THE SOCIALIST REPUBLIC OF THE UNION OF BURMA

REPORT ON GEOLOGICAL SURVEY OF THE MONYWA AREA

(DRILLING)

PHASE Ⅲ

(VOL. Ⅲ)

November 1975

METAL MINING AGENCY

JAPAN INTERNATIONAL COOPERATION AGENCY

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PREFACE

The Government of Japan, in response to the request of the Government of the Socialist Republic of the Union of Burma, decided to conduct a geological survey for mineral exprolation in Monywa area of the Burma, and commissioned its implementation to the Japan International Cooperation Agency.

The Agency, taking into consideration of the importance of technical nature of the survey work, in turn, sought the Metal Mining Agency of Japan for its cooperation to accomplish the task within a period of four years.

The term of this survey is four years on agreement including one year extended, and this year is for the survey of the third year phase. The survey work on the spot in Burma for the phase of this year has been completed successfully as scheduled owing to the assistance and support extended by the authorities concerned of the Government of the Socialist Republic of the Union of Burma.

This report submitted hereby summarizes the results of boring survey conducted in the third year phase, and it will be also formed a portion of the final report.

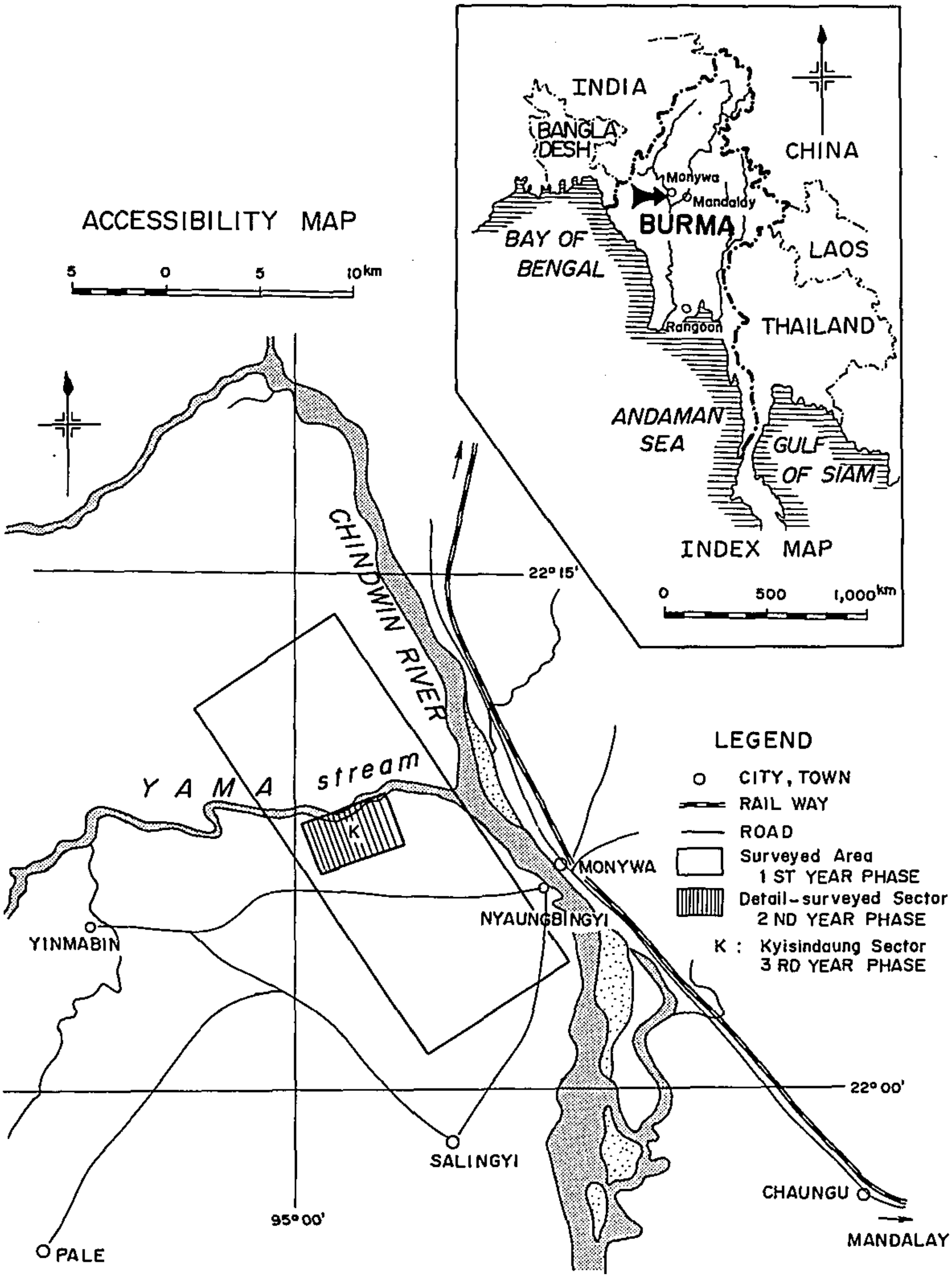
I wish to take this opportunity to express my heartfelt gratitude to the Government of the Socialist Republic of the Union of Burma and the other authorities concerned for their kind cooperation and support extended to the Japanese survey team.

September, 1975

Shinsaku Hogen
President
Japan International Cooperation Agency

Fig. 1

LOCATION MAP OF THE SURVEYED AREA



ABSTRACT

The operation of the Geological Survey for Mineral Exploration in Manywa area was started in 1972 as the First Year Phase, which consisted of ground geological survey, geophysical survey, and diamond drilling. In the Second Year Phase, precise geological survey for the potential areas of mineral resources, geophysical survey, and the calculation of ore reserves of Sabedaung and Kyisindaung Ore Deposits were carried out. The exploration by diamond drilling for Sabedaung Ore Deposit had nearly come to completion within the Second Year Phase, while kyisindaung Ore Deposit had been still under the exploration by diamond drilling, for which it was pointed out through the results of surveys in the Second Year Phase to carry out the precise drilling for the specific part of the ore deposit in view of the necessity to acquire the correct informations about ore emplacement.

The present survey, the operation of the Third Year Phase, consists of diamond drilling of 5 holes with total drilled length of 1,505.3 meters, based upon the results of the Second Year Phase, for the purpose to acquire the correct informations of ore emplacement in the northeastern part of kyisindaung Ore Deposit.

The important fruits of the present survey are firstly that the modes of occurrence of the secondary sulphide ore body has been clarified much accurately in the northeastern part of kyisindaung Ore Deposit, and secondly that the existence of a fault in NE-SW system, which had been inferred at the east side of kyisindaung Hill in the survey of the Second Year Phase, has been ascertained and, consequently, the mineralized domain has well been clarified.

It has been found that kyisindaung Ore Deposit, though it has been put under the continuous drilling operation by Burmese party, has the spaces to be explored in

its southern and southwestern parts, as well as some parts of the deeper ore zone in its central part not to have been explored deep enough to its bottom. In view of this, it may be said necessary to try the definitive calculation of ore reserves at the moment of the completion of the said drilling operation.

Since Kyisindaung Ore Deposit has generally deeper leached zone, reaching more than 200 meters below the surface in some parts, and this means enormous amount of overburden to be stripped in the open pit system, it may be necessary to investigate various ways of mining system in planning the development programme.

As Sabedaung South Ore Deposit has been explored by diamond drilling since June last year, for which the survey of the Second Year Phase had pointed out the necessity of rushed exploration, it is also advisable to try the definitive calculation of ore reserves as soon as the operation will come to completion.

PART I GEOLOGICAL SURVEY

CONTENTS

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Appendices

List of Plates

CHAPER 1 INTRODUCTION

1-1 Purpose of Surveys

As the survey works of the Third Year Phase in Monywa area of the Socialist Republic of the Union of Burma, surface diamond drillings were carried out in the northeastern part of Kyisindaung, for the purpose to contribute for planning the development programme of the Monywa Copper Mine by collecting fundamental informations regarding to the ore deposits such as subterrenean informations of geological structure and mineralization.

1-2 Outline of Surveys

1-2-1 Site and Amount of Drilling Works

1) Site — Kyisindaung Ore Deposit

2) Amount — 5 drill holes of approx. 300 meters deep each, totalling 1,505.3 meters

3) Core Logging for 5 drill holes totalling 1,505.3 meters

1-2-2 Period of Field Operation from December 6, 1974 to April 30, 1975

1-3 Organization of Survey Team

The field works and data analysis have been done by Mitsui Kinzoku Engineering Service Co., Ltd. (MESCO), with the cooperation of M.M.D.C. (Myanma Mineral Development Corporation) of the Ministry of Mines, Government of the Union of Burma.

Followings are the members of field team ;

Liaison and General Supervision

Toshiaki Hisamoto	MESCO
U Kyi	M.M.D.C.

Drilling

Katsuei Narita	MESCO
Isamu Furuya	"

Drill Core Logging

Sakiyuki Mononobe	MESCO

1-4 Core Logging

1) The results of geological logging of the drilled cores have been compiled into the drawings of scale 1/300 for the entire drilled length of 1,505.3 meters of 5 drill holes done by the Japanese team in the present survey.

2) All the mineralized cores were split into two and one of the halves was further split into two, from the one half of which assay samples for total Cu were taken at every 2 meters length.

3) In the logging, not only the variety of ignenous rocks and sediments with their modes of occurrence were observed carefully, but also the distribution of fissures, dykes, and fractured zones, and the aspects of wall rock alteration were precisely examined, with the special cares to clarify the relation of ore deposition to the geological structure.

1-5 Data Analysis

1) More than 60 pieces of specimens of the important rocks and ores were picked out of the cores logged to use for the closer examination. The split sides of cores by diamond saw of the said specimens were polished to be photographed, of

which remarkable parts were further made into thin sections or polished sections for the use of rock determination, classification of wall rock alteration, and discussion of assemblage of ore minerals with their paragenic relations.

2) Clay minerals were determined by X-ray diffraction method.

3) A geological section of 1/1000 scale was prepared by arranging the geological logs of the current 5 drill holes to investigate the features of ore emplacement.

CHAPTER 2 GEOLOGICAL SUMMARY

The followings are the geological informations obtained through the surveys of Monywa area in the First and Second Year Phases.

2-1 Formation of Basin and Sedimentation

The Monywa area occupies a part of a local basin formed on the eastern fringe of Salingyi Uplift, which spreads widely in approximately central part of Burmese Plain. Formation of the basin was caused by the depressional faulting of NW-SE and NE-SW systems, and the active volcanisms followed in the course of generating the sedimentary basin.

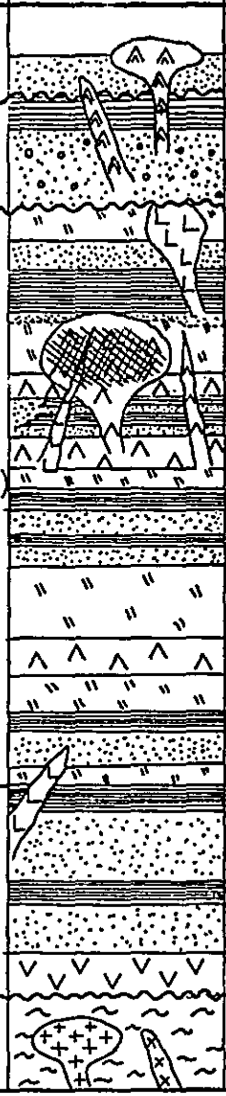
2-1-1 Sedimentation

The depression of the basin began in Miocene Epoch of Tertiary Period, resulting in the deposition of Damapala formation covering unconformably the green rocks of late Cretaceous Period exposed in the western fringe of the basin. The severest depression took place from Miocene to Pliocene of Tertiary Period with the active volcanisms resulting in the deposition of Magyigon formation which served as the host for mineralization. The depression continued upto the deposition of Kangon formation of Diluvial Epoch of Quarternary, although the depression itself diminished gradually.

Total thickness of the sediments in Monywa Basin reaches to 1,150 meters in which Damapala formation is more than 300 meters thick, the Magyigon 800 meters, and the Kangon 50 meters.

Table 1 shows the inter-relation of successions of the sediments and volcanisms in this area.

Table 1 Generalized Column of Monywa Area



GEOLOGICAL AGE		FORMATION	ROCK FACIES
QUATERNARY	RECENT	ALLUVIUM (10-20m)	sandy soil olivine basalt
	PLEISTOCENE	KANGON F. (30 - 50m)	upper muddy member
			lower coarse s.s. member lower coarse sandstone
TERTIARY	PLIOCENE	MAGYIGON F. (IRRAWADDY F.) (300 - 800m)	rhyolite dome with its pyroclastics
			upper s.s. and mudstone. rhyolite dyke and biot-porphyry and its pyroclastics
			alternation of s.s. and mudstone
			upper Hb-biot porphyry with its pyroclastics
			alternation of middle s.s. and mudstone
	MIOCENE		lower Hb-biot porphyry and its pyroclastics
			lower s.s. mudstone alternation and rhyolite dykes
	MIOCENE OLIGOCENE	DAMAPALA F. (PEGU-GROUP) (Over 300m)	alternation of graded s.s. and laminated mudstone
			andesite flow
CRETACEOUS		BASEMENT	greenrocks hornblende diorite(+) granophyre dykes (x)

STRUCTUAL MOVEMENT: SUBSIDING MOVEMENT BY STEP-WISE FAULTING (MONYWA BASIN)

IGNEOUS ACTIVITY:
- Andesite, Rhyolite.
- Hb-Biot porphyry.
- Hb-Biot porphyry
- Biotite porphyry (lavadome)
- Qz-Biot-porphyry (dyke)
- Rhyolite (dyke)
- Rhyolite (dome)
- Olivine basalt

MINERALIZATION: COPPER MINERALIZATION (MONYWA AREA)

ss. - sandstone Hb - hornblende biot - biotite F. - formation ore body

mudstone sandstone tuff basalt rhyolite Hb-biot-porphyry andesite

2-2 Volcanisms and Geological Structure

1) The volcanic activities took place in the period from Miocene to Pliocene of Tertiary Period, having their eruptive centers at the intersections of the two systems of faults of NE-SW and NW-SE which partook the formation of the sedimentary basin, and these activities are represented by hornblende-biotite porphyry and its pyroclastics. In the latest stage of activities of hornblende-biotite porphyry, such lava domes of biotite porphyry as Sabedaung, Kyisindaung, Letpadaung, etc., were formed, which offered the host for the ore emplacement in Monywa area. The distribution of these lava domes are shown on Fig. 2.

2) Succeeding to the eruption of lava domes, intrusion of a series of liparitic dykes took place which accompanied the mineralization of copper in and around the domes. This is how the Monywa Ore Deposits were formed which is illustrated schematically on Fig. 3.

3) The volcanic activity had a pause after the formation of ore deposits in Monywa area, during which sandstone and mudstone of the uppermost of Magyigon formation were deposited. Penetrating this formation, an activity of volcanic rocks forming Kyaukmyet and Shwebonthataung Hills took place as the last volcanic activity during Tertiary Period.

4) On the northwestern extension of the line combining Letpadaung and Kyisindaung, there exists a plateau in Silaungtaung formed by Quarternary olivine-basalt, which may suggest that the fractures related to the formation of the sedimentary basin and ore emplacement are still controlling the recent volcanic activity.

Fig. 2 GENERALIZED STRUCTURAL MAP OF MONYWA AREA

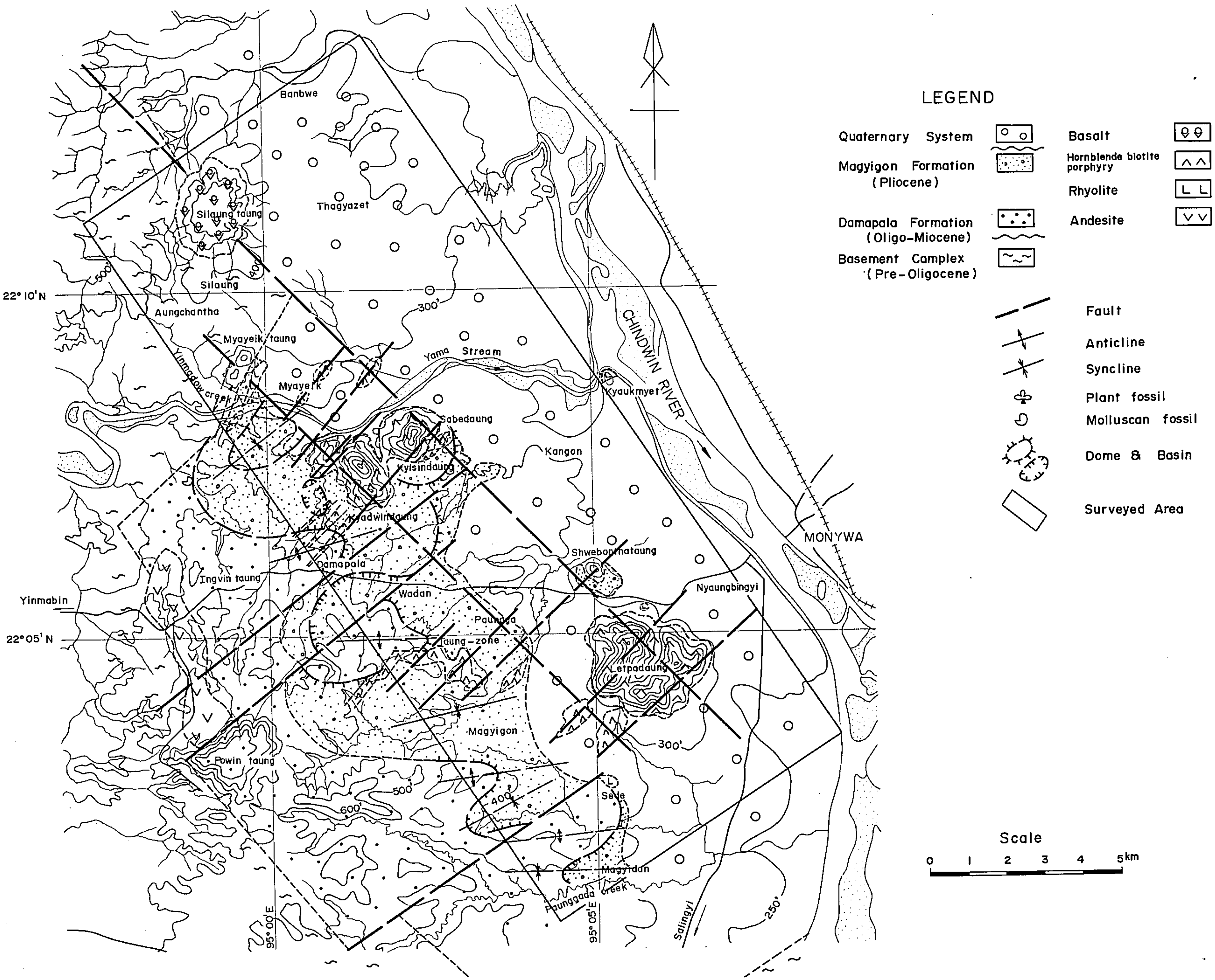
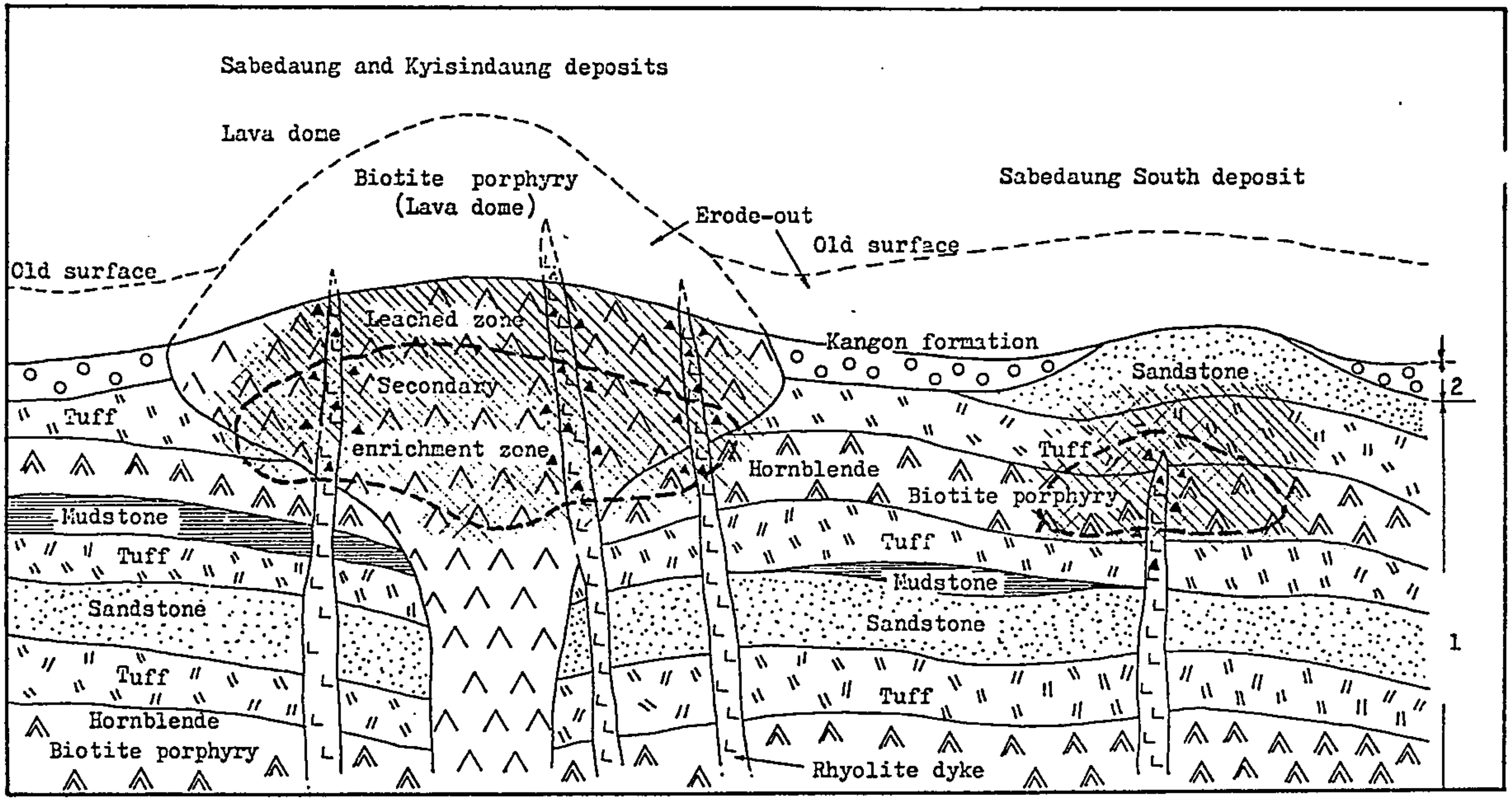


Fig. 3 Schematic Explanation of Ore Deposits



▲ Brecciated structure   2 Kangon formation   1 Magyigon formation

Network and Dissemination zone

CHAPTER 3 GEOLOGY OF ORE DEPOSITS

3-1 General Aspects

The ore deposits of Monywa area are mostly formed in and around the volcanic domes scattered in Monywa basin, which may roughly be divided into three groups of Sabedaung, Kysindaung, and Letpadaung.

These volcanic domes, as stated before, are lava domes formed by the volcanic activities during Miocene of Tertiary Period, and the deposits are of hydrothermal disseminated or network type directly related to the liparitic dykes intruded in and around the domes, which has been clarified since the geological surveys of the First and Second Year Phases.

Main ore minerals are pyrite and secondary chalcocite due to the supergene alteration, and are distributed approxmately in lenticular masses beneath a leached zone of 10 to 200 meters deep.

3-2 Mineralization

1) The characteristics of intense mineralization in these known deposits of Sabedaung and Kyisindaung are as follows ;

(1) the portions of intense silicification and alunitization,

(2) the portions of dense distribution of gossans consisting of hematite and limonite,

(3) the portions where network fractures and fractured zones are developed,

(4) the portions where the abundant dykes of liparite are distributed with brecciated structure.

It has been recognized that the enriched portions of ore exist under the portions where the above four conditions are distinguished on the ground surface.

2) In view of the said geological conditions, the precise surveys by diamond drillings were recommended through the surveys of the Second Year Phase in Sabedaung South, northeastern, southern, and southwestern parts of Kyisindaung, and the exploratory diamond drillings in Letpadaung where the areas of intense alteration coincide to the strongly anomalous area of IP survey.

3) The events of ore deposition and volcanic activities in Monywa area have been concluded to have taken place after the following chronological successions through the surveys of the First and Second Year Phases.

(1) activity of hornblende-biotite porphyry at the upper Magyigon formation,

(2) formation of domes of biotite porphyry,

(3) intrusion of liparite dykes in and around the lava domes and associated mineralization,

(4) post mineralization activity of liparite.

As stated above, the alteration haloes of silicification, alunitization, and argillization, are arranged zonally from the center of liparite dykes, and the rich mineralization has often been found where the silicification is strong. Judging from such alteration features, it is understood that the alunitization and argillization may represent the fore-runners of mineralization, and the succeeding silicification might have deposited the sulphides. It has been ascertained that the primary copper mineral was chalcopyrite, as part of it unattacked by supergene alteration has been found remaining in pyrite crystal.

CHAPTER 4 GEOLOGICAL LOGGING

4-1 Geological Logging of Drillings of the Third Year Phase

4-1-1 Amount of Drilling Works (cf. Location Map of Drill Holes)

The following diamond drillings for exploration were performed as the operation of the present year phase by the Japanese survey team ;

Drilling Site	Nos. of Holes Drilled	Total Length Drilled
Kyisindaung	5	1,505.3 meters

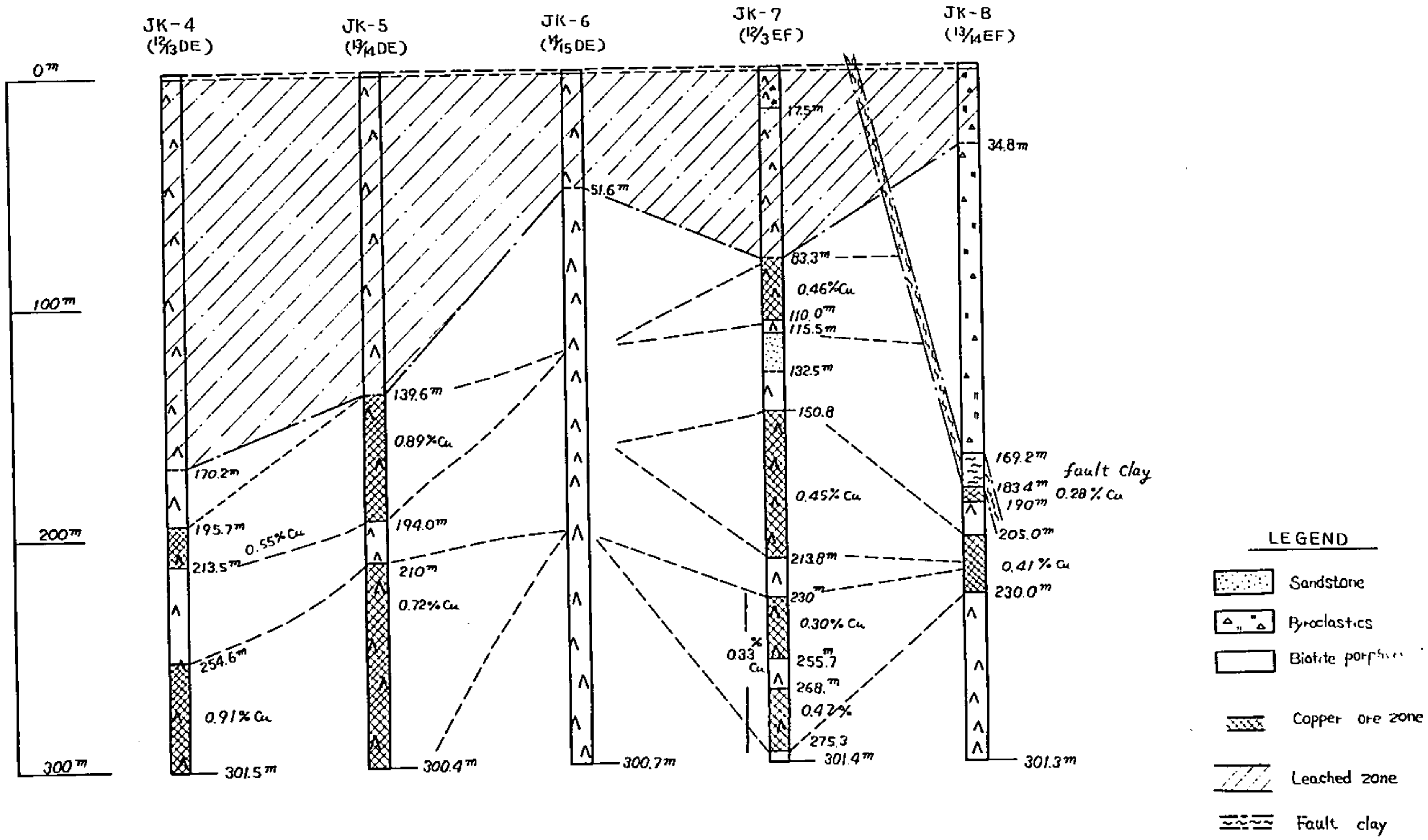
in which particulars are given as

NO.	Notation of Drill Holes		Length Drilled
	Japan	Burma	
1	JK - 4	(12/13 DE)	301.5 m
2	JK - 5	(13/14 DE)	300.4
3	JK - 6	(14/15 DE)	300.7
4	JK - 7	(12/13 DF)	301.4
5	JK - 8	(13/14 DF)	301.3
		Total	1,505.3 m

4-1-2 About Notation of Drill Holes

A systematic notation was given as JK-1, JK-2, and so on, for each of the three drill holes drilled by the Japanese team for the depth of 300 meters in the Second Year Phase on the southern foot of Kyisindaung Hill, where an anomaly had been detected by the IP survey of the First Year Phase. In order to keep clear the numbers of drilled holes by the Japanese survey team, the notation of them in this year phase followed the previous system, starting in JK-4 and ending in JK-8. On the other hand, as the holes were located in between the grid patterns which Burmese

Fig. 4 Compiled Map of Core-logs



team had delineated they applied the system of notation independently. For instance, the one located between lines 12 and 13, and between lines D and E has been named as 12/13 DE ; the rest followed this system as 13/14 DE, 14/15 DE, 12/13 EF. Therefore, the attached drawings of geological logging contain the both notations.

4-2 Geological Descriptions of Drill Holes

4-2-1 JK-4 drilled length, 301.5 meters

The hole consists of medium to coarse grained biotite porphyry from the surface to the bottom, in which the leached zone reaches as deep as 170.2 meters from the ground surface. The fair concentrations of chalcocite have been recognized at the depths of 195.7 m to 213.5 m, net 17.8 m, and from 254.6 m to 301.5 m the bottom, net 46.9 m, that is to say, two zones of fair mineralization have been recognized to exist with a barren interval of 58.9 m. The simple arithmetic averages of copper assays are 0.55 % in the former and 0.91 % in the latter.

4-2-2 JK-5 drilled length, 300.4 meters

Similarly to JK-4 the hole is composed of medium to coarse grained biotite porphyry throughout the length. Silicification is generally intense, as well as the concentration of hematite and limonite is advanced in the leached zone. Especially, intense alunitization is recognized from the surface to the depth of 70 meters.

A xenolith of fine sandstone is recognized for 20 cm from the depth of 157.0 m to 157.2 m, which is highly silicified.

The zones of intense brecciation have been observed in the depths of 180.0 m–185.7 m (net 5.7m), 253.5 m–255.9 m (net 2.4m), 259.8 m–263.7 m (net 3.9m), and 282.7 m–288.4 m (net 5.7m), the surroundings of which have been found especially fair in mineralization.

The leached zone reaches as deep as 139.6 meters from the surface, from which chalcocite is recognized almost continuously for the rest 160.8 meters to the bottom accompanying intense silicification. The fair mineralizations have been recognized in the depths of 139.6 m–194.0 m (net 54.4m) with average Cu of 0.89% and 210.0 m–300.4 m (net 90.4m) with average Cu 0.72%.

4-2-3 JK-6 drilled length, 300.7 meters

Throughout the length is composed of biotite porphyry of medium to coarse grained. The leached zone is shallower as 51.6 meters from the surface.

The distinct alunitization is recognized at the following 4 spots ; at 6.0 m, 34.5 m, 230.5 m, and 287.0 m deep from the surface respectively.

Silicification is generally weaker with less dissemination of pyrite, showing the average assay of copper as low as below 0.20%, with the exception at the depths of 120.0 m–132.1 m (net 12.1m) and 196.6 m–199.5 m (net 2.9m) with advanced silicification. Chalcocite concentration has been recognized at the following three spots, 71.7 m–90.7 m (net 19.0m), 101.0 m–140.7 m (net 39.7m), and 187.8 m–223.5 m (net 35.7m). Chalcocite is recognized in other holes continuously to the bottom, while in this hole, it can only be found poorly scattered below the depth of 223.5 m, showing the weaker mineralization in the depth zone.

4-2-4 JK-7 drilled length, 301.4 meters

There exists a brecciated zone from the surface to 17.5 m depth with well developed boxworks of hematite, below which is occupied by medium to coarse grained biotite porphyry to the depth of 115.5 m., while for another 27.4 m from there to the depth of 132.5 m, there appears fine to medium grained silicified sandstone of grayish white in color. For the rest length to the bottom of 301.4 m depth, appears medium to coarse grained biotite porphyry. Both the upper and lower contacts between the sandstone and biotite porphyry are represented by fractured zones, which may suggest a part of sandstone in Magyigon formation was drugged up into the porphyry at the time of formation of the porphyry dome.

The leached zone continues from the surface to the depth of 83.3 m, while the secondary enriched chalcocite zones are recognized roughly as the following 4 zones ; from 83.3 m to 110.0 m (net 26.7m) with average 0.46 % Cu, from 150.8 m to 213.9 m (net 63.0m) with average 0.45 % Cu, from 230.0 m to 255.7 m (net 25.7m) with average 0.30 % Cu, and from 268.0 m to 295.3 m (net 27.3m) with average 0.47 % Cu.

The exceptionally high silicification is recognized from the depth of 123.1 m to 135.0 m (net 11.9m), where the network veins of pyrite are well developed with fair concentration of chalcocite.

4-2-5 JK-8 drilled length, 301.3 meters

From the surface to the depth of 169.2 m, there appears tuff-breccia, for the next 14.2 m from there to the depth of 183.4 m there comes a faulted zone with argillization, and the rest of the length to the bottom is occupied by medium to fine grained biotite porphyry.

The tuff-breccia consists of alternation of two kinds of layers, the one containing the breccias of hornblende-biotite porphyry with 5 to 10 cm diameter, and the other volcanic tuff layer containing breccias of same origin with less than 3 cm diameter. The leached zone continues from the surface to the depth of 34.8 m, showing faint stain of yellowish brown with much less gossans. From the bottom of this zone to the faulted zone, the formation is so fresh that any trace of mineraliztion has ever been found.

The faulted zone is found almost free from pyritization, indicating none of the mineralization effect. The determination of minerals in this zone by X-ray diffraction method has revealed alpha quartz and kaoline, but none of the other elements has not been detected. This may suggest the kaoline so far detected was formed during the faulting movement and the movement is considered to have taken place after the completion of mineralization.

Mineralization is also feeble even in the biotite porphyry below the fault with generally weaker silicification, and chalcocite has been recognized only at the following two sections; from 180.0 m to 190.0 m with 0.28% Cu as an average for 10 m, and from 205 m to 230 m with 0.41% Cu as an average for 25 m.

4-3 Relation to the Results of Last Year Phase

4-3-1 About the Fault East of Kyisindaung

A fault of NE-SW system was inferred in the east side of Kyisindaung Hill during the geological survey of the Second Year Phase, the existence of which has been ascertained with its nature by Drill Hole JK-8 in the present survey. The reason why two or three of the secondary enriched zones were recognized in this ore deposit was interpreted that a set of parallel faults of NE-SW system, intercalating Kyisindaung Dome in between, caused the dome down-thrown, and consequenly the primary leaching zone was also taken down below withholding some unleached chalcopyrite in it, which offered the source of copper to be leached again after the completion of faulted structure and to be redeposited as another secondary enriched zone after its migration. It is very fruitful that this interpretation has been justified by Drill Hole JK-8 in the present survey.

4-3-2 Relation to the Ore Emplacement

1) Drill Hole JK-4, located between the lines of No.12 and No.13 in the grid

pattern of Burmese party, has revealed the existence of continuous mineralization from the depth of 200 meters to the bottom, which may suggest these holes drilled by Burmese party on these lines have not penetrated the ore zones deep enough.

2) As for JK-5 and JK-8, located between the Burmese lines No. 13 and No. 14, the former, JK-5, has not penetrated the lower zone deep enough, and the latter, JK-8, has revealed the fault impervious and its hanging-wall tuff-breccia formation unmineralized, which has clarified the reason why the assay around the fault has not shown any sizable concentration of copper, as the secondary enrichment had been prevented to be well progressed by such geological conditions.

3) JK-6, located between the Burmese holes 14 D and 14 E and south of them, has revealed too low grade zone all the way down to result in any increase of ore reserves. But this hole has served a great deal to supplement the adjacent 14 D which has been drilled as shallow as only about 100 meters.

CHAPTER 5 CONCLUSION AND FUTURE PROBLEMS

5-1 Exploration Problem of Kyisindaung Ore Deposit

It has been pointed out since the surveys of the Second Year Phase that Kyisindaung Ore Deposit has the spaces to be explored in its southern and southwestern parts, and including the results of the present survey, its lateral extension of mineralized area has been explored almost thoroughly. But as regards to its deeper persistence, the present survey has revealed the increase of possibility of the lower ore zone to reach to about 50 m horizon below sea level. This, or to prospect the bottom of the lower ore body of this deposit, must be kept in mind as the exploration problem from this time on, for which deeper drillings of about 500 meters will be required.

5-2 Forms of Ore Bodies in Kyisindaung Deposit and Future Developement

Kyisindaung Ore Deposit consists of two ore bodies, the upper and lower ones. The upper is smaller in its size, while the lower lies under a leached zone of enormous thickness, reaching more than 200 meters below the surface, which may cause a great strip ratio in planning the development by open pit system. In planning the development, therefore, it may be necessary to search for some other system to substitute the open pit system, such as in-place leaching.

5-3 About Calculation of Ore Reserves

The ore deposits of Kyisindaung and Sabedaung South have been explored by the Burmese party in this year, too, and this operation will be completed within this year. Although their ore reserves were calculated in the Second Year Phase, it is advisable to try a re-calculation of reserves at the state in order to prepare the definitive guide in planning the development programme.

PART II DRILLING

CONTENTS

TABLES AND ANNEXES

CHAPTER 1 SUMMARY OF DRILLING WORKS

The drilling works for the third year phase (1974) consist of 5 holes, of which locations are shown on Plate 1, with the total drilled length of 1,505.30 meters, conducted as the detailed investigation of Kyisindaung Deposit in order to confirm the mineralization and geological structure at the east end of the deposit. In executing the works, the drilling method was established on the basis of the experiences gained in this area last year, and the results were successful in both core recovery and drilling efficiency.

The drilling operation was commenced on February 11, 1975 and completed on April 12 by two teams composed of two Japanese drillers and one supervisor with the assistance of two Japanese drilling experts under the Colombo Plan (Mr. Itsuki Hatazawa and Mr. Akio Chida) operating two drills on two shifts a day.

With the works performed as above, the three years' survey by diamond drilling in Monywa Area has completed its entire program aggregating 30 holes and 6,840.50 meters in drilling length. In carrying out the drilling project, emphasis has been laid on the training of local technicians as one of the objectives of the project and, at the same time, cares have been taken in organizing the team so that there are always experienced members who participated in the past phases of the survey after the first year to facilitate the operation of the project. In consequence, satisfactory results have been obtained as expected through the efforts made by the survey team and the collaboration rendered by all Burmese people concerned.

CHAPTER 2 DRILLING METHOD AND EQUIPMENT EMPLOYED

As aforesaid, in the execution of the three years' drilling works in Monywa Area that have ended this year, various drilling methods were elaborately designed to suit the geological conditions and put into practice successfully to produce the results well surpassing those initially anticipated.

For this year's survey in particular, priority has been given to the following two points in working out the drilling method in view of the drilling results obtained in Kyisindaung area last year-one is the measures to protect against the loss of mud-fluid and cavings that might happen in the oxidized and leached zone and the other is the increased cutting efficiency of diamond bits.

Summaries are given below on these considerations.

2-1 Matters Attended to in Establishing Drilling Method

(1) Because of a great variety of hardness and abundant cracks found in the rocks, formations existing in the oxidized and leached zone, on the whole, are very likely to cause the loss of mud-fluid, making it difficult to provide against the caving of drill holes and resulting in the decreased drilling efficiency. The drill hole caving will also induce to casue sometimes detention, breaking-off and other troubles to the drilling tools, many of them being very difficult to recover.

(2) Vibration of the drilling rods caused by the loss of mud-fluid, caved materials, sludges remaining in the hole, etc. hinder the recovering of cores.

(3) In addition to the loss of mud-fluid and caving that may happen frequently, bit wear becomes heavy due to the breakage and falling-off of diamond in drilling the formations consisting of rocks exceptionally variant in hardness.

All these happenings are also very likely to cause burning to bits.

(4) In the drilling of biotite porphyry or exceedingly silicified mineralized zones, diamonds are subjected to heavy abrasion affecting bit life and drilling efficiency.

To cope with the abovementioned problems, the measures were taken as follows.

2-2 Measures Taken for Drilling Method

(1) Chromenite mud-fluid was used in the whole drilling for the protection of drill hole wall. Against the loss of mud-fluid or cavings occasioned from time to time, efforts were made to take appropriate steps depending on the quantity of loss or the degree of cavings such as selective use of chemicals for the prevention of mud-fluid loss, cementing measures or installation of casings.

(2) For the purpose of increasing the rate of core recovery, wireline method was employed along with mud-fluid drilling as well as to stabilize the wall of drill hole and for smooth discharging of sludge. NQ size drilling was adhered to as far as practicable for the effective use of mud-fluid until the oxidized and leached zone was gone through. In addition, in the drilling of rocks with abundant cracks or soft portions interbedded, as these are the most difficult portions to recover cores therefrom, technical devices were cautiously made to keep the balance of mud-fluid supply and drilling speed.

(3) The rocks to be drilled were classified into hard and soft rocks in order to select rightly diamond bits to be used accordingly. For soft rocks, in anticipation of hard rocks partially interbedded, bits were set with diamonds of medium particles (1/25 - 1/30 carat), using hard matrix (R. C. 35) for a

longer life and a better cutting effect.

Bits for hard rocks were designed mainly to improve the cutting effect with diamonds of fine particles (1/35 - 1/40 carat) set in matrix of R.C. 20 in hardness having 5-6 steps and 4-6 waterways same as in the previous years.

Types and specifications of the drill are as shown in Table 1 (A, B and C).

CHAPTER 3 DRILLING OPERATIONS

3-1 Preparatory Works

Various preparatory works were carried out according to the drilling program for this year with a view to commencing the drilling as from February 19.

On January 24, one drilling supervisor was first dispatched to take delivery of the previously forwarded equipment for transfer to Monywa and to make necessary preparations at the work site to accommodate drilling technicians coming to join him. Following the arrival at Monywa of two drilling technicians on February 9, works were further carried on such as examination of the drilling equipment stored at Monywa, inspection of the proposed drilling sites and repairs of the haulage roads to the sites until the start of transportation of two drills and supplies on February 11.

The first drilling sites, DHK-12/13-DE (JK-4) and DHK-12/13-EF (JK-7) are both located on the slope east of Kyisindaung Hill at the distance of 450 meters from the end of a truck road. To cover this 450 meter distance, a temporary road had to be constructed for the drilling equipment to be towed by bulldozer to the sites although up to the end of the existing road trucks were available for transportation of equipment and supplies other than drills.

Drilling water was supplied by installing a water pump at the reservoir in the Burmese Camp to raise water to the tank existing at the top of Kyisindaung Hill through iron pipes for about 450 meters and from the tank to each drilling site by use of polynite pipes.

3-2 Moving Operations

The construction of haulage roads to move from site to site, ground-levelling of the sites and other preparatory works were conducted before the start of drilling operations. Haulage of equipment was made by bulldozer.

Moving operations for each drilling site are shown in Table 4.

3-3 Withdrawing Operations

Immediately after the completion of the last drill hole DHK-13/14-EF(JK-8) on April 3, the dismantling works were carried out such as lifting of casing pipes, disassembling of drills, derricks, waterpipes, etc. Equipment and materials other than drills and pumps were carried by manpower for about 50 meters to the road, then by truck to the storage designated by the Burmese side. Drills and pumps were towed by bulldozer from the site to the designated storage.

After the haulage, all the equipment and materials were checked and arranged in order, then handed over to the Burmese side after inspection.

All the field works were completed on April 12.

3-4 Drilling Works

Efforts were made to improve core recovery and drilling rates by establishing the drilling method suitably to work the fractured zone and soft formations, as well as to prevent the loss of mud-fluid, on the basis of the experiences in the first and second year phases of operation. The results turned out to be very successful, gaining a core recovery rate of 95.6 per cent averaged for the total drilling length of 5 holes of 1,505.30 meters and a drilling speed of 14.7 meters per shift for the total works conducted.

The conditions of drilling works in this year are summarized as follows.

The overburden of this area ranges between 1.50 and 3.00 meters in thickness, and 120 m/m tri-cone bits were used for drilling this portion. Then, 112 m/m and NX casing pipes were inserted, followed by NQ and BQ wire line method drilling. Fractured zone continued to the depth of 170.00 meters with soft formations interbedded therein, causing substantial losses of mud-fluid and caving during the drilling. The work, therefore, had to be carried on for this zone by taking such steps to recover these troubles as pouring of chemicals for the prevention of loss of mud-fluid, cementation and in some parts enlarging the drill hole by casing pipes to place them down to the required depths.

Rocks were good below the depth of 170.00 mters and drilling proceeded satisfactorily with a little core blocking. Neochromenite mud-fluid was used for the whole drilling to improve drilling speed and core recovery.

3-5 Drilling Conditions

The drilling conditions of each hole are as follows.

DHK-12/13-DE (JK-4)

Drilling commenced with 120 m/m tri-cone bit until the rock was reached at 1.50 meters, then 112 m/m casing pipe inserted to drill by 101 m/m diamond bit to the depth of 3.00 meters, thereupon NX casing pipe inserted. Drilled by NQ wire line method from 3.00 meters to 160.30 meters, during which there were heavy losses of mud-fluid and cavings becasue of the fractured zone with soft formations interbedded, and at 24.50 meters occurred the total loss of mud-fluid. Drilling continued with various measures taken to overcome these difficulties such as pouring of chemicals for the prevention of mud-fluid loss and cementation, but the drilling became difficult to proceed at the depth of 27.00 meters and the drill hole was enlarged by NX casing pipes to extend them down to this point. From this point downward, there were also losses of mud-fluid and cavings at several places, but they were overcome by use of loss prevention chemicals and mud-fluid.

The oxidized zone was gone through at 160.30 meters, and as rocks became stabilized causing core blocking to decrease, BX casing pipes were inserted.

Subsequently, drilled by BQ wire line method, but soft formations interbedded thereabout to the depth of 170.00 meters caused again loss of mud-fluid and cavings, necessitating the hole enlarged by BX casing pipes to extend them to 170.00 meters.

Below the said point, rocks were good and drilling satisfactory with only slight core blocking.

Completed drilling at 301.50 meters with the objective achieved. Neochormenite mud-fluid was used for the entire drilling.

DHK-12/13-EF (JK-7)

Used 120 m/m tricone bit in the start of drilling, placed 112 m/m casing pipe when the rock was reached at 1.50 meters and drilled by 101 m/m diamond bit to the depth of 3.00 meters, then inserted NX Casing Pipe. Drilled from the depth of 3.00 meters downward by NQ wire line method, but because of the fractured zone with soft formations interbedded and resultant heavy cavings and losses of mud-fluid, the drilling through to the depth of 70 meters required the pouring of chemicals for the prevention of mud-fluid loss and cementing operations. But, continued drilling becoming difficult with repeated cavings and losses of mud-fluid in mid course, the drill hole had to be enlarged by NX casing pipes to extend them to the point of 70 meters.

Rocks were good from 70 meters to 150 meters and the drilling proceeded satisfactorily with slight core blocking. At 150 meters inserted BX casing pipes and drilled by BQ wire line method.

Completed drilling at the depth of 301.40 meters with objective achieved. Used neochormenite mud-fluid for the entire drilling and cutting oil as well for hard rocks.

DHK-14/15-DE (JK-6)

Used 120 m/m tri-cone bit from the start of drilling to the depth of 3.00 meters where the rock was reached, then inserted 112 m/m and NX casing pipes to continue drilling by NQ wire line method.

As there were a total loss of mud-fluid and cavings at 30 meters, the NX casing pipes were withdrawn and the drill hole was enlarged by 101 m/m diamond bit to the depth of 30 meters to extend NX casing pipes to that point.

Rocks were stable from 30 meters downward and the drilling proceeded satisfactorily with slight core blocking. At 171.00 meters inserted BX casing pipes and drilled by BQ wire line method to the depth of 300.70 meters finishing the work with the objective achieved.

Used neochromenite mud-fluid for the entire drilling and also cutting oil in part.

DHK-13/14-DE (JK-5)

Used 120 m/m tri-cone bit from the start of drilling to the depth of 1.50 meters where the rock was reached, then inserted 112 m/m casing pipes. After that drilled by 101 m/m diamond bit to the depth of 3.00 meters and NX caing pipes inserted. From 3.00 meters downward drilled by NQ wire line method, but as the drilling became difficult at the depth of 28.50 meters due to heavy losses of mud-fluid and caving resulting from the soft formations, the NX casing pipes were withdrawn and the drill hole was enlarged with 101 m/m diamond bit to 28.50 meters to extend the NX casing pipes to the said depth. The subsequent drilling was still accompanied with a succession of mud-fluid losses and cavings to the depth of 140.00 meters, but they were overcome by use of chemicals for the prevention of mud-fluid loss and by cementation.

At 140.00 meters inserted BX casing pipes and continued drilling by BQ wire line method. The rocks contained quartz and were hard causing much wear to bits, but drilled smoothly without much of core blocking.

Completed drilling at the depth of 300.40 meters with the objective achieved. Used neochromenite mud-fluid for the entire drilling and also cutting oil for hard rock portions.

DHK-13/14-EF (JK-8)

Commenced drilling with 120 m/m tri-cone bit. Reached the rock at the depth of 3.00 meters and inserted 112 m/m and NX casing pipes, thereafter drilled by NQ wire line method to the depth of 159.40 meters. During drilling this portion, there were cavings and losses of mud-fluid in part, but the drilling continued by use of chemicals for the prevention of mud-fluid loss and by additional input of mud-fluid for protection of drilled hole.

At 159.40 meters inserted BX casing pipes and drilled thereafter by BQ wire line method. The rocks were good and drilling proceeded satisfactorily with only slight core blocking.

Completed drilling at the depth of 301.30 meters with the objective achieved. Used neochromenite mud-fluid for the entire drilling and also cutting oil in part.

3-6 Operational Records and Analysis

(1) Analysis of Drilling Work Time

As shown in Table 2-A, the percentage of Drilling Work Time stands at 70.6% of the Total Working Time, represented mainly by Drilling Time in the proportion of 66.1%. Proportion rates of the Drilling Time of each drill hole are approximately even in comparison.

Ancillary works account for 17.6% of the Total Working Time, most of them being mud-fluid loss prevention work, drilling preparations and post-drilling works. Comparison of each hole operation shows that two holes of DHK-12/13-DE and DHK-12/13-EF occupied 70 % of the total ancillary works because of so much time having been spent in these two holes for reaming and prevention of mud-fluid loss.

Moving operations were carried out mostly by bulldozer haulage except in part where manpower had to be employed in the haulage of equipment, and the time taken in the moving operations was 29.4 % of the Total Working Time. Proportions of time by work category to the Total Working Time are as shown in Table 2-B.

(2) Drilling Results

As shown in Table 3, the drilling length per shift was 14.07 meters for the total works conducted in drilling 5 holes aggregating 1,505.30 meters and 17.01 meters for the net drilling operations.

In the comparative operational results of these drill holes, the worst was DHK-12/13-EF showing 10.05 meters per shift for the total works and 14.35 meters per shift for the net drilling operations. This was because of unusually heavy losses of mud-fluid and cavings caused due to soft formations interbedded and abundant cracks in the rocks developing to the depth of 170.00 meters from the surface.

The best result was obtained in drilling DHK-13/14-EF with the drilling length of 21.52 meters per shift for the total works and of 22.36 meters per shift for the net drilling operations.

The drilling works for the 1974 fiscal year brought more favorable results than originally expected as a whole although in part there was an unavoidable decline in drilling efficiency.

(3) Core Recovery Rate

The overall average rate of core recovery reached 95.6 % excepting the overburden of 1.50 - 3.00 meters as shown in Table 3.

As regards the core recovery of each hole, there was unavoidable loss of cores in part owing to heavy mud-fluid losses and cavings caused in the drilling of two holes, DHK-12/13-DE and DHK-12/13-EF, because of the soft formations, resulting in the recovery rates of 90.4 % and 93.8 % respectively. However, others showed higher results than 96.4 %, thus making the total average as high as aforesaid.

(4) Summary Records of Drilling Results

Summary records of drilling results for each drill hole are shown in Tables 5, 6, 7, 8, and 9.

Table 1-A Drilling Equipment [TEL - 3 B]

TEL - 3B (1)

Item	Type	Specification	Quantity
Drilling Machine	TEL - 3B (TONE Boring Co., LTD.)	Capacity (m) 800 m Dimensions Height 1,380 mm Length 2,820 mm Width 1,200 mm Weight (Except Power Unit) 2,200 kg	1 set
	Swivel Head	Spindle Speed 270, 540, 720, 1,200 r.p.m. 150, 300, 400, 670 r.p.m.	
	Hoist	Planetary Gear Hoisting Capacity 4,500 kg	
	Oil Pump	*Automatic Variable Delivery Vane Type* Capacity 0 ～ 100 ℓ/min. Pressure Max. 70 kg/cm^2 Pressure Regular Working 50 kg/cm^2	
Motor	F4L.912 (Mitsui Deuts, Co.)	Diesel Engine Revolution 1,200 ～ 2,400 r.pm. Related Power 22 ～43 p.s.	1 set
Drilling Pump	NAS - 3	Duplex Cylinder Double Action Weight (Except Power Unit) 330 kg Piston Diameter 75 mm Stroke 50 mm *Discharge Capacity* 130 ℓ/*min.* Max. Pressure 70 kg/cm^2	1 set
Motor	NS - 110 (Yammer Diesel Co.)	Diesel Engine Revolution 2,200 r.p.m. Related Power 11 p.s.	1 set
Mud Mixer	MCE - 100 A	Tankage 125 ℓ Mixing Capacity 100 ℓ Mixing Revolution 800 r.p.m.	1 set
Motor	NS - 40 (Yammer Diesel Co.)	Diesel Engine Revolution 2,000 r.p.m. Related Power 4 p.s.	1 set
Water Supply Pump	NAS - 3	Same as Drilling Pump	1 set
Motor	NS - 110	Same as Drilling Pump's Motor	1 set
Derrick	DR - 12	Height 12.5 m Max. Road Capacity 20 ton	1 set

TEL - 3B (2)

Item	Type	Specification		Quantity
Generator	YSG - 1.5 s	Capacity	1.5 kW, 15 kVA	1 set
		Voltage	100 V	
		Electric Current	15 A	
Motor	NS - 40	Revolution	2,000 r.p.m.	1 set
	(Yammer Diesel Co.)	Related Power	4 p.s.	
Drill Rod		NQ - 3 m		57 pcs.
		BQ - 3 m		101 pcs.
Casing Pipe		112 mm - 3 m		1 pc.
		NX - 3 m		1 pcs.
		BX - 3 m		57 pcs.
Wire Line Hoist		Attached to Drill		1 set
Rod Safty Clamps		RH 85		1 set
Water Swivel		DH Type		1 set
Traveling Block				3 pcs.
Hoisting Swivel		B Type		1 set

Table 1-B Drilling Equipment (TGM - 2 C)

TGM - 2C (1)

Item	Type	Specification	Quantity
Drilling Machine	TGM - 2C (TONE Boring Co., Ltd.)	Capacity (m) 550 m Dimensions Height 1,520 mm Length 2,430 mm Weight (Except Power Unit) 1,200 kg	1 set
	Swivel Head	Spindle Speed 200, 500, 770, 1,000 r.p.m.	
	Hoist	Planetary Gear Hoisting Capacity 2,000 kg	
	Oil Pump	Automatic Variable Delivery Vane Type Capacity 0～100 ℓ/min. Max. Pressure 70 kg/cm^2	
Motor	F3L.912 (Mitsui Deuts, Co.)	Diesel Engine Revolution 2,000 r.p.m. Related Power 33～36 p.s.	1 set
Drilling Pump	NAS - 3	Duplex Cylinder Double Action Weight (Except Power Unit) 330 kg Piston Diameter 75 mm Stroke 50 mm Discharge Capacity 130 ℓ/min. Max. Pressure 70 kg/cm^2	1 set
Motor	NS - 110 (Yammer Diesel Co.)	Diesel Engine Revolution 2,200 r.p.m. Related Power 11 p.s.	1 set
Mud Mixer	MCE - 100A	Tankage 125 ℓ Mixing Capacity 100 ℓ Mixing Revolution 800 r.p.m.	1 set
Motor	NS - 40 (Yammer Diesel Co.)	Diesel Engine Revolution 2,000 r.p.m. Related Power 4 p.s.	1 set
Water Supply Pump	NAS - 4	Duplex Cylinder Double Action Weight (Except Power Unit) 640 kg Piston Diameter 85 mm Stroke 90 mm Discharge Capacity 250 ℓ/min. Max. Pressure 70 kg/cm^2	1 set
Motor	F3L.912 (Mitsui Deuts, Co.)	Same as Drilling Machine	1 set

TGM - 2C (2)

Item	Type	Specification		Quantity
Derrick	DRPQ - 5	Height	12.5 m	1 set
		Max. Road Capacity	20 ton	
Drill Rod		NQ - 3 m		34 pcs.
		BQ - 3 m		101 pcs.
Casing Pipe		112 mm - 3 m		1 pc.
		NX - 3 m		10 pcs.
		BX - 3 m		34 pcs.
Wire Line Hoist		Attached to drill		1 set
Rod Safty Clamps		RH 85		1 set
Traveling Blesk				3 pcs.
Water Swivel		DH Type		1 set
Hoisting Swivel		B Type		1 set

Table 1-C Consumed Materials

Description	Specification	Unit	Quantity						
			DHK 12/13-DE	DHK 12/13-EF	DHK 13/14-DE	DHK 13/14-EF	DHK 14/15-DE	Com.	Total
Parts for Drilling Machine		pec.						8	8
Chuck piece		set						3	3
Chuck bolt		"						2	2
V belt		pec.	3			2			5
Piston Packing	For Pump	set						2	2
Piston rod		pec.						4	4
V packing		set						2	2
Cylinder liner		"						2	2
Valve ball		pec.						16	16
Valve seat		"						16	16
Suction hose		"						3	3
Delivery hose		"						2	2
Water swivel packing		set	1			1			2
Spindle		pec.	1	1		1			3
Bearing		pec.	1	1		1			3
Wire rope	18 mm ø	m	30	30	30				90
"	5 mm ø	"						900	900
Manila rope	20 mm ø	"						60	60
Wire	# 10	kg	15	15	10	10	15		65
Nail		"	3	3	3	3	3		15
Square timber		m^3						10	10
Board		"						32	32
Core box		pec.	39	40	40	42	41		202
Rag		kg	8	12	10	10	10		50
Parts for motor		pec.						4	4
Casing pipe	112 mm	"		1			1		2
"	NX	"	2	1	1				4
"	BX	"	4	2	3	5	4		18
Drill rod	NQT.WL	"						17	17
"	BQT.WL	"						8	8
3 cutter bit		"						3	3
Gasoline		ℓ						120	120
Light oil		"	607	730	595	450	510		2,892
Heavy oil		"	80	160	180	80	60	200	760
Mobil oil	*Engine*	"	18	30	40	15	18		121
Mission oil	Gear	"	8	10	15	13	7		53
Grease		kg	6	11	3	5	4	20	49
Turbine oil	Oil pressure	ℓ	80	60	30	40	60		270
Bentonite		kg	1,400	1,495	1,010	750	910		5,565
Chromenite		"	345	855	220	170	175		1,765
C.M.C		"	97	50	59	54	55		315
Caustic soda		"	10	9	18	10	14		61
Tel-stop		"	30	25	15	–	5		75
Sea clay		"	50	40	10	5	10		115
Tel-seal		"	15	20	5	5	10		55
Cutting oil		ℓ	100	80	70	60	60		370
Cement		kg	140	140	40	40	40		400
Single core tube	101 mm	set						2	2
Double core tube	101mm x 1.5m	"						1	1
"	NQT.WL x 3.0m	"						3	3
"	BQT.WL x 3.0m	"						3	3
Inner tube	101mm x 1.5m	pec.						1	1
"	NQT.WL x 3.0m	"						6	6
"	BQT.WL x 3.0m	"						6	6
Core tube head	*101 mm*	"						1	1
"	NQT.WL	"						4	4
"	BQT.WL	"						4	4
Metal shoe	112 mm	"	1	1	1	1	1		5
"	NX	"	3	2	1	1	1		8
"	BX	"	1	1	1	1	1		5
Parts for Core tube	101 mm	"						3	3
"	NQT.WL	"						24	24
"	BQT.WL	"						30	30

Table 2-A Analysis of Working Time

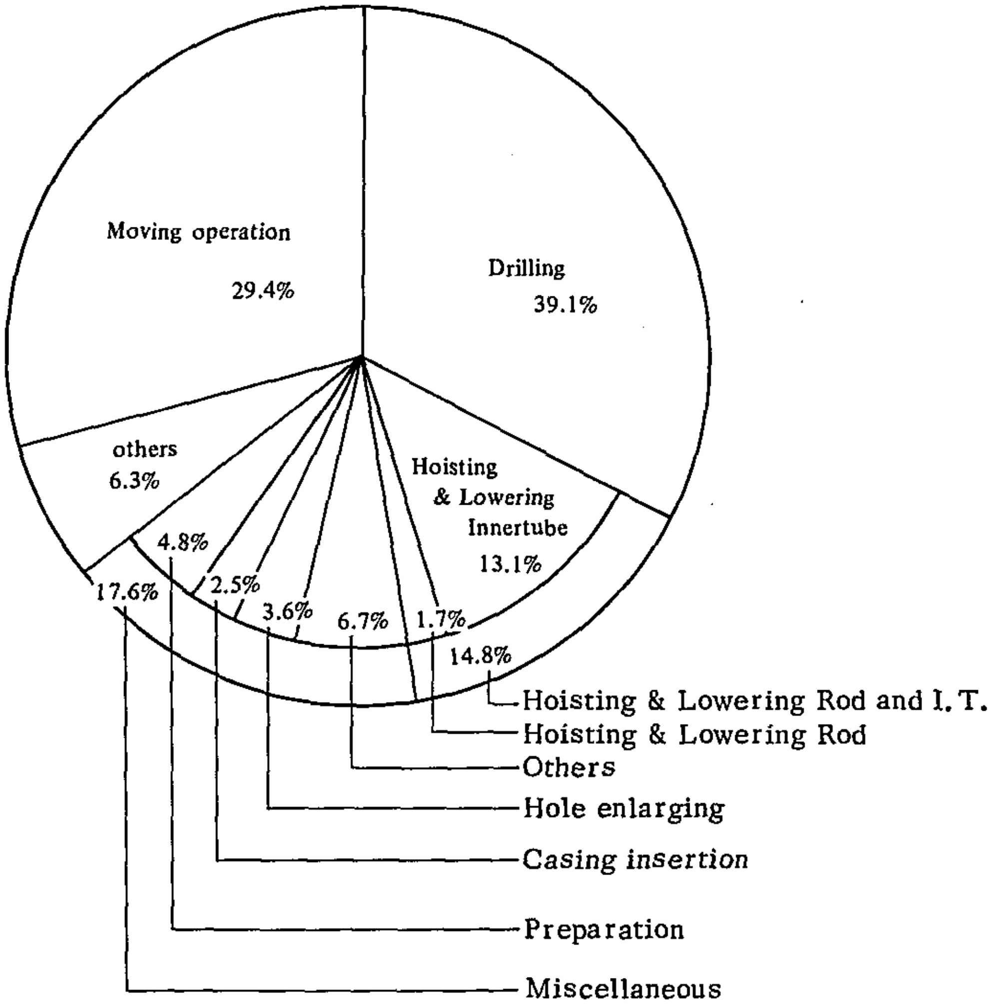


Table 2-B Analysis of Working time for Each Borehole

Borehole	Drilling	Hoisting & Lowering Rod and I. T.		Miscellaneous			Repairs	Others	Moving Operation	Total
		Rod	Inner Tube	Casing Insertion	Hole Enlarging	Others				
DHK-12/13-DE	88°20'	0°40'	41°20'	9°30'	8°30'	41°00'	–	21°30'	77°10'	288°00'
DHK-12/13-EF	86°40'	4°30'	32°00'	3°30'	28°50'	59°00'	–	25°30'	80°00'	320°00'
DHK-14/15-DE	66°00'	3°50'	30°30'	7°30'	2°50'	15°50'	–	9°30'	40°00'	176°00'
DHK-13/14-DE	86°00'	7°00'	28°40'	6°10'	3°40'	16°30'	–	12°00'	72°00'	232°00'
DHK-13/14-EF	61°20'	5°00'	26°50'	4°10'	–	6°40'	–	8°00'	88°00'	200°00'
Total		21°00'	159°20'	30°50'	43°50'	139°00'	–			
	388°20'	182°20'			213°40'			76°30'	357°10'	1,215°00'
	31.9%	1.7%	13.1%	2.5%	3.6%	11.5%	–	6.3%	29.4%	100%

Table 3 drilling results

Drill Hole No.	Type of Machine	Drilling Period	Drilled Length	Core		Number of Drilling Shift			Drilling Speed		Remarks
				Length	Recovery	Drilling	Casing etc.	Total	* m/shift	** m/shift	
			m	m	%	shift	shift	shift	m	m	
(JK-4) DHK-12/13-DE	TEL-3b	Com. 19th Feb. 1975 Fin. 8th Mar. 1975	301.50	271.30	90.4	21	5	26	11.60	14.36	Overburden 1.50 m
(JK-7) DHK-12/13-EF	TGM-2c	Com. 22nd Feb. 1975 Fin. 12th Mar. 1975	301.40	281.30	93.8	21	9	30	10.05	14.35	Overburden 1.50 m
(JK-6) DHK-14/15-DE	TEL-3b	Com. 13th Mar. 1975 Fin. 21st Mar. 1975	300.70	294.70	99.0	15	2	17	17.69	20.05	Overburden 3.00 m
(JK-5) DHK-13/14-DE	TGM-2c	Com. 15th Mar. 1975 Fin. 25th Mar. 1975	300.40	288.10	96.4	18	2	20	15.02	16.69	Overburden 1.50 m
(JK-8) DHK-13/14-EF	TEL-3b	Com. 28th Mar. 1975 Fin. 3rd Apr. 1975	301.30	294.90	98.9	13.5	0.5	14	21.52	22.36	Overburden 3.00 m
Total			1,505.30	1,430.30	95.6	88.5	18.5	107	14.07	17.01	

* Drilled length per one shift covering total works conducted.
* * Drilled length per one shift covering net drilling operations.

Table-4 Moving Operation

Item \ Hole No.		DHK-12/13-DE		DHK-12/13-EF		DHK-14/15-DE		DHK-13/14-DE		DHK-13/14-EF		Total	
Moving Operation	in	11th Feb. 1975		11th Feb. 1975		10th Mar. 1975		14th Mar. 1975		23rd Mar. 1975			
		18th Feb. 1975		21st Feb. 1975		12th Mar. 1975		–		27th Mar. 1975			
	out	9th Mar. 1975		13th Mar. 1975		22nd Mar. 1975		26th Mar. 1975		4th Apr. 1975			
		–		–		–		5th Apr. 1975		12th Apr. 1975			
		Day	Man-day	Day	Man-day	Day	Man-day	Day	Man-day	Day	Man-day	Day	Man-day
Preparations	Access Road	1	7	3	27	1	13	–	–	0.5	6	5.5	53
	Haulage	2	29	3	27	1	13	0.5	6	1	13	7.5	88
	Installations	2	32	2	22	1	13	0.5	6	1.5	20	7	93
	Water Pipe	1	9	1	11	–	–	–	–	–	–	2	20
	Test Run. etc.	2	8	2	10	–	–	–	–	2	–	6	
	Total	8	85	11	97	3	39	1	12	5	39	28	272
Removal	Dismantling	0.5	25	1	12	1	19	1	12	2	26	5.5	94
	Pipe Removal	0.5	8	–	–	–	–	1	12	0.5	7	2	27
	Haulage	–	–	–	–	–	–	3	36	1.5	20	4.5	56
	Road Reinstatement	–	–	–	–	–	–	–	–	–	–	–	–
	Others	–	–	–	–	–	–	6	12	5	21	11	33
	Total	1	33	1	12	1	19	11	72	9	74	23	210
	Grand Total	9	118	12	109	4	58	12	84	14	113	51	482

Summary Record of Drilling Results

Table 5 DHK-12/13-DE (JK-4)

Item		Periods	Number of Days	Actual Working Days	Day Off	Total Number of Working
Drilling Periods	Preparation	11th Feb. 1975 - 18th Feb. 1975	8	7	1	85
	Drilling	19th Feb. 1975 - 8th Mar. 1975	18	16	2	184
	Removing	9th Mar. 1975	1	1	0	33
	Total	11th Feb. 1975 - 9th Mar. 1975	27	24	3	302

Drilling Length	Planned Length	300.00 m	Over-Burden	1.50 m
	Increase or Decrease in Length	1.50 m	Core Length	271.30 m
	Length Drilled	301.50 m	Core Recovery	90.40%
Working Time	Drilling	88°20'	41.9 %	30.7 %
	Hoisting & Lowering Rod	0°40'	0.3	0.2
	Hoisting & Lowering I.T.	41°20'	19.6	14.4
	Miscellaneous	59°00'	28.0	20.5
	Reparing	–	–	–
	Others	21°30'	10.2	7.5
	Total	210°50'	100	73.3
	Removing: Preparation	56°00'	–	19.4
	Removing: Moving	21°10'	–	7.3
	G. Total	288°00'	–	100

Core Recovery for 100 m Section

Depth of Hole	Section	Total	Depth of Hole	Section	Total
0-100	82.3%	82.3%	400-500		
100-200	88.8%	85.6%	500-600		
200-300	100 %	90.4%	600-700		
300-400			700-800		

Effciency of Drilling

301.50 m/Work Period	11.17 m/Day
301.50 m/Working Days	12.56 m/Day
301.50 m/Drilling Period	16.75 m/Day
301.50 m/Net Drilling Days	18.84 m/Day
Total Workers/301.50 m	1.0 Shift
Total Drilling Workers/301.50 m	0.61 Shift

Casing Pipe Inserted: Pipe Size & Meterage	Inserted Length / Drilling Length (%)	Recovery of Casing Pipe
112 m/m 1.50m	0.5 %	100 %
NX 27.00m	9.0 %	88.9 %
BX 170.00m	56.4 %	92.9 %

Hoisting & Lowering Rod	1 Time	Hoisting & Lowering I.T.	162 Times

Remarks

Summary Record of Drilling Results

Table 6 DHK-12/13-EF (JK-7)

	Item	Periods	Number of Days	Actual Working Days	Day Off	Total Number of Working
Drilling Periods	Preparation	11th Feb. 1975 - 21th Feb. 1975	11	9	2	97
	Drilling	22th Feb. 1975 - 12th Mar. 1975	19	16	3	187
	Removing	13th Mar. 1975	1	1	–	12
	Total	11th Feb. 1975 - 13th Mar. 1975	31	26	5	296

Drilling Length	Planned Length	300.00 m	Over-Burden	1.50 m
	Increase or Decrease in Length	1.40 m	Core Length	281.30 m
	Length Drilled	301.40 m	Core Recovery	93.8 %

Core Recovery for 100 m Section

Depth of Hole	Section	Total	Depth of Hole	Section	Total
0-100	84.1%	84.1%	400-500		
100-200	97.6%	90.0%	500-600		
200-300	99.7%	93.8%	600-700		
300-400			700-800		

	Item		Time	%	%
Working Time	Drilling		86°40'	36.1	27.1
	Hoisting & Lowering Rod		4°30'	1.9	1.4
	Hoisting & Lowering I.T.		32°00'	13.3	10.0
	Miscellaneous		91°20'	38.1	28.5
	Repairing		–	–	–
	Others		25°30'	10.6	8.0
	Total		240°00'	100	75.0
	Removing	Preparation	72°00'	–	22.5
		Moving	8°00'	–	2.5
	G. Total		320°00'	–	100

Efficiency of Drilling

301.40 m/Work Period	9.72 m/Day
301.40 m/Working Days	11.59 m/Day
301.40 m/Drilling Period	15.86 m/Day
301.40 m/Net Drilling Days	18.84 m/Day
Total Workers/301.40 m	0.98 Shift
Total Drilling Workers/301.40 m	0.62 Shift

	Pipe Size & Meterage	Inserted Length / Drilling Length (%)	Recovery of Casing Pipe
Casing Pipe Inserted	112m/m 1.50m	0.5 %	100 %
	NX 70.00m	23.2 %	100 %
	BX 150.00m	49.8 %	96.0 %

Hoisting & Lowering Rod 5 Time	Hoisting & Lowering I.T. 134 Times

Remarks

Summary Record of Drilling Results

Table 7 DHK-14/15-DE (JK-6)

Item		Periods	Number of Days	Actual Working Days	Day Off	Total Number of Working
Drilling Periods	Preparation	10th Mar. 1975 - 12th Mar. 1975	3	3	–	39
	Drilling	13th Mar. 1975 - 21th Mar. 1975	9	9	–	111
	Removing	22th Mar. 1975	1	1	–	19
	Total	10th Mar. 1975 - 22th Mar. 1975	13	13	–	169

Drilling Length				
	Planned Length	300.00 m	Over-Burden	3.00 m
	Increase or Decrease in Length	0.70 m	Core Length	294.70 m
	Length Drilled	300.70 m	Core Recovery	99.0 %

Working Time				
	Drilling	66°00'	48.5 %	37.5 %
	Hoisting & Lowering Rod	3°50'	2.8	2.2
	Hoisting & Lowering I.T.	30°30'	22.4	17.3
	Miscellaneous	26°10'	19.3	14.9
	Repairing	–	–	–
	Others	9°30'	7.0	5.4
	Total	136°00'	100	77.3
Removing	Preparation	24°00'	–	13.6
	Moving	16°00'	–	9.1
	G. Total	176°00'	–	100

Core Recovery for 100 m Section					
Depth of Hole	Section	Total	Depth of Hole	Section	Total
0-100	98.5%	98.5%	400-500		
100-200	98.5%	98.5%	500-600		
200-300	100 %	99.0%	600-700		
300-400			700-800		

Effciency of Drilling	
300.70 m/Work Period	23.13 m/Day
300.70 m/Working Days	23.13 m/Day
300.70 m/Drilling Period	33.41 m/Day
300.70 m/Net Drilling Days	33.41 m/Day
Total Workers/300.70 m	0.56 Shift
Total Drilling Workers/300.70 m	0.37 Shift

Casing Pipe Inserted			
Pipe Size & Meterage		Inserted Length / Drilling Length (%)	Recovery of Casing Pipe
112 m/m	3.00m	1.0 %	100 %
NX	30.00m	10.0 %	100 %
BX	171.00m	56.9 %	93.0 %

Hoisting & Lowering Rod	3 Times	Hoisting & Lowering I.T.	144 Times

Remarks

Summary Record of Drilling Results

Table 8 DHK-13/14-DE (JK-5)

Item		Periods	Number of Days	Actual Working Days	Day Off	Total Number of Working
Drilling Periods	Preparation	14th Mar 1975	1	1	–	12
	Drilling	15th Mar. 1975 - 25th Mar. 1975	11	10	1	144
	Removing	26th Mar. 1975 - 5th Apr. 1975	11	8	3	72
	Total	14th Mar. 1975 - 5th Apr. 1975	23	19	4	228

Drilling Length				
Planned Length	300.00 m	Over-Burden	1.50 m
Increase or Decrease in Length	0.40 m	Core Length	288.10 m
Length Drilled	300.40 m	Core Recovery	96.40 m

Working Time				
	Drilling	86°00'	53.8 %	37.0 %
	Hoisting & Lowering Rod	7°00'	4.4	3.0
	Hoisting & Lowering I.T.	28°40'	17.9	12.4
	Miscellaneous	26°20'	16.4	11.3
	Repairing	–	–	–
	Others	12°00'	7.5	5.2
	Total	160°00'	100	69.0
Removing	Preparation	8°00'	–	3.4
	Moving	64°00'	–	27.6
	G. Total	232°00'	–	100

Core Recovery for 100 m Section

Depth of Hole	Section	Total	Depth of Hole	Section	Total
0-100	89.9%	89.9%	400-500		
100-200	99.2%	94.6%	500-600		
200-300	100 %	96.4%	600-700		
300-400			700-800		

Effciency of Drilling

300.40 m/Work Period	13.06 m/Day
300.40 m/Working Days	15.81 m/Day
300.40 m/Drilling Period	27.31 m/Day
300.40 m/Net Drilling Days	30.04 m/Day
Total Workers/300.40 m	0.76 Shift
Total Drilling Workers/300.40 m	0.48 Shift
Hoisting & Lowering Rod 5 Times	Hoisting & Lowering I.T. 129 Times

Casing Pipe Inserted

Pipe Size & Meterage	Inserted Length / Drilling Length (%)	Recovery of Casing Pipe
112 m/m 1.50m	0.5 %	100 %
NX 28.50m	9.5 %	100 %
BX 140.00m	46.6 %	93.6 %

Remarks

Summary Record of Drilling Results

Table 9 DHK-13/14-EF (JK-8)

	Item	Periods	Number of Days	Actual Working Days	Day Off	Total Number of Working
Drilling Periods	Preparation	23th Mar. 1975 - 27th Mar. 1975	5	3	2	39
	Drilling	28th Mar. 1975 - 3th Apr. 1975	7	7	–	91
	Removing	4th Apr. 1975 - 12th Apr. 1975	9	8	1	74
	Total	23th Mar. 1975 - 12th Apr. 1975	21	18	3	204

Drilling Length			
Planned Length	300.00 m	Over-Burden	3.00 m
Increase or Decrease in Length	1.30 m	Core Length	294.90 m
Length Drilled	301.30 m	Core Recovery	98.9 %

Core Recovery for 100 m Section

Depth of Hole	Section	Total	Depth of Hole	Section	Total
0-100	98.5%	98.5%	400-500		
100-200	98.1%	98.3%	500-600		
200-200	100 %	98.9%	600-700		
300-400			700-800		

	Working Time			
	Drilling	61°20'	54.7 %	30.7 %
	Hoisting & Lowering Rod	5°00'	4.5	2.5
	Hoisting & Lowering I.T.	26°50'	24.0	13.4
	Miscellaneous	10°50'	9.7	5.4
	Repairing	–	–	–
	Others	8°00'	7.1	4.0
	Total	112°00'	100	56.0
Removing	Preparation	24°00'	–	12.0
	Moving	64°00'	–	32.0
	G. Total	200°00'	–	100

Effciency of Drilling

301.30 m/Work Period	14.35 m/Day
301.30 m/Working Days	16.74 m/Day
301.30 m/Drilling Period	43.04 m/Day
301.30 m/Net Drilling Days	43.04 m/Day
Total Workers/301.30 m	0.68 Shift
Total Drilling Workers/301.30 m	0.30 Shift

Hoisting & Lowering Rod	Hoisting & Lowering I.T.
4 Times	118 Times

Casing Pipe Inserted

Pipe Size & Meterage	Inserted Length / Drilling Length (%)	Recovery of Casing Pipe
112 m/m 3.00m	1.0 %	100 %
NX 3.00m	1.0 %	100 %
BX 159.40m	52.9 %	90.6 %

Remarks

Table - 10 Specifications Diamond Bits and Reaming Shells

Item	Size	Type	Carat	Matrix	Size (diamond)	Water way	Quantity (pc.)	Remarks
Diamond Bit	101 m/m	D-10	150 ct	ZZ	1/20 ct	6	5	ZZ = R.C. 35
	NQ	NQT-WL	480	Z· ZZ	1/25-1/30	6	16	Z = R.C. 30 ZZ = R.C. 35
	BQ	BQT-WL	460	Z	1/35-1/40	4	23	Z = R.C. 30
	Total		1,090				44	
Reaming Shell	101 m/m	D-10	16	ZZ	1/15-1/20	6	2	ZZ = R.C. 35
	NQ	NQT-WL	48	ZZ	1/15-1/20	6	6	"
	BQ	BQT-WL	70	ZZ	1/15-1/20	4	10	"
	Total		134				18	
	Grand Total		1,224				62	

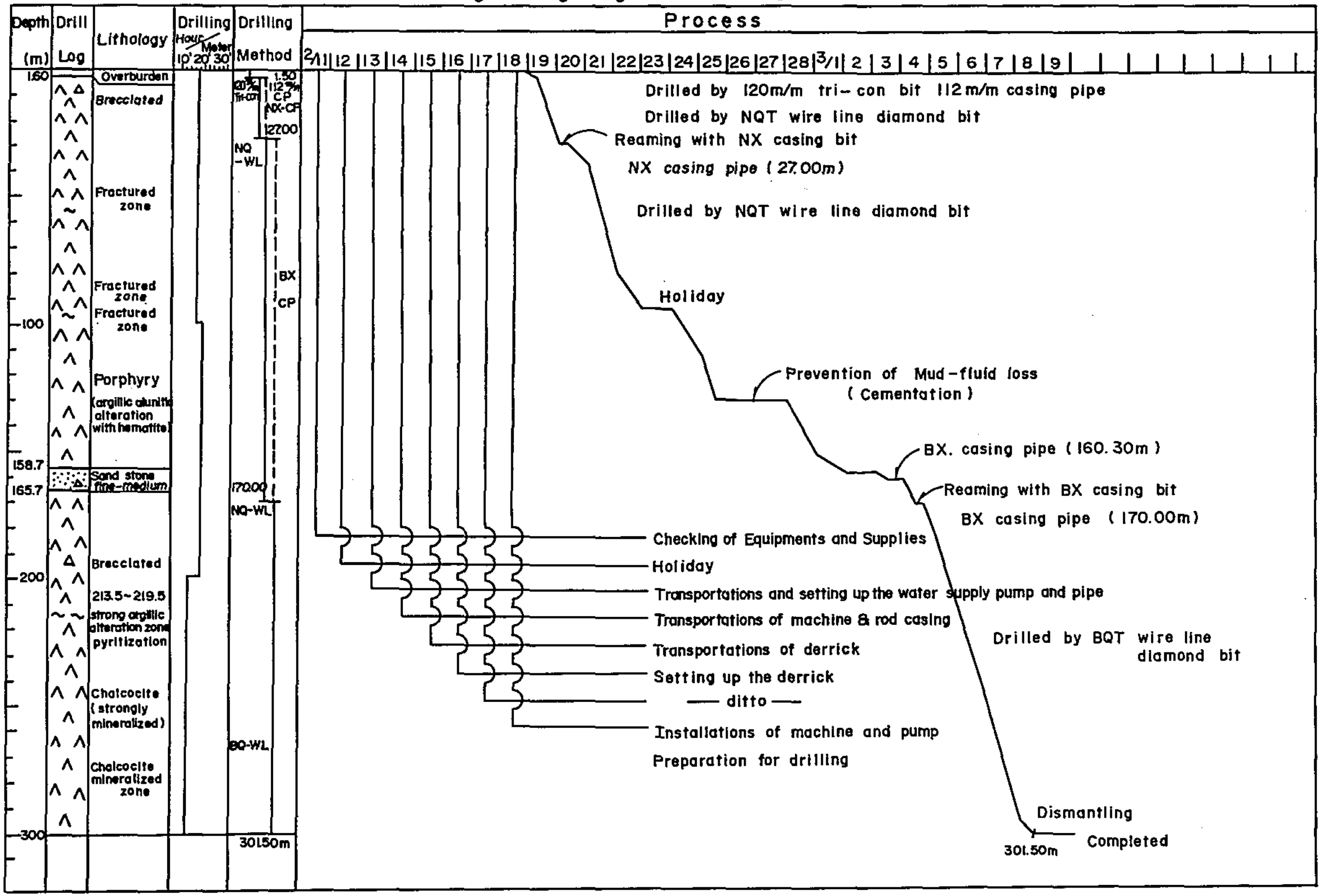
R.C = Rockwell C scale

Table-11 Drilling Meterage by Diamond Bit and Reaming shell

Item	Size	Type	Bit No.	Drilling Meterage by Borehole						Remarks		
				DHK 12/13-DE	DHK 12/13-EF	DHK 14/15-DE	DHK 13/14-DE	DHK 13/14-EF	Total	Used	Unused	Total
Bit	101 mm	D-10	U 8692			(27.00)			(27.00)	o		
	"	"	" 8693						enlarging		o	
	"	"	" 8694								o	
	"	"	" 6865								o	
	"	"	" 6866	1.50	1.50		1.50		4.50	o		
Bit	NX	NQT.WL	V 4755		56.90				56.90	o		
	"	"	" 4756	36.10					36.10	o		
	"	"	" 4757		40.70				40.70	o		
	"	"	" 4758	66.40					66.40	o		
	"	"	" 4759		49.40				49.40	o		
	"	"	" 4760			99.40			99.40	o		
	"	"	A 5666			68.60			68.60	o		
	"	"	" 5667	30.80					30.80	o		
	"	"	" 5668				94.30		94.30	o		
	"	"	N 6874				42.70		42.70	o		
	"	"	" 6875					63.30	63.30	o		
	"	"	" 8696	24.00					24.00	o		
	"	"	W 8347					25.70	25.70	o		
	"	"	" 8348								o	
	"	"	" 8349								o	
	"	"	" 8350					67.40	67.40	o		
Bit	BX	BQT.WL	A 5671	93.50					93.50	o		
	"	"	" 5672		42.00				42.00	o		
	"	"	" 5673				23.10		23.10	o		
	"	"	" 5674		60.60				60.60	o		
	"	"	" 5675				52.10		52.10	o		
	"	"	" 5676	47.70					47.70	o		
	"	"	" 5677				27.00		27.00	o		
	"	"	" 5678			46.60			46.60	o		
	"	"	" 5679			43.00			43.00	o		
	"	"	" 5680					45.00	45.00	o		
	"	"	" 5681			40.10			40.10	o		
	"	"	" 5682				37.10		37.10	o		
	"	"	" 5683								o	
	"	"	" 5702					55.10	55.10	o		
	"	"	" 5703								o	
	"	"	" 5704				21.10		21.10	o		
	"	"	" 5705		48.80				48.80	o		
	"	"	" 5706								o	
	"	"	" 5707								o	
	"	"	" 222								o	
	"	"	U 8712					41.80	41.80	o		
	"	"	32-1								o	
	"	"	U 8715								o	
			44	300.00	299.90	297.70	298.90	298.30	1,494.80	32	12	44
Tri-Cone Bit	120 mm		2	1.50	1.50	3.00	1.50	3.00	10.50	o		
Bit	Total		46	301.50	301.40	300.70	300.40	301.30	1,505.30			
Reaming Shell	101 mm	D-10	UG 8695	1.50	1.50		1.50		4.50	o		
	"	"	2940			(27.00)			(27.00)	o		
	NX	NQT.WL	AG 5669		147.00				147.00	o		
	"	"	" 5670	157.30					157.30	o		
	"	"	UG 8709			168.00			168.00	o		
	"	"	NR 4					156.40	156.40	o		
	"	"	WG 8351				137.00		137.00	o		
	"	"	" 8352								o	
	BX	BQT.WL	AG 5684				160.40		160.40			
	"	"	" 5685								o	
	"	"	" 5686								o	
	"	"	" 5687					45.00	45.00	o		
	"	"	" 5688			129.70			129.70	o		
	"	"	" 5689								o	
	"	"	R 2429	141.20					141.20	o		
	"	"	" 8428					96.90	96.90	o		
	"	"	UG 8717		151.40				151.40	o		
	"	"	" 8718								o	
Reaming Shell	Total		18	300.00	299.90	297.70	298.90	298.30	1,494.80	13	5	18

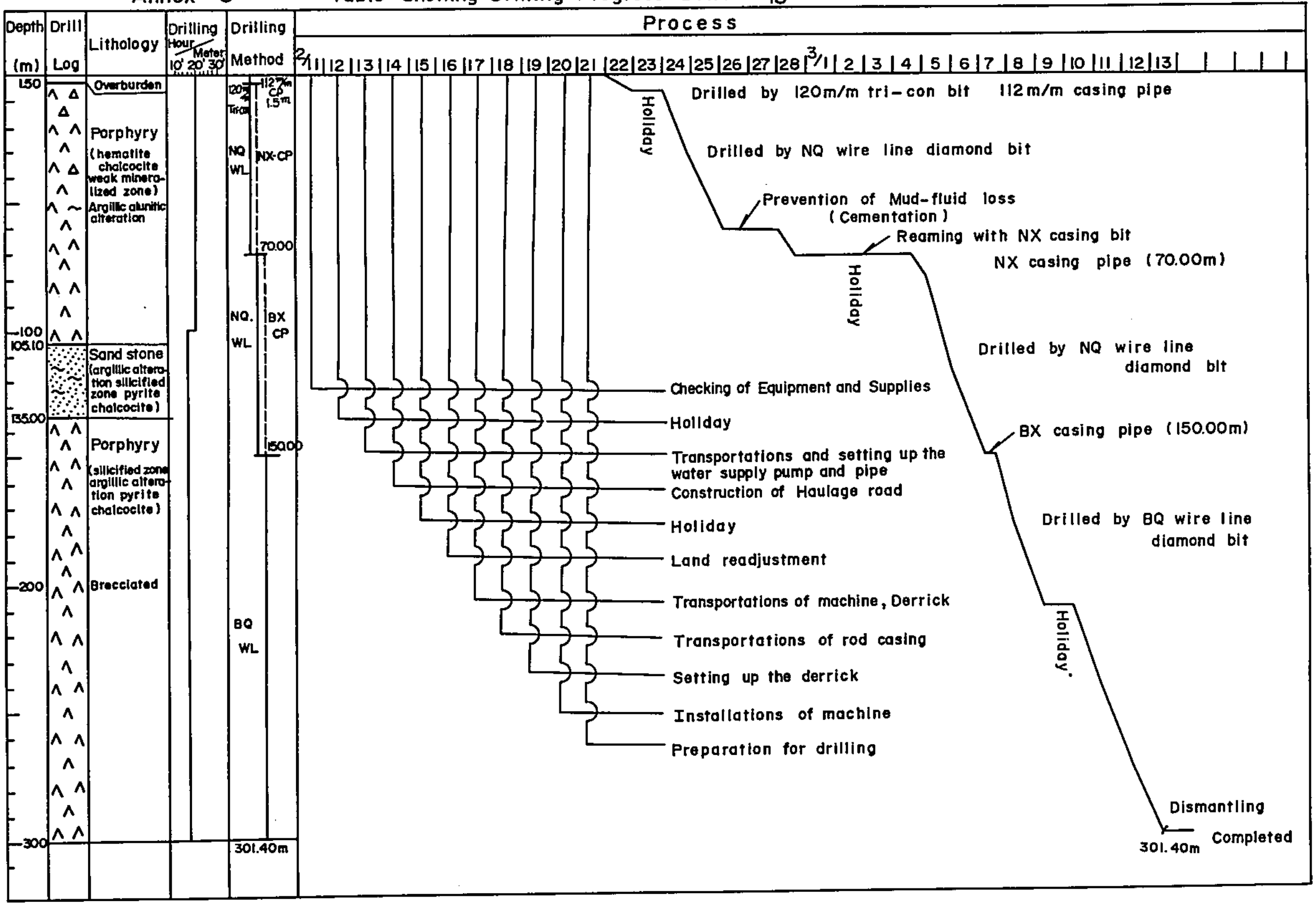
Annex - 2

Table Showing Drilling Progress DHK-12/13 - DE (JK-4)

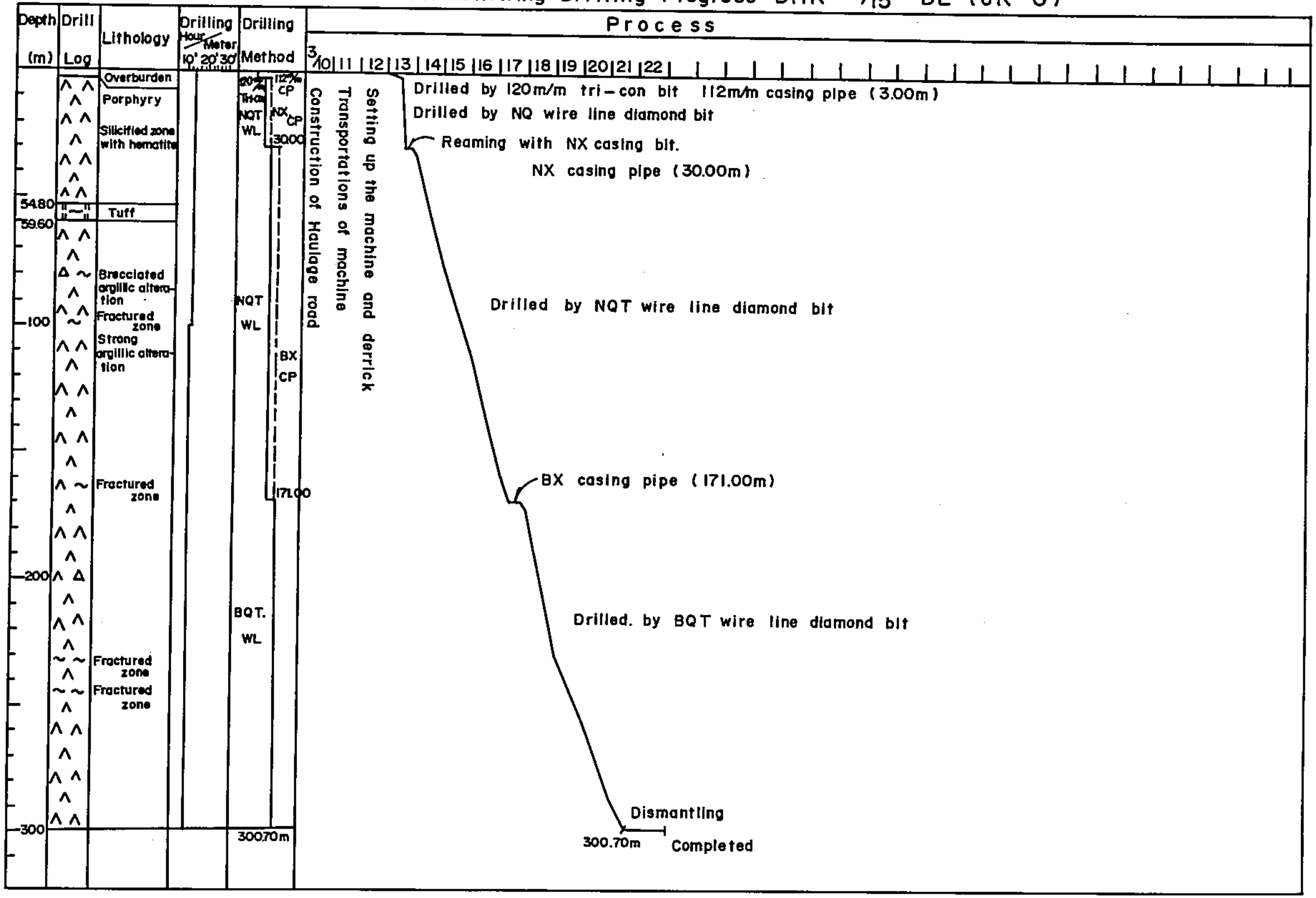


Annex-3

Table Showing Drilling Progress DHK-12/13-EF (JK-7)

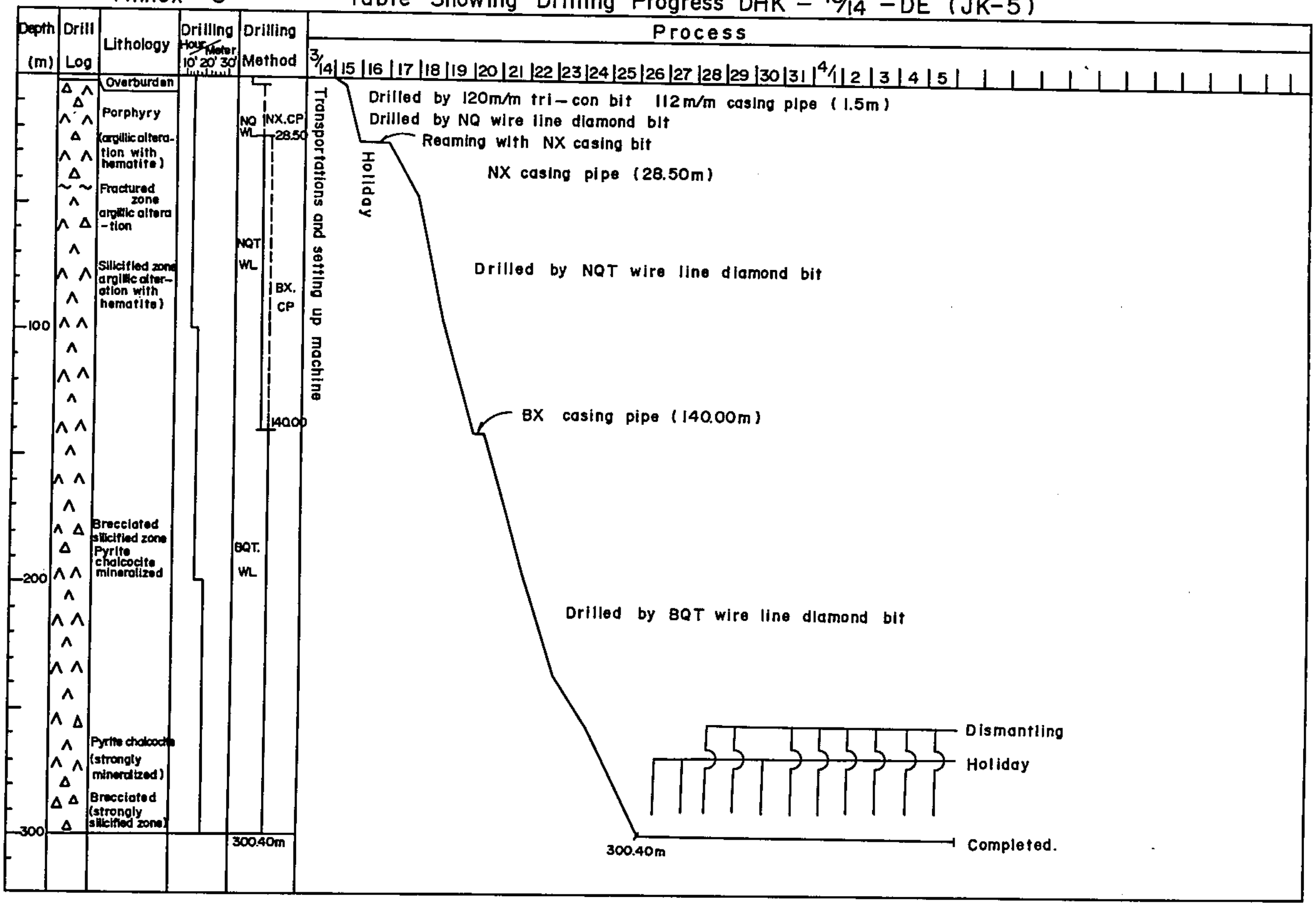


Annex – 4 Table Showing Drilling Progress DHK-14/15-DE (JK-6)



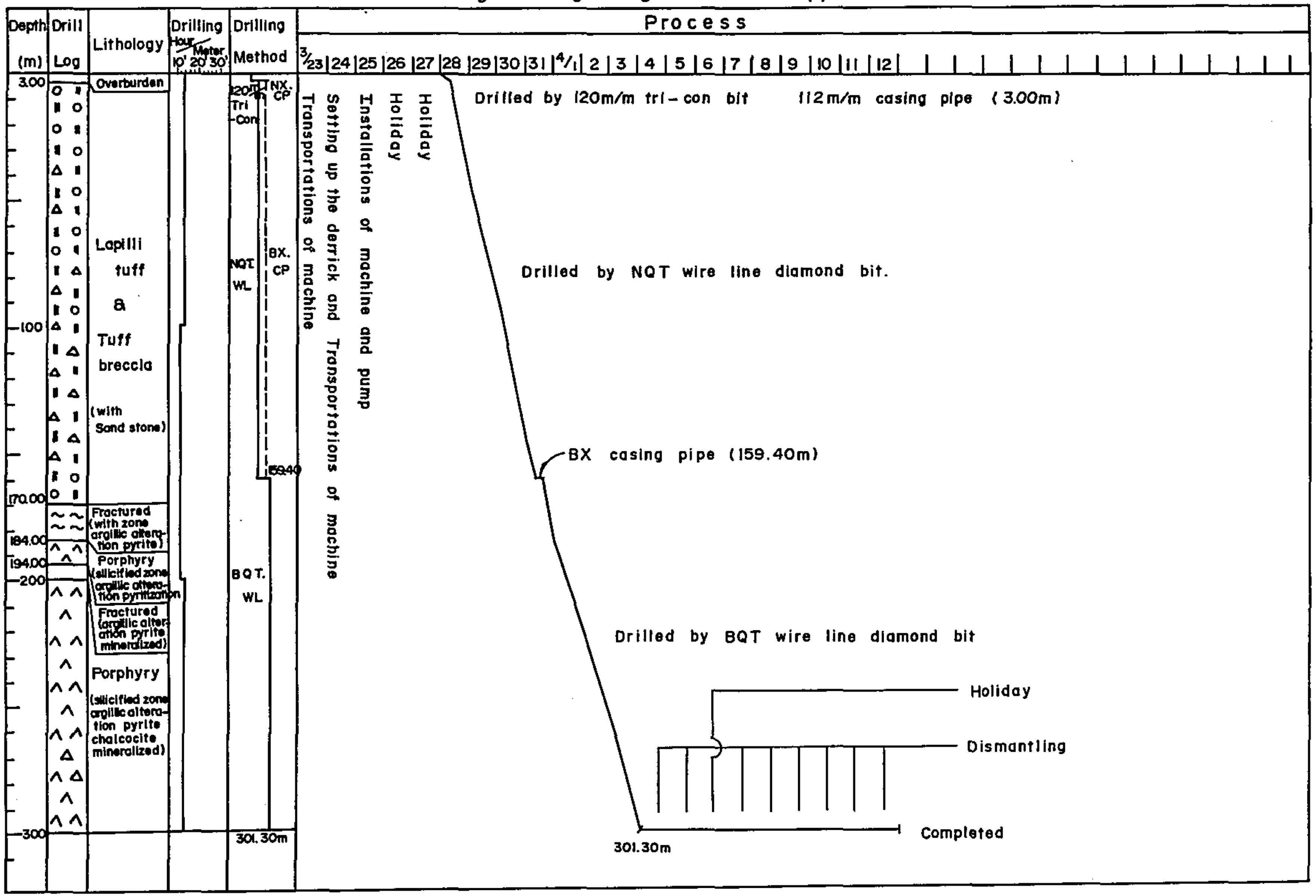
Annex - 5

Table Showing Drilling Progress DHK - 13/14 - DE (JK-5)



Annex – 6

Table Showing Drilling Progress DHK-13/14 – EF (JK-8)



APPENDICES

Appendices

Table 1-1 List of Rock Samples

part 1

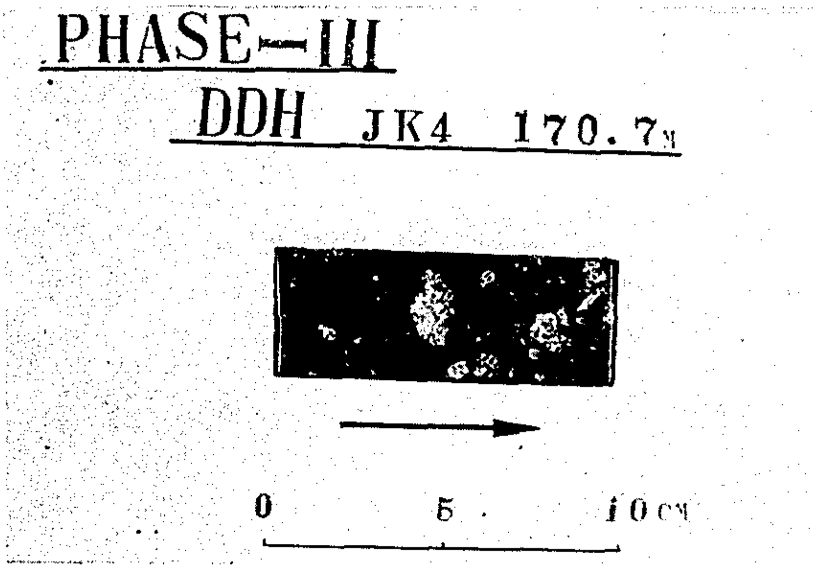
Hole No	Sample No	Location kyishindaung	Depth	Rock name	Alteration			Thin section	Polished section	X - ray analysis	Remarks
					Argi	Sili	Alu				
JK-4	1	Kyishindaung	31.6	biotite porphyry		+++	+++				Medium grained biotite porphyry, strong alunitized. Fale brownish violet colored
"	2	"	93.7	biotite porphyry	++	++					Porcus textured biotite porphyry, reddesh brown colored.
"	3	"	145.3	siltstone	+++	+					Strong silicified silstonexenolith size of $10cm^3$. Fale violet colored.
"	4	"	170.7	brecciated biotite porphyry		+++	+				Brecciated biotite porphyry . breccia size 3cm-5cm. Matrix sandy part are same rock with breccia.
"	5	"	182.3	pyrite veinlet	+++				○		Strong silicified biotite porphyry with chalcocite brearing pyrite veinlet
"	6	"	194.3	pyrite vein		+++					Brecciated biotite porphyry, breccia size: 5mm-2mm, with dissemination pyrite and chalcocite
JK-5	7	"	149.2	brecciated biotite porphyry	+	++					Gray colored brecciated and silicified biotite porphyry breccia size: 3cm-5cm with chalcocite pyrite dissemination
"	8	"	154.8	biotite porphyry (with chalcocite)		+++			○		Chalcocite veinlet and dissemination ore sample, wall rocks, strong silicified small grained biotite porphyry
"	9	"	175.6	chalcocite vein		+++			○		Fine grained quartz aggregation part with drusy chalcocite and quartz mixed vein
"	10	"	202.6	pyrite vein	++	+					Pyrite vein and pyrite discemination part in wall rocks. Gray colored strong silicified
"	11	"	232.3	pyrite and chalcocite vein		+++					pyrite dissemination part , wall rocks change to gray colored fine grained quartz aggregation
"	12	"	271.3	ditto		+++					Brecciated textured pyrite and chalcocite quartz mixed vein width 5cm
"	13	"	272.8	ditto		+++		○	○		Ditto width 1.2cm

Hole No	Sample No	Location kyishindaung	Depth	Rock name	Alteration			Thin section	Polished section	X - ray analysis	Remarks
					Argi	Sili	Alu				
JK-6	14	Kyishindaung	140.2	biotite porphyry	+	++					Pale gray colored medium argillized fine grained biotite porphyry biotite relict: 2mm feldspar: 3mm
"	15	"	149.2	biotite porphyry	+	++		○			Gray colored medium grained biotite porphyry. Medium argillized Feldespar change white clay minerals.
"	16	"	159.5	clay	+++						Graynish white colored strong argillized part, feldspar and groundmass, all changed into clay minerals
"	17	"	200.0	biotite porphyry	++	++			○		Medium grained biotite porphyry with pyrite and chalcocite veinlet
JK-7	18	"	88.2	brecciated biotite porphyry	+	++					White colored, brecciated biotite porphyry breccia size: 2cm-4cm. strong silicified Matrix... dark gray colored fine grained biotite porphyry, strong silicified
"	19	"	88.9	disseminated chalcocite ore	+	++					Brecciated biotite porphyry with chalcocite network
"	20	"	99.6	chalcocite ore	+	++					With chalcocite vein and pyrite dissemination. pale gray colored silicified biotite porphyry
"	21	"	104.6	chalcocite ore network texture	+	+++		○			with chalcocite networks part , grayish white colored silicified, medium grained biotite porphyry
"	22	"	106.7	sandstone	+	++					yellowish white colored silicified fine grained and compact sandstone with pyrite veinlet networks
"	23	"	108.5	sandstone & siltstone	+	+		○			Yellowish white colored silicified sandstone and siltstone alternation part sandstone part is strong pyrite dissemination
"	24	"	272.0	disseminated pyrite	+	+++					With 2cm width calcite vein, pyrite strong dissemination part and medium grained grayish silicified sandstone

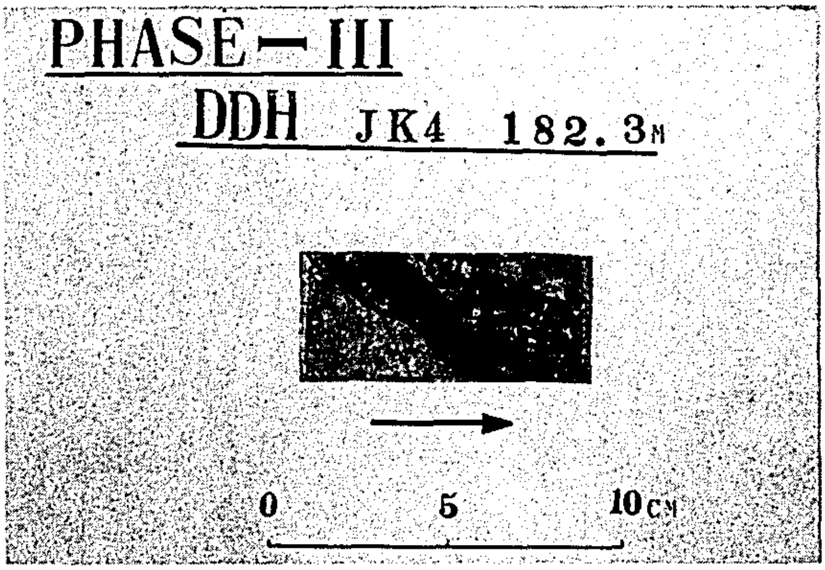
Hole No	Sample No	Location	Depth	Rock name	Alteration			Thin section	Polished section		Remarks
					Argi	Sili	Alu				
JK-7	25	Kyishindaung	297.0	Pyrite & chalcocite		+++					chalcocite bearing pyrite network
"	26	"	298.3	biotite porphyry	+	+++					Pale gray colored strong silicified and aluritized small grained biotite porphyry (feldspar change to alunite biotite change to pyrite)
JK-8	27	"	7.1	lapilli tuff	++						Weathered and argillized lapilli tuff reddish brown colored with green copper stain(oxidized and hematized zone)
"	28	"	7.7	lapilli tuff	++						Brownish, yellow colored lapilli tuff pyrite changed to limonite (lapilli size: 3mm-5mm)
"	29	"	55.2	lapilli tuff	+			○			Gray colored lapilli tuff, fragment size: 1mm-1cm. sandstone and hornblende biotite porphyry
"	30	"	77.9	tuff breccia (fine grained part)	+						Gray colored weak argillized tuff breccia breccia maximum size: 5cm brecciated fragment: sandstone and hornblende biotite porphyry
"	31	"	88.3	lapilli tuff	+						yellowish gray colored lapilli tuff, weak silicified and argillized (lapilli:biotite porphyry, sandstone, mudstone) with weak pyrite dissemination
"	32	"	126.2	horblende biotite porphyry(xenolith)	+	+					horblende biotite porphyry xenolith in the tuff breccia , size maximum: 15cm
"	33	"	146.0	ditto	+						Size: 8cm small grained weathered hornblende biotite porphyry xenolith, in the tuff breccia
"	34	"	150.7	tuff breccia	++						yellowish gray colored tuff breccia, sample lapilli part(medium silicified zone)
"	35	"	176.3	tuff breccia	+++					○	Grayish white fault clay in round and sub round fault breccia. Breccia size:5mm-2cm with weak pyrite dissemination
"	36	"	221.0	biotite porphyry	+++						Gray colored, silicified, coarse grained biotite porphyry, with weak pyrite dissemination feldspar phenocryst changed to clay minerals size: 2mm - 7mm
"	37	"	257.9	biotite porphyry	++	+					
"	38	"	278.9	biotite porphyry	++	+		○			
"	39	"	295.9	biotite porphyry				○			Ditto

Table 1-2 Core Sample Photographs

22 photos

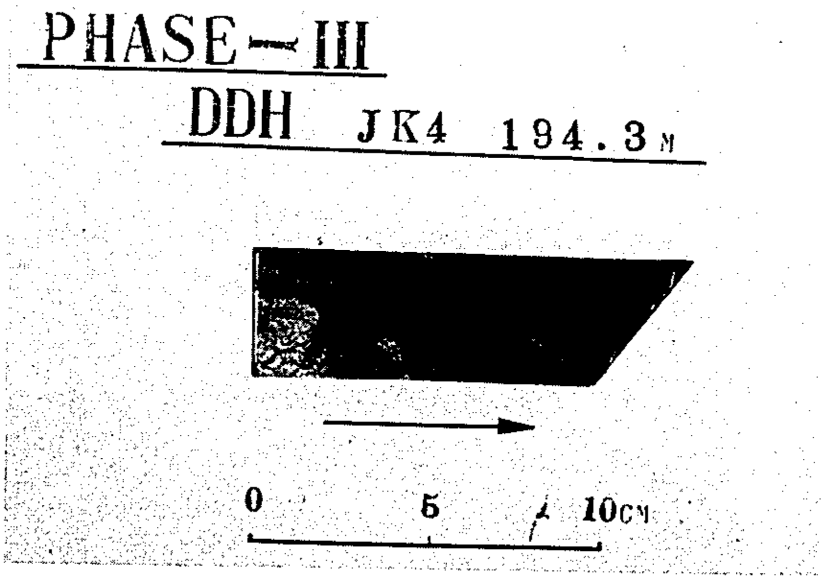


Chalcocite dissemination
in brecciated biotite porphyry

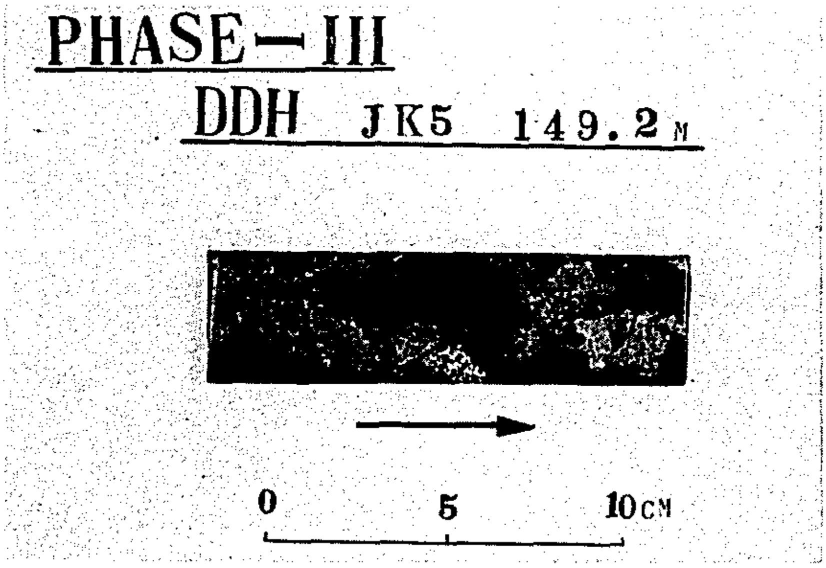


Chalcocite vein (black)
in biotite porphyry

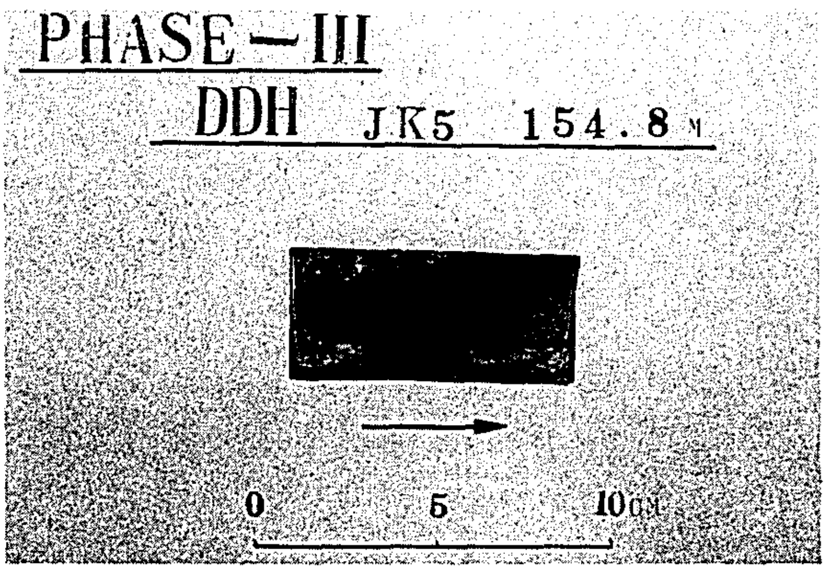
———→ shows a deep side of drill hole



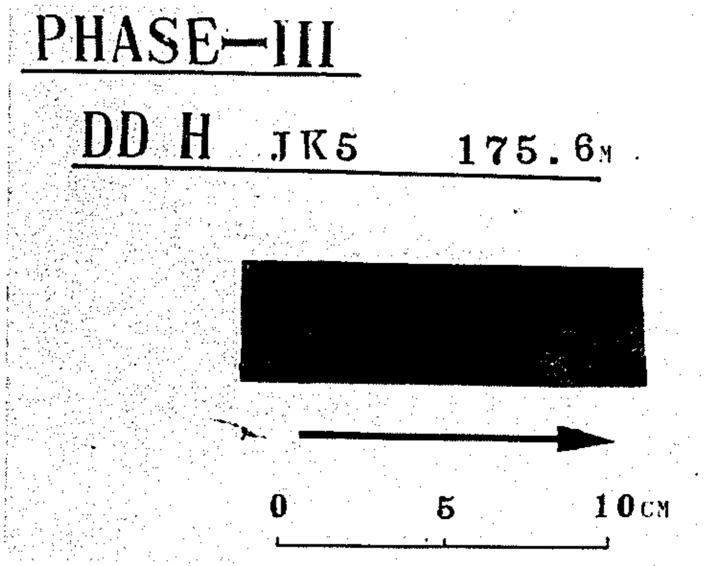
Chalcocite rich part:
chalcocite into parallel veinlet
and dissemination



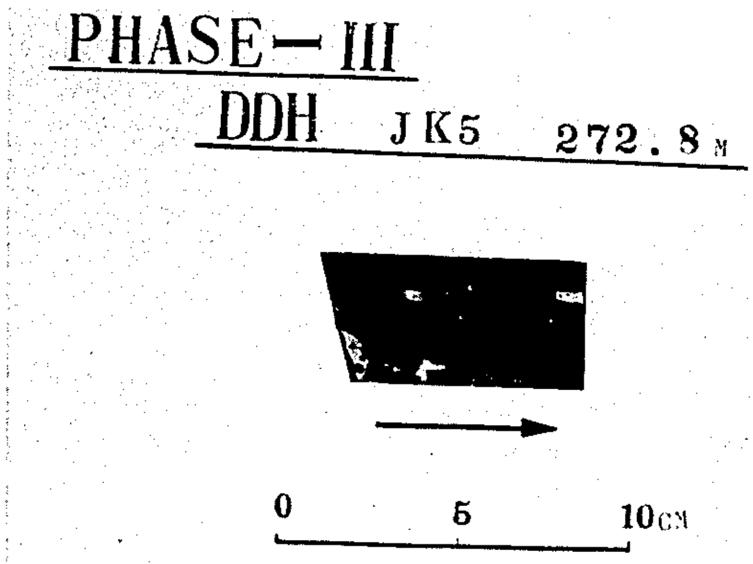
Chalcocite high grade part
in brecciated biotite porphyry



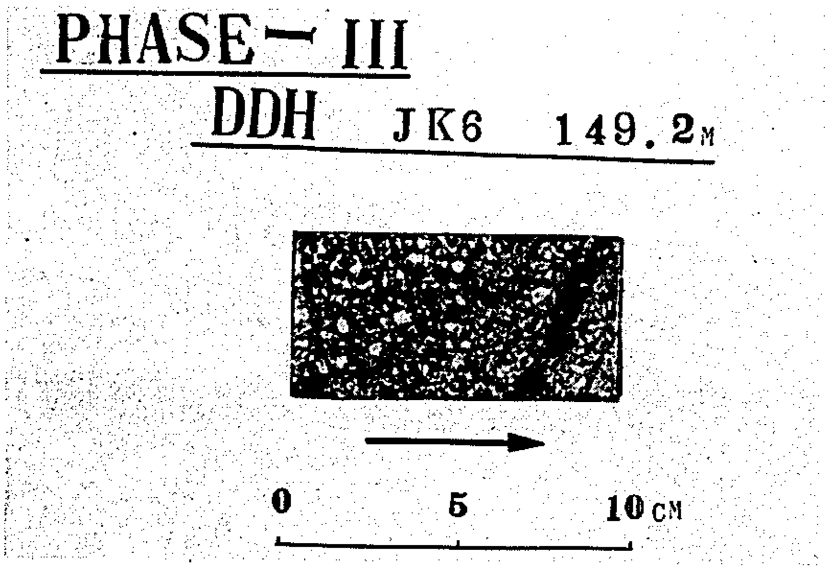
Pyrite and Chalcocite veinlet



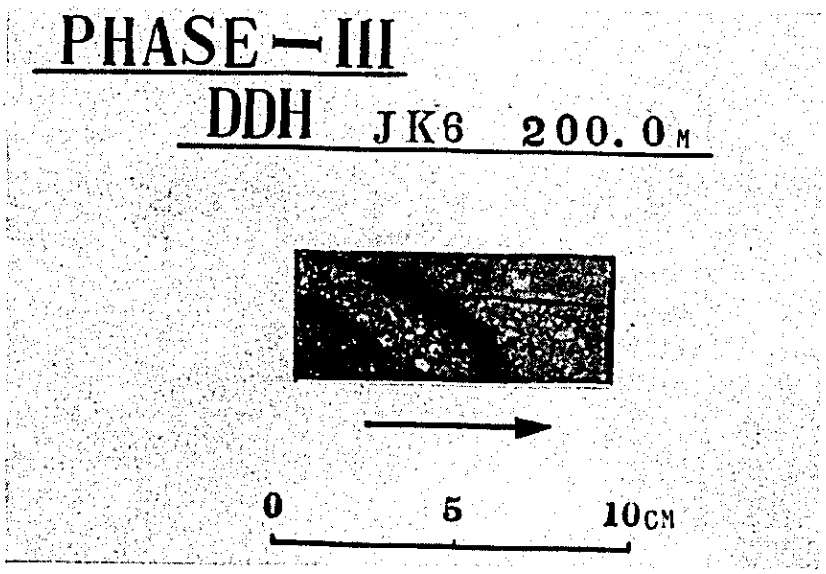
Horizontal: pyrite veinlet
Intersected:chalcocite and quartz



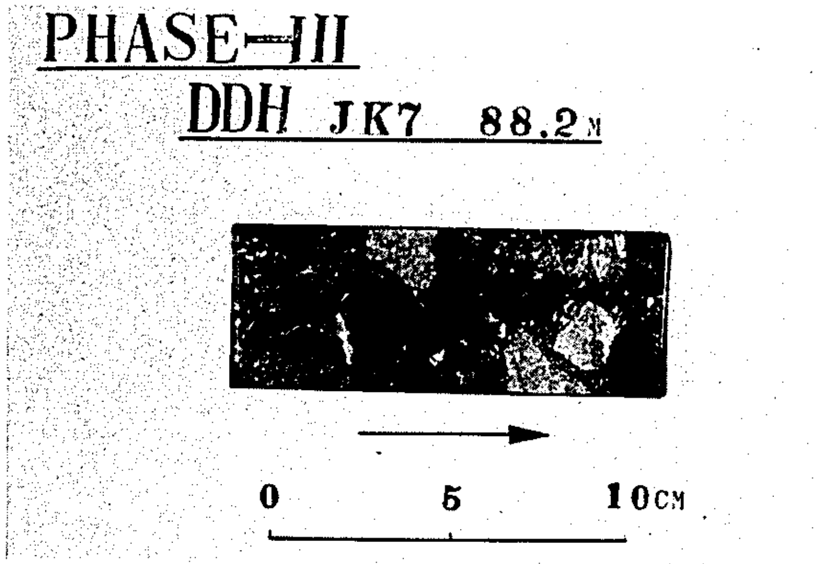
Pyrite vein withchalcocite and quartz



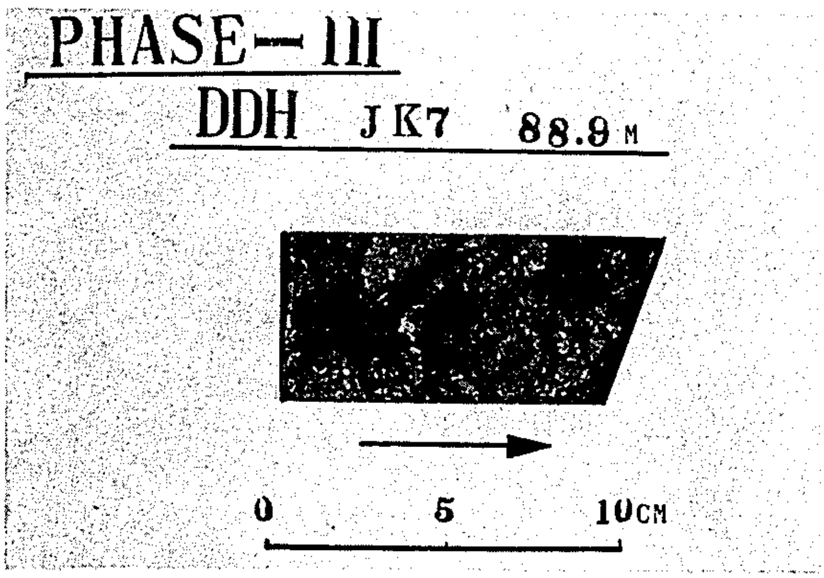
Chalcocite stringer in coarse
grained biotite porphyry



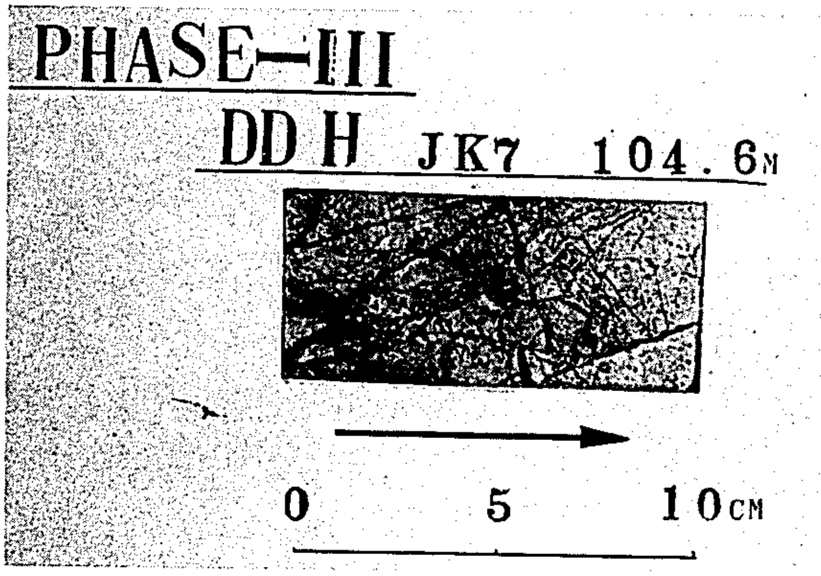
Chalcocite stringer (black)
in biotite porphyry



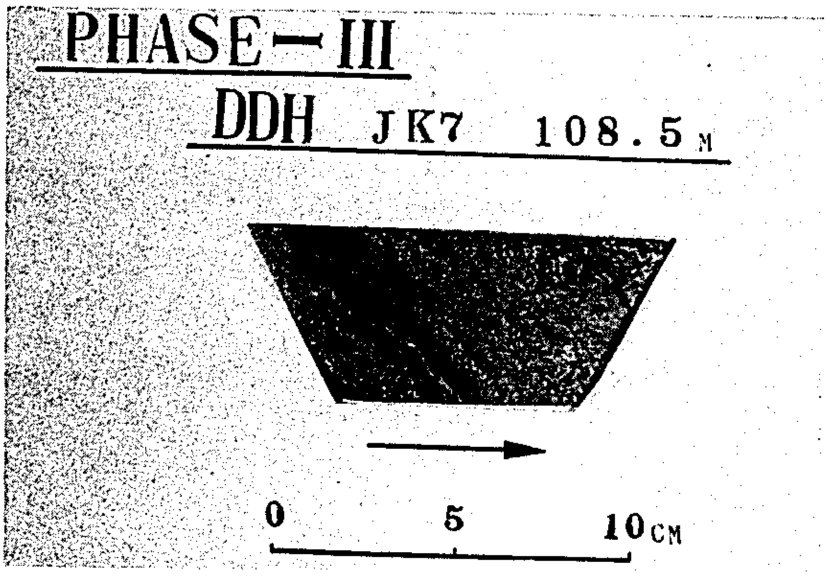
Chalcocite zone in
brecciated biotite porphyry



Chalcocite disseminated ore



Chalcocite veinlet in silicified
biotite porphyry



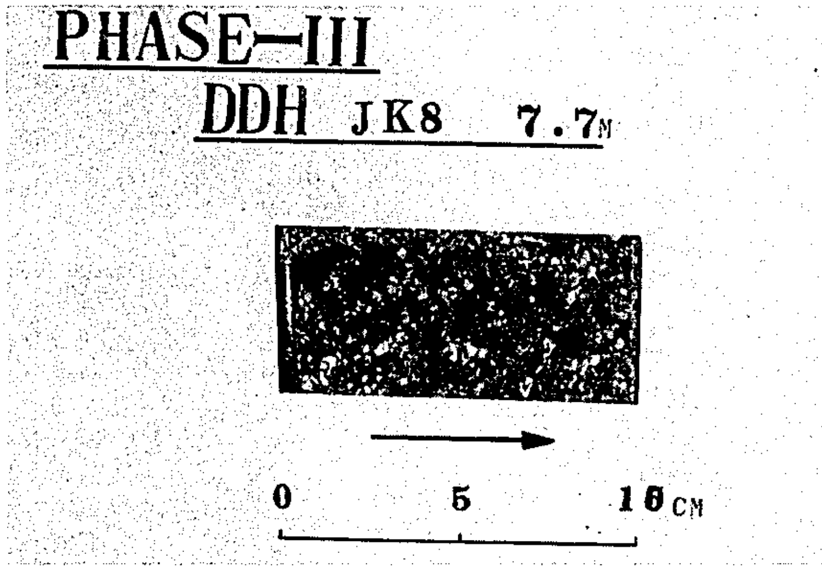
Banding part with sandstone,
siltstone

PHASE—III

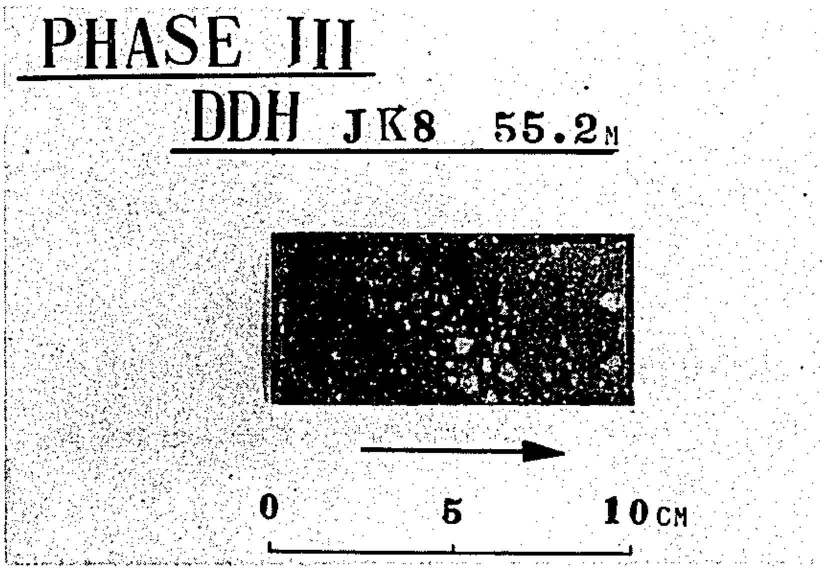
DDH JK7 272.0M

0 5 10CM

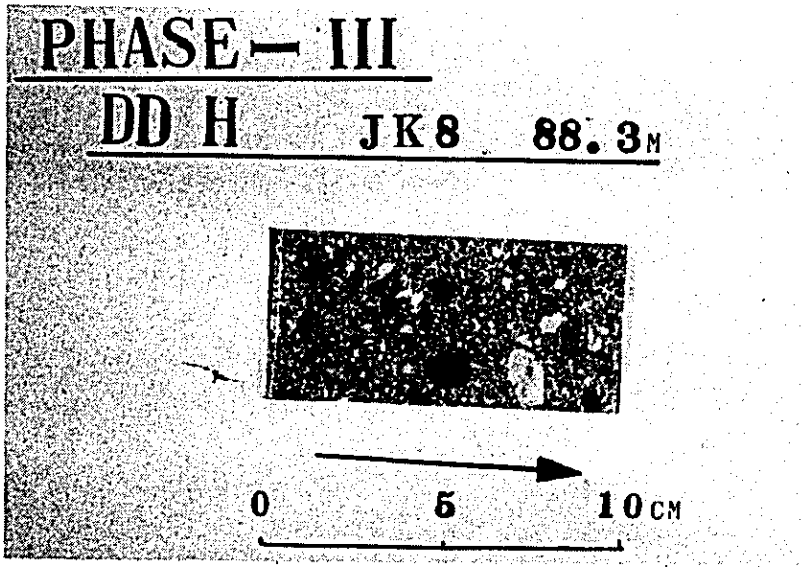
Chalcocite-calcite vein



Lapilli tuff



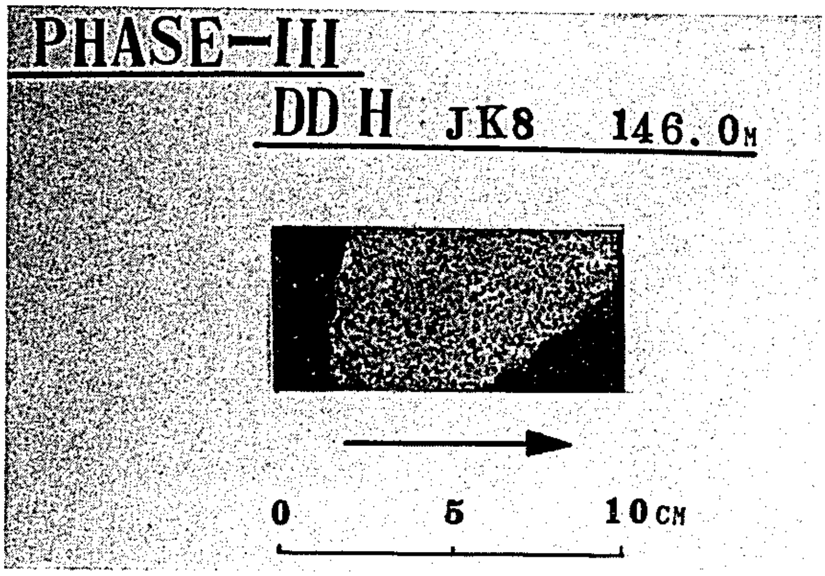
Banding part with fine tuff and
lapilli tuff



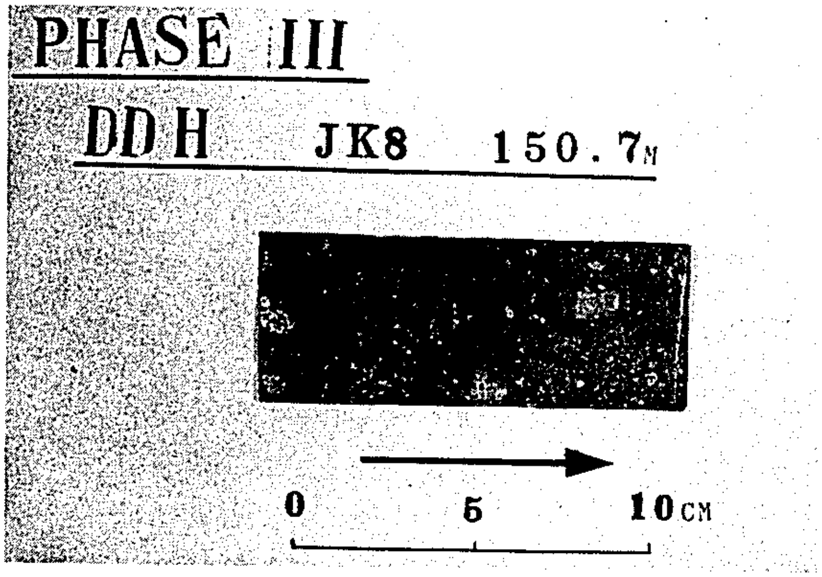
Lapilli tuff

black spot: sandstone

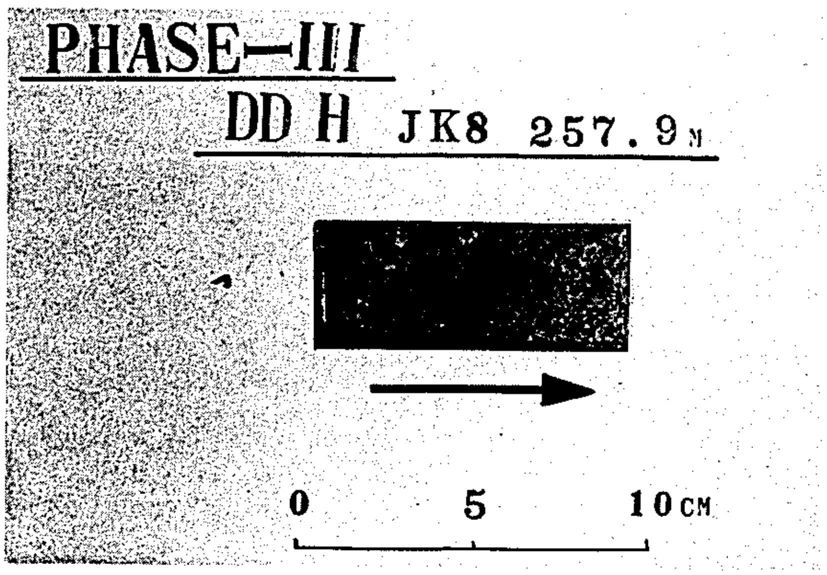
white spot: hornblende biotite porphyry



Hornblende biotite porphyry xenolith in tuff breccia



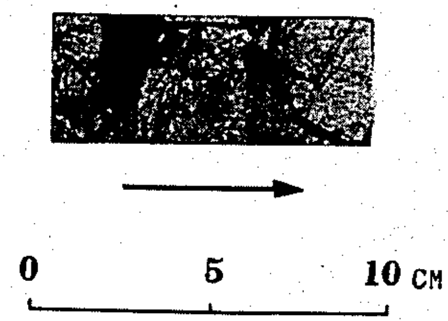
Tuff breccia
black part: hornblende biotite
porphyry



Coarse grained biotite porphyry

PHASE-III

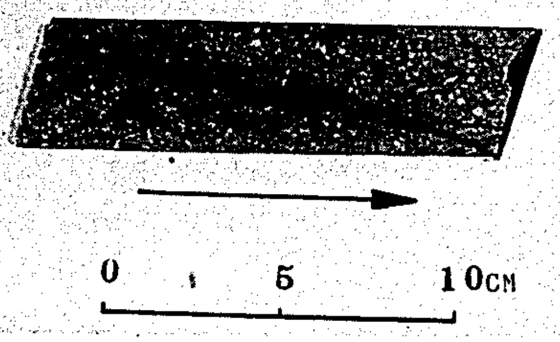
DDH JK8 278.9M



Biotite porphyry
black part: chalcocite

PHASE-III

DDH JK8 295.9M

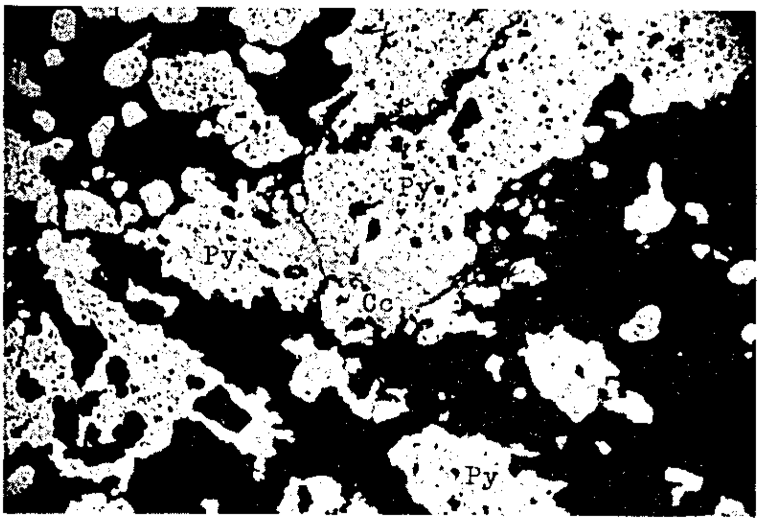


Chalcocite network stringer
in biotite porphyry

Table 1-3 Microphotographs

Sample No.5 Locality: JK-4 (12/13 DE) 182.3^{m}

Rock Name: pyrite veinlet

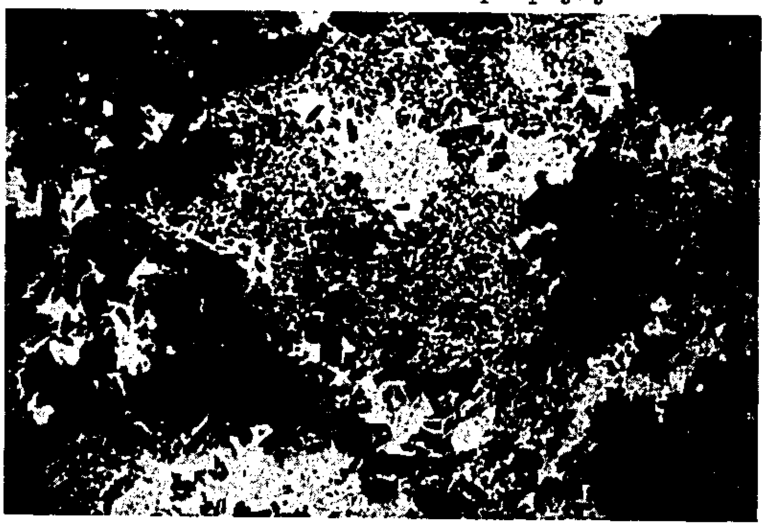


Cc: chalcocite
Py: pyrite

0 0.5^{mm}

Sample No.8 Locality: JK-5 13 JK-5 (13/14 DE) 154.8^{m}

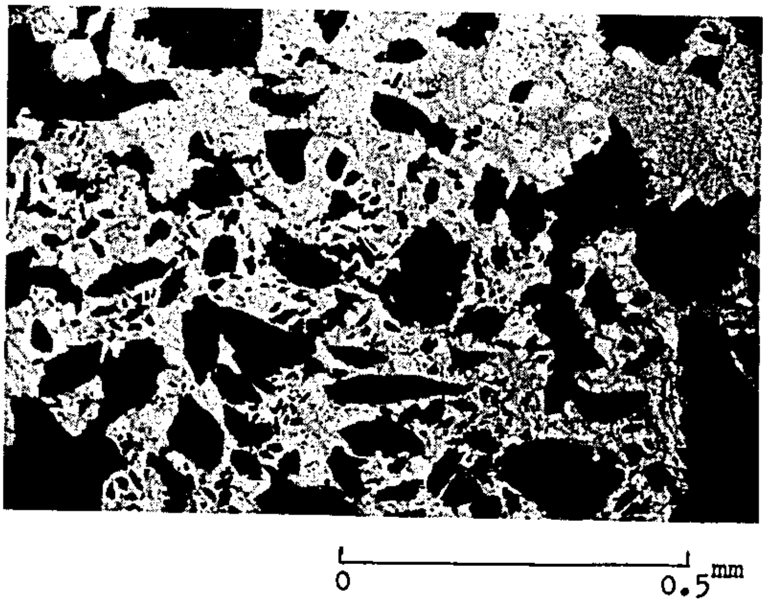
Rock Name: biotite porphyry



0 0.5^{mm}

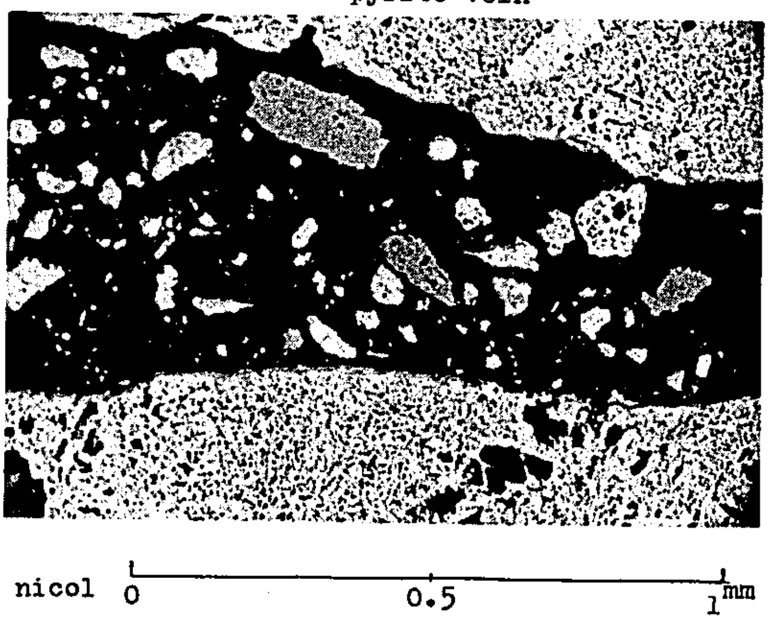
Sample No.9 Locality: JK-5 (13/14 DE) 175.6^{m}

Rock Name: chalcocite vein



Sample No.13 Locality: JK-5 (13/14 DE) ?7 $X2.8^{m}$

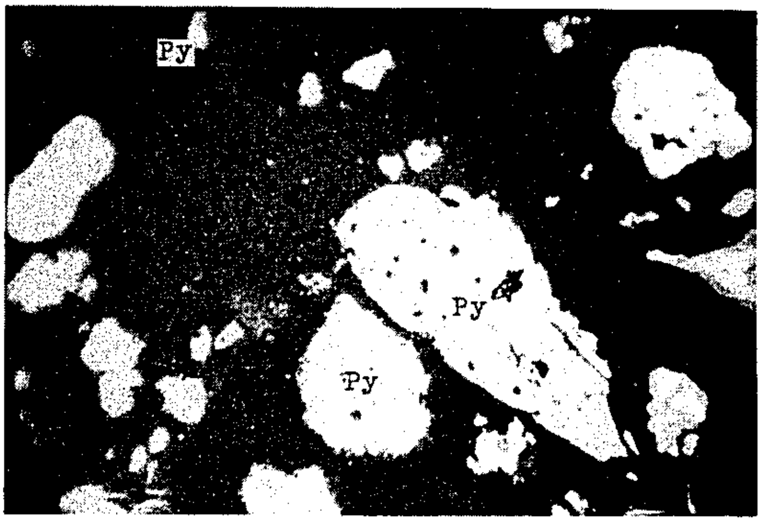
Rock Name: pyrite vein



opened nicol

Sample No.13 Locality: JK-5 (13/14 DE) 272.8^{m}

Rock Name: pyrite vein

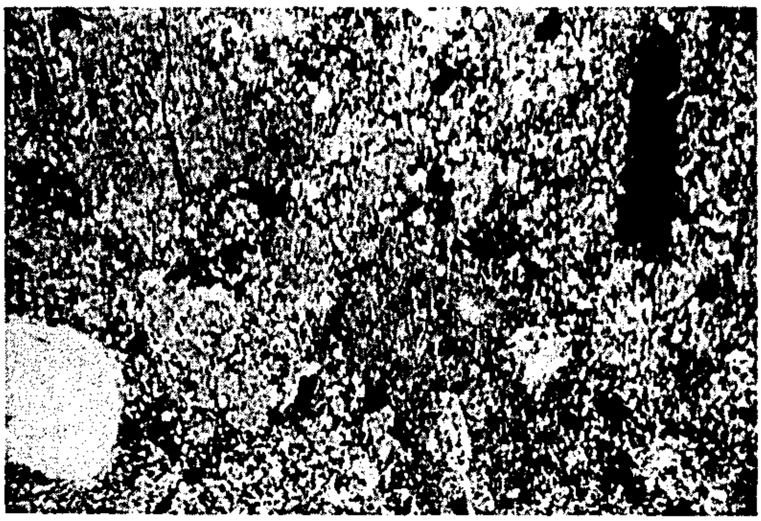


Py: pyrite

0 0.1^{mm}

Sample No.15 Locality: Jk-6 (14/15 DE) 149.2^{m}

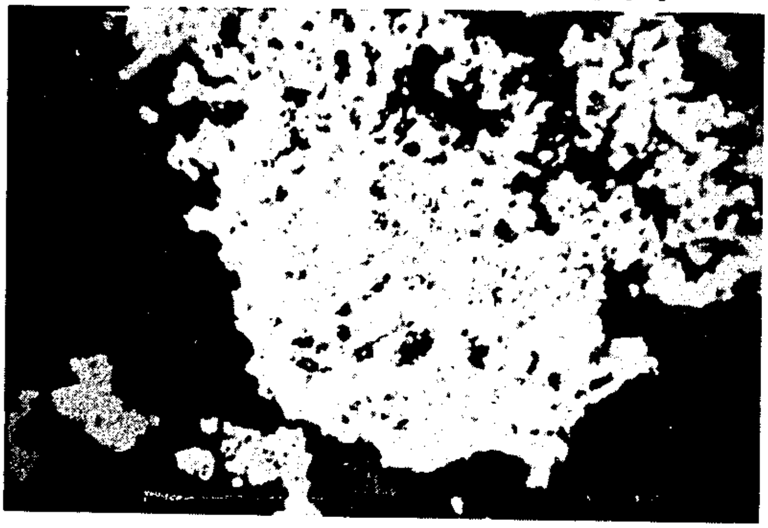
Rock Name: biotite porphyry



opened nicol 0 0.5 1^{mm}

Sample No.17 Locality: JK-6 (14/15 DE) 200^m

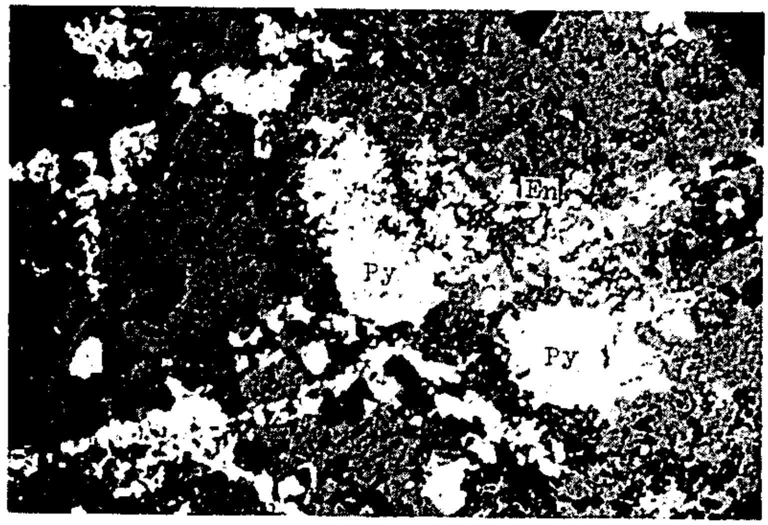
Rock Name: biotite porphyry



chalcopyrite dots in pyrite 0 — 0.1^{mm}

Sample No.17 Locality: JK-6 (14/15 DE) 200^m

Rock Name: biotite porphyry

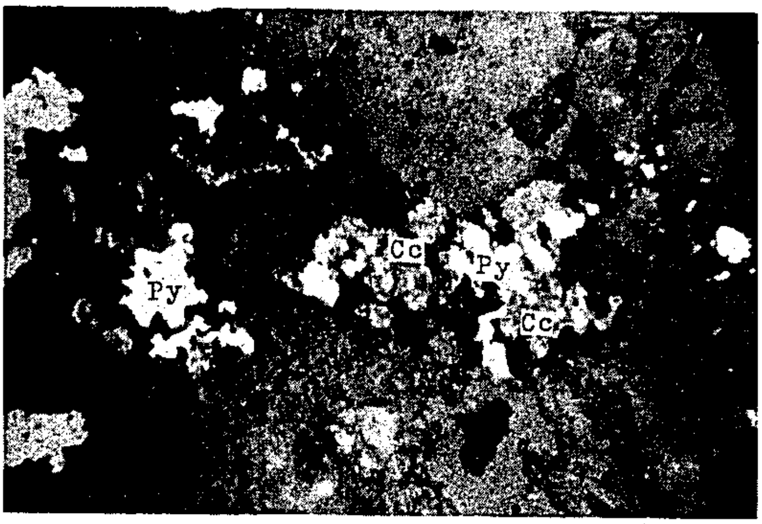


En: enargite
Py: pyrite 0 — 0.5^{mm}

Sample No.17

Locality: JK-6 (14/15 DE)

Rock Name: biotite porphyry



Cc: chalcocite

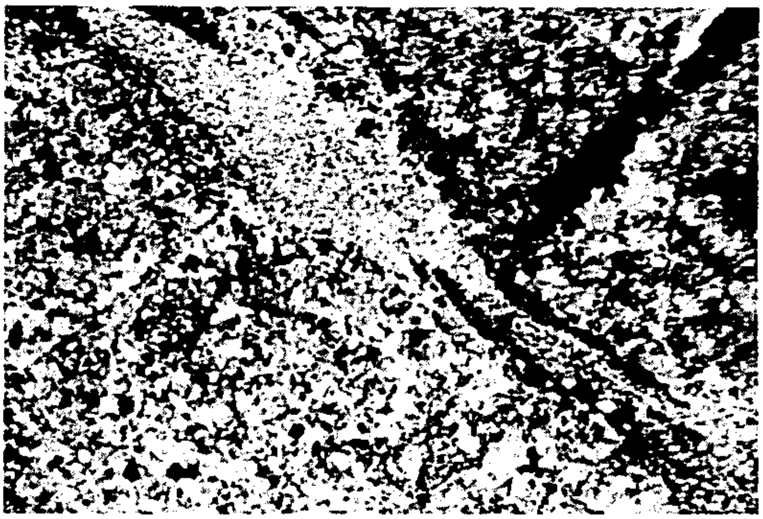
Py: pyrite

0 0.1 mm

Sample No.21

Locality: JK-7 (12/13 EF) 104.6 m

Rock Name: chalcocite veinlet into biotite porphyry

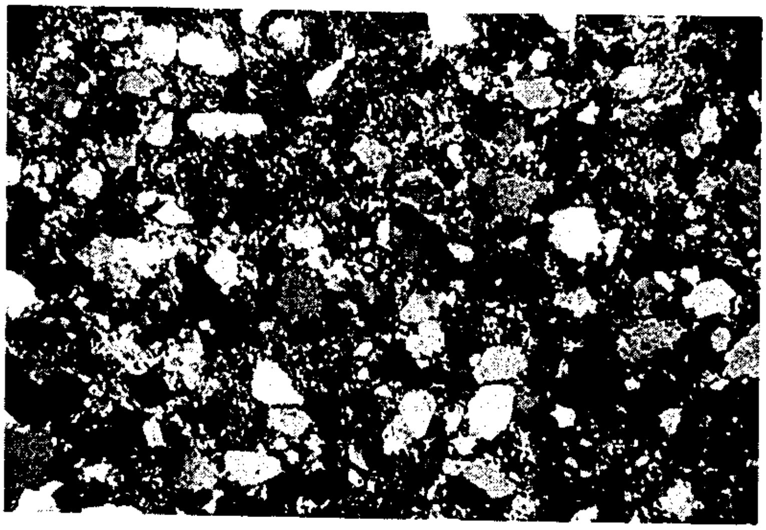


opened nicol 0 0.5 1 mm

Sample No.23

Locality: JK-7 (12/13 EF) 108.5^{m}

Rock Name: sandstone & siltstone

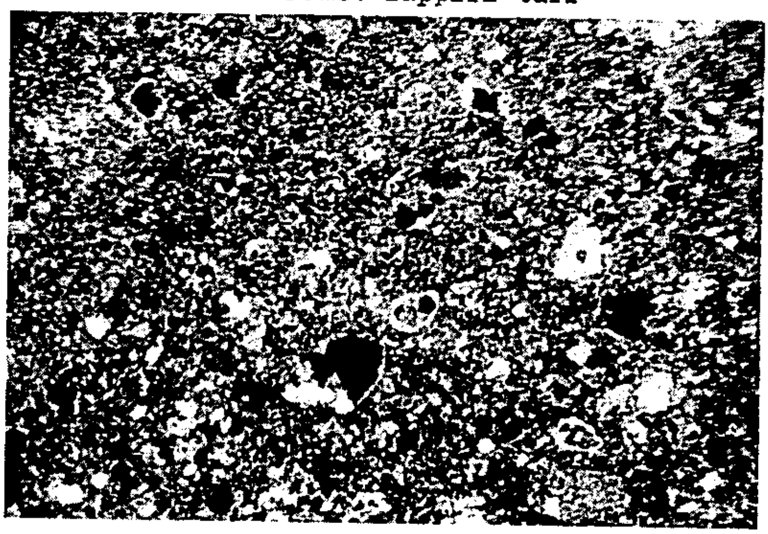


crossed nicols 0 0.5 1^{mm}

Sample No.29

Locality: JK-8 (13/14 EF) 55.2^{m}

Rock Name: lappili tuff

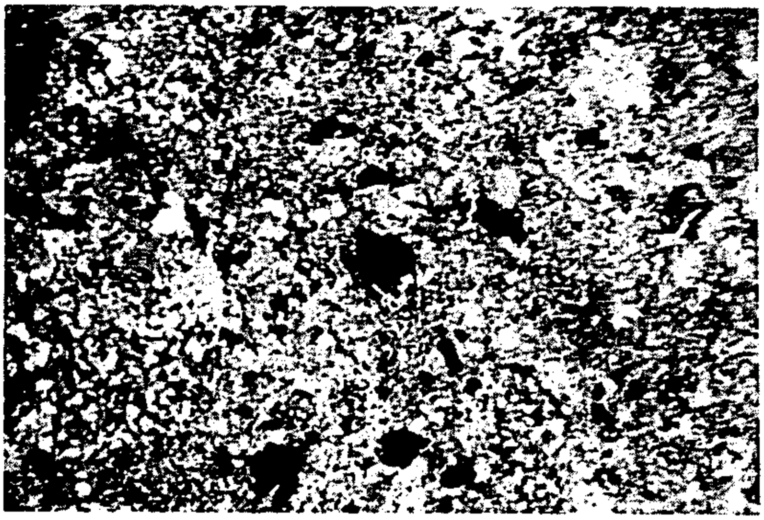


opened nicol 0 0.5 1^{mm}

Sample No.38

Locality: JK-8 (13/14 EF) 278.9^m

Rock Name: biotite porphyry



opened nicol 0 0.5 1^{mm}

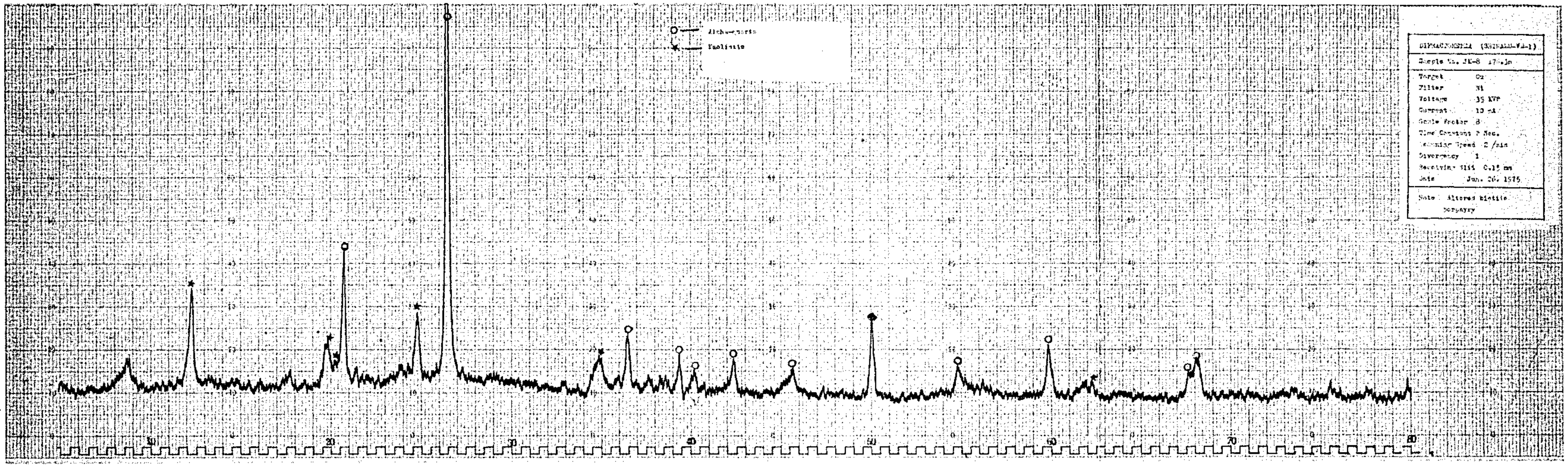
Sample No.39

Locality: JK-8 (13/14 EF) 295.9^m

Rock Name: biotite porphyry

opened nicol 0 0.5 1^{mm}

Table 1-4 Chart of X–ray Diffractive Analysis

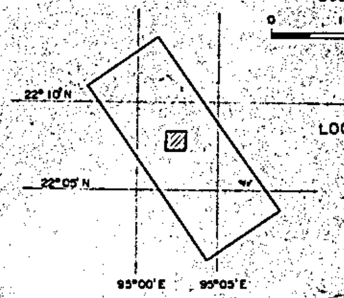


PL. I

GEOLOGICAL SURVEY OF
MONYWA AREA, UNION OF BURMA
(PHASE III)

LOCALITY MAP OF DRILL HOLES IN KYISINDAUNG SECTOR

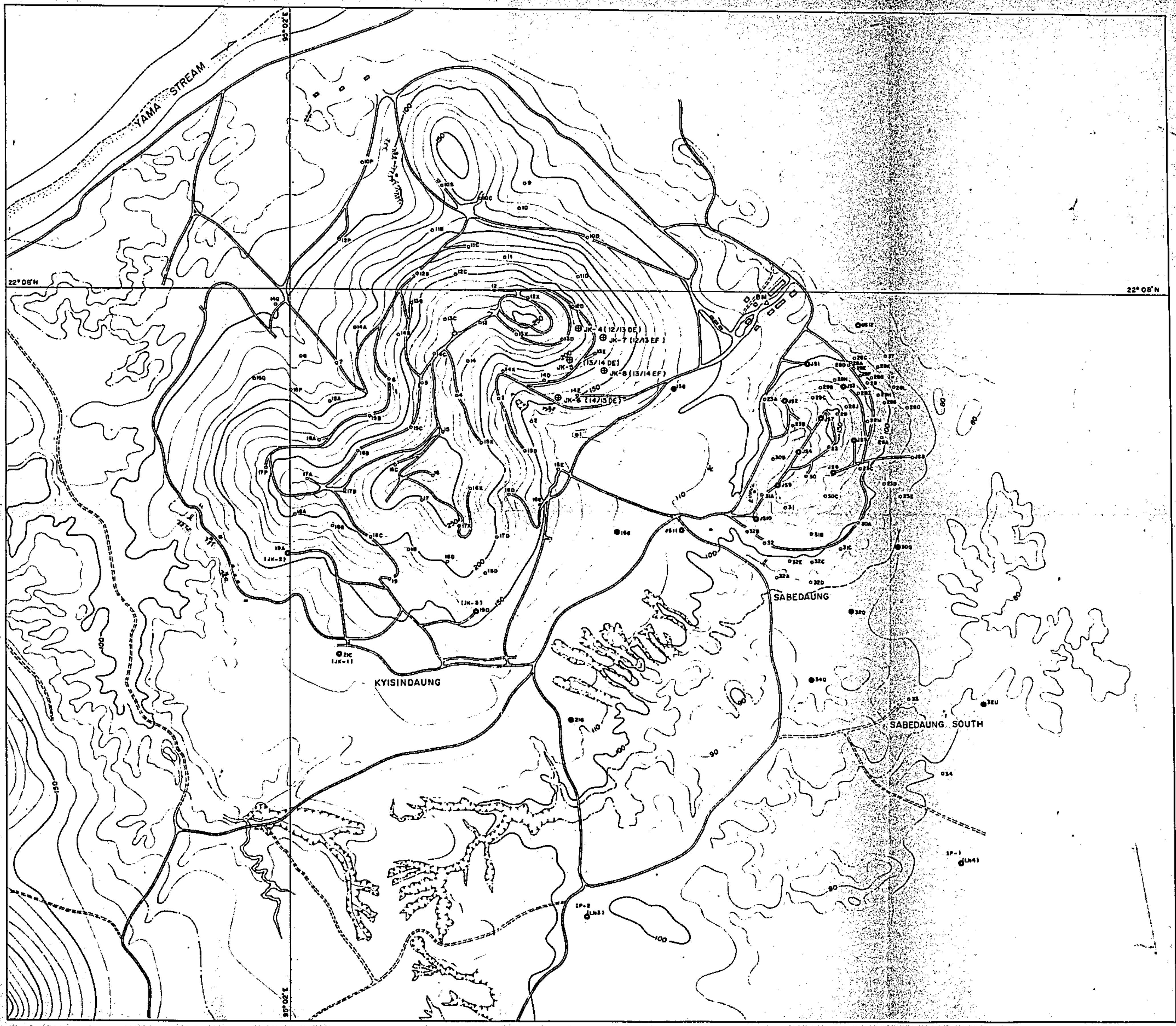
Scale 1:5,000
0 100 200 300m



METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

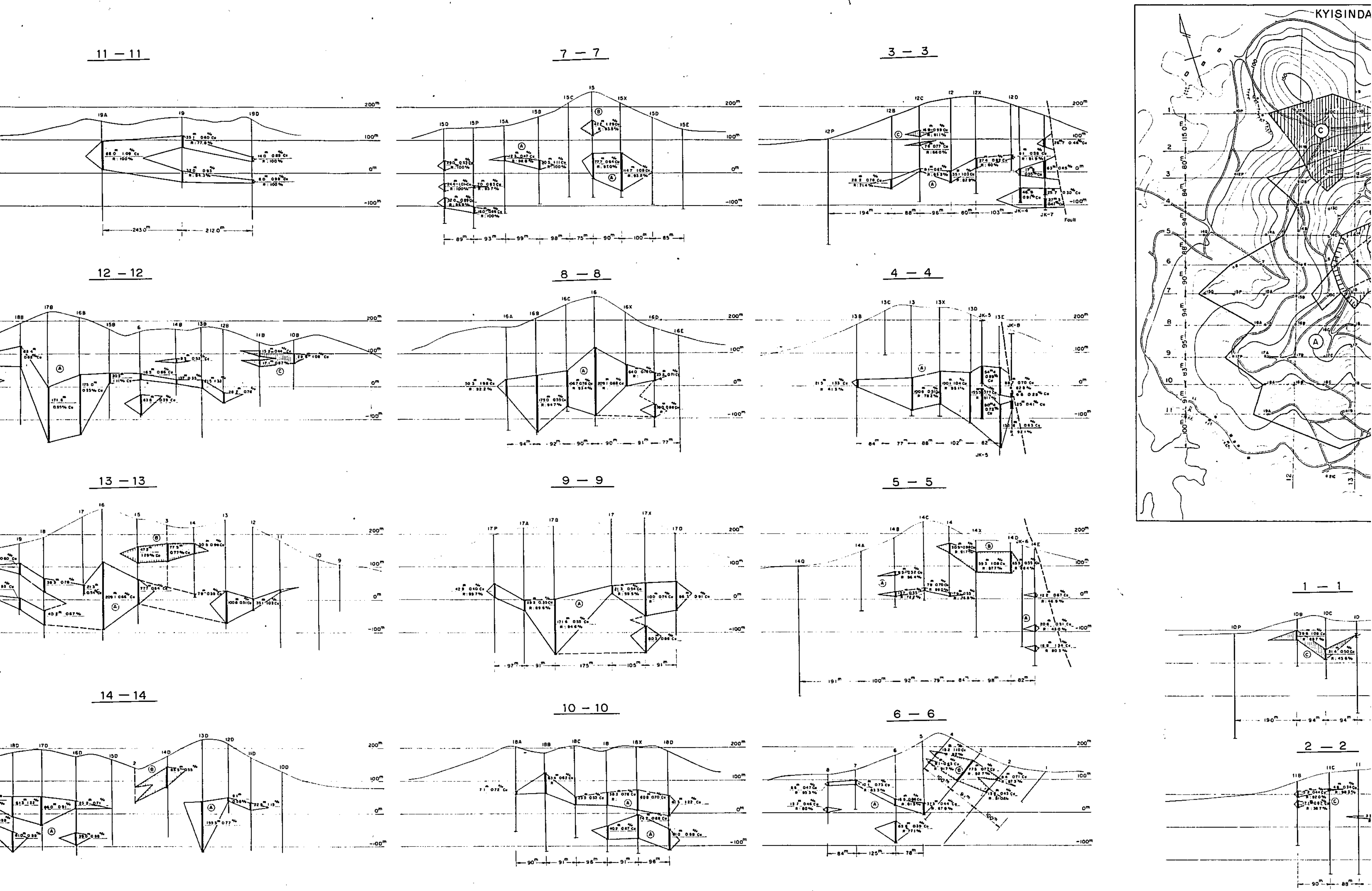
SEPTEMBER 1975

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

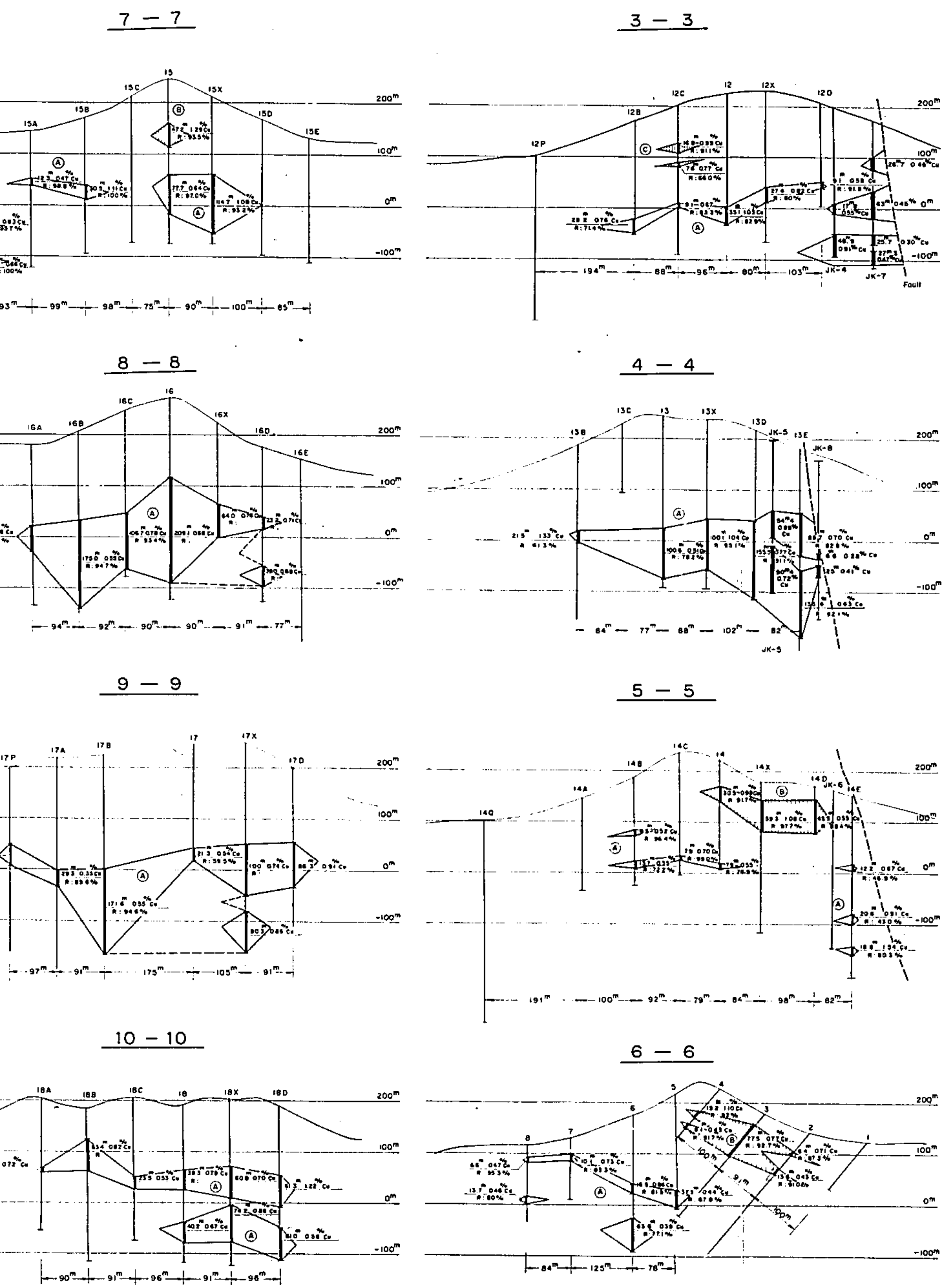


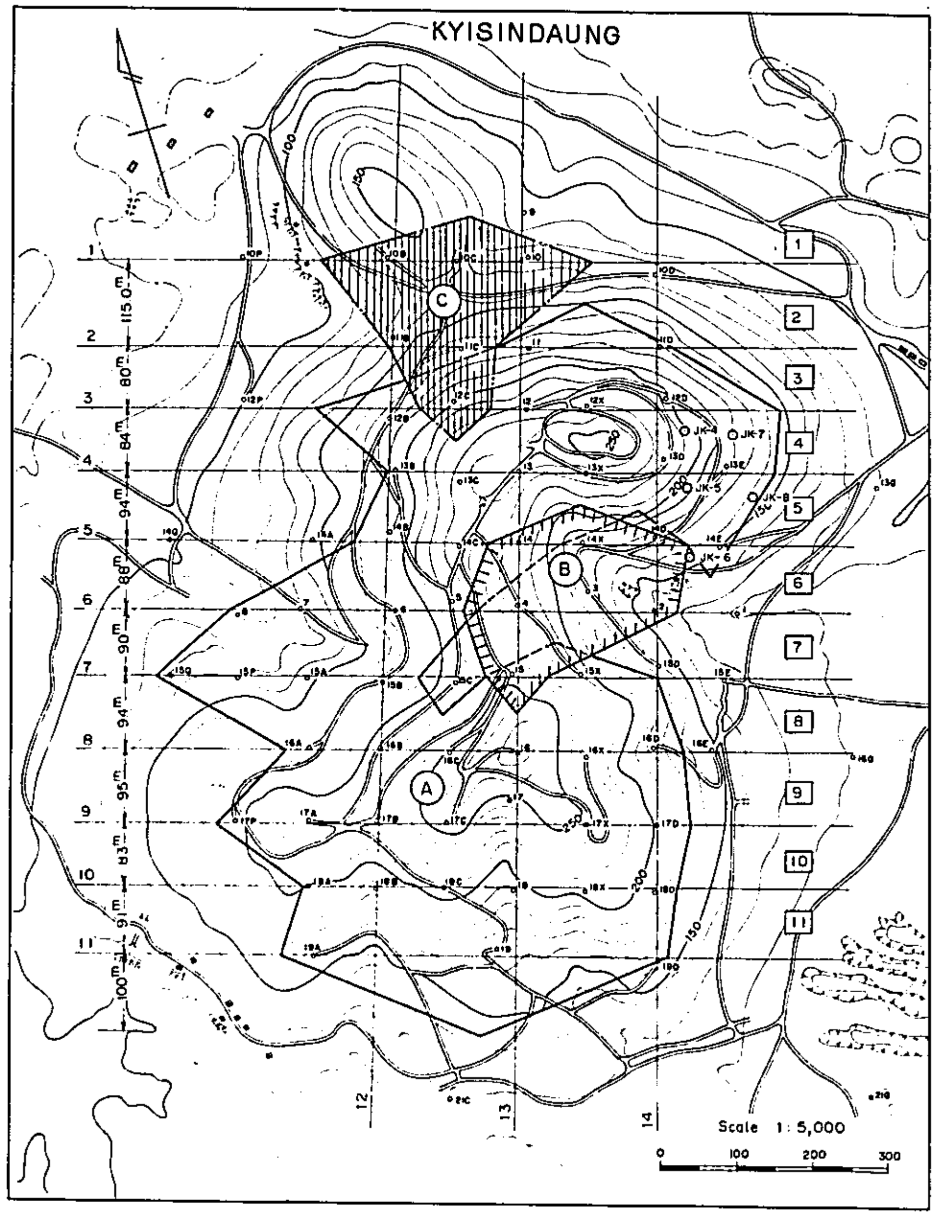
LEGEND

- JK 8 — Drill Hole by Japanese Survey Team (◉ 1972, PHASE I ○ 1973, PHASE II ⊕ 1974, PHASE III)
- 16 D — Drill Hole by M.M.D.C.
- Jeepable Road
- 100 — Contours (Interval 10m)
- Old Working



KYISINDA
11 — 11
7 — 7
3 — 3
12 — 12
8 — 8
4 — 4
13 — 13
9 — 9
5 — 5
1 — 1
14 — 14
10 — 10
6 — 6
2 — 2





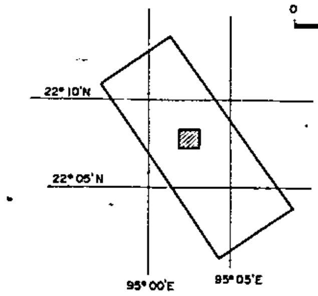
PL.I—13

GEOLOGICAL SURVEY OF MONYWA AREA UNION OF BURMA

(PHASE III)

PLAN AND SECTION FOR THE ORE RESERVE ESTIMATION OF KYISINDAUNG ORE DEPOSIT

Scale 1:5,000



LOCALITY INDEX

METAL MINING AGENCY

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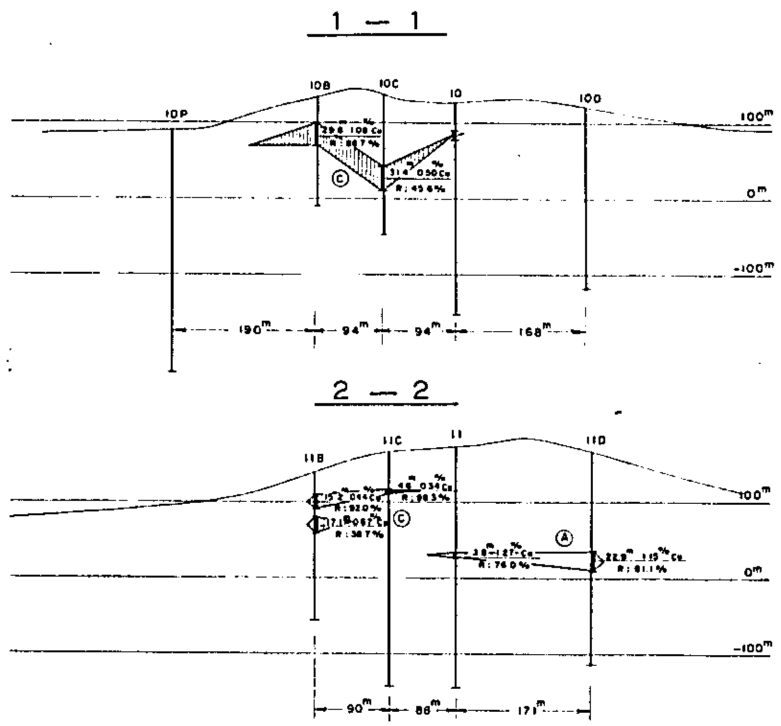
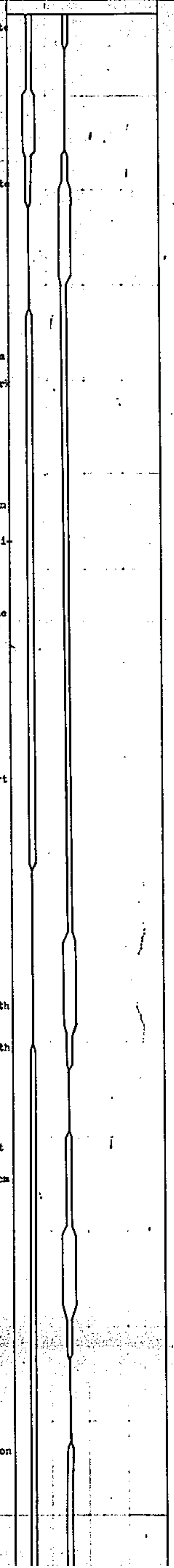


LEGEND

- Block number
- Section line number
- Area of the orebody on the section
- Length and grade of each drill hole (Cut off 0.3% cu) R : core recovery
- Mark for each ore body Ⓐ Ⓑ Ⓒ
- Drill hole on the section — Drill hole projected
- Fault.

Depth (feet)	Depth (m)	Inclination	Particulars
	1.6		non core
	3.7		weathered biotite porphyry with hematite veinlet
			brecciated biotite porphyry
			medium silicified and argillized
	8.7		breccia size: 0.5cm – 3.0cm
	10.0		strong argillization zone
			clay minerals kaoline and coricite
		30	13.6m clay sample
500			hematite veinlet wide: 1cm
	15.?		13.6m – 15.5m brecciated part
			15.5m – 23.6m shearing zone quartz
		87	veinlet width: 1cm
	20.0		medium argillized and silicified biotite porphyry
			feldspar change to alunite
	23.6		23.6m – 25.1m breccia part
	25.1	40	breccia size: 3cm – 5cm
			silicified and medium grained, weathored biotite porphyry alunitization strong
1000	30.0		biotite relict: 4mm – 7mm
	32.0	40	feldspar phenocryst: 5mm – 7mm
			brecciated part with hematite network
			take 31.6m. alunite sample
	35.?	70	hematite veinlet width: 2mm
	37.?	20	2mm hematite veinlet
			silicification and argillization medium part
	40.0		groundmass change to fine grained
	41.0	35	quartz aggregation with hematite network
			41.0m – 48.3m brecciated and strong hematization zone
1500	44.?	20	5mm hematite veinlet
			reddish brown colored strong oxidation zone
	48.?	60	hematite veinlet network
	50.0		hematite veinlet width: 12mm
			medium argillized and shearing part
			partly porous texture
	54.1	70	argillization and silicification medium zone
			hematite veinlet width: 5mm
			silicified and crushed part with hematite network and weak alunitization
	60.0		5mm – 7mm width hematite veinlet
2000	61.1	35	porous biotite porphyry
			biotite relict: 5mm
	64.?	10	hematite veinlet width: 5mm
			hard compact and medium alunitized zone
			feldspar phenocryst change to alunite
	69.0	70	hematite veinlet width: 4mm
	70.0		small grained biotite porphyry
			71.9m strong silicified and medium alunitite zone
			74.9m – 75.2m sludge
2500			porous texture and strong oxidation zone
	80.0		75.2m – 80.2m shearing zone
	80.9		80.9m – 81.5m sludge
	81.?		porous biotite porphyry, shearing part
	84.?	55	hematite veinlet width: 2mm
			silicified biotite porphyry
			biotite relict: 5mm
	89.?	75	quartz and limonite veinlet
	90.0		medium alunitization part
3000	91.?		biotite relict: 5mm
			93.7m alunite sample
			shearing zone with hematite veinlet network
	95.?		alunitization medium part
	98.?	75	hematite veinlet width: 3cm
	100.0		medium grained biotite porphyry
			strong silicified zone
			biotite relict: 5mm
	104.?	40	feldspar phenocryst: 5mm
			5mm width hematite veinlet
3500			strong silicified biotite porphyry with hematite network
	110.0	75	hematite rich brecciated part
			argillized and silicified porphyry with hematite network and dissemination
			alunitization weak
			115.0m – 115.3m sluge
			strong alunitization zone
			partly porous part strong silicified zone with alunitization
4000	120.0 / 122.?		122.4m – 125.3m strong alunitized part
			123.5m alunite sample
	125.?	75	medium grained sandstone xenolith: 3.5cm
			medium silicified and argillized part
	128.?	75	boundary of brecciated massive part
	130.0 / 131.?	35	hematite veinlet width: 5mm
			hard compact strong silicified and medium alunitized part
			biotite relict: 5mm
4500	136.?	65	hematite vein width: 1.5cm
			silicified and porous texture part
	140.0		hematite network and dissemination
			medium argillized biotite porphyry with weak alunitized
			quartz veinlet with pyrite
	145.?	60	medium argillized and weak alunitized
			shearing and brecciation zone
	150.0		medium argillized and weak alunitized
5000			152.6m – 158.7m medium argillized and weak silicified zone with alunitization
			biotite relict: 5mm
	152.?		158.7m – 165.7m
	160.0		fine compact siltstone and medium grained sandstone mixed part with graded texture sampling of siltstone
	165.?		165.7m – 170.7

Alteration & Mineralization (arg. sil. py. Cu)



Result of Chemical Analysis (Sample No. | Depth (m) | Core Length | Sample Length | T-Cu %)

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PL. I - 14

GEOLOGICAL SURVEY OF MONYWA AREA UNION OF BURMA

(PHASE III)

CORE LOG and ASSAY

DD.H. No. JK-4 (12/13DE) Sheet 1

Total Length 301.5 m Core Recovery 89.98%

Location Kyishindaung Elevation 227.6 m

Direction 0 Inclination -90°

Date of Logging from 6.4.75' to 10.4.75'

Logged by S. MONONOBE

METAL MINING AGENCY

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SEPTEMBER 1975

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO. LTD.

※ Burmese Hole No.

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende-biotite porphyry, biotite porphyry, quartz-biotite porphyry
- Brecciaton
- 30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

	argillization※	silicification SiO_2	pyritization FeS_2	mineralization Cu
fresh		< 55 %	< 1 %	< 0.2 %
weak		55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
medium		65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
strong		> 80 %	> 10 %	> 1 %

※ fresh : unaltered

weak : parts of feldspar phenocrysts changed into clay minerals

medium : almost all the feldspar phenocrysts changed into clay minerals

strong : not only feldspar phenocrysts but also groundmass changed into clay minerals

(by field observation)

feldspar phenocryst change to alunite
69.0 hematite veinlet width: 4mm (70)
70.0 small grained biotite porphyry
71.9m strong silicified and medium alunitite zone
74.9m - 75.2m sludge
2500 porous texture and strong oxidation zone
75.2m - 80.2m shearing zone
80.0
80.9m - 81.5m sludgo
81.5 porous biotite porphyry, shearing part
84.0 hematite veinlet width: 2mm (65)
silicified biotite porphyry
biotite relict: 5mm
89. quartz and limonite veinlet (75)
90.0 medium alunitization part
3000 91. biotite relict: 5mm
93.7m alunite sample
shearing zone with hematite veinlet network
95.
alunitization medium part
98. hematite veinlet width: 3cm (75)
100.0 medium grained biotite porphyry
strong silicified zone
biotite relict: 5mm
104. feldspar phenocryst: 5mm (40)
5mm width hematite veinlet
3500 strong silicified biotite porphyry with hematite network
110.0 hematite rich brecciated part (75)
argillized and silicified porphyry with hematite network and dissemination
alunitization weak
115.0m - 115.3m sluge
strong alunitization zone
partly porous part strong silicified zone with alunitization
120.0
4000 122. 122.4m - 125.3m strong alunitized part
123.5m alunite sample
125. medium grained sandstone xenolith: 3.5cm (75)
medium silicified and argillized part
129. boundary of brecciated massive part (75)
130.0
131. hematite veinlet width: 5mm (35)
hard compact strong silicified and medium alunitized part
biotite relict: 5mm
4500 136. hematite vein width: 1.5cm (65)
silicified and porous texture part
140.0 hematite network and dissemination
medium argillized biotite porphyry with weak alunitized
quartz veinlet with pyrite (60)
145. medium argillized and weak alunitized
shearing and brecciation zone
150.0
medium argillized and weak alunitized
5000 152.6m - 158.7m medium argillized and weak silicified zone with alunitization
biotite relict: 5mm
158.7m - 16?.7m
152.
160.0 fine compact siltstone and medium grained sandstone mixed part with graded texture sampling of siltstone
165. 165.7m - 170.7
5500 medium argillized and silicified part
170.0m bottom of oxidized zone
170.0
170.7 170.7m sampling of the breccia part
2mm pyrite and chalcocite veinlet
173.2 take sample of strong silicified porphyry (50)
174.5
176.2 chalcocite and pyrite veinlet 4mm (45)
medium grained biotite porphyry
strong silicified zone
180.0 groundmass change to fine grained
quartz aggregation pyrite and chalcocite
6000 182.3 veinlet (sample) (40)
183. brecciated pyrite vein width: 10cm (55)
185.4 chalcocite veinlet width: 1mm (75)
pyrite network and dissemination part
medium grained biotite porphyry
190.0 quartz veinlet with pyrite & chalcocite (55)
medium argillized and silicified part
pyrite and chalcocite veinlet 2mm
194.3 strong silicified and brecciation zone (40)
breccia fragment: 5mm - 2cm
6500 take samples 195.7m spotted epidote
200.0 200.7m - 201.7m strong silicified and chalcocite rich part (60)
4mm width pyrite and chalcocite veinlet
204. 204.7m - 207.2m chalcocite rich part (60)
206.0 chalcocite rich strong silicified and weak sericitization part (85)
210.0
210. 1cm width pyrite and chalcocite vein (40)
212.0 pyrite and chalcocite bearing quartz (55)
7000 213. veinlet width: 7mm (70)
213.5m - 219.5m strong argillized part with pyrite dissemination
219. chalcocite veinlet width: 4mm (70)
220.0
220. coarse grained biotite porphyry (70)
biotite relict: 5mm
224. strong argillized pyrite veinlet width: 5mm (20)
227. 224.7m - 227.0m shearing part
7500 228. 270.0m - 228.8m pyrite network (60)
230.0 230.0m - 234.0m coarse grained biotite porphyry
biotite relict: 5mm - 6mm
234.0 pyrite veinlet width: 2mm (70)
medium argillized and silicified part with weak alunitization (60)

	164			
1851	166	2.0	2.0	0.05
1852	168	2.0	2.0	0.01
1853	170	2.0	2.0	0.26
1854	172	2.0	2.0	0.27
1855	174	2.0	2.0	0.26
1856	176	2.0	2.0	0.25
1857	178	2.0	2.0	0.18
1858	180	2.0	2.0	0.09
1859	182	2.0	2.0	0.18
1860	184	2.0	2.0	0.16
1861	186	2.0	2.0	0.39
1862	188	2.0	2.0	0.32
1863	190	2.0	2.0	0.25
1864	192	2.0	2.0	0.23
1865	194	2.0	2.0	0.22
1866	196	2.0	2.0	0.43
1867	198	2.0	2.0	0.30
1868	200	2.0	2.0	0.41
1869	202	2.0	2.0	0.30
1870	204	2.0	2.0	0.55
1871	206	2.0	2.0	1.17
1872	208	2.0	2.0	0.64
1873	210	2.0	2.0	0.36
1874	212	2.0	2.0	0.82
1875	214	2.0	2.0	0.48
1876	216	2.0	2.0	0.20
1877	218	2.0	2.0	0.16
1878	220	2.0	2.0	0.15
1879	222	2.0	2.0	0.13
1880	224	2.0	2.0	0.13
1881	226	2.0	2.0	0.32
1882	228	2.0	2.0	0.56
1882	230	2.0	2.0	0.29
1884	232	2.0	2.0	0.34
1885	234	2.0	2.0	0.28
1886	236	2.0	2.0	0.20
1887	238	2.0	2.0	0.21

※ Burmese Hole No.

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende-biotite porphyry; biotite porphyry; quartz-biotite porphyry
- Brecciation
- 30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

	argillization ※	silicification	pyritization	mineralization
	fresh	SiO_2 < 55 %	FeS_2 < 1 %	Cu < 0.2 %
	weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
	medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
	strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also ground-mass changed into clay minerals

(by field observation)

ABBREVIATIONS

arg	:	Argillization
sil.	:	Silicification
py.	:	Pyritization
kao	:	Kaolinization
ser.	:	Sericitization
ch	:	Chloritization
alu	:	Alunitization
ccp	:	Chalcopyrite
c.c.	:	Chalcocite
en.	:	Enargite
ds.	:	Dissemination
v.	:	Veinlet
w.	:	Width

550.0

medium argillized and silicified part
170.0m bottom of oxidized zone
170.0
170.7 170.7m sampling of the breccia part
2mm pyrite and chalcocite veinlet
173.2 (60) take sample of strong silicified porphyry
174.6
176.2 (45) chalcocite and pyrite veinlet 4mm
medium grained biotite porphyry
strong silicified zone
180.0 groundmass : change to fine grained
quartz aggregation pyrite and chalcocite
600.0 182.3 (40) veinlet (sample)
183.7 (55) brecciated pyrite vein width: 10cm
185.4 (75) chalcocite veinlet width: 1mm
pyrite network and dissemination part
medium grained biotite porphyry
190.0 (55) quartz veinlet with pyrite & chalcocite
medium argillized and silicified part
pyrite and chalcocite veinlet 2mm
194.3 (40) strong silicified and brecciation zone
breccia fragment: 5mm - 2cm
650.0 take samples 195.7m spotted epidote
200.0 (60) 200.7m - 201.7m strong silicified and chalcocite rich part
4mm width pyrite and chalcocite veinlet
204.7 (60) 204.7m - 207.2m chalcocite rich part
206.0 (85) chalcocite rich strong silicified and week sericitization part
210.0
210.7 (40) 1cm width pyrite and chalcocite vein
212.0 (55) pyrite and chalcocite bearing quartz
700.0 213.5 (70) veinlet width: 7mm
213.5m - 219.5m strong argillized part with pyrite dissemination
219.5 (70)
220.0
220.5 (70) chalcocite veinlet width: 4mm
coarse grained biotite porphyry
biotite relict: 5mm
224.7 (20) strong argillized pyrite veinlet width: 5mm
227.0 224.7m - 227.0m shearing part
750.0 228.8 (60) 270.0m - 228.8m pyrite network
230.0 230.0m - 234.0m coarse grained biotite porphyry
biotite relict: 5mm - 6mm
234.0 (70) pyrite veinlet width: 2mm
medium argillized and silicified part with weak alunitization
238.0 (60) 4mm width pyrite veinlet in spotted chalcocite
240.0
240.5 (85) chalcocite veinlet with pyrite
medium silicified and argillized part
800.0 243.5 (65) 5mm width pyrite veinlet in chalcocite
biotite change to muscovite
246.0
246.5 shearing and argillized part
248.5 (40) pyrite veinlet width: 7mm
250.0 weak argillized and strong silicified
small grained biotite porphyry
254.6 (60) chalcocite veinlet width: 2mm
chalcocite network and dissemination
257.6 (65) chalcocite veinlet width: 5mm
850.0 coarse grained biotite porphyry
260.0 feldspar phenocryst: 7mm - 1cm
263.6 (60) biotite relict: 7mm
264.6 (70) 3mm pyrite veinlet with chalcocite
2mm chalcocite and pyrite veinlet
254.6m - 264.6m chalcocite rich zone
268.1 (70) network and dissemination
270.0 268.1m 6mm pyrite and chalcocite vein
chalcocite dissemination zone
900.0 273.7 (70) chalcocite veinlet width: 1cm
chalcocite dissemination part
pyrite and chalcodite veinlet
278.0 (85) strong silicified and pyrite dissemination and network zone
280.0 chalcocite vein width: 1cm
283.6 (55) medium grained biotite porphyry
feldspar phenocryst: 3.mm - 4mm
biotite relict: 2mm - 3mm
950.0 (40) chalcocite veinlet width: 5mm
290.0
291.0 (60) medium grained biotite porphyry
pyrite and chalcocite veinlet width:5mm
295.3 (85) biotite phenocryst: 5mm
feldspar . phenocryst: 7mm - 9mm
300.0 298.1m - 298.7m breccia part
301.2 301.2m - 301.5m shearing part
bottom 301.5m
1000.0
310.0

1851	166	2.0	2.0	0.05
1852	168	2.0	2.0	0.01
1853	170	2.0	2.0	0.26
1854	172	2.0	2.0	0.27
1855	174	2.0	2.0	0.26
1856	176	2.0	2.0	0.25
1857	178	2.0	2.0	0.18
1858	180	2.0	2.0	0.09
1859	182	2.0	2.0	0.18
1860	184	2.0	2.0	0.16
1861	186	2.0	2.0	0.39
1862	188	2.0	2.0	0.32
1863	190	2.0	2.0	0.25
1864	192	2.0	2.0	0.23
1865	194	2.0	2.0	0.22
1866	196	2.0	2.0	0.43
1867	198	2.0	2.0	0.30
1868	200	2.0	2.0	0.41
1869	202	2.0	2.0	0.30
1870	204	2.0	2.0	0.55
1871	206	2.0	2.0	1.17
1872	208	2.0	2.0	0.64
1873	210	2.0	2.0	0.36
1874	212	2.0	2.0	0.82
1875	214	2.0	2.0	0.48
1876	216	2.0	2.0	0.20
1877	218	2.0	2.0	0.16
1878	220	2.0	2.0	0.15
1879	222	2.0	2.0	0.13
1880	224	2.0	2.0	0.13
1881	226	2.0	2.0	0.32
1882	228	2.0	2.0	0.56
1882	230	2.0	2.0	0.29
1884	232	2.0	2.0	0.34
1885	234	2.0	2.0	0.28
1886	236	2.0	2.0	0.20
1887	238	2.0	2.0	0.21
1808	240	2.0	2.0	0.17
1809	242	2.0	2.0	0.34
1890	244	2.0	2.0	0.12
1891	246	2.0	2.0	0.10
1892	248	2.0	2.0	0.06
1893	250	2.0	2.0	0.14
1894	252	2.0	2.0	0.10
1895	254	2.0	2.0	0.19
1896	256	2.0	2.0	0.60
1897	258	2.0	2.0	2.43
1898	260	2.0	2.0	1.97
1899	262	2.0	2.0	1.81
1900	264	2.0	2.0	0.82
1901	266	2.0	2.0	0.84
1902	268	2.0	2.0	1.18
1903	270	2.0	2.0	0.35
1904	272	2.0	2.0	0.29
1905	274	2.0	2.0	0.27
1906	276	2.0	2.0	1.64
1907	278	2.0	2.0	0.88
1908	280	2.0	2.0	1.02
1909	282	2.0	2.0	0.49
1910	284	2.0	2.0	0.37
1911	286	2.0	2.0	0.76
1912	288	2.0	2.0	0.41
1913	290	2.0	2.0	0.48
1914	292	2.0	2.0	0.54
1915	294	2.0	2.0	0.84
1916	296	2.0	2.0	0.42
1917	298	2.0	2.0	2.12
1918	300	2.0	2.0	1.00
1919	301.5	1.5	1.5	0.42

ABBREVIATIONS

arg : Argillization
sil. : Silicification
py. : Pyritization
kao : Kaolinization
ser. : Sericitization
ch : Chloritization
alu : Alunitization
ccp : Chalcopyrite
c.c. : Chalcocite
en. : Enargite
dis. : Dissemination
v. : Veinlet
w. : Width

PL. I-14

GEOLOGICAL SURVEY OF
MONYWA AREA, UNION OF BURMA
(PHASE III)

CORE LOG and ASSAY

D.D.H. No JK-5(※13/14DE) Sheet 1

Total Length 300.4m Core Recovery 95.91%

Location Kyishindaung Elevation 198.8 m

Direction 0 Inclination 90°

Date of Logging from 11.4.75' to 17.4.75'

Logged by S. MONONOBE

METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

SEPTEMBER 1975

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO. LTD.

※ Burmese Hole No

Depth (feet)	Depth (m)	Particulars
	1.5	non core
	3.8	weathered, biotite porphyry
	4.7	75 1cm width quartz hematite veinlet
		45 4mm width hematite veinlet
	7.5	brecciated biotite porphyry
	10.0	weak alunitization zone; medium grained biotite porphyry
		biotite relict: 3mm.
50.0	14.0	feldspar phenocryst: 3-5mm
	16.	strong alunitization zone
	17.	brecciation part reddish colored
	20.0	quartz hematite veinlet width: 1cm
	23.0	fine grained biotite porphyry; biotite: 1-2mm feldspar : 2mm
		23.0m to 28.3m brecciate zone
	27.	50 hematite veinlet width: 5mm
		brecciate and strong alunitization
100.0	30.0	sandstone xenolith bearing biotite porphyry
	35.	sandstone xenolith: 2cm- 4cm
	37.	shearing and argillized part
	40.0	clay and fragmental porphyry mixture; argillized and shearing part
	42.	biotite change into muscovite; 42.3m - 50.0m medium argillization zone
150.0		biotite porphyry partly porous texture
		feldspar phenocryst change to alunite
	50.0	groundmass change small graind
		quartz aggregation
		shearing and brecciation zone
	54.	50 quartz veinlet width: 3 - 5mm
		medium alunitization, silicification, and argillization zone
	58.	90 quartz veinlet width: 1 - 2mm
200.0	60.0	medium grained biotite porphyry; strong alunitization zone
	63.	70 hematite veinlet width: 3mm
		medium grained biotite porphyry
	66.	60 feldspar change to alunite; quartz veinlet width: 5mm
	70.0	medium argillized and weak alunitized
	72.	70 hematite veinlet width: 3mm
		strong siliticified and limonite gossan zone with hematite network
250.0		hematite veinlet width:3mm
	78.	85
	80.0	strong silicified part
	81.	60 hematite veinlet width: 7mm
		medium grained biotite porphyry
		biotite relict: 3mm
		feldspar phenocryst: 5mm
	88. / 90.0	90 quartz veinlet with hematite: 3mm
300.0		98.7m - 99.8m
		weak argillized and medium silicified zone with hematite veinlet network and dissemination
	99.	reddish gray colored, werthered biotite porphyry
	100.0 / 100.	87 hematite veinlet with: 3mm
		100.3m - 103.8m silicified and porous texture part
	103.	biotite phenocryst: 5mm - 6mm
350.0		feldspar phenocryst: 8mm
	109. / 110.0	109.4m sampling to altered biotite
	110.	80 oolitic texture hematite veinlet
		strong alunitized and silicified; weak argillized
	114.	70 hematite veinlet width: 3mm
		strong silicified zone with hematite network and dissemination
	119. / 120.0	reddish brown colored
400.0		strong hematitezation and silicified zone
	122.	20 hematite is network and dissemination; 2mm width hematite veinlet
		strong silicified and weak alunitized part
		biotite relict: 3mm
	128.	60 hematite veinlet width: 2mm
	130.0 / 130.	pyrite and hematite mixed zone
		130.5m - 139.6m
		strong silicified biotite porphyry with strong alunitization
450.0		biotite relict : 2mm-4mm, feldspar phenocryst : 5mm- 7mm
	139. / 140.0	oxidized zone
	141.	90 chalcocite veinlet width: 5mm
	144.	65 inclination vertical, 1.5m long; chalcocite and pyrite veinlet: 4mm
		strong silicified biotite porphyry with pyrite and chalcocite network
	149. / 150.0	brecciation and silicified part
500.0		strong silicified and porous part
		weak pyritization and chalcocite dissemination
	154.	75 chalcocite veinlet width: 5mm - 7mm
	157.	30 157.8m to 10cm medium grained
		sandstone xenolith pale gray colored; strong silicified part
	160.0 / 161.	20 chalcocite veinlet width: 3mm

Result of Chemical Analysis

Sample No.	Depth (m)	Core Length	Sample Length	T-Cu %
1767	136	2.0	2.0	0.02
1768	138	2.0	2.0	0.02
1769	140	2.0	2.0	0.01
1770	142	2.0	2.0	0.33
1771	144	2.0	2.0	1.07
1772	146	2.0	2.0	0.59
1773	148	2.0	2.0	0.73
1774	150	2.0	2.0	0.52
1775	152	2.0	2.0	1.07
1776	154	2.0	2.0	0.61
1777	156	2.0	2.0	0.50
1778	158	2.0	2.0	0.46
1779	160	2.0	2.0	0.73

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia.
- Rhyolite
- Porphyry: hornblende-biotite porphyry; biotite porphyry; quartz-biotite porphyry
- Brecciaton
- 30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

	argillization※	silicification (SiO_2)	pyritization (FeS_2)	mineralization (Cu)
	fresh	< 55 %	< 1 %	< 0.2 %
	weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
	medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
	strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also groundmass changed into clay minerals

medium argillized and weak alunitized
70.0
72.3 ∠70 hematite veinlet width: 3mm
strong silicified and limonite gossan zone with hematite network
2500
hematite veinlet width: 3mm
78.9 ∠85 strong silicified part
80.0
81.8 ∠60 hematite veinlet width: 7mm
medium grained biotite porphyry
biotite relict: 3mm
feldspar phenocryst: 5mm
∠80 quartz veinlet with hematite: 3mm
90.0
3000
98.7m - 99.6m
weak argillized and medium silicified zone with hematite veinlet network and dissemination
reddish gray colored, werthered biotite porphyry
99.8
100.0 ∠87 hematite veinlet with: 3mm
100.3m - 103.8m silicified and porous texture part
103.8
biotite phenocryst: 5mm - 6mm
3500
feldspar phenocryst: 8mm
109.4m sampling to altered biotite
110.0 ∠80 oolitic texture hematite veinlet
110.6
strong alunitized and silicified
weak argillized
114.9 ∠70 hematite veinlet width: 3mm
strong silicified zone with hematite network and dissemination
119.0
120.0 reddish brown colored
strong hematitezation and silicified zone
4000
122.1 ∠20 hematite is network and dissemination
2mm width hematite veinlet
strong silicified and weak alunitized part
biotite relict: 3mm
128.1 ∠60 hematite veinlet width: 2mm
130.0 pyrite and hematite mixed zone
130.5
130.5m - 139.6m
strong silicified biotite porphyry with strong alunitization
biotite relict: 2mm-4mm,
4500
feldspar phenocryst: 5mm- 7mm
oxidized zone
140.0
141.0 ∠90 chalcocite veinlet width: 5mm
144.3 ∠65 inclination vertical, 1.5m long chalcocite and pyrite veinlet: 4mm
strong silicified biotite porphyry with pyrite and chalcocite network
149.3 brecciation and silicified part
150.0
strong silicified and porous part
5000
weak pyritization and chalcocite dissemination
154.6 ∠75 chalcocite veinlet width: 5mm - 7mm
157.8 ∠30 157.8m to 10cm medium grained sandstone xenolith pale gray colored
strong silicified part
160.0
161.0 ∠20 chalcocite veinlet width: 3mm
feldspar phenocryst: 3mm - 5mm
biotite relict: 2mm - 4mm
5500 167.9 ∠50 chalcocite and pyrite veinlet: 2mm
chalcocite network and dissemination
170.0 ∠65 pyrite and chalcocite veinlet
172.4 ∠80 3cm width drusy pyrite vein with chalcocite
strong silicified and chalcocite dissemination
175.0 ∠50 2cm width pyrite chalcocite vein strong silicified part
180.0
180.3m - 185.7m
silicified and brecciation part
6000
pyrite and chalcocite dissemination
185.7 ∠50 2cm width pyrite vein with chalcocite
medium grained biotite porphyry
187.6 ∠45 chalcocite veinlet width: 5mm
biotite relict: 5mm
190.0 ∠85 189.7m 2mm width chalcocite vein
190.2 weak pyritization zone
192.2m-195.8m chalcocite network part
width: under 1mm veinlet
195.8 medium silicified biotite porphyry
biotite change to phlogopite
6500
size to: 5mm
200.0
feldspar phenocryst: 7mm - 8mm
202.6 ∠85 2.5mm width pyrite veinlet
feldspar phenocryst: 2mm - 5mm
205.1 ∠75 chalcocite brecciated vein width: 2mm
with chalcocite dissemination
weak chalcocite zone
210.0 ∠55 pyrite veinlet with chalcocite: 5mm
7000 212.1 ∠70 medium argillized part
2mm width chalcocite veinlet
strong silicified and chalcocite dissemination part
216.0 ∠70 chalcocite veinlet width: 2mm
strong silicified and weak pyritization
chalcocite network and dissemination
220.0
220.9 ∠75 chalcocite veinlet width: 2mm
medium grained biotite porphyry
strong alunitization zone
224.0 ∠75 chalcocite veinlet with pyrite: 8mm
biotite relict: 5mm
7500 228.0 ∠35 chalcocite and pyrite vein width: 1cm
strong silicified zone with pyrite and chalcocite dissemination
230.0
∠85 chalcocite veinlet width: 2mm
medium grained biotite porphyry
∠50 biotite: 3mm , feldspar: 5mm
chalcocite bearing quartz veinlet width: 1cm
234.4m-235.5m strong pyrite dissemination and silicified zone
240.0
241.2 ∠2 medium alunite zone
chalcocite bearing pyrite vein wide: 8cm

1767	136	2.0	2.0	0.02
1768	138	2.0	2.0	0.02
1769	140	2.0	2.0	0.01
1770	142	2.0	2.0	0.33
1771	144	2.0	2.0	1.07
1772	146	2.0	2.0	0.59
1773	148	2.0	2.0	0.73
1774	150	2.0	2.0	0.52
1775	152	2.0	2.0	1.07
1776	154	2.0	2.0	0.61
1777	156	2.0	2.0	0.50
1778	158	2.0	2.0	0.46
1779	160	2.0	2.0	0.73
1780	162	2.0	2.0	0.75
1781	164	2.0	2.0	0.73
1782	166	2.0	2.0	0.28
1783	168	2.0	2.0	0.39
1784	170	2.0	2.0	0.72
1785	172	2.0	2.0	1.44
1786	174	2.0	2.0	1.35
1787	176	2.0	2.0	1.68
1788	178	2.0	2.0	1.20
1789	180	2.0	2.0	1.65
1790	182	2.0	2.0	2.53
1791	184	2.0	2.0	1.46
1792	186	2.0	2.0	1.33
1793	188	2.0	2.0	1.20
1794	190	2.0	2.0	0.15
1795	192	2.0	2.0	0.24
1796	194	2.0	2.0	0.28
1797	196	2.0	2.0	0.10
1798	198	2.0	2.0	0.07
1799	200	2.0	2.0	0.14
1800	202	2.0	2.0	0.32
1801	204	2.0	2.0	0.09
1802	206	2.0	2.0	0.18
1803	208	2.0	2.0	0.17
1804	210	2.0	2.0	0.19
1805	212	2.0	2.0	0.39
1806	214	2.0	2.0	0.93
1807	216	2.0	2.0	0.95
1808	218	2.0	2.0	0.93
1809	220	2.0	2.0	0.48
1810	222	2.0	2.0	0.18
1811	224	2.0	2.0	0.19
1812	226	2.0	2.0	0.27
1813	228	2.0	2.0	0.23
1814	230	2.0	2.0	0.13
1815	232	2.0	2.0	0.15
1816	234	2.0	2.0	0.33
1817	236	2.0	2.0	0.78
1818	238	2.0	2.0	0.27
1819	240	2.0	2.0	0.21
1820	242	2.0	2.0	1.36

※ Burmese Hole No

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende-biotite porphyry; biotite porphyry; quartz-biotite porphyry
- Brecciation
- ∠30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

	argillization ※	silicification	pyritization	mineralization
		SiO_2	FeS_2	Cu
	fresh	< 55 %	< 1 %	< 0.2 %
	weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
	medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
	strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also ground-mass changed into clay minerals
(by field observation)

ABBREVIATIONS

arg	:	Argillization
sil.	:	Silicification
py.	:	Pyritization
kao	:	Kaolinization
ser.	:	Sericitization
ch	:	Chloritization
alu	:	Alunitization
ccp	:	Chalcopyrite
c.c.	:	Chalcocite
en.	:	Enargite
dn.	:	Dissemination
v.	:	Veinlet
w.	:	Width

chalcocite network and dissemination
170.0 — 85 — pyrite and chalcocite veinlet
172. — 80 — 3cm width drusy pyrite vein with chalcocite
strong silicified and chalcocite dissemination
175.0 — 50 — 2cm width pyrite chalcocite vein strong silicified part
180.0 — 180.3m - 185.7m
6000 — silicified and brecciation part
pyrite and chalcocite dissemination
185. — 50 — 2cm width pyrite vein with chalcocite
medium graind biotite porphyry
187.6 — 45 — chalcocite veinlet width: 5mm
biotite relict: 5mm
190.0 — 85 — 189.7m 2mm width chalcocite vein
190.2 — weak pyritization zone
192.2m-195.8m chalcocite network part
width: under 1mm veinlet
195.8 — medium silicified biotite porphyry
biotite change to phlogopite
6500 — size to: 5mm
200.0 — feldspar: phenocryst: 7mm - 8mm
202.6 — 85 — 2.5mm width pyrite veinlet
feldspar: phenocryst: 2mm - 5mm
205. — 75 — chalcocite brecciated vein width: 2mm
with chalcocite dissemination
weak chalcocite zone
210.0 — 55 — pyrite veinlet with chalcocite: 5mm
medium argillized part
7000 — 212. — 70 — 2mm width chalcocite veinlet
strong silicified and chalcocite
216.0 — 70 — dissemination part
chalcocite veinlet width: 2mm
strong silicified and weak pyritization
chalcocite network and dissemination
220.0 / 220. — 75 — chalcocite veinlet width: 2mm
medium grained biotite porphyry
strong alunitization zone
224.0 — 75 — chalcocite veinlot with pyrite: 8mm
biotite relict: 5mm
7500 — 228.0 — 35 — chalcocite and pyrite vein width: 1cm
230.0 — strong silicified zone with pyrite and chalcocite dissemination
85 — chalcocite veinlet width: 2mm
medium grained biotite porphyry
50 — biotite: 3mm , feldspar.: 5mm
chalcocite bearing quartz veinlet width: 1cm
234.4m-235.5m strong pyrite dissemination and silicified zone
240.0 — medium alunite zone
241. — 2 — chalcocite bearing pyrite vein wide: 8cm
8000 — 85 — 243.2m - 247.2m strong phyrite dissemination and very strong silicified zone
10 — pyrite vein width: 10mm
247.2m - 253.5m pyrite and chalcocite veinlet network part
250.0 — 251.5m - 354.3m brecciated and strong silicification zone
breccia size: 3cm - 7cm
256.0 — 40 — strong silicified bounary of the breccia part and massive part biotite porphyry
8500 — 256.0m - 268.3m strong pyrite dissemination zone
260.0 — 75 — pyrite and chalcocite veinlet
shearing and brecciated zone
75 — breccia is very strong silicified
chalcocite bearing pyrite vein width: 5cm
strong pyrite dissemination part
medium grained biotite porphyry
269.4 / 270.0 — 75 — chalcocite veinlet width: 5mm
271. — 70 — pyrite vein with chalcocite width: 5cm
271.3 - 274.3m pyrite and chalcocite high grade zone (network and dissemination)
9000 — 274. — 10 — chalcocite veinlet width: 5mm
strong silicified and chalcocite and pyrite riched zone
280.0 — small grained biotite porpyry
281.0 — 55 — chalcocite veinlet with chalcocite width: 6mm
282. — 75 — chalcocite and pyrite veinlot width: 3mm
282.7m - 288.4m brecciated zone
strong silicified, pyrite and chalcocite riched zone
9500 — pyrite and chalcocite network and dissemination
290.0 / 291.4 — 75 — chalcocite veinlet with quartz fragment
strong silicified biotite porphyry
biotite phenocryst: 5mm
294.3m - 294.5m 20cm width medium grained sandstone xenolith
silicified biotite porphyry
3 — strong silicified zone
300.0 / 300.4 — pyrite chalcocite veinlet width: 4mm
medium grained biotite porphyry
bottom 300.4m
1000.0
310.0

1783	168	2.0	2.0	0.39
1784	170	2.0	2.0	0.72
1785	172	2.0	2.0	1.44
1786	174	2.0	2.0	1.35
1787	176	2.0	2.0	1.68
1788	178	2.0	2.0	1.20
1789	180	2.0	2.0	1.65
1790	182	2.0	2.0	2.53
1791	184	2.0	2.0	1.48
1792	186	2.0	2.0	1.33
1793	188	2.0	2.0	1.20
1794	190	2.0	2.0	0.15
1795	192	2.0	2.0	0.24
1796	194	2.0	2.0	0.28
1797	196	2.0	2.0	0.10
1798	198	2.0	2.0	0.07
1799	200	2.0	2.0	0.14
1800	202	2.0	2.0	0.32
1801	204	2.0	2.0	0.09
1802	206	2.0	2.0	0.18
1803	208	2.0	2.0	0.17
1804	210	2.0	2.0	0.19
1805	212	2.0	2.0	0.39
1806	214	2.0	2.0	0.93
1807	216	2.0	2.0	0.95
1808	218	2.0	2.0	0.93
1809	220	2.0	2.0	0.48
1810	222	2.0	2.0	0.18
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1812	226	2.0	2.0	0.27
1813	228	2.0	2.0	0.23
1814	230	2.0	2.0	0.13
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1816	234	2.0	2.0	0.33
1817	236	2.0	2.0	0.78
1818	238	2.0	2.0	0.27
1819	240	2.0	2.0	0.21
1820	242	2.0	2.0	1.36
1821	244	2.0	2.0	1.34
1822	246	2.0	2.0	0.23
1823	248	2.0	2.0	0.17
1824	250	2.0	2.0	0.07
1825	252	2.0	2.0	0.14
1826	254	2.0	2.0	0.33
1827	256	2.0	2.0	0.40
1828	258	2.0	2.0	0.07
1829	260	2.0	2.0	0.06
1830	262	2.0	2.0	0.57
1831	264	2.0	2.0	0.11
1832	266	2.0	2.0	0.26
1833	268	2.0	2.0	0.18
1834	270	2.0	2.0	0.28
1835	272	2.0	2.0	1.78
1836	274	2.0	2.0	5.24
1837	276	2.0	2.0	2.66
1838	278	2.0	2.0	1.16
1839	280	2.0	2.0	0.94
1840	282	2.0	2.0	2.00
1841	284	2.0	2.0	0.45
1842	286	2.0	2.0	0.50
1843	288	2.0	2.0	0.88
1844	290	2.0	2.0	0.63
1845	292	2.0	2.0	0.63
1846	294	2.0	2.0	1.49
1847	296	2.0	2.0	0.60
1848	298	2.0	2.0	0.62
1849	300	2.0	2.0	0.75
1850	300.4	2.0	2.0	0.64

ABBREVIATIONS

arg. : Argillization
sil. : Silicification
py. : Pyritization
kao : Kaolinization
ser. : Sericitization
ch. : Chloritization
alu. : Alunitization
c.c.p. : Chalcopyrite
c.c. : Chalcocite
en. : Enargite
dis. : Dissemination
v. : Veinlet
w. : Width

PL. I-14

GEOLOGICAL SURVEY OF
MONYWA AREA, UNION OF BURMA
(PHASE III)

CORE LOG and ASSAY

D.D.H. No. JK-6 (14/15DE) ※ Sheet 1

Total Length 300.7 m — Core Recovery 98.00%

Location Kyishindaung — Elevation 156.7 m

Direction 0 — Inclination 90°

Date of Logging from 17.4.75' to 20.4.75

Logged by S. MONONOBE

METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN
SEPTEMBER 1975
Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO. LTD

※ Burmese Hole No

Depth (feet) (m)	Columnar Section	Particulars	Alteration & Mineralization: arg	sil	py	cu.

Depth marks (m): 8.2, 10.0, 11.3, 13.3, 16.3, 17.7, 20.0, 24.0, 25.9, 27.8, 30.0, 31.3, 34.0, 40.0, 42.5, 44.4, 46.7, 48.8, 50.0, 51.6, 54.8, 59.6, 60.0, 60.4, 63.2, 66.5, 70.0, 71.7, 76.8, 80.0, 81.2, 83.1, 85.7, 90.0, 100.0, 101.0, 105.1, 109.0, 110.0, 114.1, 117.0, 120.0, 123.1, 130.0, 130.3, 132.1, 135.5, 140.0, 140.3, 143.0, 149.3, 150.0, 158.3, 160.0, 160.1
Depth marks (feet): 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000

non core
reddish brown colored weathord zone
silicified and alunitized biotite porphyry
biotite relict: 4mm - 5mm
strong hematite network
brecciate hematite veinlet and dissemination network veinlet width: 1cm
13.3m - 16.3m fine grained quartz aggregation and strong silicified zone
feldspar and change to clay minerals
weather coarse grained biotite porphyry
biotite: 1mm, feldspar: 8mm
medium grained biotite porphyry
biotite change to limonite, weak alunitized zone
10cm width hematite riched part biotite porphyry fine grained part
25.9m - 27.8m width: 1mm under, hematite veinlet network zone
strong argillization and shearing part
3cm width hematite vein
31.3m - 34.0m strong silicified part, with hematite network and disseminated
34.0m - 42.5m argillized and weak alunitization, coarse grained biotite porphyry
feldspar phenocryst: 5mm
biotite relict: 5mm
reddish brown colored zone
hematite fissure with green copper stain observed
argillized and crushed weathered biotite porphyry with green copper stain
biotite relict: 3mm - 4mm oxidation zone
brecciated and strong hematite zone
medium grained argillized tuff
with 30cm siltstone fragment
strong argillized medium grained tuff
copper mineralization weak
1cm width pyrite vein with chalcocite
medium argillized and silicified biotite porphyry. shearing part
medium argillized and slight silicified biotite porphyry with 2mm width chalcocite veinlet
medium silicified and argillized
biotite porphyry with partry small grained epidote and width: 1.5mm chalcocite veinlet
chalcocite and pyrite network, dissemination zone. grain size: 0.5mm under
argillization zone, clay minerals kaolin sericite. 1.5mm chalcocite veinlet
brecciated part, biotite porphyry
breccia fragment size : 1cm^3 to 5cm^3
quartz, pyrite, chalcocite veinlet ;4mm
coarse grained biotite porphyry, biotite relict: 5mm, feldspar phenocryst: 7-8mm
chalcocite weak zone
shearing and strong argillized part
copper secondary enrichement weak
medium silicified and coarse grained biotite porphyry, biotite relict: 1mm
medium silicified and argillized
chalcocite veinlet width 5mm with pyrite
medium silicified, chalcocite and pyrite, dissemination part
chalcocite and pyrite dissemination
argillization and silicification medium
chalcocite brecciated vein width: 2cm
medium grained biotite porphyry with chalcocite and pyrite dissemination and network, chalcocite veinlet: 7mm
medium argillized and weak silicified part
170.0m - 120.0m brecciated zone fragment size 0.3mm - 1cm
120.0m - 123.0m shearing part
chalcocite network and dissemination weak
pyrite network with chalcocite
pyrite vein with chalcocite small veinlet
strong silicified coarse grained biotite porphyry, biotite relict: 6mm
chalcocite 1mm small veinlet network part
fine grained quartz aggragated, silicified part
fine grained biotite porphyry
small grained chalcocite, impregnation
strong silicified part
biotite replaced by pyrite small grained
partry amethyst aggregation
quartz veinlet with chalcocite silicified
coarse grained biotite porphyry
1.5mm drusy quartz vein, with chalcopyrite
fine grained biotite porphyry
copper mineralization poor zone
1mm chalcopyrite and pyrite veinlet
coarse grained biotite porphyry
feldspar phenocryst 7mm - 8mm
biotite relict: 5mm
biotite veinlet: 2mm
biotite porphyry medium grained part
weak chloritized and sericite zone
argilized and shearing zone
medium grained argillized and silicified, biotite porphyry quartz veinlet with pyrite

Result of Chemical Analysis

Sample No	Depth (m)	Core Length	Sample Length	T-Cu %
1920	46	2.0	2.0	0.10
1921	48	2.0	2.0	0.08
1922	50	2.0	2.0	0.04
1923	52	2.0	2.0	0.18
1924	54	2.0	2.0	0.44
1925	56	2.0	2.0	0.37
1926	58	2.0	2.0	0.11
1927	60	2.0	2.0	0.12
1928	62	2.0	2.0	0.09
1929	64	2.0	2.0	0.12
1930	66	2.0	2.0	0.18
1931	68	2.0	2.0	0.19
1932	70	2.0	2.0	0.13
1933	72	2.0	2.0	0.17
1934	74	2.0	2.0	0.50
1935	76	2.0	2.0	0.10
1936	78	2.0	2.0	0.26
1937	80	2.0	2.0	0.18
1938	82	2.0	2.0	0.09
1939	84	2.0	2.0	0.12
1940	86	2.0	2.0	0.07
1941	88	2.0	2.0	0.08
1942	90	2.0	2.0	0.02
1943	92	2.0	2.0	0.06
1944	94	2.0	2.0	0.09
1945	96	2.0	2.0	0.11
1946	98	2.0	2.0	0.06
1947	100	2.0	2.0	0.05
1948	102	2.0	2.0	0.15
1949	104	2.0	2.0	0.10
1950	106	2.0	2.0	0.06
1951	108	2.0	2.0	0.10
1952	110	2.0	2.0	0.08
1953	112	2.0	2.0	0.07
1954	114	2.0	2.0	0.09
1955	116	2.0	2.0	0.05
1956	118	2.0	2.0	0.06
1957	120	2.0	2.0	0.06
1958	122	2.0	2.0	0.09
1959	124	2.0	2.0	0.09
1960	126	2.0	2.0	0.15
1961	128	2.0	2.0	0.23
1962	130	2.0	2.0	0.14
1963	132	2.0	2.0	0.12
1964	134	2.0	2.0	0.14
1965	136	2.0	2.0	0.14
1966	138	2.0	2.0	0.14
1967	140	2.0	2.0	0.11
1968	142	2.0	2.0	0.12
1969	144	2.0	2.0	0.12
1970	146	2.0	2.0	0.11
1971	148	2.0	2.0	0.10
1972	150	2.0	2.0	0.08
1973	152	2.0	2.0	0.09
1974	154	2.0	2.0	0.09
1975	156	2.0	2.0	0.10
1976	158	2.0	2.0	0.11
1977	160	2.0	2.0	0.13
1978	162	2.0	2.0	0.10
1979	164	2.0	2.0	0.09

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende–biotite porphyry; biotite porphyry; quartz–biotite porphyry
- Brecciaton
- \30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

argillization ※	silicification	pyritization	mineralization
	SiO_2	FeS_2	Cu
fresh	< 55 %	< 1 %	< 0.2 %
weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
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strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also groundmass changed into clay minerals
(by field observation)

to veinlet
1700 medium silicified and argillized
71.7 (85) biotite porphyry with partry small grained epidote and width: 1.5mm chalcocite veinlet
2500
76.8 chalcocite and pyrite network, dissemination zone, grain size: 0.5mm under argillization zone, clay minerals kaolin
80.0 81.2 (85) sericite. 1.5mm chalcocite veinlet
brecciated part, biotite porphyry breccia fragment size : 1cm³ to 5cm³
83.1
85.7 (60) quartz, pyrite, chalcocite veinlet :4mm
coarse grained biotite porphyry, biotite relict: 5mm, feldspar phenocryst: 7–8mm
90.0
3000
chalcocite weak zone
shearing and strong argillized part
copper secondary enrichement weak
medium silicified and coarse grained biotite porphyry, biotite relict: 5mm
100.0 medium silicified and argillized
101.0 (85) chalcocite veinlet width 5mm with pyrite
medium silicified, chalcocite and pyrite, dissemination part
105.? (65)
3500
chalcocite and pyrite dissemination
argillization and silicification medium
109.0 110.0 (60) chalcocite brecciated vein width: 2cm
medium grained biotite porphyry with chalcocite and pyrite dissemination and network , chalcocite veinlet: 7mm
114.1 (70)
medium argillized and weak silicified part
117.0
170.0m – 120.0m brecciated zone fragment size 0.3mm – 1cm
120.0 120.0m – 123.0m shearing part
4000
chalcocite network and dissemination weak pyrite network with chalcocite
123.1 (75) pyrite vein with chalcocite small veinlet
strong silicified coarse grained biotite porphyry, biotite relict: 6mm
130.0 130.? chalcocite 1mm small veinlet network part
fine grained quartz aggragated, silicified part
132.1
fine grained biotite porphyry
135.? small grained chalcocite, impregnation
4500 strong silicified part
biotite replaced by pyrite small grained
140.0 140.? (65) partry amethyst aggregation
quartz veinlet with chalcocite silicified
143.0 (75) coarse grained biotite porphyry
1.5mm drusy quartz vein, with chalcopyrite
fine grained biotite porphyry
copper mineralization poor zone
149.? (70) 1mm chalcopyrite and pyrite veinlet
150.0
coarse grained biotite porphyry
5000 feldspar phenocryst 7mm – 8mm
biotite relict: 5mm
(80) biotite veinlet: 2mm
biotite porphyry medium grained part
weak chloritized and sericite zone
158.?
160.0 argilized and shearing zone
160.? medium grained argillized and silicified, biotite porphyry quartz veinlet with
164.? (60) pyrite
argilization and silicification medium
5500 part coarse grained biotite porphyry
170.0
coarse grained medium argillized and silicified porphyry
5mm with chalcocite bearing quartz veinlet
175.? (80) 3mm quartz and pyrite veinlet with
178.? (50) chalcocite
argillization and silicification medium zone
180.0 pyrite and chalcocite weak part
shearing part argillization medium and silicification weak
6000 182.?
pyritization and chalcocite weak
187.? (45)
190.0 (45) pyrite with chalcocite veinlet
crusing part, argillization medium silicification weak mineralization poor
193.0 (50) 15mm pyrite veinlet
medium grained biotite porphyry
biotite relict: 4mm
6500 196.? (70) 2mm width pyrite veinlet with chalcocite
200.0 brecciated part, strong pyritization
(60) 7mm width chalcocite pyrite veinlet
argillized and silicifoed medium zone
mineralization poor
pyrite veinlet width: 3mm
206.? (70) partly chalcocite dissemination and network argillization and silicification
210.0 medium zone
211.? strong argillized and shearing part
7000 212.? medium grained biotite porphyry
calcite vein width: 2mm with chalcocite
(75) 3cm cubic, fine grained sandstone xenolith
silicification and argillization
220.0
medium zone chalcocite and pyrite disseminated
223.? (75) 3mm width pyrite and chalcocite veinlet
medium silicified and weak altered part
weak pyrite and chalcocite disseminated
(80) 5mm pyrite chalcocite veinlet
7500
230.0 medium grained biotite porphyry
weak alunitized and medium argillized part
232.?
argillized and shearing part
240.?
argillized and silicified medium zone
medium grained biotite phorphyry
feldspar phenocryst: 4mm
240.0 pyrite inpregnation poor
241.? shearing part, partry chalcocite disseminate
8000 242.?
244.? (90) medium grained silicified porphyry

1931	68	2.0	2.0	0.19
1932	70	2.0	2.0	0.13
1933	72	2.0	2.0	0.17
1934	74	2.0	2.0	0.50
1935	76	2.0	2.0	0.10
1936	78	2.0	2.0	0.26
1937	80	2.0	2.0	0.18
1938	82	2.0	2.0	0.09
1939	84	2.0	2.0	0.12
1940	86	2.0	2.0	0.07
1941	88	2.0	2.0	0.08
1942	90	2.0	2.0	0.02
1943	92	2.0	2.0	0.06
1944	94	2.0	2.0	0.09
1945	96	2.0	2.0	0.11
1946	98	2.0	2.0	0.06
1947	100	2.0	2.0	0.05
1948	102	2.0	2.0	0.15
1949	104	2.0	2.0	0.10
1950	106	2.0	2.0	0.06
1951	108	2.0	2.0	0.10
1952	110	2.0	2.0	0.08
1953	112	2.0	2.0	0.07
1954	114	2.0	2.0	0.09
1955	116	2.0	2.0	0.05
1956	118	2.0	2.0	0.06
1957	120	2.0	2.0	0.06
1958	122	2.0	2.0	0.09
1959	124	2.0	2.0	0.09
1960	126	2.0	2.0	0.15
1961	128	2.0	2.0	0.23
1962	130	2.0	2.0	0.14
1963	132	2.0	2.0	0.12
1964	134	2.0	2.0	0.14
1965	136	2.0	2.0	0.14
1966	138	2.0	2.0	0.14
1967	140	2.0	2.0	0.11
1968	142	2.0	2.0	0.12
1969	144	2.0	2.0	0.12
1970	146	2.0	2.0	0.11
1971	148	2.0	2.0	0.10
1972	150	2.0	2.0	0.08
1973	152	2.0	2.0	0.09
1974	154	2.0	2.0	0.09
1975	156	2.0	2.0	0.10
1976	158	2.0	2.0	0.11
1977	160	2.0	2.0	0.13
1978	162	2.0	2.0	0.10
1979	164	2.0	2.0	0.09
1980	166	2.0	2.0	0.08
1981	168	2.0	2.0	0.08
1982	170	2.0	2.0	0.08
1983	172	2.0	2.0	0.06
1984	174	2.0	2.0	0.07
1985	176	2.0	2.0	0.07
1986	178	2.0	2.0	0.09
1987	180	2.0	2.0	0.12
1988	182	2.0	2.0	0.14
1989	184	2.0	2.0	0.08
1990	186	2.0	2.0	0.09
1991	188	2.0	2.0	0.06
1992	190	2.0	2.0	0.06
1993	192	2.0	2.0	0.09
1994	194	2.0	2.0	0.09
1995	196	2.0	2.0	0.10
1996	198	2.0	2.0	0.26
1997	200	2.0	2.0	0.20
1998	202	2.0	2.0	0.11
1999	204	2.0	2.0	0.12
2000	206	2.0	2.0	0.21
2001	208	2.0	2.0	0.19
2002	210	2.0	2.0	0.12
2003	212	2.0	2.0	0.08
2004	214	2.0	2.0	0.08
2005	216	2.0	2.0	0.12
2006	218	2.0	2.0	0.07
2007	220	2.0	2.0	0.06
2008	222	2.0	2.0	0.08
2009	224	2.0	2.0	0.08
2010	226	2.0	2.0	0.08
2011	228	2.0	2.0	0.12
2012	230	2.0	2.0	0.06
2013	232	2.0	2.0	0.06
2014	234	2.0	2.0	0.06
2015	236	2.0	2.0	0.20
2016	238	2.0	2.0	0.10
2017	240	2.0	2.0	0.09
2018	242	2.0	2.0	0.07
2019	244	2.0	2.0	0.08
2020	246	2.0	2.0	0.09

※ Burmese Hole No

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry — hornblende-biotite porphyry, biotite porphyry, quartz-biotite porphyry
- Brecciaton
- 30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

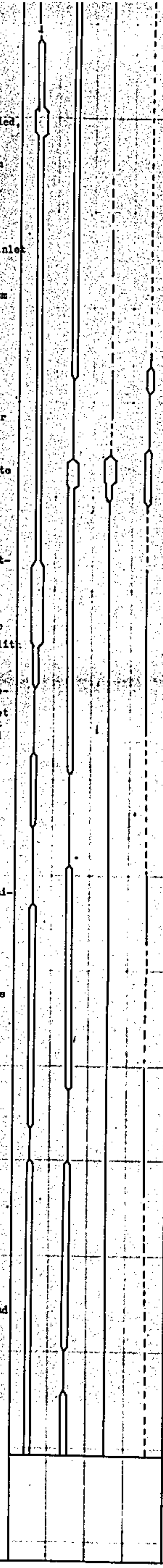
	argillization※	silicification	pyritization	mineralization
		SiO_2	FeS_2	Cu
	fresh	< 55 %	< 1 %	< 0.2 %
	weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
	medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
	strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also groundmass changed into clay minerals
(by field observation)

ABBREVIATIONS

arg : Argillization
sil. : Silicification
py : Pyritization
kao : Kaolinization
ser. : Sericitization
ch : Chloritization
alu : Alunitization
ccp : Chalcopyrite
cc : Chalcocite
en. : Enargite
dis. : Dissemination
v. : Veinlet
w. : Width

Depth	Description
	1mm chalcopyrite and pyrite veinlet
150.0	coarse grained biotite porphyry
5000	feldspar phenocryst 7mm – 8mm
	biotite relict: 5mm
	biotite veinlet: 2mm
	biotite porphyry medium grained part weak chloritized and sericite zone
158.3 / 160.0	argilized and shearing zone
160.	medium grained argillized and silicified, biotite porphyry quartz veinlet with pyrite
164.1	argilization and silicification medium part coarse grained biotite porphyry
5500 / 170.0	coarse grained medium argillized and silicified porphyry
	5mm with chalcocite bearing quartz veinlet
175.2	3mm quartz and pyrite veinlet with chalcocite
178.	argillization and silicification medium zone
180.0	pyrite and chalcocite weak part
6000 / 182.8	shearing part argillization medium and silicification weak
	pyritization and chalcocite weak
187.6 / 190.0	pyrite with chalcocite veinlet
	crusing part, argillization medium silicification weak mineralization poor
193.6	15mm pyrite veinlet
	medium grained biotite porphyry
	biotite relict: 4mm
6500 / 196.6	2mm width pyrite veinlet with chalcocite
200.0	breccinated part, strong pyritization
	7mm width chalcocite pyrite veinlet
	argillized and silicifood medium zone
	mineralization poor
	pyrite veinlet width: 3mm
206.4	partly chalcocite dissemination and net-work argillization and silicification medium zone
210.0 / 211.0	strong argillized and shearing part
7000 / 212.0	medium grained biotite porphyry
	calcite vein width: 2mm with chalcocite
	3cm cubic, fine grained sandstone xenolit
	silicification and argillization
220.0	medium zone chalcocite and pyrite disseminated
223.5	3mm width pyrite and chalcocite veinlet
	medium silicified and weak altered part
	weak pyrite and chalcocite disseminated
7500	5mm pyrite chalcocite veinlet
230.0	medium grained biotite porphyry
	weak alunitized and medium argillized part
232.4	argillized and shearing part
240.0	argillized and silicified medium zone
	medium grained biotite phorphyry
	feldspar phenocryst: 4mm
240.0 / 241.3	pyrite impregnation poor
8000 / 242.4	shearing part, partry chalcocite disseminate
244.1	medium grained silicified porphyry
	2mm quartz veinlet with chalcocite
247.2	porous biotite porphyry
248.2	shearing and argillized part
250.0	coarse grained biotite porphyry
251.1	pyrite veinlet width: 1mm
	chalcocite and pyrite dissemination zone
	1.5mm pyrite and chalcocite veinlet
	medium grained porphyry
	biotite relict : 3mm–4mm
8500	feldspar phenocryst : 6mm
260.0	silicified and argillized medium part
	brecciated quartz vein width 2cm
	pyrite and chalcocite weak network and dissemination zone
266.8 / 267.4	argillized and shearing zone
270.0	weak alunitized and medium silicified part
	mineralization medium
9000 / 274.0	4mm chalcocite pyrite veinlet
	pyrite dissemination and network zone
278.2	chalcocite poor
280.0	copper mineralization poor
282.0	argillization and silicification medium
282.	argillized and shearing part
284.7	pyrite veinlet width: 3mm
	argillization, silicification medium, and weak alunilization : zone
9500 / 290.0	feldspar charge to alunite
	pyrite veinlet width 3mm
	medium argillized weak silicified
	crushed part pyrite dissemination
	argillized and shearing zone
	coarse grained medium argillized biotite porphyry
300.0	with pyrite disseminate and network
	bottom
1000.0	
310.0	



1972	150	2.0	2.0	0.08
1973	152	2.0	2.0	0.09
1974	154	2.0	2.0	0.09
1975	156	2.0	2.0	0.10
1976	158	2.0	2.0	0.11
1977	160	2.0	2.0	0.13
1978	162	2.0	2.0	0.10
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1991	188	2.0	2.0	0.06
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1993	192	2.0	2.0	0.09
1994	194	2.0	2.0	0.09
1995	196	2.0	2.0	0.10
1996	198	2.0	2.0	0.26
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2004	214	2.0	2.0	0.08
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2012	230	2.0	2.0	0.06
2013	232	2.0	2.0	0.06
2014	234	2.0	2.0	0.06
2015	236	2.0	2.0	0.20
2016	238	2.0	2.0	0.10
2017	240	2.0	2.0	0.09
2018	242	2.0	2.0	0.07
2019	244	2.0	2.0	0.08
2020	246	2.0	2.0	0.09
2021	248	2.0	2.0	0.15
2022	250	2.0	2.0	0.07
2023	252	2.0	2.0	0.21
2024	254	2.0	2.0	0.16
2025	256	2.0	2.0	0.11
2026	258	2.0	2.0	0.13
2027	260	2.0	2.0	0.14
2028	262	2.0	2.0	0.11
2029	264	2.0	2.0	0.10
2030	266	2.0	2.0	0.09
2031	268	2.0	2.0	0.10
2032	270	2.0	2.0	0.08
2033	2-2	2.0	2.0	0.07
2034	274	2.0	2.0	0.11
2035	276	2.0	2.0	0.11
2036	278	2.0	2.0	0.08
2037	280	2.0	2.0	0.09
2038	282	2.0	2.0	0.09
2039	284	2.0	2.0	0.11
2040	286	2.0	2.0	0.10
2041	288	2.0	2.0	0.06
2042	290	2.0	2.0	0.09
2043	292	2.0	2.0	0.11
2044	294	2.0	2.0	0.09
2045	296	2.0	2.0	0.12
2046	298	2.0	2.0	0.06
2047	300	2.0	2.0	0.07
2048	300.7	2.0	2.0	0.07

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(by field observation)

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v. : Veinlet
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PL. I-14

GEOLOGICAL SURVEY OF
MONYWA AREA UNION OF BURMA
(PHASE III)

CORE LOG and ASSAY

DD.H. No JK-7(12/13EF)※ Sheet 1

Total Length 301.4 m Core Recovery 93.33%

Location Kyishindaung Elevation 180.8 m

Direction 0 Inclination 90°

Date of Logging from 20.4.75' to 22.4.75'

Logged by S. MONONOBE

METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

SEPTEMBER 1975

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO. LTD.

※ Burmese Hole No

Core log

Columns: Depth (feet) (m) | Columnar Section | Particulars | Alteration & Mineralization (arg. | sil. | py. | cu.) | Result of Chemical Analysis (Sample No. | Depth (m) | Core Length | Sample Length | T-Cu %)

Depth (feet)	Depth (m)	Inclination	Particulars
	1.5		
	3.0	35	silicified and weathered brecciated porphyry with 1cm width limonite veinlet
			1.5–10.0m brecciation and strong weathered part limonite veinlet width: 4mm
		60	
	10.0	75	3mm width limonite veinlet
			medium grained weatherd biotite porphyry
	12.6	50	biotite relict: 3mm feldspar: 3 – 5mm
50.0		10	12.6m – 17.5m brecciated and strong weathered part 1cm width limonite vein fragment 0.5mm – 4cm brecciated biotite porphyry
	17.5	30	
	20.6	45	5mm width hematite veinlot porous part phenocryst reached out groundmass changed very fine grained quartz aggregation
			20.6m – 34.6m shearing zone
			20.6m – 26.0m strong silicified part
	26.0		medium grained biotite porphyry
			26.0m – 30.2m strong argillized, partly in slage
100.0	30.2		30.2 – 34.7 m porous biotite porphyry groundmass is very fine, grained. quartz aggregation
	34.7	70	limonite veinlet width: 5mm
		50	medium argillized and silicified, weak alunited zone
	40.0		hematite veinlet 3mm: width brecciated and strong gossan part
	41.3	60	hematite veinlet 5mm: width
			medium grained biotite porphyry
			biotite changed to hematite
150.0	45.8	75	0.5 – 1cm width hematite and limonite mixed veinlet
			strong hematite goscan zone with weak alunitized
	50.0		50 – 55.8° sheard and silicified part with strong hematite gossan weak alunitized
			porous biotite porphyry argillized part
	55.8		with hematite dissemination and network
200.0	60.0		
	61.4		brecciated and coarse biotite porphyry with hematite grossan
	64.8	70	silicified and porous part
	66.2	70	limonite veinlet width: 1cm
			hematite veinlet width: 2mm
			medium argillized and silicified part with
	70.0	80	hematite dissemination
			3cm width hematite breccia vein
			medium grained biotite porphyry with hematite network and dissemination
	73.8	50	hematite veinlet width: 2mm
250.0			feldspar phenocryst 4 – 5mm
	76.7	65	hematite veinlet 3mm width
	78.3	50	silicified and brecciated part boundary in 1cm width hematite veinlet
	80.0		porous biotite porphyry strong hematite gossan part silicified, medium grained
	83.3	60	biotite porphyry
			pyrite and chalcocite veinlet 1mm wide reached zone
			medium grained silicified biotite
	88.2	65	porphyry biotite relict: 5mm
300.0	90.0		pyrite and chalcocite weak disseminate
			chalcocite veinlet width: 3mm brecciated texture part
	93.5		coarse grained silicified biotite porphyry
			biotite change to phlogopite
	95.7	85	93.5 – 95.7m strong secondary enrichment part
	97.0	45	1.5 – 2cm width quartz vein, with chalcocite
	100.0	80	5mm chalcocite pyrite veinlet strong argillized zone
			5m – 1.5cm llel chalcocite pyrite veinlet
			strong silicified, medium grained biotite
	104.6		
	105.1	30	porphyry with chalcocite network
350.0	106.7		porphyry and sandstone bounding part
			2cm width chalcocite impregnated vein
	108.5	40	106.7 – 106.8 s.s sample
	110.0		sandstone and porphyry boundary part
			105.1 – 106.3m strong enrichment
			sandstone siltstone tanding part
	112.6		109.0 – 112.6 argillized and shearing part
			pyrite and chalcocite dissemination,
	115.1		medium silicified sandstone with chalcocite
			114.9m – 115.1m crushed
	117.9		medium argillized and silicified sandstone
			pyrite and chalcocite weak dissemination
	120.0		
400.0			117.9 – 123.1 argillized sandstone shearing part
	123.1		pyritization and chalcocite poor
			123.1m – 132.5m strong silicified fine grained sandstone
			pyritization and chalcocite medium
			gray colored massive sandstone
	130.0	60	5mm width chalcocite and pyrite veinlet
			pyrite dissemination strong medium
	132.5		argillized and silicified part
			porphyry and sandstone mixed, brecciated
	135.0		part
450.0	136.3		coarse grained biotite porphyry
			5cm width brecciated pyrite and chalcocite
	138.0	70	vein
	140.0		feldspar phenocryst: 7 – 9mm
			biotite change to muscovite and pyrite
			1cm width brecciated pyrite and chalcocite
	145.7	70	parallel veinlet
			coarse grained biotite porphyry with pyrite chalcocite network and dissemination
	150.0		
	150.8	55	150m core small size
500.0			pyrite veinlet with chalcocite width: 4mm
			160.8m – 168.0m strong silicified and chalcocite enrichment zone
	155.3		
	155.8		155.3 – 155.8m strong pyrite and chalcocite network and dissemination part
			159.7m – 160.5m brecciated texture
	160.0		brecciated fragment scale: 0.5cm– 2cm
			1cm width quartz pyrite veinlet

Result of Chemical Analysis

Sample No.	Depth (m)	Core Length	Sample Length	T-Cu %
	76			
2049	78	2.0	2.0	0.06
2050	80	2.0	2.0	0.05
2051	82	2.0	2.0	0.04
2052	84	2.0	2.0	0.21
2053	86	2.0	2.0	0.38
2054	88	2.0	2.0	0.40
2055	90	2.0	2.0	0.47
2056	92	2.0	2.0	0.54
2057	94	2.0	2.0	0.79
2058	96	2.0	2.0	0.53
2059	98	2.0	2.0	0.21
2060	100	2.0	2.0	0.17
2061	102	2.0	2.0	0.13
2062	104	2.0	2.0	0.21
2063	106	2.0	2.0	1.72
2064	108	2.0	2.0	0.48
2065	110	2.0	2.0	0.20
2066	112	2.0	2.0	0.19
2067	114	2.0	2.0	0.10
2068	116	2.0	2.0	0.12
2069	118	2.0	2.0	0.04
2070	120	2.0	2.0	0.10
2071	122	2.0	2.0	0.07
2072	124	2.0	2.0	0.10
2073	126	2.0	2.0	0.26
2074	128	2.0	2.0	0.21
2075	130	2.0	2.0	0.11
2076	132	2.0	2.0	0.14
2077	134	2.0	2.0	0.11
2078	136	2.0	2.0	0.08
2079	138	2.0	2.0	0.16
2080	140	2.0	2.0	0.09
2081	142	2.0	2.0	0.06
2082	144	2.0	2.0	0.32
2083	146	2.0	2.0	0.14
2084	148	2.0	2.0	0.16
2085	150	2.0	2.0	0.15
2086	152	2.0	2.0	0.38
2087	154	2.0	2.0	0.25
2088	156	2.0	2.0	0.62
2089	158	2.0	2.0	0.44
2090	160	2.0	2.0	0.15
2091	162	2.0	2.0	0.13

LEGEND

Mudstone

Sandstone

Tuff Lapilli tuff Tuff Breccia.

Rhyolite

Porphyry: hornblende-biotite porphyry, biotite porphyry, quartz-biotite porphyry

Brecciaton

∠30 Inclination of plane structures (bedding plane intrusive boundary etc)

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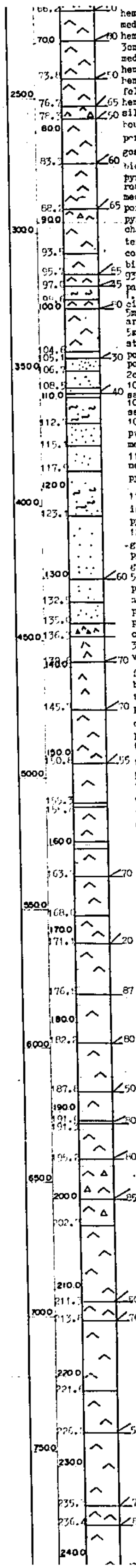
strong : not only feldspar phenocrysts but also groundmass changed into clay minerals



- ∠10 hematite veinlet width: 2mm
- medium argillized and silicified part with
- ∠80 hematite dissemination
- 3cm width hematite breccia vein
- medium grained biotite porphyry with
- ∠50 hematite network and dissemination
- hematite veinlet width: 2mm
- feldspar phenocryst 4 - 5mm
- ∠65 hematite veinlet 3mm width
- ∠50 silicified and brecciated part
- boundary in 1cm width hematite veinlet
- porous biotite porphyry strong hematite
- gossan part silicified, medium grained
- ∠60 biotite porphyry
- pyrite and chalcocite veinlet 1mm wide
- ronched zone
- medium grained silicified biotite
- ∠65 porphyry biotite relict: 5mm
- pyrite and chalcocite weak disseminate
- chalcocite veinlet width: 3mm brecciated
- texture part
- coarse grained silicified biotite porphyry
- biotite change to phlogopite
- ∠55 93.5 - 95.7m strong secondary enrichment
- ∠45 part
- 1.5 - 2cm width quartz vein, with chalco-
- ∠50 cite
- 5mm chalcocite pyrite veinlet strong
- argillized zone
- 5m - 1.5cm llel chalcocite pyrite veinlet
- strong silicified, medium grained biotite
- ∠30 porphyry with chalcocite network
- porphyry and sandstone bounding part
- 2cm width chalcocite impregnated vein
- 106.7 - 106.8 s.s sample
- ∠40 sandstone and porphyry boundary part
- 105.1 - 106.3m strong enrichment
- sandstone siltstone banding part
- 109.0 - 112.6 argillized and shearing part
- pyrite and chalcocite dissemination.
- medium silicified sandstone with chalcocite
- 114.9m - 115.1m crushed
- medium argillized and silicified sandstone
- pyrite and chalcocite weak dissemination
- 117.9 - 123.1 argillized sandstone shear-
- ing part
- pyritization and chalcocite poor
- 123.1m - 132.5m strong silicified fine
- grained sandstone
- pyritization and chalcocite medium
- gray colored massive sandstone
- ∠60 5mm width chalcocite and pyrite veinlet
- pyrite dissemination strong medium
- argillized and silicified part
- porphyry and sandstone mixed, brecciated
- part
- coarse grained biotite porphyry
- 3cm width brecciated pyrite and chalcocite
- ∠70 vein
- feldspar phenocryst: 7 - 9mm
- biotite change to muscovite and pyrite
- 1cm width brecciated pyrite and chalcocite
- ∠70 parallel veinlet
- coarse grained biotite porphyry with
- pyrite chalcocite network and dissemina-
- tion
- ∠55 150m core small size
- pyrite veinlet with chalcocite width: 4mm
- 160.8m - 168.0m strong silicified and
- chalcocite enrichment zone
- 155.3 - 155.8m strong pyrite and chalco-
- cite network and dissemination part
- 159.7m - 160.5m brecciated texture
- brecciated fragment scale: 0.5cm- 2cm
- ∠70 5mm width quartz pyrite veinlet
- strong silicified coarse grained biotite
- porphyry
- 167.0m - 170.1cm drusy pyrite vein with
- chalcocite, pyrite
- ∠20 chalcocite and pyrite vein width: 8mm
- medium grained biotite porphyry
- biotite relict: 3mm - 4mm
- feldspar phenocryst: 3mm - 5mm
- 87 chalcocite veinlet width: 3mm
- strong silicified, pyrite and chalcocite
- networks and dissemination part
- ∠80 2mm width chalcocite veinlet
- strong silicified part with pyrite and
- chalcocite disseminate
- pyrite and chalcocite veinlet
- ∠50 strong silicified hard compact part
- ∠30 191.0m - 191.3m porous part
- pyrite and chalcocite network zone
- ∠80 chalcocite veinlet part
- 195.2m - 202.7m strong silicified
- chalcocite and pyrite veinlet
- ∠85
- chalcocite and pyrite rich part
- strongly silicified and brecciated part
- wallrock change to fine grained quartz
- aggregation
- 210.6m - 211.3m quartz aggregation zone
- with brecciated chalcocite
- ∠50 pyrite and chalcocite veinlet
- ∠76 medium grained biotite porphyry
- pyrite and chalcocite veinlet width: 6mm
- coarse grained biotite porphyry
- biotite relict: 4mm - 6mm
- feldspar phenocryst: 6mm - 9mm
- medium argillized and silicified weak
- argillized and medium silicified part
- pyrite dissemination weak
- ∠55 pyrite veinlet with chalcocite impregnate
- weak argillized and medium silicified
- medium grained biotite porphyry
- pyrite and chalcocite network and disse-
- mination, mineralization medium.
- ∠70 1cm width quartz pyrite chalcocite vein
- ∠87 5mm pyrite and chalcocite veinlet
- whitesh gray colored
- fine grained biotite porphyry
- biotite relict: 1mm - 2mm

	76			
2049	78	2.0	2.0	0.06
2050	80	2.0	2.0	0.05
2051	82	2.0	2.0	0.04
2052	84	2.0	2.0	0.21
2053	86	2.0	2.0	0.38
2054	88	2.0	2.0	0.40
2055	90	2.0	2.0	0.47
2056	92	2.0	2.0	0.54
2057	94	2.0	2.0	0.79
2058	96	2.0	2.0	0.53
2059	98	2.0	2.0	0.21
2060	100	2.0	2.0	0.17
2061	102	2.0	2.0	0.13
2062	104	2.0	2.0	0.21
2063	106	2.0	2.0	1.72
2064	108	2.0	2.0	0.48
2065	110	2.0	2.0	0.20
2066	112	2.0	2.0	0.19
2067	114	2.0	2.0	0.10
2068	116	2.0	2.0	0.12
2069	118	2.0	2.0	0.04
2070	120	2.0	2.0	0.10
2071	122	2.0	2.0	0.07
2072	124	2.0	2.0	0.10
2073	126	2.0	2.0	0.26
2074	128	2.0	2.0	0.21
2075	130	2.0	2.0	0.11
2076	132	2.0	2.0	0.14
2077	134	2.0	2.0	0.11
2078	136	2.0	2.0	0.05
2079	138	2.0	2.0	0.16
2080	140	2.0	2.0	0.09
2081	142	2.0	2.0	0.06
2082	144	2.0	2.0	0.32
2083	146	2.0	2.0	0.14
2084	148	2.0	2.0	0.16
2085	150	2.0	2.0	0.15
2086	152	2.0	2.0	0.38
2087	154	2.0	2.0	0.25
2088	156	2.0	2.0	0.62
2089	158	2.0	2.0	0.44
2090	160	2.0	2.0	0.15
2091	162	2.0	2.0	0.13
2092	164	2.0	2.0	0.98
2093	166	2.0	2.0	0.60
2094	168	2.0	2.0	0.58
2095	170	2.0	2.0	0.14
2096	172	2.0	2.0	0.31
2097	174	2.0	2.0	0.11
2098	176	2.0	2.0	0.14
2099	178	2.0	2.0	0.18
2100	180	2.0	2.0	0.92
2101	182	2.0	2.0	0.78
2102	184	2.0	2.0	0.10
2103	186	2.0	2.0	0.30
2104	188	2.0	2.0	0.23
2105	190	2.0	2.0	0.51
2106	192	2.0	2.0	0.83
2107	194	2.0	2.0	1.04
2108	196	2.0	2.0	0.94
2109	198	2.0	2.0	0.95
2110	200	2.0	2.0	1.05
2111	202	2.0	2.0	0.39
2112	204	2.0	2.0	0.22
2113	206	2.0	2.0	0.09
2114	208	2.0	2.0	0.10
2115	210	2.0	2.0	0.12
2116	212	2.0	2.0	0.51
2117	214	2.0	2.0	0.13
2118	216	2.0	2.0	0.18
2119	218	2.0	2.0	0.05
2120	220	2.0	2.0	0.04
2121	222	2.0	2.0	0.05
2122	224	2.0	2.0	0.10
2123	226	2.0	2.0	0.07
2124	228	2.0	2.0	0.10
2125	230	2.0	2.0	0.19
2126	232	2.0	2.0	0.30
2127	234	2.0	2.0	0.20
2128	236	2.0	2.0	0.35
2129	238	2.0	2.0	0.78
2130	240	2.0	2.0	0.59

※ Burmese Hole No

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende-biotite porphyry; biotite porphyry; quartz-biotite porphyry
- Brecciation
- ∠30 inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

argillization※	silicification (SiO_2)	pyritization (FeS_2)	mineralization (Cu)
fresh	< 55 %	< 1 %	< 0.2 %
weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
strong	> 80 %	> 10 %	> 1 %

※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also ground-mass changed into clay minerals

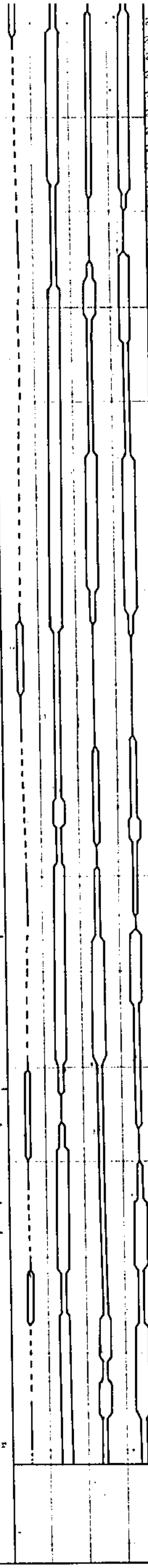
(by field observation)

ABBREVIATIONS

arg	:	Argillization
sil.	:	Silicification
py.	:	Pyritization
kao	:	Kaolinization
ser.	:	Sericitization
ch	:	Chloritization
alu	:	Alunitization
ccp.	:	Chalcopyrite
c.c.	:	Chalcocite
en.	:	Enargite
dn.	:	Dissemination
v.	:	Veinlet
w.	:	Width

tion

150.0 / 150.8 ∠55 150m core small size
pyrite veinlet with chalcocite width: 4mm
160.8m - 168.0m strong silicified and
chalcocite enrichment zone
155.3 - 155.8m strong pyrite and chalcocite network and dissemination part
159.7m - 160.5m brecciated texture
brecciated fragment scale: 0.5cm- 2cm
163.7 ∠70 5mm width quartz pyrite veinlet
strong silicified coarse grained biotite porphyry
167.0m - 170.1cm drusy pyrite vein with chalcocite, pyrite
171.1 ∠20 chalcocite and pyrite vein width: 8mm
medium grained biotite porphyry
biotite relict: 3mm - 4mm
feldspar phenocryst: 3mm - 5mm
176.8 87 chalcocite veinlet width: 3mm
strong silicified, pyrite and chalcocite networks and dissemination part
182.7 ∠80 2mm width chalcocite veinlet
strong silicified part with pyrite and chalcocite disseminate
pyrite and chalcocite veinlet
187.8 ∠50 strong silicified hard compact part
191.0 / 191.3 ∠30 191.0m - 191.3m porous part
pyrite and chalcocite network zone
195.2 ∠60 chalcocite veinlet part
195.2m - 202.7m strong silicified
chalcocite and pyrite veinlet
∠65 chalcocite and pyrite rich part
202.7 strongly silicified and brecciated part
wallrock change to fine grained quartz aggregation
210.6m - 211.3m quartz aggrogation zone with brecciated chalcocite
211.3 ∠50 pyrite and chalcocite veinlet
213.8 ∠76 medium grained biotite porphyry
pyrite and chalcocite veinlet width: 6mm
coarse grained biotite porphyry
biotite relict: 4mm - 6mm
feldspar phenocryst: 6mm - 9mm
221.0 medium argillized and silicified weak
argillized and medium silicified part
pyrite dissemination weak
226.3 ∠55 pyrite veinlet with chalcocite impregnate
weak argillized and medium silicified
medium grained biotite porphyry
pyrite and chalcocite network and dissemination, mineralization medium,
235.3 ∠70 1cm width quartz pyrite chalcocite vein
236.4 ∠87 5mm pyrite and chalcocite veinlet
whitesh gray colored
fine grained biotite porphyry
biotite relict: 1mm - 2mm
feldspar phenocryst: 3mm
pyrite and chalcocite dissemination zone
245.4 ∠30 mineralization medium
10cm width quart vein with pyrite chalcocite dissemination
strong silicified roch original texture not clear part
pyrite and chalcocite dissemination and network
mineralization strong zone
255.7 ∠60 25cm wide brecciated pyrite vein with chalcocite
258.6 ∠85 pyrite network strong zone
pyrite veinlet width 5mm
261.7 ∠70 medium grained biotite porphyry
3cm brecciated pyrite vein with chalcocite
263.7 argillization and silicification medium
pyrite and chalcocite network and disseminate
medium grained biotite porphyry
biotite relict: 3m - 4m
272.0 ∠85 1.3cm width chalcocite vein with pyrite and chalcocite
272.0mm - 282.7m strong silicified part
pyrite and chalcocite network and dissemination
281.7 ∠80 2mm width pyrite and chalcocite veinlet
medium argillized and silicified part
285.7 20 baundary of silicified part and argillized part
287.0m - 287.5m 50cm pyrite rich and chalcocite poor part
287.0m - 295.3m strong silicified part
pyrite and chalcocite rich network and dissemination
295.3 295.3m - 300m coarse grained silicified biotite porphyry, feldspar phonocryst: 7mm - 8mm
298.7
300.0 ∠60 3mm width pyrite veinlet chalcocite poor
301.4 bottom 301.4m



2085	150	2.0	2.0	0.15
2086	152	2.0	2.0	0.38
2087	154	2.0	2.0	0.25
2088	156	2.0	2.0	0.62
2089	158	2.0	2.0	0.44
2090	160	2.0	2.0	0.15
2091	162	2.0	2.0	0.13
2092	164	2.0	2.0	0.98
2093	166	2.0	2.0	0.60
2094	168	2.0	2.0	0.58
2095	170	2.0	2.0	0.14
2096	172	2.0	2.0	0.31
2097	174	2.0	2.0	0.11
2098	176	2.0	2.0	0.14
2099	178	2.0	2.0	0.18
2100	180	2.0	2.0	0.92
2101	182	2.0	2.0	0.78
2102	184	2.0	2.0	0.10
2103	186	2.0	2.0	0.30
2104	188	2.0	2.0	0.23
2105	190	2.0	2.0	0.51
2106	192	2.0	2.0	0.83
2107	194	2.0	2.0	1.04
2108	196	2.0	2.0	0.94
2109	198	2.0	2.0	0.95
2110	200	2.0	2.0	1.05
2111	202	2.0	2.0	0.38
2112	204	2.0	2.0	0.22
2113	206	2.0	2.0	0.09
2114	208	2.0	2.0	0.10
2115	210	2.0	2.0	0.12
2116	212	2.0	2.0	0.51
2117	214	2.0	2.0	0.13
2118	216	2.0	2.0	0.18
2119	218	2.0	2.0	0.05
2120	220	2.0	2.0	0.04
2121	222	2.0	2.0	0.05
2122	224	2.0	2.0	0.10
2123	226	2.0	2.0	0.07
2124	228	2.0	2.0	0.10
2125	230	2.0	2.0	0.19
2126	232	2.0	2.0	0.30
2127	234	2.0	2.0	0.20
2128	236	2.0	2.0	0.35
2129	238	2.0	2.0	0.78
2130	240	2.0	2.0	0.50
2131	242	2.0	2.0	0.38
2132	244	2.0	2.0	0.05
2133	246	2.0	2.0	0.13
2134	248	2.0	2.0	0.19
2135	250	2.0	2.0	0.13
2136	252	2.0	2.0	0.21
2137	254	2.0	2.0	0.44
2138	256	2.0	2.0	0.30
2139	258	2.0	2.0	0.11
2140	260	2.0	2.0	0.07
2141	262	2.0	2.0	0.08
2142	264	2.0	2.0	0.10
2143	266	2.0	2.0	0.07
2144	268	2.0	2.0	0.06
2145	270	2.0	2.0	1.66
2146	272	2.0	2.0	0.48
2147	274	2.0	2.0	0.32
2148	276	2.0	2.0	0.44
2149	278	2.0	2.0	0.19
2150	280	2.0	2.0	0.26
2151	282	2.0	2.0	0.56
2152	284	2.0	2.0	0.44
2153	286	2.0	2.0	0.41
2154	288	2.0	2.0	0.34
2155	290	2.0	2.0	0.63
2156	292	2.0	2.0	0.20
2157	294	2.0	2.0	0.24
2158	296	2.0	2.0	0.14
2159	298	2.0	2.0	0.18
2160	300	2.0	2.0	0.12
2161	300.4	2.0	2.0	0.19

weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
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(by field observation)

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- c.c.p. : Chalcopyrite
- c.c. : Chalcocite
- en. : Enargite
- dis. : Dissemination
- v. : Veinlet
- w. : Width

PL. I-14

GEOLOGICAL SURVEY OF
MONYWA AREA UNION OF BURMA
(PHASE III)

CORE LOG and ASSAY

D.D.H. No. JK-8(13/14EE)※ Sheet 1

Total Length 301.3 m Core Recovery 97.88%

Location Kyishindaung Elevation 161.1 m

Direction 0 Inclination 90°

Date of Logging from 23. 4.75' to 25. 4.75'

Logged by S. MONONOBE

METAL MINING AGENCY
JAPAN INTERNATIONAL COOPERATION AGENCY
GOVERNMENT OF JAPAN

SEPTEMBER 1975

Prepared by MITSUI KINZOKU ENGINEERING SERVICE CO., LTD.

※ Burmese Hole No

Depth (feet)	Depth (m)	Particulars
		non core
	3.0	weathered lapilli tuff, fragment: shale, sandstone hornblende biotite porphyry size: 3mm - 1.5cm
	7.1	reddish brown colored tuff breccia breccia fragment: hornblende biotite porphyry (hornblende- green colored) longitudinal size: 5mm - 6mm)
	10.0	
	11.4	
	13.1	brownish, yellow colored lapilli tuff
500		lapilli size: 3mm - 1.2cm average 7mm - 8mm
	18.5	
	20.0	18.5m - 24.0m lapilli size:maximum 3cm hornblende biotite porphyry, lapilli riched part
	24.0	
	24.5	24.0m - 24.5m small lapilli part lapilli size maximum 1cm
1000	30.0	weathered lapilli tuff silicified sandstone lapilli
	31.9	tuff breccia, breccia is sandstone and hornblende biotite porphyry
	34.2	weathered lapilli tuff riched zone
	34.8	34.1m - 42.7m pale gray colored tuff breccia breccia size maximum 10cm large breccia:hornblende biotite porphyry with 5mm - 8mm fragmental pyrite
	40.0	
	42.7	pale blueish gray colored lapilli tuff lapilli: hornblende biotite porphyry, and silicified sandstone
1500		
	49.1	
	50.0	
	51.2	weak pyrite dissemination zone 51.3m: size 10cm biotite porphyry (breccia) gray colored lapilli tuff
	53.8	
	55.2	lapilli size 3mm - 3cm weak argillized part
2000	60.0	55.2m sampling by weak argillized part
	63.0	pale gray colored tuff breccia breccia part argillized
	65.4	argillized and shearing part 7mm width drusy pyrite veinlet medium argillized zone
	67.7	small grained lapilli tuff
	70.0	
	71.4	lapilli size: 1cm 1cm clay pyrite veinlet graysh colored medium argillized, lapilli tuff partly crushed
2500	74.7	weak argillized tuff breccia, greenish gray colored
	77.9	breccia size maximum 5cm and medium argillized fragment: medium grained sandstone and hornblende biotite porphyry
	80.0	77.3m - 78.2m breccia lapilli size: 1cm - 1.5m argillized and shearing part
	84.3	
	85.3	85.3m - 85.6m weak silicified part grey colored weak silicified and argillized
	87.3	
	90.0	lapilli tuff, lapilli maximum 3cm pyrite dissemination very weak gray colored
3000	91.9	weak silicified and argillized tuff breccia 95.2m - 95.4m in the 20cm scale large breccia hornblende biotite porphyry
	100.0	
	102.0	coarse grained tuff breccia 102.5cm - 103.6cm big biotite porphyry breccia 3 piece breccia size maximum:30cm, minimum: 15cm
3500		103.6m - 130.7m gray colored argillized, and silicified tuff breccia 107.7m: 15cm size hornblende biotite porphyry (breccia)
	110.0	119.5m fine grained part sampling
	119.5	
4000	120.0	124.8m, fragmental pyrite samples 126.2m gray colored tuff breccia, in 15cm size hornblend biotite porphyry 126.4m black colored small materials
	130.0	
	130.7	pale gray colored lapilli tuff shearing and argillized zone with pyrite fragment
	134.5	gray colored coarse grained 134.5m - 156.4m tuff breccia, 137.0m - 10cm breccia fragment: hornblende biotite porphyry
4500	140.0	139.7m - 10cm width shearing part 142.8m breccia size:5cm biotite porphyry 144.2m breccia size:8cm biotite porphyry 146.0m breccia size:10cm hornblende biotite porphyry 147.5m breccia size: 10cm hornblende biotite porphyry
	150.0	147.8m width: 30cm argillized part 150.7m pyrite dissemination silicified breccia size: 1cm x 2cm 153.0m breccia size: 15cm hornblende biotite porphyry
5000	156.4	155.9m breccia size: 15cm pyrite impregnated silicified sandstone argillized and gray colored lapilli tuff
	160.0	157.0: 2.5cm pyrite impregnated silicified sandstone breccia lapillituff,
	162.	lapilli size maximum 2cm, clay part

Inclination marks in log: 30 (34.8m), 50 (65.4m), 25 (71.4m), 20 (85.3m), 40 (140.0m), 25 (147.5m)

Columns: Alteration & Mineralization (arg. / sil / py / cu); Result of Chemical Analysis (Sample No. / Depth (m) / Core Length / Sample Length / T-Cu %)

LEGEND

- Mudstone
- Sandstone
- Tuff Lapilli tuff Tuff Breccia
- Rhyolite
- Porphyry: hornblende-biotite porphyry, biotite porphyry, quartz-biotite porphyry
- Brecciation
- 30 Inclination of plane structures (bedding plane intrusive boundary etc)

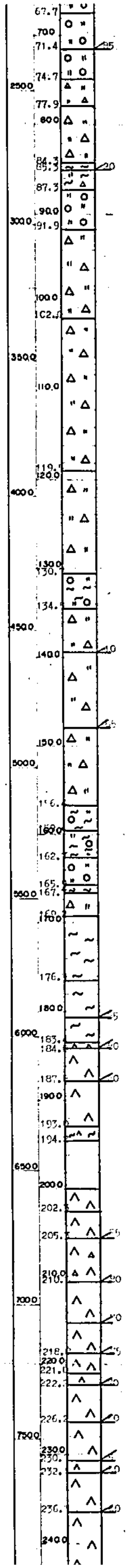
DEGREE OF ALTERATION AND MINERALIZATION

	argillization※	silicification SiO_2	pyritization FeS_2	mineralization Cu
	fresh	< 55 %	< 1 %	< 0.2 %
	weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
	medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
	strong	> 80 %	> 10 %	> 1 %

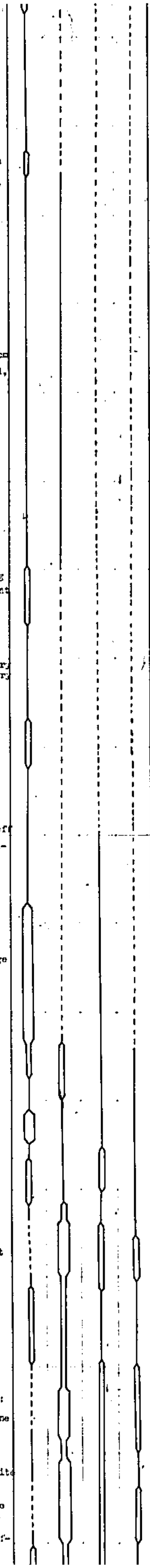
※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also ground-mass changed into clay minerals

(by field observation)

※ Burmese Hole No



7mm width drusy pyrite veinlet
medium argillized zone
small grained lapilli tuff
lapilli size: 1cm
1cm clay pyrite veinlet graysh colored
medium argillized, lapilli tuff
partly crushed
weak argillized tuff breccia, greenish gray colored
breccia size maximum 5cm and medium argillized
fragment: medium grained sandstone and hornblende biotite porphyry
77.3m – 78.2m breccia lapilli size: 1cm – 1.5m argillized and shearing part
85.3m – 85.6m weak silicified part gray colored
weak silicified and argillized
lapilli tuff, lapilli maximum 3cm
pyrite dissemination very weak gray colored
weak silicified and argillized tuff breccia
95.2m – 95.4m in the 20cm scale large breccia hornblende biotite porphyry
coarse grained tuff breccia
102.5cm – 103.6cm big biotite porphyry breccia 3 piece
breccia size maximum:30cm, minimum: 15cm
103.6m – 130.7m gray colored argillized, and silicified tuff breccia
107.7m: 15cm size hornblende biotite porphyry (breccia)
119.5m fine grained part
sampling
124.8m. fragmental pyrite samples
126.2m gray colored tuff breccia, in 15cm size hornblend biotite porphyry
126.4m black colored small materials
pale gray colored lapilli tuff shearing and argillized zone with pyrite fragment
gray colored coarse grained
134.5m – 156.4m tuff breccia,
137.0m – 10cm breccia fragment: hornblende biotite porphyry
139.7m – 10cm width shearing part
142.8m breccia size:5cm biotite porphyry
144.2m breccia size:8cm biotite porphyry
146.0m breccia size:10cm hornblende biotite porphyry
147.5m breccia size: 10cm hornblende biotite porphyry
147.8m width: 30cm argillized part
150.7m pyrite dissemination silicified
breccia size: 1cm x 2cm
153.8m breccia size: 15cm hornblende biotite porphyry
155.9m breccia size; 15cm pyrite impregnated silicified sandstone
argillized and gray colored lapilli tuff
157.0: 2.5cm pyrite impregnated silicified sandstone breccia lapilli tuff
lapilli size maximum 2cm, clay part
(fault clay with 1cm sandstone and porphyry pebble.)
tuff breccia is hornblende biotite porphyry size: 5cm
169.2m – 183.4m grayish white colored fault clay zone
176.3m: by X- ray analyzed with average size 1cm fault breccia
pyrite weak impregnate
180.2m 2cm pyrite vein
180.4m 5cm biotite porphyry pebble
182.2m pyrite network
183.4m gray colored medium silicified and argillized biotite porphyry
4mm width pyrite veinlet
silicified and pyrite networked zone chalcocite
argillized and shearing part
silicified and argillized medium part
pyrite network and dissemination part chalcocite weak
200 – 202.3 argillized part
weak pyritization
network and dissemination zone
2cm quartz pyrite veinlet
strong silicified and brecciated part
breccia: biotite porphyry
3mm width quartz pyrite veinlet with weak chalcocite
210.5m – 218.8m medium silicified and argillized part pyrite network and dissemination
3cm quartz pyrite vein
gray colored coarse grained biotite porphyry
3mm width pyrite vein, biotite relict: 7 – 1cm
strong silicified and pyritization zone
pyrite, network and dissemination
pyrite chalcocite veinlet width: 4mm
226.2m – 246.2m medium argillized and silicified zone
pale gray colored medium grained biotite porphyry
4mm pyrite chalcocite veinlet
232.1m – 236.2m strong silicified zone with pyrite network and dissemination
5mm – 7mm width drusy pyrite veinlet
236.2m – 246.2m argillized and silicified medium part
gray colored medium grained biotite



	180			
2162	182	2.0	2.0	0.25
2163	184	2.0	2.0	0.12
2164	186	2.0	2.0	0.39
2165	188	2.0	2.0	0.15
2166	190	2.0	2.0	0.47
2167	192	2.0	2.0	0.17
2168	194	2.0	2.0	0.10
2169	196	2.0	2.0	0.12
2170	198	2.0	2.0	0.08
2171	200	2.0	2.0	0.06
2172	202	2.0	2.0	0.06
2173	204	2.0	2.0	0.15
2174	206	2.0	2.0	0.73
2175	208	2.0	2.0	0.85
2176	210	2.0	2.0	0.18
2177	212	2.0	2.0	0.20
2178	214	2.0	2.0	0.52
2179	216	2.0	2.0	0.08
2180	218	2.0	2.0	0.06
2181	220	2.0	2.0	0.20
2182	222	2.0	2.0	0.16
2183	224	2.0	2.0	0.50
2184	226	2.0	2.0	1.44
2185	228	2.0	2.0	0.27
2186	230	2.0	2.0	0.25
2187	232	2.0	2.0	0.26
2188	234	2.0	2.0	0.16
2189	236	2.0	2.0	0.08
2190	238	2.0	2.0	0.14
2191	240	2.0	2.0	0.07
2192	242	2.0	2.0	0.10

LEGEND

Mudstone
Sandstone
Tuff Lapilli tuff Tuff Breccia
Rhyolite
Porphyry: hornblende-biotite porphyry, biotite porphyry, quartz-biotite porphyry
Brecciaton
30 Inclination of plane structures (bedding plane intrusive boundary etc)

DEGREE OF ALTERATION AND MINERALIZATION

argillization*	silicification	pyritization	mineralization
	SiO_2	FeS_2	Cu
fresh	< 55 %	< 1 %	< 0.2 %
weak	55 ~ 65%	1 ~ 5 %	0.3 ~ 0.5%
medium	65 ~ 80%	5 ~ 10 %	0.6 ~ 0.9%
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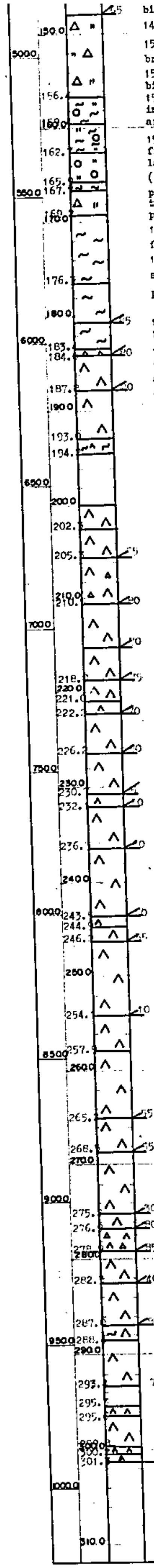
※ fresh : unaltered
weak : parts of feldspar phenocrysts changed into clay minerals
medium : almost all the feldspar phenocrysts changed into clay minerals
strong : not only feldspar phenocrysts but also groundmass changed into clay minerals

(by field observation)

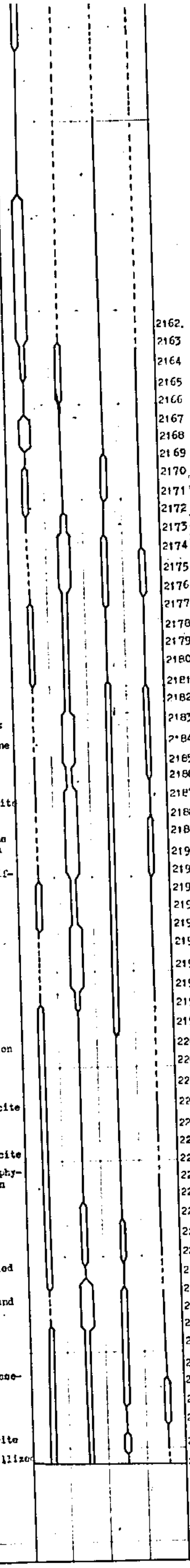
ABBREVIATIONS

arg : Argillization
sil : Silicification
py : Pyritization

kao : Kaolinization
ser : Sericitization
ch : Chloritization
alu : Alunitization
ccp : Chalcopyrite
cc : Chalcocite
en. : Enargite
ds. : Dissemination
v. : Veinlet
w. : Width



biotite porphyry
147.6m width: 30cm argillized part
150.7m pyrite dissemination silicified
breccia size: 1cm x 2cm
153.8m breccia size: 15cm hornblende
biotite porphyry
155.9m breccia size: 15cm pyrite
impregnated silicified sandstone
argillized and gray colored lapilli tuff
157.0: 2.5cm pyrite impregnated silicified sandstone breccia lapilli tuff
lapilli size maximum 2cm, clay part
(fault clay with 1cm sandstone and
porphyry pebble.)
tuff breccia in hornblende biotite
porphyry size: 5cm
169.2m - 183.4m grayish white colored
fault clay zone
176.3m: by X- ray analyzed with average
size 1cm fault breccia
pyrite weak impregnate
180.2m 2cm pyrite vein
180.4m 5cm biotite porphyry pebble
182.2m pyrite network
183.4m gray colored medium silicified
and argillized biotite porphyry
4mm width pyrite veinlet
silicified and pyrite networked zone
chalcocite
argillized and shearing part
silicified and argillized redium part
pyrite network and dissemination part
chalcocite weak
200 - 202.3 argillized part
weak pyritization
network and dissemination zone
2cm quartz pyrite veinlet
strong silicified and brecciated part
breccia: biotite porphyry
3mm width quartz pyrite veinlet with
weak chalcocite
210.5m - 218.8m medium silicified and
argillized part pyrite network and
dissemination
3cm quartz pyrite vein
gray colored coarse grained biotite
porphyry
3mm width pyrite vein, biotite relict:
7 - 1cm
strong silicified and pyritization zone
pyrite, network and dissemination
pyrite chalcocite veinlet width: 4mm
226.2m - 246.2m medium argillized and
silicified zone
pale gray colored medium grained biotite
porphyry
4mm pyrite chalcocite veinlet
232.1m - 236.2m strong silicified zone
with pyrite network and dissemination
5mm - 7mm width drusy pyrite veinlet
236.2m - 246.2m argillized and silicified medium part
gray colored medium grained biotite
porphyry
4mm pyrite chalcocite veinlet
7mm pyrite veinlet
246.2m - 254.1m strong silicified
biotite porphyry
groundmass change to small quartz
aggregation with pyrite network and
dissemination
pyrite dissemination weak part
biotite relict: 7mm
5mm width pyrite veinlet
254.1m - 268.5m: medium argillized
weak silicified zone
pyritization and copper mineralization
poor
coarse grained argillized biotite
porphyry
2mm clay pyrite veinlet with chalcocite
biotite relict: 5mm -7mm
feldspar phenocryst: 6mm - 8mm
2mm clay pyrite veinlet with chalcocite
268.5m - 275.2m porous biotite porphyry weak silicified and argillization
width: 30cm, shearing and clay zone
biotite relict 5mm
brecciated part: medium silicified
medium argillized and weak silicified
part pyritization poor
282.3m - 287.0m strong silicified and
pyrite riched part
silicified and shearing part
argillization and silicification
medium part. pyrite network and dissemination
chalcite and pyrite veinlet
295.3m - 295.6m pyrite chalcocite
network part biotite relict: 5mm
299.8m - 300.2m reccíated a[illegible]d pyrite
network part
bottom: 301.3m medium grained argillized
biotite porphyry



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2192	242	2.0	2.0	0.10
2193	244	2.0	2.0	0.14
2194	246	2.0	2.0	0.24
2195	248	2.0	2.0	0.07
2196	250	2.0	2.0	0.10
2197	252	2.0	2.0	0.04
2198	254	2.0	2.0	0.04
2199	256	2.0	2.0	0.10
2200	258	2.0	2.0	0.06
2201	260	2.0	2.0	0.04
2202	262	2.0	2.0	0.08
2203	264	2.0	2.0	0.11
2204	266	2.0	2.0	0.07
2205	268	2.0	2.0	0.10
2206	270	2.0	2.0	0.09
2207	272	2.0	2.0	0.04
2208	274	2.0	2.0	0.05
2209	276	2.0	2.0	0.06
2210	278	2.0	2.0	0.10
2211	280	2.0	2.0	0.10
2212	282	2.0	2.0	0.14
2213	284	2.0	2.0	0.07
2214	286	2.0	2.0	0.07
2215	288	2.0	2.0	0.03
2216	290	2.0	2.0	0.03
2217	292	2.0	2.0	0.05
2218	294	2.0	2.0	0.06
2219	296	2.0	2.0	0.14
2220	298	2.0	2.0	0.06
2221	300	2.0	2.0	0.05
2222	300.3	2.0	2.0	0.06

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K-29