direction bordered by Permian sedimentary rocks and Permian-Triassic volcanic rock. Alteration occurred with the fault or the andesite-basalt dikes intruding along the fault as the hydrothermal passage, causing alternation of the dikes and surrounding sandstone, tuff and sedimentary rocks. Extensive pyrite dissemination is also frequently found in the alteration zone. There are many quartz-calcite veins thought to be from the final period of the hydrothermal action, but no banded quartz veins or additional silicified zones representing the center of hydrothermal activity are seen.

As a result of ore assay, gold, silver, copper, lead and zinc were apparent in low concentrations or were below the detection limit in many of the samples, but in places where pyrophyllite was found in the alteration mineral assemblage mentioned above, the following anomaly values were obtained: Au=0.08-0.34g/t, Ag=0.2-1.8ppm (at depths of 255-275m and 340-374m in hole MJTC-2), Pb=55-315ppm, and Zn=75-305ppm (at depths of 93-103m and 131-150m in hole MJTC-1).

As can be seen from the above, although intense alteration was seen deep underground in the most promising survey area, mineralization of useful metals is extremely weak, and there is little likelihood of mineralization on a scale to warrant development in the surrounding area.seful metals is extremely weak, and there is little likelihood of mineralization on a scale to warrant development in the surrounding area.

Considering that the anomaly values (mineralization) in the geochemical surveys and drilling surveys, and the geochemical characteristics of the volcanic rock in the previous two years, are accompanied by pyrophyllite, it is possible that Permian-Triassic hornblende andesite or rhyolite is connected with this mineralization. There is thought to be scope for prospecting in the eastern part of the region in the upper reaches of Huai Nam Sala Area where alteration has taken place.

CONTENTS

Preface
Location Map of the Survey Area
Summary
Contents

Part I GENERAL REMARKS

Chapter 1 Introduction ······ 1
1-1 Background and Objective ······ 1
1-2 Conclusions and Recommendations of the Second Phase Survey ······ 1
1-2-1 Conclusions of the Second Phase Survey ······ 1
1-2-2 Recommendation for the Third Phase Survey ······ 3
1-3 Outline of the Third Phase Survey ······ 3
1-3-1 Objective of the Survey ······ 3
1-3-2 Survey Area ······ 3
1-3-3 Contents of the Survey ······ 4
1-3-4 Members of the Survey Team ······ 4
1-3-5 Period of the Survey ······ 5
Chapter 2 Geography ······ 5
2-1 Topography ······ 5
2-2 Climate and Vegetation ······ 5
Chapter 3 Summary of the Result of the Survey ······ 6
Chapter 4 Comprehensive Discussion ······ 7
Chapter 5 Conclusion and Recommendation ······ 8
5-1 Conclusion ······ 8
5-2 Recommendation for the Future Survey ······ 8

Part II DETAIL DESCRIPTION

Chapter 1 Drilling Survey ······ 10
1-1 Objective of the Survey ······ 10
1-2 Contents of the Survey ······ 10
1-3 Period of Survey ······ 10

1-4 Survey Results ······ 16
1-4-1 MJTC-1 ······ 16
1-4-2 MJTC-2 ······ 18
1-5 Summary of the Survey Results ······ 23
1-6 Considerations ······ 24
Chapter 2 Laboratory Work ······ 27
2-1 Microscopic Observation ······ 27
2-2 X-ray Diffraction Test ······ 27
2-3 Measurement of Homogenization Temperature of Fluid Inclusions ······ 30

Part III CONCLUSIONS AND RECOMMENDATIONS

Chapter 1 Conclusions ······ 34
Chapter 2 Recommendations for the Future Survey ······ 34

References ······ 37
Appendices

Figures

Fig. I-1-1	Location Map of the Survey Area	
Fig. II-1-1	Location Map of the Drilling site	11
Fig. II-1-2	Protection Area of the Environment and Forestry Law	12
Fig. II-1-3	Geologic Profile of MJTC-1	17
Fig. II-1-4	Geologic Profile of MJTC-2	19
Fig. II-1-5	Alteration Map around Drilling Sites	25
Fig. II-2-1	Histogram of Homogenization Temperature of Liquid Inclusion(1-2)	32-33
Fig.III-1-1	Promising Part for the Future Survey	37

Tables

Table I-1-1	Contents of Survey	4
Table II-1-1	Equipment of Drilling Survey	13
Table II-1-2	Articles of Consumption during Drilling Survey	13
Table II-1-3	Program of Drilling Survey	14
Table II-1-4	Summary of Drilling Activity	15
Table II-2-1	Result of Microscopic Observations	28
Table II-2-2	Result of X-ray Diffraction Analysis	29
Table II-2-3	Hogenization Temperature of Fluid Inclusion	31

Appendices

Appendix 1	Geologic Column of Drilling Core (MJTC-1, MJTC-2)
Appendix 2	Ore Assay Data of Core Sample

PART I GENERAL REMARKS

CHAPTER 1 INTRODUCTION

1-1 Background and Objective

The existence of gold in Thailand has long been known and the amount of gold produced in the past is apparent in the gold statues of Buddha found throughout the country and in individual gold ownership. Many placer gold-producing districts are known in various parts of the country and local people used to pan for gold in the classical manner during the dry season. And in western and southern Thailand gold was collected from drift sand deposits as a by-product of tin.

In recent years there has been a steady increase in the amount of gold consumed in Thailand, but the supply of gold is mostly dependent on foreign imports. For this reason, the Department of Mineral Resources of Thailand is promoting the discovery of primary deposits and the reassessment of secondary deposits in the area in the vicinity of previously known occurrences of gold.

Under these circumstances, the Government of the Thailand requested the Japanese government to conduct to a cooperative mineral exploration project for gold and base metals deposits in three areas in the north and west of Thailand.

In response to this request, the Japanese government dispatched a preliminary survey mission to Thailand and on September 1, 1994 a Scope of Works was signed between the International Cooperation Agency (JICA) and Metal Mining Agency of Japan (MMAJ), and the Thailand representatative, the Department of Mineral Resources (DMR), the Ministry of Industry.

On the basis of this agreement, it was decided to conduct a cooperative mineral resource exploitation survey extending over three years, starting in 1994, in the Chiang Khong and Doi Chong areas in the north of Thailand and the Ratchaburi area in the west.

The purpose of the survey is to grasp the possibility and amount of useful elemental deposits, such as gold, tin, base metals and antimony, by obtaining a comprehensive grasp of the relationship between the geology and geologic structures of the survey areas, and mineralization, geochemical characteristics and geophysical prospecting.

1-2 Conclusions and Recommendations of the Second Phase Survey

1-2-1 Conclusions of Second Phase Survey

The Upper Huai Nam Sala area is made up of Permian sedimentary rocks, the basement of this area, Permo-Triassic rhyolitic volcanic rocks, Permo-Triassic andesitic volcanic rocks, Jurassic intrusive rocks and Quaternary riverbed deposits. The basement rocks of Permian age are distributed in the western part of the detailed survey zone.

Within this area, two fault systems were observed, a N-S fault and a NE-SW fault. Both fault systems have a vertical displacement, with the western or northwestern block relatively raised. The

NE-SW fault is developed on the synclinal axis of the Permian rocks, and continues to the southwestern part of the Survey Area. The N-S fault converges with the NE-SW fault, and is thought to be derived from this fault.

The alteration zones and mineral occurrences are regulated by this fault system and are developed in Permo-Triassic tuff as host rocks. The alteration zones are zones of argillization accompanied by silicification, and while there is some difference in the strength of silicification, the alteration zones are classified into weakly acidic to neutral alteration zone, that is, sericite+quartz zone; sericite+kaolinite ± quartz zone; sericite+montmorillonite ± kaolinite ± quartz zone; montmorillonite±kaolinite zone; weak or no alteration zone and display a zonal structure. The mineral occurrences are the area where quartz veins are accompanied by these alteration zones or strongly silicified altered rocks. The strongest alteration zone spread along the NE-SW fault on the south side of the detailed zone. It is made up mainly of sericite+quartz zone accompanied by strong silicification, and here in the assey analysis, values of Au=5.6g/t, 1.0g/t were obtained.

The alteration zone which is distributed from Line F to the starting point - 1000m point on Line M is observed to have a zonal structure, with a central zone of sericite+quartz followed by a sericite+kaolinite ± quartz zone and a sericite+montmorillonite ± kaolinite ± quartz zone. Overlapping this alteration zone, geochemical anomalies in Au, As, Sb and Hg, suggesting the stongest gold mineralization, are observed in the whole of the Survey Area. In the geophysical survey, this corresponds to the border area between the high resistivity zone in the western part of the detailed survey zone and the low resistivity zone on the eastern side. Anomalous values in Au, As and Sb are distributed from Line J to the starting point - 500m point on Line M; in the surface area there occurs a low resistivity zone and at a depth of 100m-300m a high resistivity zone which thought to be a silicification zone; and it is anticipated the occurrence of gold. An anomaly zone of Hg and As, suggesting the mineralization halo of the upper part of hydrothermal deposits, occurs from Line E to Line M along the resistivity discontinuous line(the border area between basement rock and tuff) of the geophysical survey. From Line E to Line I and from Line J to Line M there is a difference in the structure of resistivity in the lower part, but gold mineralization are expected where a low resistivity zone shifts to a high resistivity zone.

Also, anomalous values in Au, As and Hg continue southwards from the starting point of Line I, and in this area also the existence of a silicified zone accompanied by gold mineralization is anticipated.

Since the boiling phenomenon is observed and the homogenization temperature of fluid inclusion near the surface seems to be low, at 150℃, there is a very strong possibiility indeed that the center of the gold mineralization effect is still further down, and that deep down there is a quartz vein and silicified zone accompanied by gold.

1-2-2 Recommendation for the Third Phase Survey

There is a strong possibility of the presence of gold mineralization in the lower part of the anomaly zone in Hg and As along the resistivity discontinuous line and the high resistivity zone accompanying the comparatively shallow zone of anomaly in Au, As and Sb extracted in the Survey this year. Next year it is desirable that a survey be made of the mineralization condition and of alteration through a drilling survey in the lower parts of each anomaly zone, and the presence or otherwise of gold mineralization be confirmed.

1-3 Outline of the Third Phase Survey

1-3-1 Objective of the Survey

The objective of the survey is to find new deposits through clarifing the setting of geology and mineralization in the Chaing Khong, Doi Chong, Ratchabri Area,the Kingdom of Thailand.

It also intends to transfer the technology to the Government of the Kingdom of Thailand through the survey.

1-3-2 Survey Area

Among the extracted areas as promising region from the result of the first phase survey, Upper Huai Nam Sala Area, which is located in the northest part of Chaing Khong area in the northern part of the Kingdom of Thailand as shown in Fig. I-1-1, is the survey area of the second phase.

The Chiang Khong area is situated 20 km east of Chiang Rai, the northernmost city of the Kingdom of Thailand and it covers an area of 700 km^2 and is approxisimetly 50 km at its longest side and 18km at its shortest side. Administratively it belongs to the Chiang Rai province. The Upper Huai Nam Sala Area is located in the northen part of Chaing Khong area, about 40 km northeast of Chaing Rai. This area has an extent of 40 km^2. The detailed survey zone where geophysical and detailed geochemical survey has done is situated in the northern part of the Upper Huai Nam Sala Area and it covers 4.4 km^2. National highway Route 1 runs from the capital of Bangkok to Chiang Rai and it takes about 12 hours to cover the distance of 820 km by car. There are also 4 return flights a day between Chiang Rai airport and Bangkok (flight time: 1 hour 20 minutes) and 2 return flights a day to Chiang Mai (flight time: 40 minutes). A paved road runs from Chiang Rai to the survey area and takes about one hour.

1-3-3 Contents of the survey

To extract the prospecting area of mineralization in more detail, two holes of drilling survey and associated laboratory tests have been implemented in this area. The contents and quantities are shown in Table.I-1-1.

Table I-1-1 Contents of Survey

(1) Drilling Survey

Item	Hole No.	Direction	Inclination	Length
Core Drilling	MJTC-1	N90° E	-45°	300.10m
	MJTC-2	S75° E	-45°	454.60m
Total				754.70m

(2) Laboratory Works and Ore Assay

Contents	Item	Quantity
Laboratory Works	Rock Thin Section	6 pieces
	Ore Polished Thin Section	5 pieces
	X-ray Diffration Test	52 pieces
	Homogenized Temperature of Fluid Inclusion	11 pieces
Chemical Analysis	Ore Assay	
	Au,Ag,Cu,Pb,Zn	42 pieces

1-3-4 Memmbers of the Survey Team

Japan

Coordination and Planning

Katsutaka NAKAMURA		Metal Minig Agency of Japan, Bangkok
Yoshiaki IGARASHI		Metal Mining Agency of Japan

Drilling Survey

Hiroyuki TAKAHATA	Geologist	Nittetsu Mining Consultants Co.,Ltd

Thailand

Coordination and Planning

Suvit Sampattavenija		Dept. of Mineral Resources
Phairat Suthakorn		Dept. of Mineral Resources
Peerapong Khuenkong		Dept. of Mineral Resources

Drilling Survey

Phureewat Jenrungroj	Geologist	Dept. of Mineral Resources
Yodying Manoi	Geologist	Dept. of Mineral Resources
Wicharn Mungkhun	Geologist	Dept. of Mineral Resources

1-3-5 Period of the Survey

Drilling Survey: from September 30, 1996 to January 18,1997

CHAPTER 2 GEOGRAPHY

2-1 Topography

The Chiang Khong area is situated in the very north of Thailand near the border with Myanmar and Laos and occupies part of the basin between the mountains which has developed in the upper reaches of the Mekong River. The basin forms flat land at an altitude of around 400 m with mountains rising 800 to 900m in the center. The form of the basin reflects the form of the surrounding mountainous area which reaches altitudes of 1,000 to 1,800m, extending NNE-SSW from the Mekong River to the middle of the basin and bending in the southern half to run in a N-S direction. The principal rivers flowing northwards on the west side of the central mountainous region are the Nam Mae Lao and Nam Mae Kok, and on the east the Nam Mae Ing. Chiang Khong Area covers the central mountainous region located in the north of the sedimentary basin. The mountains extend in a NNE-SSW direction parallel to the structure of the basin.

The survey area, Upper Huai Nam Sala Area, is situated in the northern part of Chiang Khong Area. From central to northern part of this area, mountains have ridge lines extending in a NNE-SSW and a ENE-WSW direction. As the mountains are composed of sedimentary rocks, andesite and rhyolite, they have relatively steep gradients and have been deepened by the deep-cut valleys. On the other hand, from western to southern part of this area, mountains are composed of mainly tuff, and they are steadily eroded and display gentle-sloping mountains.

The river system that flows parallel to the direction of the mountains and the system that crosses it perpendicularly are well developed and show an overall grid pattern.

2-2 Climate and Vegetation

Northern Thailand, including the Chiang Khong area, is situated inland and is not greatly affected by monsoons, but it belongs to the tropical savanna climatic zone and is affected by the northeast monsoons in winter.

Winter lasts from mid-October to mid-February in the Chiang Khong area. During this time the weather is dry and the lowest temperature drops below 10℃. March to mid-May is the hottest time of the year (summer) when the monsoons abate and the highest temperature sometimes exceeds 40℃.

From mid-May to the end of October is the rainy season which is influenced by the southwest monsoons, and over these six months the rainfall reaches 1,000 to 1,500mm.

In the Chiang Khong area only a few tropical evergreen rain forests remain on the tops of the mountains, and at the foot of the mountains land is increasingly being cleared and turned into farmland or deciduous forests. The plains and broad alluvial land between the mountains are being cultivated as fields.

CHAPTER 3 Summary of the Results of the Survey

Two holes were bored to check whether there was any mineralization at a lower level of the low resistivity zone that continues to a deep level and the Hg and As geochemical anomaly zones along the derivative fault on a N-S trend, considered promising from the results of the surveys in the previous two years.

(1) Hole MJTC-1 (Drilling length 300.10m, drilling direction N90° E, incline angle -45°)

It is composed of Permian sedimentary rock and Permian-Triassic basalt-andesite dikes that intrude into it. The dikes intrudes parallel to the bedding-schistosity of the sedimentary rock.

Quartz - chlorite - sericite - ankerite - calcite assemblage of alteration is clearly developed in the dikes and surrounding sandstone, and it is accompanied by extensive pyrite dissemination. Final quartz-calcite veins have developed across the alterations, but they are not accompanied by pyrite. According to the results of ore assay, both Au and Ag were below the detection lower limit in all the samples. Values of Pb=55-315ppm and Zn=75-305ppm were obtained at depths of around 93-103m and 131-150 where pyrophyllite is involved in the mineral assemblage mentioned above in X-ray diffraction tests.

(2) Hole MJTC-2 (Drilling length 454.60m, drilling direction S75° E, dip angle -45°)

Like MJTC-1, up to a depth of around 347m there is composed of Permian sedimentary rock and Permian-Triassic basalt-andesite dikes that intrude into it. The dikes also intrudes parallel to the bedding-schistosity of the sedimentary rock. Permian-Triassic andesitic-basaltic tuff and tuff breccia are distributed at a depth of over 347m to bottom of hole. These and the Permian sedimentary rock are presumed to be contacted to the fault. The tuff breccia layer seen at the lowest level has undergone propylization characterized by chlorite-albitization.

There is clear alteration mineral assemblage of quartz - chlorite - sericite - ankerite - calcite in the vicinity of the fault where the dikes and surrounding sandstone, sedimentary rock and tuff come into contact at a depth of 347m, and in the sedimentary rock at a depth of 128-168m. As with MJTC-1, extensive pyrite dissemination is seen in the alteration zone. Final quartz-calcite veins have developed across the alterations, but they are not accompanied by pyrite also.

According to the results of ore assay, both Au and Ag were below the detection limit in many of the samples, but gold prospects were confirmed with values of Au=.08-0.34g/t and Ag=0.2-1.8ppm at depths of 255-275m and 340-374m where pyrophyllite is involved in the mineral assemblage mentioned above in the X-ray diffraction tests. At the same time, the samples also show high values for Hg, As and Sb.

CHAPTER 4 Comprehensive Discussion

As a result of the drilling survey, it was confirmed that hydrothermal alteration and extensive pyrite dissemination had occurred along the reverse fault on a N-S trend bordered by Permian sedimentary rock and Permian-Triassic volcanic rock.

In these hydrothermal alterations, the dikes and surrounding sandstone, sandstone breccia in the slumping sediment, etc. have undergone argillization and pyrite dissemination due to hydrothermal solution rising along the basalt-andesite dikes intruding into the sedimentary rock or along the fault. Although the assemblage of quartz - chlorite - sericite - ankerite - calcite vary slightly in strength, they occur virtually uniformly in the alteration areas, and no extensive additional silicification or obvious development of quartz veins such as is seen in the vicinity of hydrothermal vein-type deposits is apparent. Extensive pyrite dissemination zones are formed accompanying the alterations, but from the results of ore assay it was judged that most of the disseminations have low concentrations of gold, silver, copper, lead and zinc. As such alteration and mineralization take place uniformly over the whole hole, unlike the center of mineralization where hydrothermal solution circulates along the cracks and forms veins, it is likely that highly porous volcanic rocks and sandstone have alternated under conditions where steam prevailed in the surrounding area, and the center of mineralization is somewhere else.

The anomaly values of Au, Ag, Pb and Zn that were detected by ore assay are seen in places where pyrophyllite is present in pyrite dissemination zones accompanying quartz - chlorite - sericite - ankerite - calcite alteration. As Hg, As and Sb show high values at the same time in this anomaly zone, it is presumed that alteration accompanied by pyrophyllite caused these anomaly values. The conditions under which pyrophyllite and ankerite are formed differ greatly, but no data concerning the process of their formation has been obtained.

Considering that alteration of pyrophyllite frequently accompanies the activity of intermediate and acidic rock, it is likely that the center of mineralization in this area is in the alteration zones where rhyolite is distributed, located on the southeast side of the present survey position, or in the shallow high resistivity zones accompanied by Au geochemical anomaly zones distributed in the vicinity of the base line in the detailed survey zone.

CHAPTER 5 Conclusions and Recommendations

5-1 Conclusions

In the third year of the survey, 2 holes were drilled in places where gold mineralization was anticipated in the deep zone, and mineralization of a maximum 0.34g/t of gold were obtained.

There is a fault on a N-S trend bordered by Permian sedimentary rock and Permian-Triassic volcanic rock in the survey area, and a reverse fault has been formed where the volcanic rock distributed on the east side has subsided in relation to the west side.

From the results of the present survey, it is clear that the Permian-Triassic volcanic rock along the fault has intruded into the sedimentary rock as dikes, and the dikes and surrounding sedimentary rock have undergone quartz - chlorite - sericite - ankerite - calcite alteration to such an extent that distinction of the original rock is no longer possible, along the dikes and the old fault which is thought to control the dikes, and it was confirmed that this is where large-scale hydrothermal activity took place. Accompanying this alteration, extensive pyrite dissemination was alternately formed in network and vein-like form, but the prospect of useful metals such as Au, Ag, Cu, Pb and Zn is extremely small.

However, in places where pyrophyllite is confirmed in the alteration, anomaly values of Au, Ag, Pb and Zn are detected.

With regard to the nature of the alteration, the whole alteration area has undergone uniform alternation, and no proof was obtained that mineralization had occurred where hydrothermal solution repeatedly circulated along the cracks and formed veins in the vicinity of where drilling survey was conducted.

From this it can be seen that hydrothermal activity accompanied by gold mineralization exists in the vicinity of the two drilling holes in the present survey, but judging from the analyzed values, the condition of the alteration and the state of development of the veins, there is little possibility of the existence of mineralized zones that could be linked to mining development in this area.

5-2 Recommendations for the Future Survey

As a result of the drilling survey, hydrothermal activity accompanied by mineralization of gold and silver has at least been confirmed, and the possibility has been raised of the center of the mineralization being somewhere in this alteration zone.

Judging from the chemical properties of the rock, the alteration and the results of the geochemical survey, it is likely that calc-alkalic hornblende andesite and rhyolite that was active at the end of the period caused gold mineralization in the Permian-Triassic volcanic rock, and there is thought to be scope for prospecting where they are distributed at the eastern tip of the Huai Nam Sala area that extends south from east of the survey positions in the third year of the survey.

In future it will be necessary to reexamine the alteration zones and geochemical anomaly zones in the vicinity of the detailed survey base line in shallow places that appeared promising in the second year of the survey, and in the region further east where rhyolite is distributed, and to confirm whether there is any prospect of gold at a lower level.

Finally, gold mineralization accompanying large-scale hydrothermal alteration zones, such as that found in the present survey, has not been known in Thailand until now. It is possible that this is a special place, but the Lampang-Phrae volcanic belt extend as far as Laos and several places in the same parallel geological belt have not been adequately surveyed yet. Due consideration must be given to this type of deposit too when pursuing future prospecting.

PART II DETAIL DESCRIPTION

CHAPTER 1 DRILLING SURVEY

1-1 Object of Survey

The purpose of the drilling survey was to check for gold mineralization at a lower level of the Hg and As geochemical anomaly zones where a low resistivity zone continues to the deep zone, in a promising region selected according to the results of the survey carried out in the second year.

1-2 Content of Survey

In the drilling survey, two holes, MJTC-1 and MJTC-2, were bored at two drilling sites. The drilling length of each hole was 300.10m for MJTC-1 and 454.60m for MJTC-2, making a total of 754.70m. About 120 test samples were collected from the two survey holes for use in ore assay, X-ray diffraction tests, grinding of fragments and measuring the homogenization temperature of fluid inclusions.

The drilling machines and wear parts used in the drilling work are shown in Table II-1-1 and Table II-1-2, and the drilling process and drilling performance for each hole are shown in Table II-1-3 and Table II-1-4.

The holes were drilled with diameters of PQ, HQ and NQ as shown in the drilling performance table, and a core recovery rate of over 95% was achieved. Drilling efficiency fluctuated according to the geological conditions during drilling and was extremely low in the argillized and brecciared zones which were particularly fragmented, but the drilling efficiency for each hole was 10.72m/total number of working days for MJTC-1 and 16.84m/total number of working days for MJTC-2. The cores that were collected were stored in the core warehouse of the Chiang Mai Branch of the Department of Mineral Resources.

1-3 Period of Survey

The field survey was conducted from 30 September 1996 to 18 January 1997, during which time drilling was carried out from 21 November 1996 to 10 January 1997.

According to the initial work plan, drilling was scheduled to begin on 15 October 1996 and be completed by the middle of December, but during final discussions with the Chiang Rai Branch of the Forestry Bureau after arriving in Thailand, it emerged that the planned drilling positions were located in a tightly controlled area (1A) under environmental laws (law protecting forests for water resource development) (Fig. II-1-1, II-1-2), and it was necessary to reapply for permission to prepare the drilling sites and repair the road. As a result, work was delayed for about 1 month. In addition, a condition was attached whereby there was to be no damage to the mountainside and the drilling positions had to be moved to the valley.

Thailand's primary policy is to protect its forests and secure forests for water resource development, so similar problems may arise in future. In the event of future surveys, it is essential

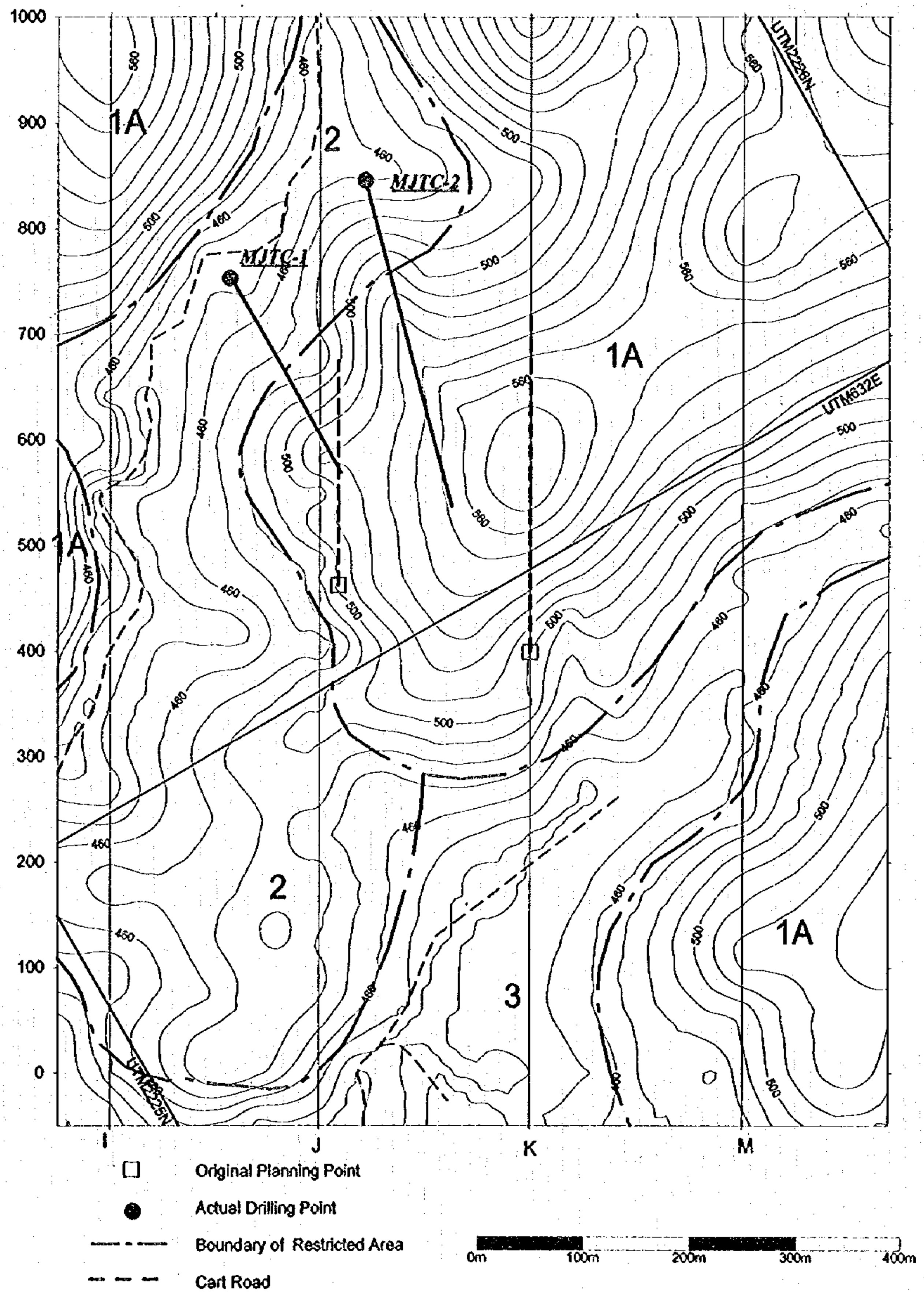


Fig. II-1-1 Location Map of the Drilling site

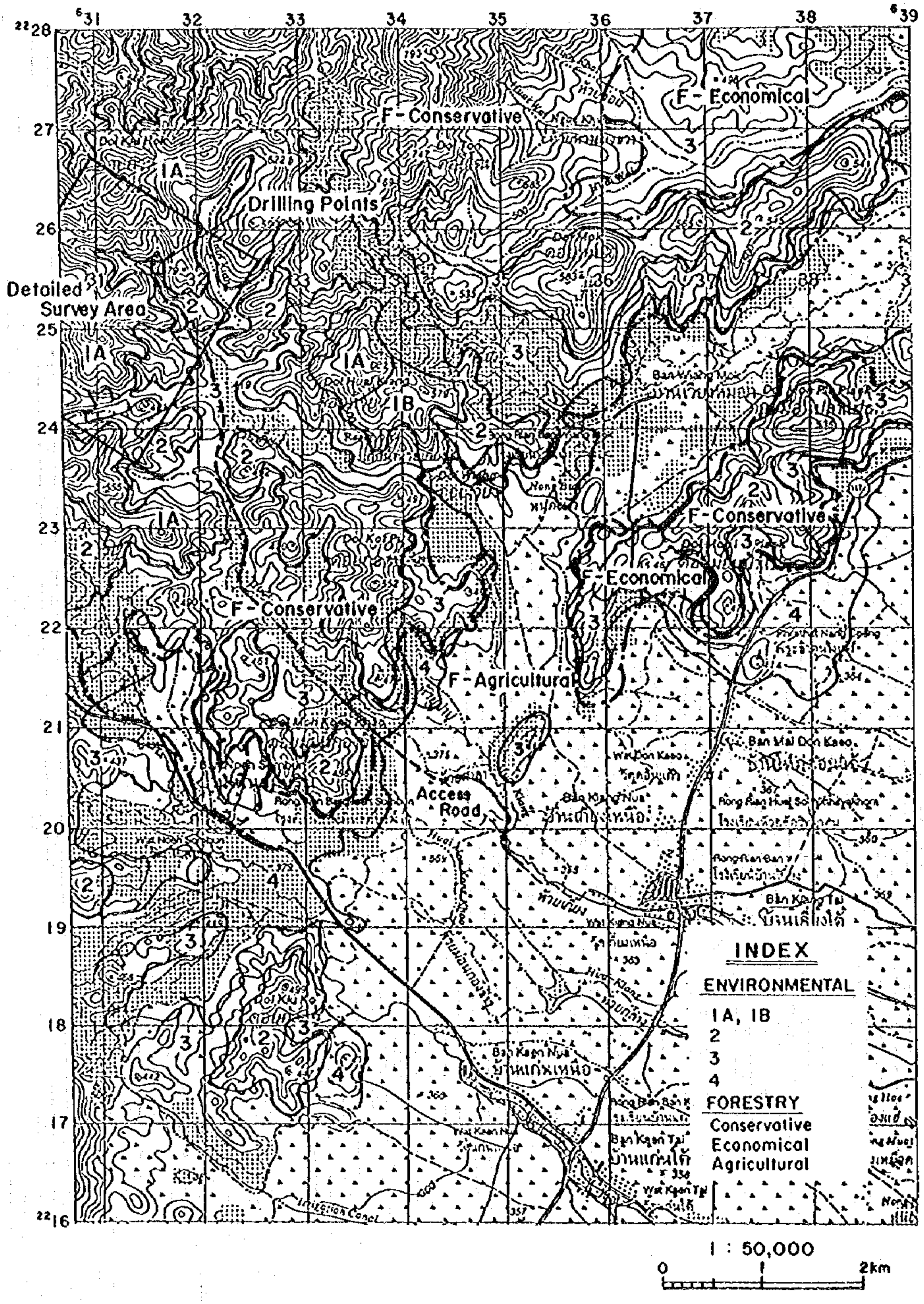


Fig. II-1-2 Protection Area of the Environment and Forestry Law

Table II-1-1 Equipment of Drilling Survey

Item	Model/Spec.	Quantity	Remarks
Drilling Machine		1	
Drill Rig	VK-600		Vilkens Keo(Australia) Max HQ600m
Engine	Detroit 471		Detroit(USA) diesel 133HP
Mud Pump	Bean Royal 435		Rexroth(Australia) 30gal/min
Mud Mixer	attached VK-600		Vilkens Keo(Australia)
Supply Pump	LO614	1	FMC corporation(USA)
Drilling Rod	PQ	15	3.05m/rod
	HQ	80	3.05m/rod
	NQ	150	3.05m/rod
Core Barrel Assembly	PQ	2	3.00m(core length 2.80m)
	HQ	2	3.00m(core length 2.80m)
	NQ	2	3.00m(core length 2.80m)
Casing	PW	3	3.05m/rod
	NW	17	3.05m/rod

Table II-1-2 Articles of Consumption during Drilling Survey

Item	Spec.	Total	MJTC-1	MJTC-2
Metal Crown	5"1/2	1	0.5	0.5
Diamond bit	PQ	2	0.5	1.5
	HQ	5	1.5	3.5
	NQ	5	1.5	3.5
Limer	PQ	1	0.5	0.5
	HQ	3	1	2
	NQ	3	1	2
Casing Shoe	PW	2	1	1
	HW	1		1
	HQ	4	1	3
Bentonite	Kg	1697	466	1231
Quick Trol	Kg	163	39	124
Ploymer	Liter	411	136	275
Diesel oil	Liter	6918	3354	3564
Core box	Box	152	63	89

Table II-1-3 Program of Drilling Survey

Items	1996 September						1996 October																						
	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Road & Site Preparation																													
Mobilization & Set up					Road repairing and reconstruction from Ban Kiang to detailed survey area																		Waiting the survey permission from						
Drilling						←	Start of Survey																						
Demobilization																													

Items									1996 November																				
	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Road & Site Preparation																													
Mobilization & Set up	the Foresty Department															Road & Site making to MJTC-1								Site repairing					
Drilling																													
Demobilization																													

Items										1996 December																			
	22	23	24	25	26	27	28	29	30	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Road & site Preparation																								rearranging site					
Mobilization & Set up												Road repairing & site making of MJTC-2																	
Drilling																													
Demobilization					MJTC-1, 300.10m																								

Items												1997 January																	
	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Road & Site Preparation																													
Mobilization & Set up																													
Drilling																													
Demobilization		MJTC-2, 454.60m																											

from Dec 30 to Jan 3: new year's holiday

Table II-1-4 Summary of Drilling Activity

MJTC-1	Period	Total Turns	Working Turns	Day Off Turns	Turn Worker	Days
Mobilization	11/15~11/21	20	6	14	36	6.66
Drilling	11/21~12/14	52	31	21	160	21
Demobilization	12/14	1	1	0	10	0.34
total	11/15~12/14	73	38	35	206	28
Depth Planned	300.00	(m)	Drilling Speed	14.29 (m/ drilling day)		
Depth Drilled	300.10	(m)		10.72 (m / total working day)		
Core Length	295.20	(m)	Casing	9.00 (m) PW CP		
Core Recovery	98.37	(%)		42.00 (m) HW CP		
Almost turns in drilling are working 12 hours				228.00 (m) HQ Rod		

MJTC-2	Period	Total Turns	Working Turns	Day Off Turns	Turn Worker	Days
Mobilization	12/15	1	1	0	8	0.34
Drilling	12/15~1/10	70	65	5	236	24
Demobilization	1/10~1/12	8	8	0	20	2.66
total	12/15~1/12	79	74	5	264	27
Depth Planned	450.00	(m)	Drilling Speed	18.94 (m/ drilling day)		
Depth Drilled	454.60	(m)		16.84 (m / total working day)		
Core Length	447.95	(m)	Casing	1.50 (m) PW CP		
Core Recovery	98.54	(%)		51.00 (m) HW CP		
From 12/31 to 1/3 new years holiday				280.50 (m) HQ Rod		

that prior studies and negotiations are conducted.

1-4 Survey Results

The geology, detection of mineralization and ore grades are described below. The columnar section is drawn to a scale of 1:200 and is appended at the end. The geologic cross-section is shown in Fig. II-1-3 and Fig. II-1-4. As for the apparent dip in the bedding (schistosity), intrusion plane, veins, etc. shown on the columnar section, the dip that is parallel to the drilling direction is taken as 0° and the perpendicular dip as 90°.

1-4-1 Hole MJTC-1

This hole has a drilling direction of N90° E, a dip angle of -45° and a length of 300.10m.

The soil from the surface to a depth of 3.30m is orange laterite and contains small rounded pebble to cobble of shale and altered tuff breccia from a lower level.

Permian sedimentary rock is distributed between a depth of 3.30 and 77.20m, and shale, sandstone, and alternate shale and sandstone layers are repeatedly seen. The shale has a well developed slate cleavage. Compared with the bedding where it alternates with sandstone, the cleavage has developed virtually parallel to the bedding. The bedding and/or schistosity in this sector is 40°-65°.

Dikes of intensely altered plagioclase porphyritic basalt intrude at depths of 53.20-54.50m and 60.70-62.05m, and the intrusion plane is parallel to the bedding plane.

With the exception of an extremely small section, the sedimentary rock in this sector is unaltered. At depths of 25.70-26.85m, 39.50m and 50.80m, the shale in the vicinity of the quartz-carbonate veins has been silicified, argillized (chlorite, mica) and carbonatized (mainly ankerite). Alteration in basalt is the same as in sedimentary rocks.

Permian sedimentary rock prevails at a depth of 77.20-131.70m, and intrusion of basalt and andesite is seen. Compared with the upper sector, the intrusive basalt and andesite dikes are wider and pyrite dissemination is seen throughout the sector. The bedding and/or schistosity of the sedimentary rock is virtually uniform at 40°-45°, but intruded boundary of dikes that are both parallel and slightly inclined to 60° are seen. The sedimentary rock is generally not altered to the naked eye, but silicification and carbonatization are seen on the hanging wall side of the altered andesite and in sandstone-bearing foliated shale. The andesite shows clear silicification, argillization (mainly chlorite), and carbonatization (calcite, ankerite). Pyrite is disseminated along the slate cleavage in the mudstone and at scattered points in the sandstone and andesite, but it forms a marbled vein-type dissemination zone at 45° at 100-103m.

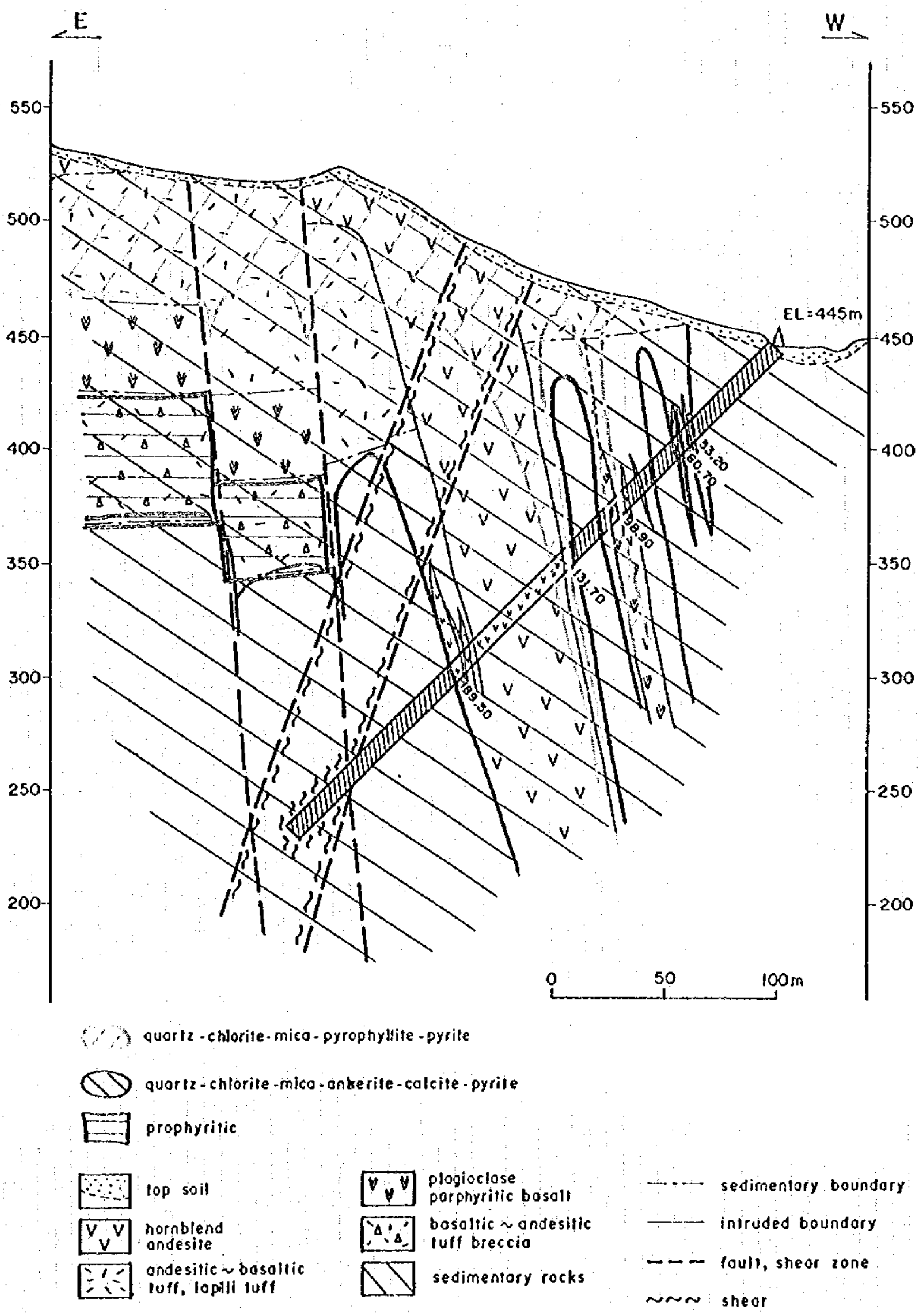


Fig. II-1-3 Geologic Profile of MJTC-1

Altered andesite is distributed at a depth of 130.70-200.30m. There are interbeded of shale, 0.5-3.5m wide. As the andesite has autobrecciared in parts, it is likely to be lava. As the boundary area has frequently been brecciared or crushed by new fault activity, the relation between the andesite and the slate in between is not clear, but judging from the fact that the slate is unaltered although there is clay in between and the andesite has been altered, it is likely that it is related to the fault. The andesite has undergone intense alteration overall, and silicification, argillization (chlorite, mica) and carbonatization (ankerite> calcite) are seen. Silicification is the strongest at 155-178m, gradually weakening in the lower part. Argillization and carbonatization grow stronger in the lower layers as silicification becomes weaker. The pyrite dissemination zone forms a marbled vein-type dissemination zone and has frequently developed at 45°. The dissemination zones are clearly developed immediately in both side of the intensely silicified zone.

Shale that has a slate cleavage, massive sandstone and shale containing a lot of sandstone fragments that extends in the direction of the schistosity (slumping sediment?) are repeatedly distributed between a depth of 200.30m and 300.10m. From around a depth of 268m to the bottom of the hole, the soil has undergone conspicuous fragmentation and there has been brecciation and argillization, and the outer shape of the core can no longer be seen. Mineralization and alteration are not seen apart from extremely small pyrite dissemination in the sandstone breccia at a depth of 229.65-229.75m.

Quartz-carbonate minerals (-chlorite) veins between 5mm and 20cm wide are seen throughout the entire hole. They appear at a frequency of 4 or 5 veins over 10m, and the prevailing direction of the veins is 0-10°, 40-60° and 80-90°. Apart from the veins that lie in the altered adesite at a depth of 130-140m, there is no accompanying pyrite.

18 samples were collected for ore assay. When they were analyzed, all the samples showed Au<0.07g/ton and Ag<1ppm or 1ppm. Values of 15-105ppm, 40-315ppm and 75-305ppm were obtained for Cu, Pb and Zn respectively in the pyrite disseminated part of the altered andesite at depths between 95m and 155m.

5 samples were analyzed for the homogenization temperature of fluid inclusion. Expecting F-3, almost of Temperature is distributed from 140 to 150℃. Inclusions of F-3 and a part of F-2 show around 200℃.

1-4-2 MJTC-2

This hole has a drilling direction of S75° E, a dip angle of -45° and a length of 454.60m.

From the surface to a depth of 3.25m, it is orange-colored laterite silt and it contains round

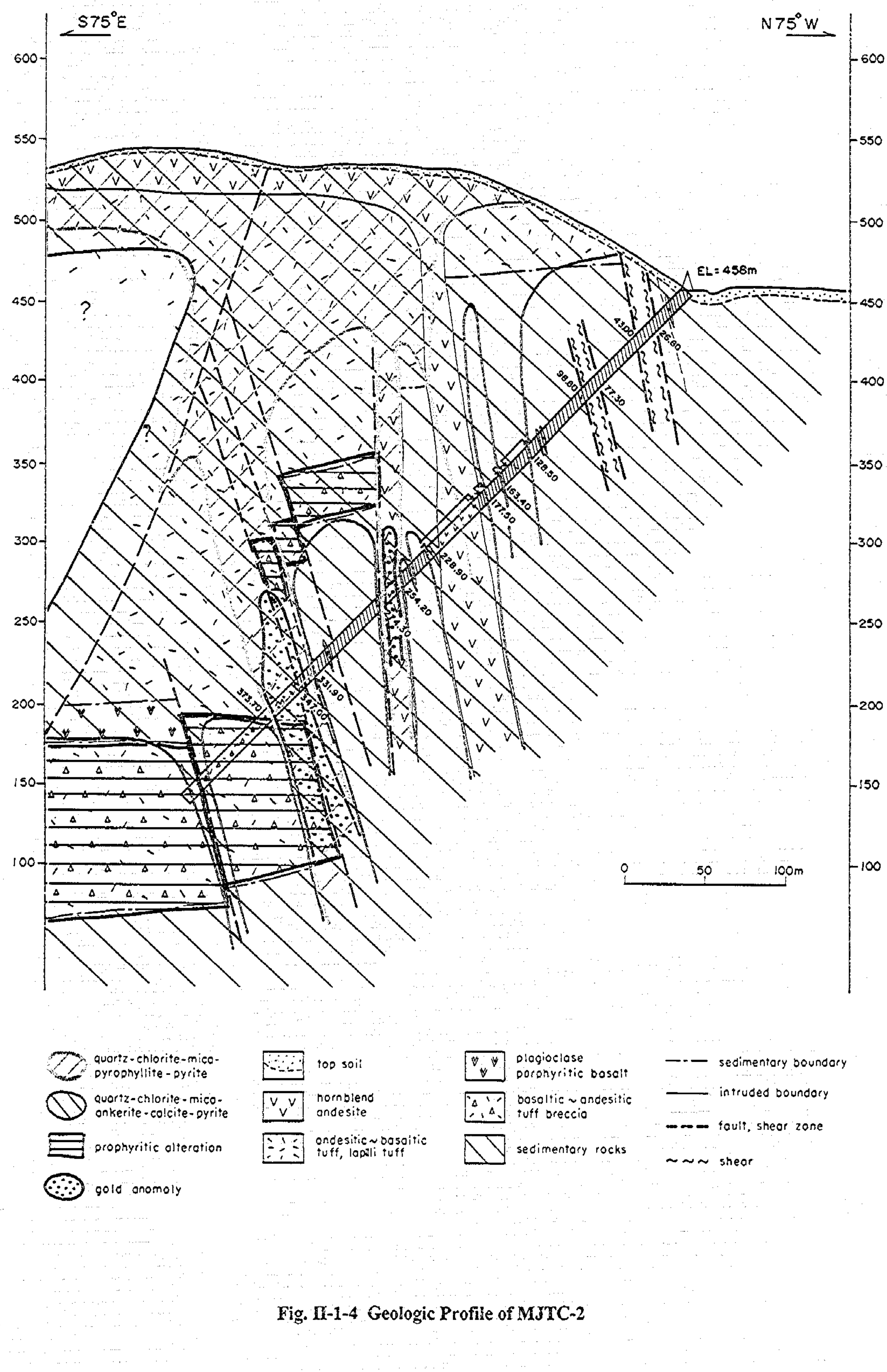


Fig. II-1-4 Geologic Profile of MJTC-2

green andesite boulders of a maximum 1m in size.

Between depths of 3.25m and 128.25m, there is repeated distribution of shale that has developed a slate cleavage, massive sandstone, massive calcareous shale containing fossils, schistose shale containing a lot of lens-shaped sandstone fragments, and alternationg of shale and sandstone. Intensely altered andesite dikes intrude at depths of 13.50-15.25m and 94.20-95.10m. Between depths of 3m and 11m, 25m and 43m, and 77m and 99m, it has been intensely crushed, and pulverization, argillization and brecciation are conspicuous. The schistosity or bedding of the sedimentary rock is 10-30° up to a depth of about 50m, but 40-60° over 50m. The intruded boundary of the andesite is parallel to the schistosity.

In the parts that have not been crushed, 5 or 6 veins of quartz-carbonate minerals vein have developed over 10m. Most of these veins have developed in the direction of 60-75° and 80-90°.

Hardly any signs of alteration are seen in the sedimentary rock, but the andesite dikes have undergone alteration to the extent that the groundmass texture of the original rocks can no longer be distinguished. The altered minerals that were detected are quartz, chlorite, mica minerals, calcite and ankerite.

In addition to distributions of sandstone, alternate layers of sandstone and shale, shale, and shale containing lens-shaped sandstone fragments in the sector between depths of 128.25m and 187.40m where sandstone prevails, andesite dikes intrude into the upper levels at 128.25-129.10m and 131.80-132.80m. The bedding or schistosity is 50-60° up to a depth of 150m, and 40-50° over 150m. The intruded surface of the andesite is parallel to the bedding.

The andesite dikes have been altered, and in addition the sandstone and part of the shale have undergone alteration and pyrite dissemination. The altered minerals are mainly quartz, chlorite, mica minerals and ankerite, and the ankerite disappears in the parts where there is strong silicification. Silicification cuts across the alterations. The quartz-carbonate mineral veins are mainly calcite and no ankerite appears.

Apart from the quartz-carbonate mineral veins, quartz veins and carbonate mineral veins have also developed, and most of the veins are 30-40° in the upper levels to a depth of about 140m, and 50-70° or 90° in the lower levels.

Hornblende andesite that has undergone strong silicification accompanied by pyrite dissemination and chloritization is distributed at a depth of 187.40-226.90m. Silicification is strong overall, but calcite and ankerite also appear universally. As for clay minerals, mica minerals are seen in addition to chlorite. Pyrite is uniformly distributed at scattered in a range of 2-5%, but it accompanies narrow quartz veins that have developed in parallel at a depth of 203.60-206.50m, and it is disseminated in extremely large quantities in network or vein-like form at 209.30-209.80m.

Banded quartz-carbonate mineral veins can be seen extending in virtually the drilling direction at 215.60-217.35m. The width of the veins is 3-6cm+, and there are enriched bands of relatively fine-grained pyrite between the 3-5mm veins of quartz and carbonate minerals that run parallel, and at a glance these are observed to be ginguro.

Shale is interposed at 216.90-227.90m, and no alteration is seen in the shale itself, but narrow chlorite veins have developed in network form.

Between 228.90m and 254.20m it is composed of shale and alternation of shale and sandstone, and andesite dikes intrude at 246.50-247.60m. No alteration or mineralization are seen in the sedimentary rock. The andesite dikes have undergone silicification, argillization and carbonatization, and there is dissemination of pyrite.

Altered andesite is distributed between depths of 254.20m and 274.30m. Silicification is rather weak, and argillization and carbonatization are conspicuous. There are few cracks overall, and narrow black veins 1-2mm wide composed of carbonate minerals, graphite and pyrite have developed in network form. Concentrations of carbonate minerals-quartz veins are distributed at 269.402-270.50m and from 273 to 274m.

There is a clay fault zone 35cm wide bordering the alternating layers of shale and sandstone in the lowest part, and the two breccias have been mixed together, but only the andesite pebbles have undergone alteration.

As a result of ore assay in the pyrite dissemination zone at 269.402-270.50m, values of Au=0.08 and 0.16g/t were obtained.

Between 274.65 and 331.90m there is composed of alternating layers of shale and sandstone, shale, and sandstone, and andesite dikes intrude at 318.20-319.60m. In the uppermost part of this sector about 30m there are relatively few cracks and bedding has developed at 70-85°, and calcite-quartz veins seen at 280-290m have also developed along this structure. Below 305m there is brecciation and many cracks, and in many parts the core has no shape. Virtually no alteration or mineralization are seen in the sedimentary rock. Chlorite veins have developed, filling the cracks at 312-313m, and the surrounding part has undergone silicification.

The andesite dikes have undergone intense silicification, argillization and carbonatization, and pyrite is extensively disseminated. Values of Au=0.10g/t and Zn=120ppm were obtained by ore assay of the samples.

Alteration and pyrite dissemination are seen overall in parts where sandstone dominates at a depth of 331.90-347.00m. It is interbeded by lapilli tuff at 338.00-340.40m. Alteration tends to be strong in the lapilli tuff parts and weak in the sandstone parts, but pyrite dissemination shows the opposite tendency, becoming strong in the sandstone areas. With regard to the altered minerals, in addition to quartz, chlorite, mica minerals, calcite and ankerite, pyrophyllite is detected in the X-ray diffraction tests.

The results of ore assay in areas where pyrite is disseminated show Au:<0.07, 0.22 and 0.08g/t, and Ag: 1.0, 1.8 and 1.4ppm, and at the same time the following high values were obtained for As, Sb and Hg: As:96-390ppm, Sb:19-49ppm, and Hg:1,020-9,460ppm.

Between depths of 347.00 and 373.70m, the ground is composed of tuff and autobrecciared andesitic lava. Fine-grained tuff distributed at 347.00-350.00m has undergone intense silicification and carbonatization, but no pyrite dissemination is seen. The autobrecciared andesite areas have been intensely silicified, argillized and carbonatized, and pyrite has been disseminated overall in marbled veins at 45°. Alteration of coarse-grained tuff at the lowest level is also extremely intense, as with andesite. There is no overall pyrite dissemination, but pyrite veins have developed in parallel at 372.50-372.70m.

With regard to the altered minerals, quartz, chlorite, mica clay minerals, calcite, ankerite and pyrophyllite are seen.

The highest gold-bearing values in the present analysis were obtained in the ore assay, with Au at 0.34, 0.26g/t and Ag at 0.4 and 0.2ppm. At the same time, the following high values were also seen, As:444 and 492ppm, Sb:84 and 84ppm, and Hg:5,420 and 6,150ppm.

Between 373.70m and 454.60m (the bottom of the hole), it is composed of repetitive dark green or reddish-brown lava, and tuff breccia, and in parts it is interbeded with lapilli tuff and coarse-grained tuff that are characteristic of this area. This layer has also undergone silicification and carbonatization (calcite>>ankerite), but it has undergone propylitization which is characterized by chloritization, albitization and pyrite dissemination. It correlates to the tuff breccia layer that makes up the lowest strata of Permian-Triassic volcanic rock in the rock facies. At 443-453m this layer shows quite intense silicification and there is fairly intense pyrite dissemination in parts, but here too albitization is marked and it differs to the alteration of other layers.

The results of ore assay in the areas of intense silicification show Au<0.07g/t and Ag<0.2ppm.

The homogenization Temperature is concentrated from 170 to 220℃ excluding 2F-6. There is higher than in MJTC-1. 2F-6 in propylitic alteration has three peaks of homogenization temperature which are 150, 220, 300℃.

1-5 Summary of the Survey Results

1-5-1 Geology

The survey area is a region where Permian sedimentary rock and Permian-Triassic volcanic rock are adjoined by a fault on a N-S trend. Permian sedimentary rocks are distributed on the west side of the fault, and Permian-Triassic volcanic rock tuff is distributed on the east side, and the east side is presumed to have subsided in relation to the west side.

Drilling survey was carried out in the area where sedimentary rock is distributed on the west side of the fault into the boundary area between the sedimentary rock and volcanic rock.

The Permian sedimentary rock is composed of shale that has developed a slate cleavage, massive sandstone from fine to coarse-grained, alternating layers of shale and sandstone, schistose shale (slumping sediment) containing sandstone fragmwnts that extends in the schistosity or bedding direction, calcareous shale and tuff. The strike and dip of bedding and/or schistosity at the ground surface is N5-15° W/70-90° W. Looking at the area surrounding the shear zone and fault, in many cases the bedding or schistose plane of the drilling hole is 30-70° taking the extension direction of the core as 0°, and by comparison with structure at the surface, it is presumed to be N0-15° W/65-90° W.

As for the Permian volcanic rock, there is distribution of andesitic-basaltic tuff breccia, plagioclase porphyritic basalt, basaltic-andesitic tuff and lapilli tuff, and hornblende andesite. Basalt and andesite dikes intrude parallel to the schistosity of the sedimentary rock in the core, often at 40-60 . Plagioclase porphyritic basalt is distributed in relatively shallow places in the drilling hole (above 100m), and the veins are not very wide. Hornblende andesite between 10 and 60m wide is distributed, though there are places where it is several meters wide, and it spreads out as lava at the ridge of the survey area. Tuff breccia is distributed from a depth of around 373m to the bottom of hole MJTC-2, and it is mixed with motley dark green and reddish-brown tuff breccia, autobrecciared lava and massive lava. Similar rock facies are exposed along the main fault for about 10km in a southwestern direction from the present survey area.

The faults that have developed in this region mainly run at an inclination or parallel to the bedding and/or schistosity of the sedimentary rock, and most dipping to the west strike in a direction of N0-15° W. Development of shear zones composed mainly of fracturing action (brecciation or fault argillization) and totally unaccompanied by alteration or mineralization is seen as final fault activity.

1-5-2 Mineralization and Alteration

From the results of the drilling survey, mineralization and alteration are observed in this region, centering on the andesite dikes intruding into the sedimentary rock. When the dikes are wide, alteration and pyrite dissemination zones extend to the sedimentary rock on the hanging wall side of the dikes. Even when no dikes are seen, as at depths of 128.50m-163.40m and 331.90m-

373.40m in MJTC-2, intense alteration and pyrite dissemination sometimes occur, but it is thought that in such parts some faults developed or dikes existed close by that provided a passage for hydrothermal mineralizing solution.

With the exception of the lowest breccia tuff facies, hydrothermal alteration caused intense alteration universally in the Permian-Triassic volcanic rock, albeit varying in strength. Hydrothermal alteration and pyritization of the sandstone are marked in the vicinity of the dikes that provided a passage for hydrothermal mineralizing solution, but pyrite dissemination in the shale is only seen along the schistosity.

From the results of microscopic observations and X-ray diffraction tests, alteration by hydrothermal mineralizing solution is characterized by silicification, argillization (chloritization, sericitization) and carbonatization (calcitization, ankeritization), and most of the rocks that have undergone alteration have been alternated so much that their structure is no longer distinguishable. The alteration is accompanied by pyrite dissemination, and in addition to dissemination of fine pyrite that is seen overall, marbled pyrite dissemination zones are formed around fairly intensely silicified areas, with a maximum of 40% pyrite visible in some places.

In the above alteration and mineralization, pyrite dissemination occurs after silicification and argillization have advanced, and later ankerite crystallizes across it in veins followed by calcite, to replace the matrix between the quartz interstitially. In quartz-calcite (-chlorite) veins from the final period that cut across the altered rock and are seen in the sedimentary rock, there is rarely any accompanying pyrite, nor is any ankerite seen.

From the results of ore assay, both Au and Ag are below the detection limit (Au<0.07g/t and Ag<0.2ppm) in zones where there is extensive pyrite dissemination accompanying quartz-chlorite-sericite-ankerite-calcite alteration such as described above or in quartz-calcite (-chlorite) veins from the final period, and high values are not obtained for Cu, Pb and Zn either. On the other hand, when pyrophyllite is involved in the combination of altered minerals mentioned above, anomaly values of gold and silver and anomaly values of lead and zinc are seen. High values for Pb and Zn, Pb=55-315ppm and Zn=75-305ppm, are obtained in the vicinity of 93-103m and 131-150m in MJTC-1, while MJTC-2 shows high values of Au=0.08-0.34g/t and Ag=0.2-1.8ppm at depths of 255-275m and 340-374m. At the same time As, Sb and Hg also show high values at each point.

Alteration zones containing pyrophyllite are seen in the surveys conducted last year and this year, accompanying quartz-sericite-chlorite alteration zones that cover the top of the low resistivity zone along the fault that is the subject of this survey (Fig. II-1-5), and pyrophyllite alteration tends to be stronger in the surface than at lower levels. According to the results of the survey last year, geochemical anomalies of Hg and As are confirmed to be strong in the alteration zones, and alteration involving pyrophyllite (-sericite) is thought to have caused mineralization. Pyrophyllite is formed under conditions of extreme acidity, while sericite, calcite and ankerite are formed under neutral conditions. On the other hand, whereas alteration involving ankerite occurs

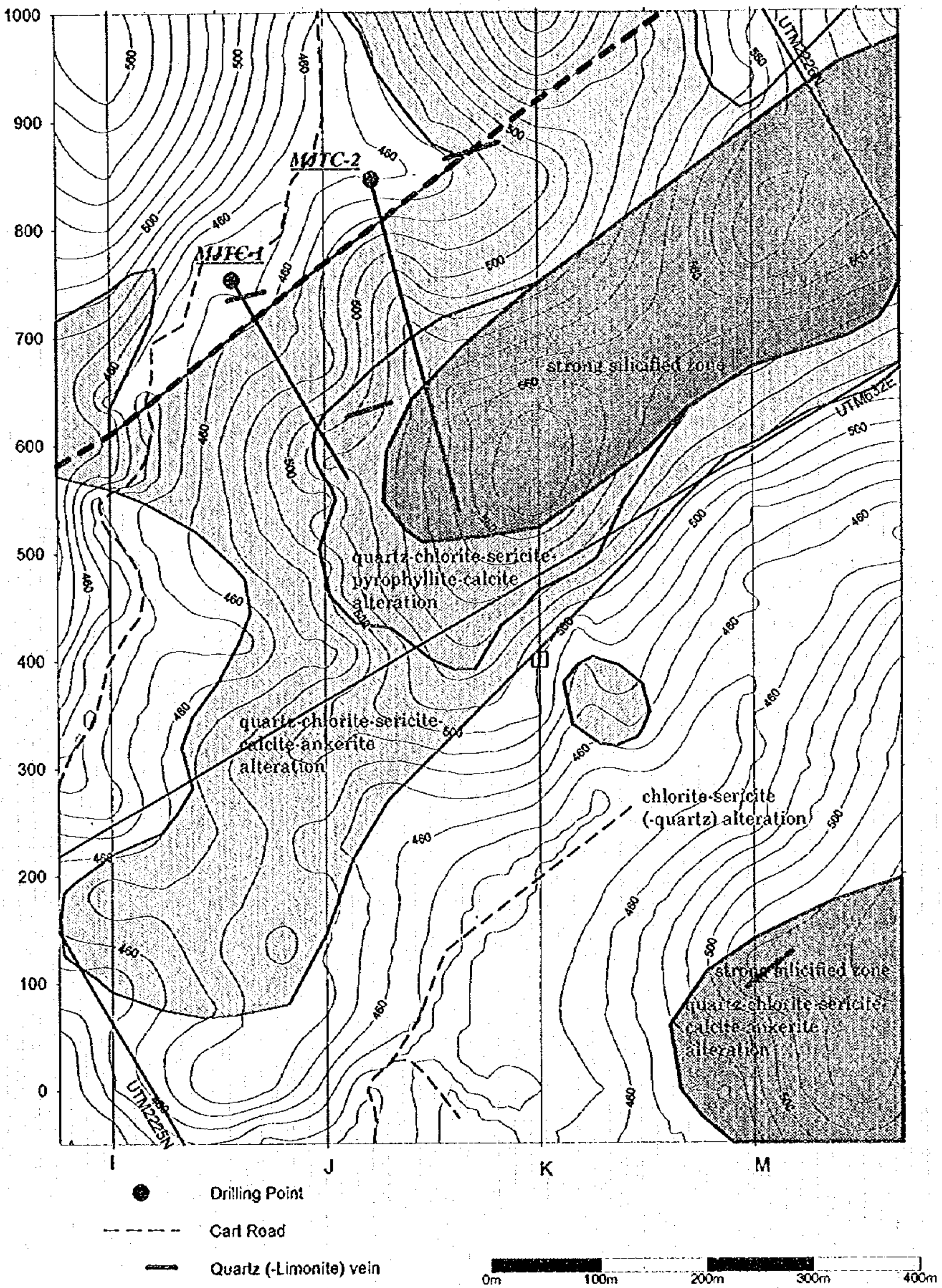


Fig. II-1-5 Alteration Map around Drilling Sites

accompanying volcanic activity of basic rock, alteration involving pyrophyllite accompanies neutral or acid activity. From this, there is thought to be more than one hydrothermal activity in this region and that they overlap to form the present alteration zone. No data has been obtained in this survey to clarify the sequence by which the alteration zone was formed, but a close relation between extensive pyrite disseminations and quartz-chlorite-sericite-ankerite-calcite alteration is seen in the results of microscopic observation.

1-6 Considerations

The occurrence of hydrothermal alteration and extensive pyrite dissemination along the reverse fault on a N-S axis bordered by Permian sedimentary rock and Permian-Triassic volcanic rock has been verified in the results of this survey. In these alterations, the dikes and surrounding sandstone, and sandstone breccia in the slumping sediment, etc., undergo argillization and pyrite dissemination due to hydrothermal solution rising along the fault or the basalt-andesite dikes intruding into the sedimentary rock. In contrast, only clots or narrow veins of pyrite have developed along the slate cleavage in the mudstone.

Alteration and pyrite dissemination occur virtually uniformly though in varying strengths, and cracks sometimes develop in the altered part. Pyrite dissemination occurs after silicification and chloritization by quartz and argillization by sericite, with ankerite and calcite finally alternating in a network form. The mineralizing solution that is left finally develops across them as quartz-calcite (-chlorite)veins.

Judging from the fact that no extensive additional silicification or clear quartz vein development such as is seen in hydrothermal deposits is observed in this area, and alteration-mineralization alternate uniformly throughout without being regulated by cracks, unlike the center of mineralization where hydrothermal circulates along the cracks to form mineral veins, it is likely that porous volcanic rocks and sandstone alternated under conditions where steam prevailed in the surrounding area.

The Au, Ag, Pb and Zn anomaly zones that were detected in this survey are seen in pyrite dissemination zones accompanying quartz-chlorite-sericite-ankerite-calcite alteration in places where pyrophyllite is involved. In neither zone is there any special characteristic to distinguish mineralization and alteration to the naked eye. As the conditions under which pyrophyllite, ankerite and calcite are formed are extremely different, it is surmised that there were at least two mineralizations, or the mineralizing solution changed from acid to neutral in the first mineralization, but no data proving this was obtained. However, whereas ankerite alteration occurs in connection with basic rock activity, pyrophyllite alteration often accompanies neutral to acidic rock activity. When this is taken into consideration, it is likely that the center of mineralization in this region is in the high resistivity zone at shallow level accompanied by Au geochemical anomaly zones distributed in the vicinity of the base line of the alteration zone and detailed survey area where rhyolite is distributed, located on the southeastern side of the present survey position.

CHAPTER 2 LABORATORY WORKS

2-1 Microscopic Observations

In order to clarify the nature and occurrence of the rocks and ore distributed in the survey holes, we prepared thin fragments and ground fragments for observation. The results are shown in Table II-2-1.

The samples that were collected have all undergone complete alternation by altered minerals and pyrite, and none of the primary rock forming minerals remain at all. A few strips of plagioclasic pseudomorph remain in the volcanic rock.

The altered minerals that are seen are quartz, chlorite, sericite, calcite, ankerite and epidote. The ore is nearly all pyrite, with geothite and chalcopyrite that have been resolved by pyrite just seen. Chalcopyrite is contained in samples thought to be volcanic rock, and from the state of its occurrence it is thought to have been contained in the samples from the start.

The results of the observation show that quartz, chlorite, sericite and pyrite are formed in close connection, and after they have been formed, carbonate minerals replace the matrix between the quartz interstitially, like a pool, producing small veins.

Idiomorphic pyrite and columnar pyrite that has relaced with hematite are seen.

2-2 X-Ray Powdered Diffraction Tests

X-ray diffraction tests were conducted to clarify the nature and distribution of alteration underground. The results are shown in Table II-2-2.

The minerals that were detected are quartz, albite, chlorite, mica-clay minerals, smectite, chlorite-sericite mixed-layer minerals, calcite, ankerite, pyrite and pyrophyllite. Mica-clay minerals are thought to be mainly sericite, but those at the top of MJTC-1 are possibly illite.

Quartz, chlorite and ankerite are detected in all sections of both holes. Calcite also appears in nearly all sections, but in areas close to where pyrophyllite appears, there is very little or it is not seen at all.

Sericite is found mainly at the bottom of MJTC-1 and in MJTC-2. Although extremely imprecise, smectite is detected at scattered points in MJTC-1.

Chlorite-sericite mixed-layer minerals prevail in MJTC-1. Pyrophyllite is only seen on the hanging wall side of the volcanic dikes and in the vicinity of faults bordered by sedimentary rock and volcanic rock in MJTC-2, but it is detected in large quantities over an extremely wide area in the surface outcrop in the mountainous region of the survey area.

Albite is detected characteristically in propylitic tuff breccia which occupies the bottom of

Talbe II-2-1 Result of Microscopic Observation

	Sample No.	No. of Hole	Sampling Depth		Rock Name	altered (gangue) mineral						opaque mineral						Remarks
						quartz	chlorite	sericite	calcite	ankerite	epidote	pyrite	hematite	Ti-oxide	chalcopyrite	sphalerite	geothite	
1	P-1		93.70	93.80	altered porphyritic basalt	◎	○	○	○	◎		◎						replacing complete, intergranular texture pseudomorph remain.
2	P-2		176.60	176.70	altered hornblend andesite	○	○	○	△	○		◎			•		○	hornblend replaced by pyrite
3	2P-1		151.35	151.70	altered sandstone	◎	○	○		△		◎	?					mafic mineral ->Fe oxide->pyrite
4	2P-2		216.50	216.60	banded quartz-calcite-pyrite vein	△			○	◎		◎						mafic mineral ->hematite-> pyrite
5	2P-3		319.10	319.20	altered andesite	◎	○	◎		○	△	◎						sericite abundant, pyrite ideomorphic
6	T-1		53.80	53.90	altered porphyritic basalt	◎	○	○	△	○		△		•	•			pyrite: fine grained, hypideomorphic
7	T-2		78.90	79.00	altered sandstone	◎	○	○	△	○		•		•	•			carbonate: very fine grained & dirty
8	T-3-1		193.60	193.70	altered andesite	○	△	○	○	○		△						
9	T-3-2		193.60	193.70	altered andesite	○	○	○		○		△			•	?		
10	2T-1		94.60	94.70	altered basalt	○	○	○	△	○		△						pyrite replacing original minerals
11	2T-2		191.60	191.70	altered andesite	◎	△	△	△	△	△	△					•	

Abbreviation ◎: abundant ○: common △: rare •: tiny ?: uncertain

Table II-2-2 Results of X-ray diffraction Analysis

	sample No.	sampling depth		detected mineral									
				quatrz	albite	chlorite	mica clay min. (sericite etc)	smectite	chlorite - sericite mixed layer	calcite	ankerite	pyrite	pyrophylite
MJTC-1													
1	X-1	25.85	25.95	◎		○	△			•		•	
2	X-2	26.50	26.60	◎		○	•			△	•		
3	X-3	39.20	39.60	◎		○	•			○	△		
4	X-4	53.80	53.90	○		○	•				○		
5	X-5	61.80	61.90	◎		○	•	?	•	△	△		
6	X-6	84.10	84.60	◎		△	•		•	○	○	•	
7	X-7	93.80	93.95	◎		○	•		•	○	○	•	
8	X-8	100.30	100.35	◎		△	•		•	△	△	•	
9	X-9	102.70	102.85	◎		○			•	△	△	•	
10	X-10	108.50	108.60	◎		△			△	○	△	•	
11	X-11	128.60	128.80	◎		△				△	○		?
12	XS-3	138.50	138.60	◎		△	•	?	△		△	△	
13	X-12	140.00	140.10	◎		○	•		△		△	•	?
14	X-13	152.30	152.40	◎		△	•		△	•	•	△	?
15	XS-2	153.60	153.80	◎		•	△		△	•	△	•	
16	X-14	159.50	159.70	◎		○			△	△	△	•	
17	X-15	180.00	180.20	◎		○	•		•	△	○		
18	XS-1	184.20	184.30	◎		△			△	•	○	△	
19	X-16	187.10	187.20	△		◎	•	?	△	•	△	•	
20	X-17	188.80	188.90	◎		△	△			•	•		
21	X-18	193.50	193.80	○		△	△				○	•	
22	X-19	291.40	291.50	◎		○	○			△	△	•	
MJTC-2													
23	2X-1	14.20	14.40	○		○	△			•	○		
24	2X-2	94.10	95.10	○		○	△			•	○		
25	2X-3	128.25	129.10	○		△	△			△	○		
26	2X-4	130.50	131.60	◎		△	△						
27	2X-5	142.00	142.10	◎		△	•				○		
28	2X-6	148.50	148.60	◎		△	△				△		
29	2X-7	160.00	160.10	◎		○				○	•		
30	2X-8	181.30	181.50	◎		○	△						
31	2X-9	188.50	189.00	◎		○				•	○		
32	2X-10	191.70	191.80	◎		△	△			△	△	•	
33	2X-11	215.60	217.35	○		△	△			◎	○	•	?
34	2X-12	225.50	225.60	◎		○	△			○	○	•	?
35	2X-13	227.90	228.90	◎		○	△		△			•	
36	2X-14	228.90	229.00	◎		◎				○	•		
37	2X-15	246.70	247.00	◎		○	△			○	○		
38	2X-16	254.20	254.30	○		△	△			•	○		
39	2X-17	257.30	257.40	○		△				•	◎		
40	2X-18	269.60	269.70	◎		○			○	△	•		
41	2X-19	273.60	237.70	◎		△				△	○		?
42	2X-20	312.50	312.60	◎		△	△			○	△		
43	2X-21	318.20	319.40	◎		○	○				○	•	
44	2X-22	338.50	338.70	◎		○	△			•	○		•
45	2X-23	347.50	347.70	◎		△				•	◎		•
46	2X-24	363.80	364.20	○		○	△			○	○		•
47	2X-25	372.50	372.70	◎		△	△				○	○	△
48	2X-26	403.00	403.20	◎	△	○	•			○	•		
49	2X-27	421.10	421.20	◎	○	○	△			○	△		
50	2X-28	448.30	448.70	◎	○	△	△			△	•	•	
51	2X-29	451.20	451.60	◎	△	△	△			•	•	•	
52	XO-1	outcrop		◎			○				△		△

Abbreviation ◎: abundant ○: common △: rare • : tiny ?: uncertain

MJTC-2.

2-3 Measurement of the Homogenization Temperature of Fluid Inclusions

Many quartz-calicite veins have been produced in the drilling core. In order to find the temperature at which these veins are formed, we measured the homogenization temperature of fluid inclusions. The results are shown in Table II-2-3, and the frequency distribution of the homogenization temperature is shown in Fig. II-2-1.

Quartz-calcite veins accompanied by chlorite and sericite are rare, but they are hardly ever accompanied by pyrite. Transparent quartz is also found very occasionally, but most veins are opaque and it is difficult to distinguish quartz and calcite with the naked eye.

Fluid inclusions only in quartz were tested. There are very small less than 10 μ m.

Homogenization temperature in MJTC-1 is concentrated 140 to 150℃ which are almost same as temperature of ground surface sample last year. Temperature in MJTC-2 is ranging from 170 to 220℃. It is slightly higher than in MJTC-1. This results is consistent with the result of X-ray diffraction test that clay minerals in MJTC-1 are well crystalized than in MJTC-2.

Table II-2-3 Homogenization Temperature of Fluid Inclusions

No.	1	2	3	4	5	6	7	8	9	10	11
Sample No.	F-1	F-2	F-3	F-4	F-5	2F-1	2F-2	2F-3	2F-4	2F-5	2F-6
Object	quartz	quartz	quartz	quartz	quartz	quartz	quartz	quartz	quartz	quartz	quartz
No. of Test	3	10	7	14	26	24	12	12	5	0	10
Average	136.3	144.3	175.3	156.5	141.5	155.1	195.4	168.0	177.2		197.2
Median	132	138	184	144	141	156	196	171	171		193
	152	186	133	145	149	146	157	169	194		142
	132	171	184	151	132	147	171	173	171		128
	125	174	218	162	148	166	178	176	197		132
		137	119	147	127	156	195	189	164		144
		108	203	139	137	162	197	204	160		246
		139	178	141	131	159	186	186			220
		121	192	145	135	168	165	173			255
		142		137	158	152	222	150			303
		129		287	133	160	219	129			166
		136		126	145	145	215	137			236
				143	146	156	214	164			
Measured				191	127	138	226	166			
data				138	140	131					
				139	139	151					
					148	176					
					151	137					
					145	164					
					146	160					
					153	156					
					142	169					
					154	188					
					140	180					
					142	127					
					135	129					
					138						
					139						

note: Liquid inclusions in 2F-5 are very small for measurement.

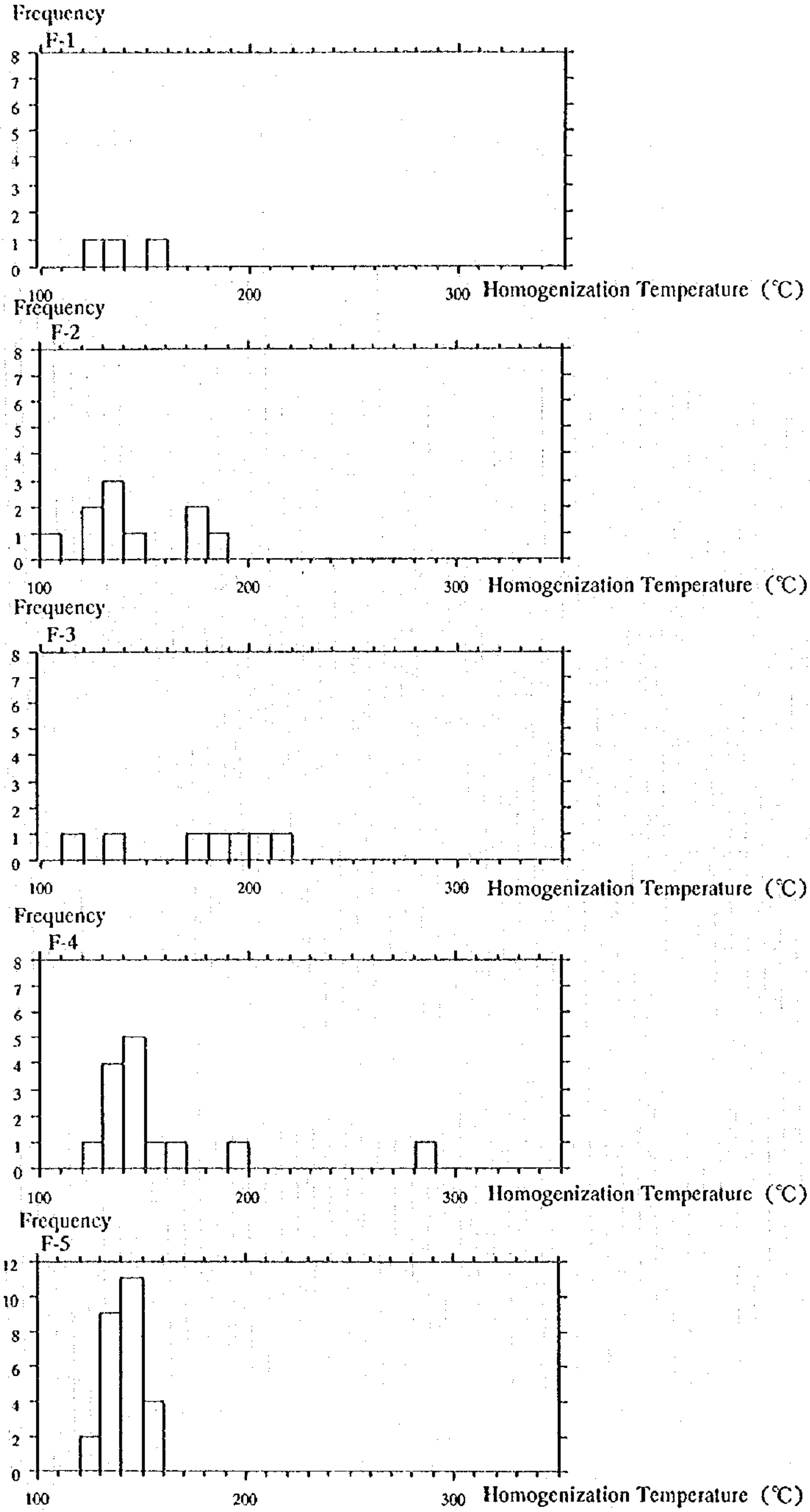
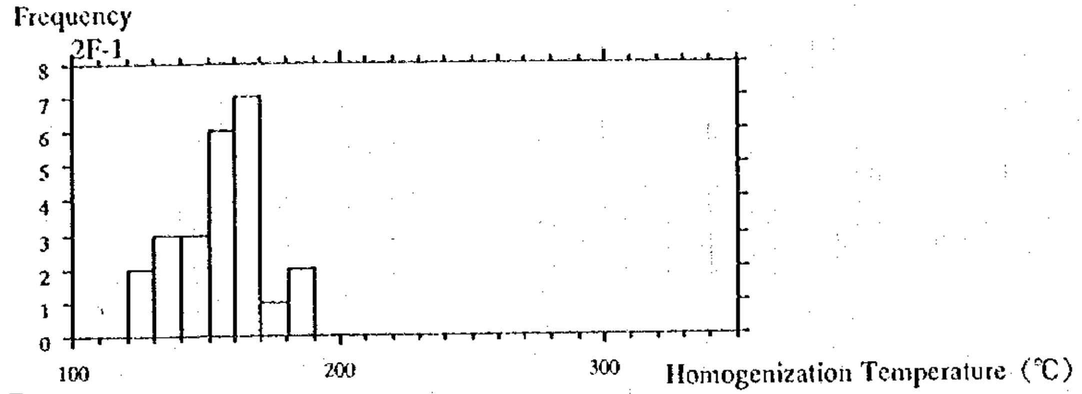
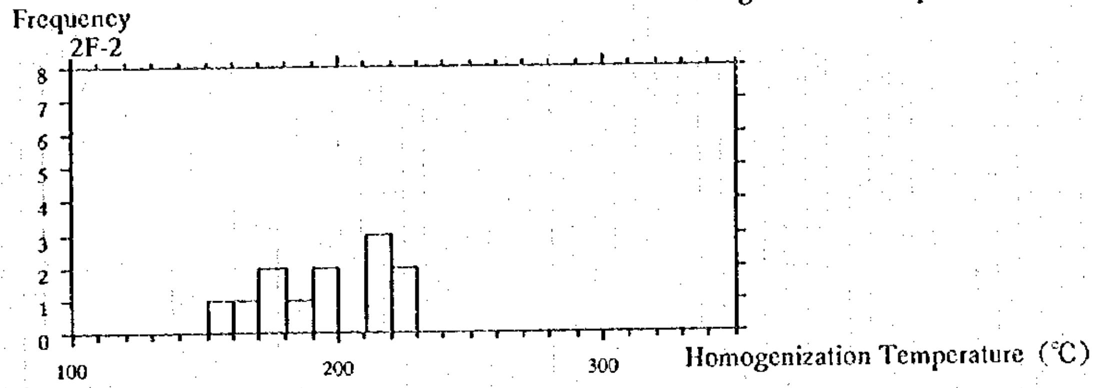
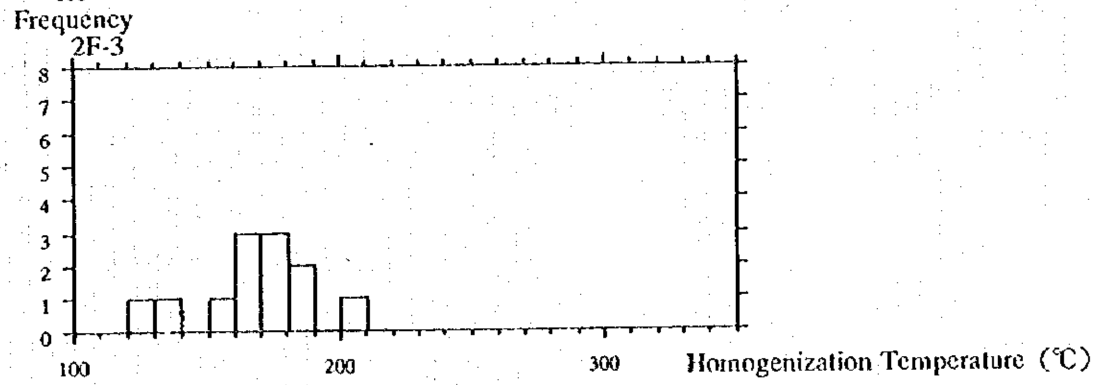
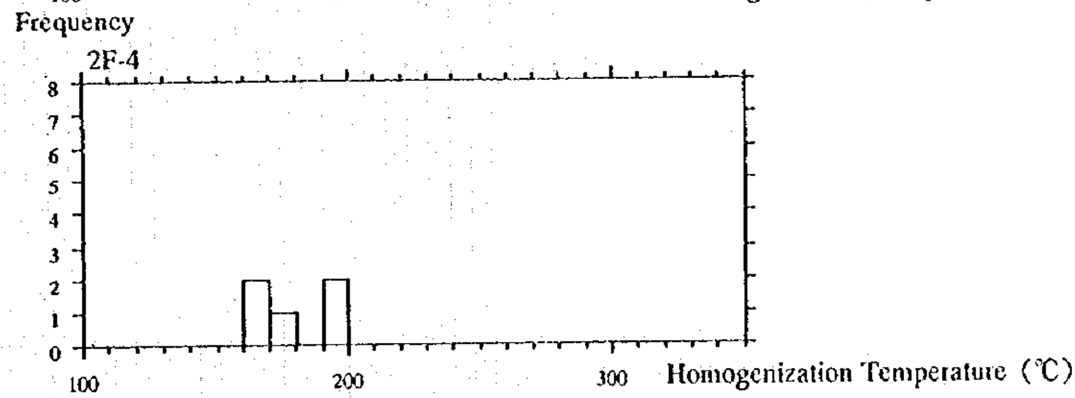


Fig. II-2-1 Histogram of Homogenization Temperature of Liquid Inclusion(1)









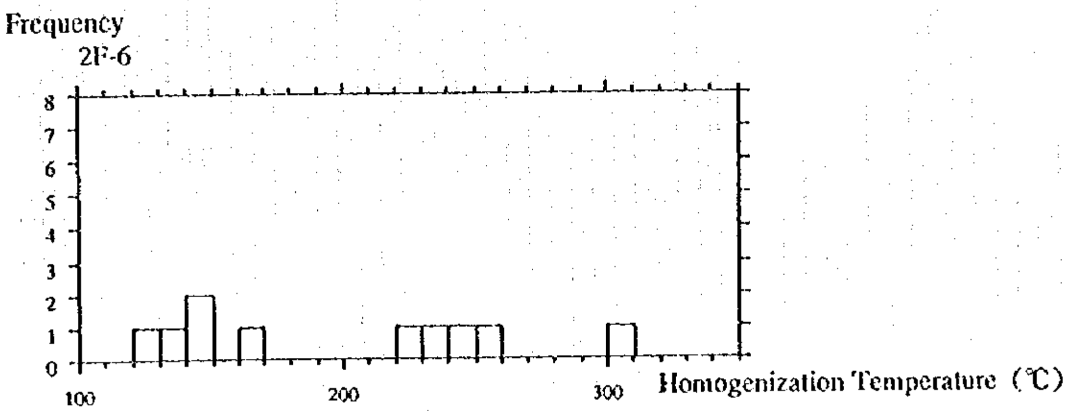


Fig. II-2-1 Histogram of Homogenization Temperature of Liquid Inclusion(2)

Part Ⅲ CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1 Conclusions

In the third year of the survey, 2 holes were drilled in places where gold mineralization was anticipated in the deep zone, and mineralization of a maximum 0.34g/t of gold were obtained.

There is a fault on a N-S direction bordered by Permian sedimentary rock and Permian-Triassic volcanic rock in the survey area, and a reverse fault has been formed where the volcanic rock distributed on the east side has subsided in relation to the west side.

From the results of the present survey, it is clear that the Permian-Triassic volcanic rock along the fault has intruded into the sedimentary rock as dikes, and the dikes and surrounding sedimentary rock have undergone quartz - chlorite - sericite - ankerite - calcite alteration to such an extent that distinction of the original rock is no longer possible, along the dikes and the old fault which is thought to control the dikes, and it was confirmed that this is where large-scale hydrothermal activity took place. Accompanying this alteration, extensive pyrite dissemination was alternately formed in net-like and vein-like form, but the prospect of useful metals such as Au, Ag, Cu, Pb and Zn is extremely small.

However, in places where pyrophyllite is confirmed in the alteration, anomaly values of Au, Ag, Pb and Zn are detected.

With regard to the nature of the alteration, the whole alteration area has undergone uniform alternation, and no proof was obtained that mineralization had occurred where hydrothermal solution repeatedly circulated along the cracks and formed veins in the vicinity of where drilling survey was conducted.

From this it can be seen that hydrothermal activity accompanied by gold mineralization exists in the vicinity of the two drilling holes in the present survey, but judging from the analyzed values, the condition of the alteration and the state of development of the veins, there is little possibility of the existence of mineralized zones that could be linked to mining development in this area.

Chapter 2 Recommendation for the Future Survey

As a result of the drilling survey, hydrothermal activity accompanied by mineralization of gold and silver has at least been confirmed, and the possibility has been raised of the center of the mineralization being somewhere in this alteration zone.

Judging from the chemical properties of the rock, the alteration and the results of the geochemical survey, it is likely that calc-alkalic hornblende andesite and rhyolite that was active at the end of the period caused gold mineralization in the Permian-Triassic volcanic rock, and there is thought to be scope for prospecting where they are distributed at the eastern tip of the Huai Nam Sala area that extends south from east of the survey positions in the third year of the survey.

In future it will be necessary to reexamine the alteration zones and geochemical anomaly zones in the vicinity of the detailed survey base line in shallow places that appeared promising in the second year of the survey, and in the area further east where rhyolite is distributed, and to confirm whether there is any prospect of gold at a lower level (Fig.III-1-1).

Finally, gold mineralization accompanying large-scale hydrothermal alteration zones, such as that found in the present survey, has not been known in Thailand until now. It is possible that this is a special place, but the Lampang-Phrae volcanic belt extend as far as Laos and several places in the same parallel geological belt have not been adequately surveyed yet. Due consideration must be given to this type of deposit too when pursuing future prospecting.

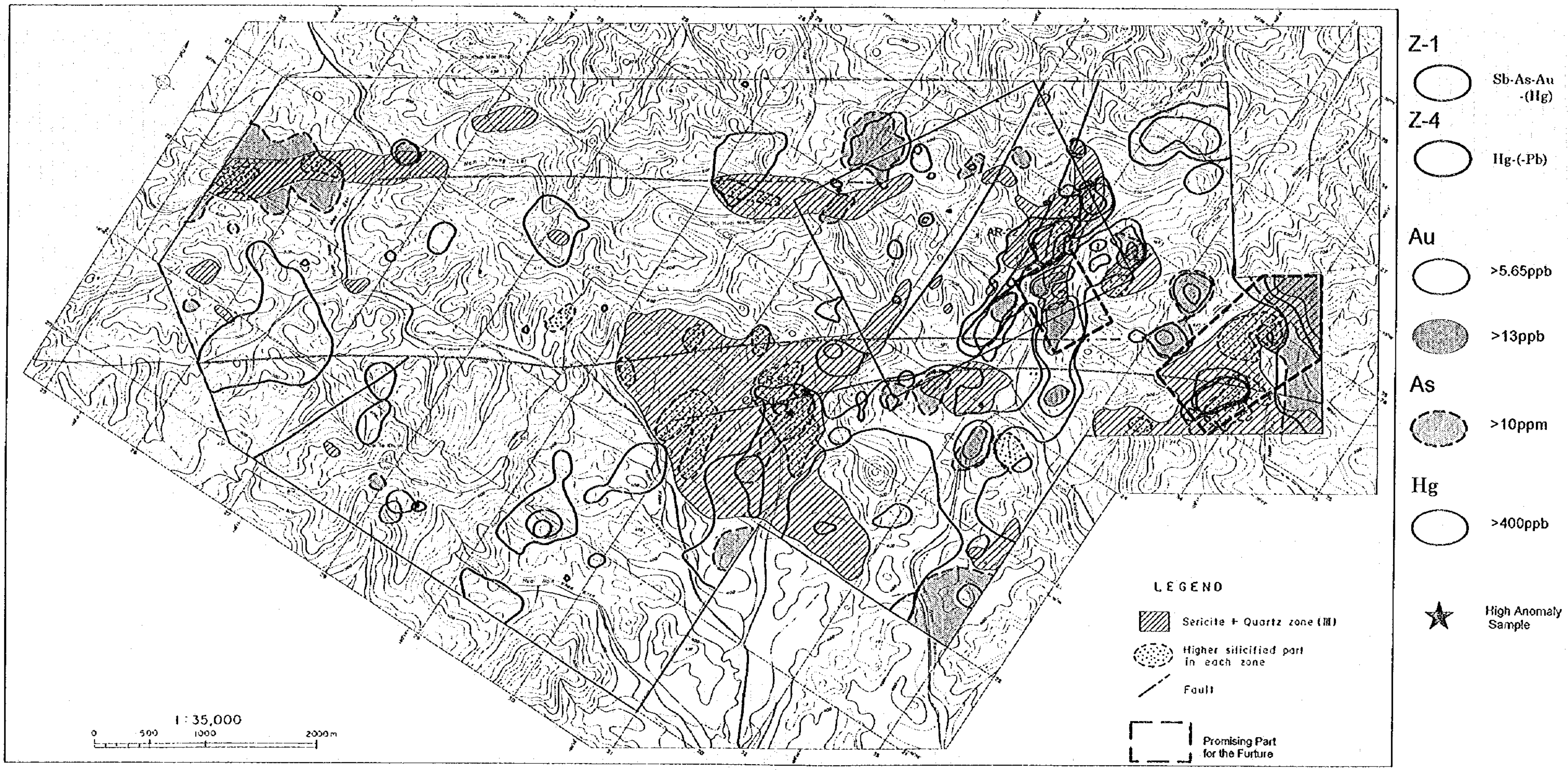


Fig.III-1-1 Promising Part for the Future Survey

REFERENCES

JICA and MMAJ, 1995: Report on the cooperative mineral exploration in the Chiang Khong, Doi Chong, Ratchaburi Area, the Kingdom of Thailand, phase I. Japan International Agency and Metal Mining Agency of Japan

JICA and MMAJ, 1996: Report on the cooperative mineral exploration in the Chiang Khong, Doi Chong, Ratchaburi Area, the Kingdom of Thailand, phase II. Japan International Agency and Metal Mining Agency of Japan

APPENDICES

Appendix 1. Geologic Column of Drilling Hole

LEGEND

Depth (m)	Geol. Column	Core Shape	Structure	Fracture	Vein	Pyritization	Silicification	Argillization	Geologic Description		Ore Assay					Detected Minerals by X-ray	Homogenization Temprature (℃)	Sample Number
									Rock	Lithology	Au (g/t)	Ag ppm	Cu ppm	Pb ppm	Zn ppm			
		①	②		③		④			⑤						⑥	⑦	

① 
short core less than 5cm length
core shape is remained
fragmental core, crash to pebbley size
small rock chips & crashed clay

② bedding or foliation of sedimentary rock
intruded plane of dyke

③ - - - quartz-calcite vein
—— quartz vein
······ calcite vein
—·— pyrite vein

④ 
abundant
common
rare
tiny

⑤
qz quartz
cal calcite
ss. sandstone
chl chlorite

⑥
q quartz
ch chlorite
m sericite
c-m sericite-chlorite mixed layer
sm smectite
cl calcite
ak ankerite
py pyrite
pp pyrophyllite

⑦
142 avarage of data
141 median of data

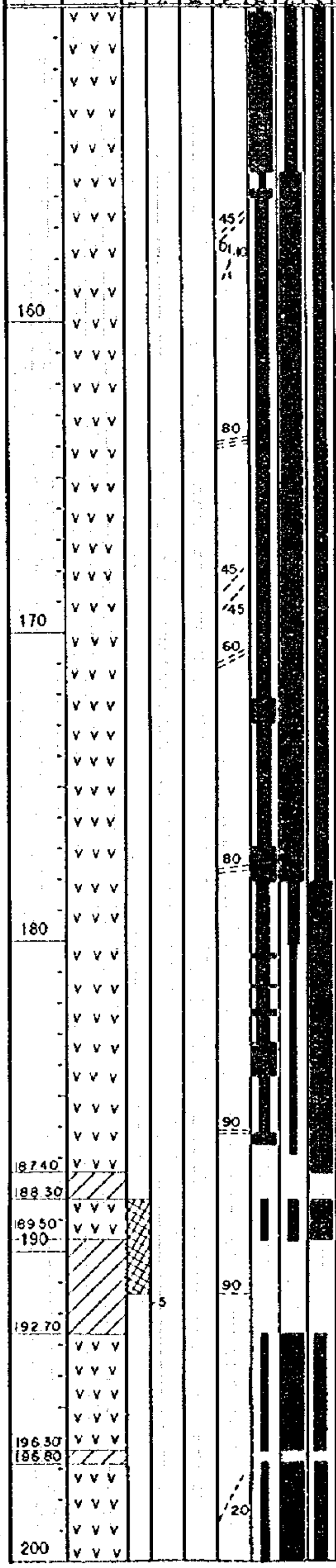
Chiang Khong, Thailand *MJTC-1* (Scale 1/200) (1/6) (Depth: 0m - 50m)

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Sample Number
0 – 3.30				top soil	orange brown sandy silt involving rounded pebble to cobble (shale, altered tuff breccia)							
3.30 – 4.80	53			slatey shale	strongly weathered							
4.80 – 6.40	53			slatey shale	platy core w=3 to 4 cm							
6.40 – 8.00	50			shale fine ss. alt.	short core l=5 to 12cm							
8.00 – 9.00	48			shale	crashing by faulting, pulverized & clayey							
9.00 – 10.10	42			fine ss.	open crack on the core direction euhedral quartz developing							
10.10 – 25.70	40, 60, 50, 54, 66, 70, 50	40, 38, 0	5	ss. / shale alt	10.75 to 12.80m crashing to small chip 17.40 to 25.10m brecciaed & pulverized 21.90 to 22.10m w=1 to 4 cm qz-cal vein							
25.70 – 26.85			90°	shale	altered shale silicified, chloritized, pyrite impregnated	<0.07	<1	5	15	25	q, ch, m, cl, py	A-1, X-1
						<0.07	<1	<5	5	13	q, ch, m, cl, ok	A-2, X-2
26.85 – 30.60	42	42	45, 10, 58	sandy shale	massive, partly phyllitic 27.80m w=1cm qz-cal vein along phyllitic fracture							
30.60 – 33.50		45, 24, 55, 78	12	ss.	massive 32.00 to 32.50m open crack with slickenside							
33.50 – 35.00		30		sandy shale	34.20m fracture with slickenside irregular qz-cal pool devlop. foot wall side							
35.00 – 41.60	30, 45	45	5	shale	strongly crashed 39.50m w=5mm qz-cal vein with silicification and carbonatization						q, ch, m, cl, ok	X-3
41.60 – 45.20	38		52	ss.	interbedding muddy seam 42.50 to 43.00m w=1 to 5mm qz-cal veinlet network in conjugate cleavage							
45.20 – 47.80	48	70, 35	45, 65	shale	strongly crashing chlorite-calcite film on fracture surface							
47.80 – 48.60				ss.	w=1 to 2mm qz-cal veinlet							
48.60 – 50	36			shale	48.60 to 50.20m slumping texture?							

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
– 53.20	54, 54	54	54	shale	50.50 to 50.80m silicification, carbonatization & graphite film along fracture								
53.20 – 54.40	54			basalt	altered porphyritic basalt with silicification carbonatization, chloritization						q, ch, m, ok		T-1, X-4
54.40 – 55.00 – 55.15 – 56.50	53		90	ss. / shale	55.00 to 55.15m qz-cal vein w=15cm								
56.50 – 60.70	50			shale	phyllitic shale with ss. fragment slumping deposit?								
60.70 – 62.05	62			basalt	altered porphyritic basalt with silicification carbonatization, chloritization pyrite disseminated along shear plane						q, ch, m, sm c-m, cl, ok		X-5
62.05 – 67.10	64, 25	0		shale	phyllitic shale with ss. fragment slumping deposit?								
67.10 – 70.80			55	ss.	67.80 to 68.00m qz-cal pool 68.50m w=8mm qz-cal vein								
70.80 – 77.20	57, 48	57	57, 60, 48	shale	partly crashing by faulting 71.50m w=1cm qz-cal vein 75.50m w=1cm qz-cal vein 75.60m w=7mm qz-cal vein								
77.20 – 81.25				ss. / shale	fine grained pyrite disseminated 77.30 to 77.60m qz-cal v. along phyllitic plane 79.08, 79.15, 79.23m qz-cal-pyrite vein 80.30m pyrite clot (2×3cm) along foliation								T-2
81.25 – 83.90	15 F?		35	ss.	fine grained pyrite disseminated 82.80m w=4cm qz-cal vein						q, ch, m, c-m cl, ok, py		X-6
83.90 – 87.60			60, 45, 35	basalt	altered porphyritic basalt strongly argillized & carbonatized, silicification moderate qz-cal vein well developed							136.3 / 132	F-1
87.60 – 93.40	70	43		sandy shale	massive, alteration weak fine grained pyrite disseminated								
93.40 – 94.65				basalt	altered porphyritic basalt moderately argillized carbonatized & silicified	.007	1	40	120	85	q, ch, m, c-m cl, ok, py		A-3, P-1, X-7
94.65 – 99.90	45, 40			ss / shale	partly included ss. fragment in shale 97.50 to 98.40m w=1 to 6mm qz-cal-chl vein network with pyrite dissemination 98.40 to 98.90m strongly silicified & chloritized								
99.90 – 100													

Chiang Khong, Thailand *MJTC-1* (Scale 1:200) (3/6) (Depth: 100 m - 150 m)

Depth (m)	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
100 – 103.80	andesite	strongly altered andesite 100.30 to 100.40, 101.20, 102.70 to 102.80, 102.95 to 103.10m densely disseminated pyrite	<0.07	1	50	65	75	q, ch, m, c-m cl, ok, py		AS-1, X-8
			<0.07	<1	85	55	130	q, ch, c-m cl, ok, py		A-4, X-9
103.80 – 107.25	ss. / shale	massive 105.30 to 105.40m, 106.35 to 106.40m qz-cal vein 105.60m pyrite disseminated in ss. lenses								
107.25 – 111.70	shale with ss. fragment	blocky core: two direction fracture(30° & 0-10°)developed 107.25 to 107.35, 107.40 to 107.45, 108.80 to 108.85, 109.80 to 109.85m densely pyrite disseminated 110.00 to 110.20m sheared shale, pulverized 110.20 to 110.70m ss. fragment abundant, ss. strongly silicified, qz-cal-chl veinlet developed	<0.07	1	105	315	285	q, ch, c-m cl, ok, py		A-5, X-10
111.70 – 115.00	ss.	massive, interbedded shale seam								
115.00 –	shale with ss. fragment	pyrite disseminated in ss. lenses								
– 128.60	ss.	massive 123.60 to 123.65m w=5cm qz-cal vein brecciated ss. with shale, pyrite disseminated in ss. breccia with weak silicification						q, ch, cl, ok pp		X-11
128.60 – 131.70	shale	shale with small amount of ss. lenses pyrite disseminated in ss. lenses with silicification							144.3 138	F-2
131.70 – 135.20	andesite	altered andesite moderately cholitized, silicified & carbonatized 132.50, 133.45 to 133.80, 134.10 to 134.25 135.0 to 135.20m pyrite-qz-cal vein network	<0.07	<1	20	70	240			AS-4
135.20 – 136.30	shale	136.00 to 136.30m pyrite disseminated w=4cm qz-cal vein develop on boundary								
136.30 – 150	andesite	andesite interbedded with brecciaed andesite (139.80 to 141.20m) Py-qz-chl-cal vein network developing at 137.80 to 138.00, 138.50 to 139.00, 139.30 to 139.40, 139.60 to 139.80m	<0.07	<1	15	70	75	q, ch, m, sm c-m, ok, py		AS-2, XS-3
			<0.07	<1	40	215	230	q, ch, m, c-m ok, py, pp		A-6, X-12
			<0.07	<1	25	20	130			A-7



Geologic Description

Depth (m)	Rock	Lithology
150 – 187.40	andesite	150.30 to 155.20m dense marblized pyrite dissemination 155.20 to 178.20m strongly silicified zone below 178.20m silicification gradually weaker 178.20 to 187.40m strongly chloritized & carbonatized instead of silicification 172.30 to 172.90, 180.50 to184.50, 186.30 150.3 to 186.60m dense marblized pyrite dissemination strongly chloritized, weak silicified
187.40 – 188.30	shale	non-altered
188.30 – 189.50	andesite	moderate silicified, carbonatization weak
189.50 – 192.70	shale	non-altered
192.70 – 196.30	andesite	strongly carbonatized & silicified
196.30 – 196.80	shale	non-altered
196.80 – 200	andesite	strongly carbonatized, silicified & chloritized chlorite & pyrite replaced mafic and opaque

Ore Assay, Detected Minerals, Homogenization Temperature, Sample Number

Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenization Temperature (°C)	Sample Number
<0.07	< 1	30	50	100			AS-3
<0.07	< 1	100	130	305	q, ch, m, c-m cl, ok, py, pp		A-8 X-13
<0.07	< 1	25	40	80	q, ch, m, c-m cl, ok, py		A-9 XS-2
<0.07	1	30	85	145			A-10
						175.3 / 184	F-3
					q, ch, c-m cl, ok, py		X-14
							P-2
					q, ch, m, c-m cl, ok, py		X-15
<0.07	< 1	20	75	55			A-11 XS-1
					q, ch, m, sm c-m, cl, ok, py		X-16
					q, ch, m, cl ok		X-17
<0.07	< 1	30	15	50	q, ch, m, ok py		A-12 X-18 T-3
<0.07	< 1	10	15	50		156.5 / 144	A-13 F-4

Chiang Khong, Thailand *MJTC-1* (Scale 1:200) (5/6) (Depth: 200 m - 250 m)

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
200.30 – 228.70	70, 75, 80, 40, 58, 60	10, 15, 45; 0-5	45, 10, 25	shale	slaty cleavage developed 203.00 to 203.10m Qz-cal vein 45° 206.50m w=1 to 5mm 3seams qz-cal vein 219.50m w=2cm fracture filling qz-cal vein								
228.70 – 244.60	52, 50	10	0, 45, 90, 85, 70	ss.	massive sandstone 229.65 to 229.75m breccia zone pyrite disseminated in ss. fragment 231.10 to 231.60m w=6mm qz-cal vein : 0° 231.90 to 232.00m w=10cm qz-cal vein: 45° 233.00 to 233.10m w=10cm qz-cal vein 234 to 235m muddy lamina distinct 241.40m w=2cm qz-cal ven 241.60 to 241.70m w=5 to 10mm qz-cal vein	<0.07 <0.07	<1 <0.2	30 29	5 12	85 64		 141.5 / 141	A-14 F-5
244.60 – 250		25	30	shale with ss. fragment	249.00 to 250.70m w=5 to 10mm qz-cal vein filling brecciated crack	<0.07	<0.2	29	12	64			A-15

Chiang Khong, Thailand *MJTC-1* (Scale 1/200) (6/6) (Depth: 250 m - 300 m)

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Sample Number
250 – 259.40	43, 40	43, 30	35, 52	shale with ss. fragment	252.60 to 258.00m brecciated zone small pebble & clay 60cm core loss. in this zone							
259.40 – 263.60			48	ss.	massive sandstone							
263.60 – 264.60		10, 15, 68, 70, 65		shale	open crack well developed with slickenside							
264.60 – 268.55				ss.	massive sandstone							
268.55 – 282.50		5, 10, 20, 70	41, 60, 45, 60	shale	ss. fragment involved strongly crashed, small chips to pebbly core	<0.07	<0.2	2	30	14		A-16
282.50 – 300				shale / ss.	strongly crashed; remaining ss. part almost pulverized and clayey core 289 to bottom of hole extremely crashed fault breccia and clay						q, ch, m, cl, ok, py	X-19

Depth (m)	Geol. Column	Core Shape	Structure	Fracture	Vein	Pyritization	Silicification	Argillization	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
0 – 3.25									top soil	orange brown silt including andesite boulder (max 1m)								
3.25 – 6.60			30						shale	strongly weathered slaty shale phyllitic texture distinct								
6.60 – 13.05			20, 0, 10, 10						shale	crashed to chips and clay shear zone								
13.05 – 15.25					60				andesite	altered andesite carbonatization & chloritization distinct						q, ch, m, cl ok		2X-1
15.25 – 19.70			20, 20		75, 60, 90				shale	platy core along foliation qz-cal vein 15.90, 16.70, 19.40-19.45m								
19.70 – 24.00									ss.	massive carck filling qz-cal veinlet well develop.								
24.00 – 45.40			15, 30, 5		85, 60, 15				shale	28.00 to 43.10m: shear zone clay, graphite & small chips of shale excepted sandy part	<0.07 As 30	<0.2 Sb 15	41 Hg 14	92 40 ppb	68			2A-1
45.40 – 50				0, 5, 5					calcareous shale	massive, fossile abundant								

Depth (m)	Structure	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
50.50 – 52.00 (50.60)			shale	slaty cleavage well developing 50.60 to 50.70m w=10cm altered andesite dyke along foliation								
52.00 – 57.80			calcareous shale	massive, fossile abundant (Fusulina, Crinoidea)								
57.80 – 60.75 (60)	60	45	shale	59.20 to 59.70m interbedded sandsetne facies							155.1 / 156	2F-1
60.90 – 77.30 (70)	50, 40, 40	90, 60, 40	shale / ss.	shale dominate, slaty cleavage well developed 65.21 to 65.31m w=6cm qz-cal vein 66.60 to 66.65m irregularly shaped qz-cal vein sandstone dominated 71.50 to 71.80m random network qz-cal vein 73.55m w-2cm qz-cal vein discordant to bedding								
77.30 – 94.20 (80, 90)	60		shale	shear zone, almost core is clayey and small chips several part core shortage								
94.20 – 95.10	?		andesite	strongly silicified, chloritized & carbonatized pyrite scattered	<0.07	<0.2	38	<2	68	q, ch, m, cl, ok		2X-2, 2A-2, 2T-1
95.10 – 100	60	90	shale	95 to 102m shear zone crashed core: small breccia to clay qz-cal vein scattered in brecciaed core								

Chiang Khong, Thailand MJTC-2 (Scale 1:200) (3 / 10) (Depth: 100 m - 150 m)

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenization Temperature (°C)	Sample Number
100–115.00 (110)	40, 50, 40		30, 40	shale	core length 10 to 30cm 104.25m w=5mm, 104.30m w=10mm qz-cal vein 106.10m w=5mm qz-cal vein 113 to 114.5m w=2 to 5mm irregular qz-cal veinlet abundant along foliation								
115.00–128.25 (120)	F? 5, 0, 30, 80, 45, 15, 50	5, 8 ~ 10, 60 ~ 0 ~ 15	40, 60, 40, 60	shale with ss. fragment	phyllitic plane is not stable open crack well developed 120.00 to 120.30m boudinage qz-cal vein w=1 to 5mm 123.60 to 123.80m interbedded conglomerate								
128.25–129.10	70, 60	0 ~ 10		andesite	strongly silicified, moderately carbonatized	<0.07	<0.2	42	4	72	q, ch, m, cl, ok		2A-3, 2X-3
						Hg 1450							
129.10–130.50 (130)			50	ss./shale	130.05m w=2cm calcite vein								
130.50–131.80	50		40	shale	strongly silicified, moderately argilized pyrite seam w=3 to 8mm well developed	<0.07	<0.2	38	18	34	q, ch, m		2A-4, 2X-4
131.80–132.80	60		35	andesite	strongly silicified, argilized & carbonatized pyrite not so much								
132.80–137.00			30, 45, 40	ss.	non altered 133 to 134.5m fracture filling qz vein								
137.00–146.60 (140)			45, 30, 90, 45, 90	ss.	strongly silicified & carbonatized 134.40 to 134.50, 137.75 to 138.00, 139.00 to 139.10, 140.30 to 141.05m pyrite marblized dissemination 143.40 to 143.60, 144.00 to 144.10, 144.60 to 144.85m qz-chl-mica vein	<0.07	<0.2	28	86	90			2A-5
						As 84	Sb 11.5	Hg 4810					
						<0.07	<0.2	19	26	96			2A-6
						As 24	Sb 2.4	Hg 7590			q, ch, m, ok		2X-5
146.60–148.10	60			shale / ss.	pyrite dissemination along foliation	<0.07	<0.2	30	16	60			2A-7
						As 10	Sb 1.2	Hg 240			q, ch, m, ok		2X-6
148.10–150					sandstone interbedded shale seam strongly silicified and carbonatized ss. breccia in shaley matrix								

Chiang Khong, Thailand *MJTC-2* (Scale 1:200) (4/10) (Depth: 150 m - 200 m)

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenization Temperature (°C)	Sample Number
150 – 154.00			70, 50	ss.	151.35 to 151.70m fine pyrite vein(w=1 to 15mm) network with chlorite 150.55m w=5mm qz-cal vein 152.40 to 152.60m fracturefilling qz-cal veinlet	<007 As196	04 Sb92	39 Hg690	62	82			2A-8 2P-1
154.00 – 159.50	45, 45	45		shale with ss. fragment	foliation distinct 154.10m w=5mm, 154.30m w=10mm cal-qz vein, druse developed irregular cal vein scattered								
159.50 – 163.40	40	0~5	90	ss.	sandstone with shale seam strongly silicified, chloritized & carbonatized 160.00 to 160.30m qz-cal vein with chl-pyrite boundary not clear						q,ch,cl,ok	195.4 196	2X-7 2F-2
163.40 – 177.50	50, 45, 40, 45, 40	40	60, 70, 55, 35, 70	shale	shale interbedded sandstone seam 163.90m pyrite replaced ss. Fragment 164.30m pyrite pool in ss. layer 164.30 to 164.40, 165.70 to 165.80, 167.40 to 167.60m calcite vein along folation 168.00 to 168.20m qz vein with chl & pyrite pyrite disseminated along foliation 169.60 to 173.00m pyrite disseminated in ss. fragment & fracture surface								
177.50 – 180.60				ss.	brecciaed sandstone with silicification & carbonatization								
180.60 – 183.50				shale	strongly silicified and chloritized pyrite scattered 182 t o183m parallel calcite vein						q,ch,m	168.0 171	2F-3 2X-8
183.50 – 187.40	40	0~15		shale with ss. fragment	185.40 to 187.10m shear zone								
187.40 – 200		15	70, 65	andesite	strongly chloritized & silicified slightly pyrite dissemination 189.40m cal-qz-chl vein with small amount of pyrite 190.00m cal-qz-chl vein w=5cm 190.30 to 190.50m breccia zone densely pyrite disseminated	<007 As6 <0.07 As6 <0.07 As6	<0.2 Sb08 <0.2 Sb52 <0.2 Sb32	11 10 Hg160 8 Hg560	20 30 14	54 66 98	q,ch,cl,ok p,ch,m,cl ok,py		2X-9 2A-9 2A-10 2A-11 2X-10 2T-2

Chiang Khong, Thailand *MJTC-2* (Scale 1:200) (5/10) (Depth: 200 m - 250 m)

Depth (m)	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
200 – 226.90	andesite	203.60 to 206.50m parallel qz veinlet with pyrite	<0.07 / As 6	<0.2 / Sb 9.0	16 / Hg 270	38	102			2A-12
		209.30 to 209.80m pyrite network vein densely disseminated								
		215.60 to 217.35m banded cal-qz-chl vein w=30 to 60cm with fine grained pyrite. ginguro-like vein	<0.07 / As 42	<0.2 / Sb 13.0	26 / Hg 4750	49	66	q, ch, m, cl ok, py, pp		2A-13, 2X-11, 2P-2
								q, ch, m, cl ok, py, pp		2X-12
226.90 – 227.90	shale	shale with chlorite vein network							177.2 / 171	2F-4
227.90 – 228.90	andesite	altered andesite strongly silicified & argilized, pyrite densely disseminated	<0.07 / As 16	<0.2 / Sb 6.8	14 / Hg 1920	22	56	q, ch, c-m py / q, ch, cl, ok		2A-14, 2X-13, 2X-14
228.90 – 246.50	shale	shale with sandstone layer non altered						q, ch, m, cl ok		2X-15
246.50 – 247.60	andesite	moderately silicified & argilized pyrite scattered								
247.60 – 250	shale / ss.	non altered								

Depth (m)	Structure	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
250 – 254.20		49	shale / ss.	non altered						q, cl, m, c-m cl, ok		2X-16
254.20 – 274.30	45	70, 50, 70, 15	andesite	moderately silicified & strongly argilized and carbonatized 255.40 to 258.00, 260.90 to 261.10, 263.00 to 264.00m: black seam with calcite, graphite, pyrite network 269.40 to 270.50m cal-qz vein with pyrite						q, ch, cl, ok		2X-17
					0.08	<0.2	11	6	92	q, ch, c-m cl, ok, pp		2A-15 2X-18
					0.16	<0.2	22	54	86			2A-16
										q, ch, cl, ok		2X-19
274.30 – 274.65	45			old fault breccia								
274.65 – 281.20	55	45	shale / ss.	calcite irregular veinlet scattered								
281.20 – 282.95			ss.	massive								
282.95 – 292.30	40, 70, 45, 80	90, 75, 79, 89, 70	shale	shale with ss. lamina & ss. fragment								
292.30 – 294.00	65		ss.	lamina texture well developed								
294.00 – 295.80			shale	phyllitic								
295.80 – 300			ss.	massive								

Depth (m)	Structure	Fracture	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
300 – 313.35 (310)	40		80, 70, 60	shale	shale with ss. fragment 304.50 to 304.60, 305.00, 305.80m banded calcite vein w=6 to 10cm 3120.00 to 313.00m chlorite vein on shear plane						q, ch, m, cl ok		2X-20
313.35 – 315.00				ss.	sandstone with shale seam								
315.00 – 317.70	60, 30			shale	shale with sandstone fragment								
317.70 – 318.20	40			ss.	coarse grained sandstone								2A-17
318.20 – 319.60				andesite	strongly silicified and argilized pyrite disseminated so much	0.10	02	16	38	146	q, ch, m, ok py		2X-21 2P-3
319.60 – 320.20 (320)	15			shale	massive								
320.20 – 323.45			90, 90	shale / ss.									
323.45 – 324.00				ss.	very coarse sandstone								
324.00 – 331.90 (330)			90, 90, 80	ss. / shale	very coarse sandstone / shale calcite vein at 325.60, 326.70 326.85m								
331.90 – 338.00				ss.	coarse sandstone to granule conglomerate wholly developed mylonitic texture 332.00 to 334.30, 336.00 to 338.00m strongly silicified & carbonatized 332.75 to 332.80, 336.00 to 336.20m pyrite pool	<0.07 As 96	10 Sb 190	55 Hg 1020	220	92			2A-18 2T-3
338.00 – 340.40 (340)		15, 40, 40, 80		lapli tuff	strongly silicified, argilized & carbonatized						q, ch, m, cl ok, pp		2X-22
340.40 – 343.20	60			ss.?	intense dissemnated pyrite, also strongly altered ;original rock not certain	0.22 As 368	1.8 Sb 49	32 Hg 3680	70	12			2A-19
343.20 – 345.40				ss.	coarse sandstone, pyrite disseminated								
345.40 – 346.00				shale	pyrite densely disseminated								2A-20
346.00 – 347.00				shale / ss.	pyrite densely disseminated	0.08 As 390	1.4 Sb 46	26 Hg 460	84	44			
347.00 – 348.90	80 F?			fine tuff	strongly silicified & carbonatized no pyritization						q, ch, cl, ok pp		2X-23
348.90 – 349.10 – 350													

Chiang Khong, Thailand *MJTC-2* (Scale 1:200) (8/10) (Depth: 350 m - 400 m)

Depth (m)	Geol. Column	Ore Shape	Structure	Fracture	Vein	Pyritization	Silicification	Argillization	Geologic Description: Rock	Geologic Description: Lithology	Ore Assay: Au (g/t)	Ore Assay: Ag (ppm)	Ore Assay: Cu (ppm)	Ore Assay: Pb (ppm)	Ore Assay: Zn (ppm)	Detected Minerals by X-ray	Homogenization Temperature (°C)	Sample Number
350–369.70 (360)									andesite breccia	autobrecciaed andesite strongly silicified, argilized & carbonatized	0.34 As 492	0.4 Sb 34	39 Hg 5420	24	38			2A-21
										massive lava	0.26 As 441	0.2 Sb 34	33 Hg 6150	12	44	q, ch, m, d ok, pp		2X-24 2A-22
369.70–373.70 (370)					90 70				coarse tuff	strongly silicified, argilized & carbonatized 372.50 to 372.70m pyrite veinlet						q, ch, m, ok py, pp		2X-25
373.70–400 (380, 390, 400)					90 90				tuff breccia	andesitic tuff breccia, deep green to reddish purple, prophyrytic 1 to 10cm breccia dominant small amount of pyrite disseminated wholly								

Chiang Khong, Thailand *MJTC-2* (Scale 1/200) (9/10) (Depth: 400 m - 450 m)

Depth (m)	Structure	Vein	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
400 – 404.90										q, ob, ch, m cl, ak		2X-26
404.90 – 406.90			andesite	massive facies, dark green to purple								
406.90 – 410.50	45	80	c.tuff lap. Tuff	dark green prophyritic tuff								
410.50 – 428.50		80, 90, 90, 90, 90	andesite	massive facies, dark green prophyrite partly observed brecciaed part 415 to 420m ferruginous quartz lenses developed 413.30 to 413.50, 413.90 to 414.00, 415.80 to 416.00m calcite-qz vein 421.10 to 421.25m qz-cal-chl vein 421.80 to 422.00m cal-qz vein network						q, ob, ch, m cl, ak		2X-27
428.50 – 431.40			tuff breccia	1 to 15cm volcanic breccia dark green to reddish purple tiny pyrite scattered								
431.40 – 442.80 (432.70, 433.00)		90	andesite	massive, prophyrytic 432.70 to 433.00m cal-qz vein w=30cm 434.30 to 434.40m calcite vein 437.20 to 437.70m qz-cal pool 438.25 to 438.40m cal vein 439 to 441m w=1 to 10mm network cal vein developed							197.2 / 193	2F-6
442.80 – 450			tuff breccia	442.80 to 453m strongly silicified, albitized, argilized with pyrite	<0.07	<0.2	10	22	148	q, ob, ch, m cl, ak, py		2A-23 2X-28

Chiang Khong, Thailand MJTC-2 (Scale 1:200) (10/10) (Depth: 450 m - 500 m)

Depth (m)	Geol. Column	Ore Shape	Structure	Fracture	Vein	Pyritization	Silicification	Argillization	Rock	Lithology	Au (g/t)	Ag (ppm)	Cu (ppm)	Pb (ppm)	Zn (ppm)	Detected Minerals by X-ray	Homogenized Temperature (°C)	Sample Number
									tuff breccia	below 452m alteration is gradually weaker	<0.07	0.2	6	10	90	q, ab, ch, m cl, ok, py		2A-24 2X-29
454.60										prophyrytic alteration only								
460																		
470																		
480																		
490																		
500																		

Appendix 2 Ore assay data of core sample

No.	Sample No.	Au g/t	Ag ppm	Cu ppm	Pb ppm	Zn ppm	Hg ppb	As ppm	Sb ppm
1	A-01	<0.07	<1	5	15	25	<10*	<10	10
2	A-02	<0.07	<1	<5	5	15	<10*	<10	10
3	A-03	<0.07	1	40	120	85	<10*	120	10
4	A-04	<0.07	<1	85	55	130	<10*	30	<10
5	A-05	<0.07	1	105	315	285	10*	460	20
6	A-06	<0.07	<1	40	215	230	<10*	580	50
7	A-07	<0.07	<1	25	20	130	<10*	40	<10
8	A-08	<0.07	<1	105	130	305	10*	430	40
9	A-09	<0.07	<1	25	40	80	<10*	90	10
10	A-10	<0.07	1	30	85	145	<10*	240	20
11	A-11	<0.07	<1	20	75	55	<10*	140	20
12	A-12	<0.07	<1	30	15	50	<10*	30	10
13	A-13	<0.07	<1	10	15	50	<10*	<10	<10
14	A-14	<0.07	<1	30	5	85	<10*	<10	<10
15	A-15	<0.07	<0.2	29	12	64	140	2	0.2
16	A-16	<0.07	<0.2	2	30	14	190	2	<0.2
17	AS-1	<0.07	1	35	85	75	<10*	100	10
18	AS-2	<0.07	<1	15	70	75	<10*	120	20
19	AS-3	<0.07	<1	30	50	100	<10*	60	10
20	AS-4	<0.07	<1	20	70	240	10*	90	<10
21	2A-01	<0.07	<0.2	41	92	68	1440	30	15.5
22	2A-02	<0.07	<0.2	38	<2	68	80	1	0.4
23	2A-03	<0.07	<0.2	42	4	72	1450	1	0.2
24	2A-04	<0.07	<0.2	38	18	74	200	4	0.6
25	2A-05	<0.07	<0.2	28	86	90	4810	84	11.5
26	2A-06	<0.07	<0.2	19	26	96	7590	24	2.4
27	2A-07	<0.07	<0.2	30	16	60	240	10	1.2
28	2A-08	<0.07	0.4	39	62	82	8690	196	9.2
29	2A-09	<0.07	<0.2	11	20	54	160	6	0.8
30	2A-10	<0.07	<0.2	10	30	66	580	6	5.2
31	2A-11	<0.07	<0.2	8	14	98	250	6	3.2
32	2A-12	<0.07	<0.2	16	38	102	270	6	9
33	2A-13	<0.07	<0.2	26	48	66	1750	42	13
34	2A-14	<0.07	<0.2	14	22	56	1920	16	6.8
35	2A-15	0.08	<0.2	11	6	92	230	4	0.6
36	2A-16	0.16	<0.2	22	54	86	320	8	3.2
37	2A-17	0.10	<0.2	16	38	146	530	1	3.4
38	2A-18	<0.07	1	55	220	92	1020	96	19
39	2A-19	0.22	1.8	32	70	12	3680	368	49
40	2A-20	0.08	1.4	26	84	44	9460	390	46
41	2A-21	0.34	0.4	39	24	38	5420	492	84
42	2A-22	0.26	0.2	33	12	44	6150	444	84
43	2A-23	<0.07	<0.2	10	22	148	150	18	5.8
44	2A-24	<0.07	0.2	6	10	90	80	2	3

*:ppm

JICA