REPORT
ON
THE COOPERATIVE MINERAL EXPLORATION
IN
THE SOUTH BATINAH COAST AREA
SULTANATE OF OMAN

(PHASE Ⅲ)

MARCH 2000

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

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PREFACE

In response to the request of the Government of the Sultanate of Oman, the Japanese Government decided to conduct a Mineral Exploration Project in South Batinah Coast area and entrusted the project to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

JICA and MMAJ sent to Oman a survey team headed by Mr. Yoshiaki Shibata from December 7th to March 10th, 2000.

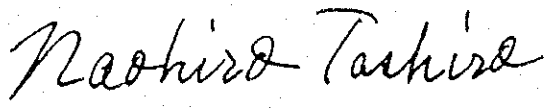
The team exchanged views with the officials concerned of the Government of Oman and conducted a field survey in the South Batinah Coast area. After the team returned to Japan, further studies were made and present report has been prepared. This report includes the survey results of geophysical and drilling surveys carried out during Phase III.

We hope that this report will serve for the development of the mineral resources in Oman and contribute to the promotion of friendly relations between Japan and Oman.

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

March, 2000

Kimio Fujita
President
Japan International Cooperation Agency



Naohiro Tashiro
President
Metal Mining Agency of Japan

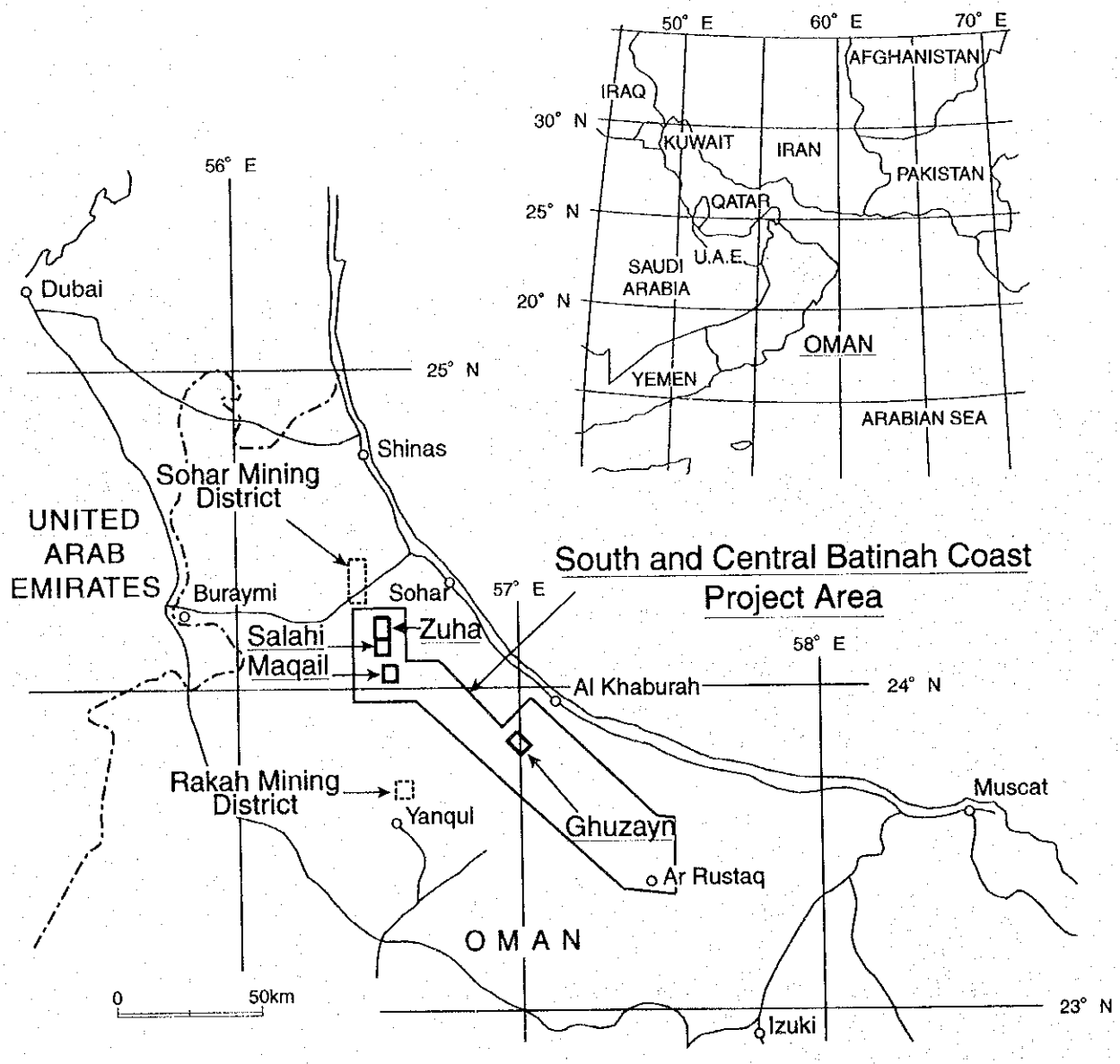


Fig.1 Location map of the surveyed area

ABSTRACT

The Government of Sultanate of Oman and the Government of Japan agreed to conduct a mineral exploration project in the South Batinah Coast area. Both governments on 17th July 1997 signed the Scope of Work for this project. The objective of this project was to discover new mineral deposits in the South Batinah Coast area by clarifying the geological setting and characteristics of mineral deposits.

The Cooperative Mineral Exploration Project in the South Batinah Coast area started in 1997 as a continuation of the Cooperative Mineral Exploration Project conducted previously during 1995 and 1996 in the Central Batinah Coast area. As a result, a third ore body was discovered in Ghuzayn area (ore body No. 3).

During the Phase III of the present project and based on the recommendations of the Phase II results, it was decided to carry out geophysical and drilling surveys in Ghuzayn. Geophysical surveys were also carried out in the areas of Maqail, Zuha and Salahi. Further drilling works were carried out in Zuha and Maqail. These results were as follows:

On the basis of all the studies already carried out, it has become clear that in Ghuzayn, mineralization can be found in a wide extent, but massive sulphide is found distributed only in the central part of the investigated area. According to the drilling results carried out within the surroundings of ore body No. 3, it has become clear that the west part of the ore body is thicker than the east part and ore body extends continuously for about 300m from south to north. Preliminary results show that this ore body can be estimated in 8.6 million tons with an average grade of 1.5%.

According to the geological indications, it can be considered that in Zuha area the mineral showing in existing gossan presents almost same scale as the existing in Ghuzayn area, with abundant copper oxides in the surroundings. To investigate this area in more detail, TDIP survey was carried out and detected high chargeability distributions along a favorable horizon indicative of the existence of ore bodies around the gossan. However, remarkable low resistivity anomalies were not detected in these distributions. TEM survey was carried out in places where high chargeability anomalies were detected by the TDIP survey, but the results did not indicate any anomaly related to the existence of massive sulphide ore bodies. To further investigate the zone, drilling was carried out on the high chargeability anomalies detected to the east of the gossan, and confirmed predominance of pyrite mineralization and alteration in V1-1. Based on the results of these surveys, a massive sulphide ore body could not be inferred to exist in this area.

In Maqail area, the TDIP survey was set up as a north extension of the survey carried out last year. Low resistivity anomalies accompanied by chargeability anomalies were detected in two places, and by TEM survey located within these areas, one remarkable TEM anomaly was extracted. Furthermore, drilling survey was carried out to confirm these anomalies, but only silicification and pyritization was recognized and therefore, no massive sulphide ore bodies could be inferred to exist within this area.

In Salahi area, located to the south of Zuha area, several mineral showings and mineralizations are confirmed in several places. In this area, the TDIP survey detected zones of high chargeability anomalies

but within this zone, low resistivity anomalies were not detected. Consequently, there are no indications for the existence of any massive sulphide ore bodies in this area.

Based on the above results, and although mineralization was found in many places in South Batinah Coast area, it became clear that massive sulphide considered to be economically feasible, is limited to the ore bodies discovered in Ghuzayn area. From the 3 ore bodies detected in Ghuzayn, a preliminary estimation of the reserve resulted in about 14 million tons. Therefore, to obtain an economical evaluation of the reserve it is recommended to carry out a more detailed investigation. However, since the ore body in Ghuzayn is rather deep and not accompanied by gold, it is expected to meet difficulties to develop this area in an independent manner. To develop this mineral resource in a more efficient way, it is recommended to carry out an economical evaluation together with Yanqul area.

CONTENTS

PART II SURVEY RESULTS

PART I GENERALITIES

CHAPTER 1 INTRODUCTION

1-1 Background and Objectives

This survey was carried out as a Cooperative Mineral Exploration program in the South Batinah Coast area of Oman based on the Scope of Works agreed on 17th July 1997 between the Government of Japan and the Government of the Sultanate of Oman.

The survey aimed at discovering new mineral deposits in the South Batinah Coast area by clarifying the geological setting and characteristics of mineral deposits. In the area under study, many exploration works have been already carried out mostly near the known mineral occurrences. However these works were only limited to the vicinity of mineralization zones with surface indications and if the whole area is taken into consideration, it is reasonable to think that only very limited portions were merely explored. In view of this matter and considering that Quaternary sediments cover the area in a very wide range, an important subject to be undertaken for exploration was the finding of an effective methodology to investigate in a systematic way the underlying part of the sediments in this area.

The previous Cooperative Mineral Exploration carried out in the Central Batinah Coast area from 1995 to 1996 find out that this area presents a high potential for bearing massive sulphide deposits. Two ore bodies were discovered during that period in Ghuzayn area.

On the other hand, the Cooperative Mineral Exploration in the South Batinah Coast area carried out during the Phase I (fiscal year of 1997) detected another massive sulphide ore body, the ore body No 3 in Ghuzayn area. This ore body was first intersected by the drilling MJOB-G30 for a core length of 91.4m and an average Cu assay of 2.68%.

During the fiscal year of 1998, geophysical surveys were carried out in order to discover new ore bodies in the areas of Ghuzayn, Sarami, Mahab, Harakilab and Maqail. Although the geophysical anomalies extracted in Sarami and Harakilab were investigated by drilling survey, new massive sulphide ore bodies were not detected.

1-2 Coverage and Outline of Works

The South Batinah Coast area, the objective area of this survey, is located in the west of Muscat, the capital of the country, and lies between the Oman Mountains and the Gulf of Oman. The survey area is shown in Fig. 1.

The massive sulphides deposits distributed in Oman are of the Cyprus-type copper deposits. These deposits occur within the volcanic rocks consisting mainly of basaltic pillow lava and associated to a stratigraphic control. Based on the survey results obtained during the last 4 years in the Batinah Coast area, the following exploration indicators have been established:

(1) Massive sulphide deposits show stratigraphic control and occur in the contact between V1-1 (Geotimes unit) and V1-2 (Lasail unit).

(2) The alteration associated with mineralization consists of silicification, chloritization (Mg-rich chlorite) and epidotization. Silicification and epidotization are remarkable even in the margin of the massive sulphide ore body.

(3) The generation of massive sulphide deposits is closely related to faults.

(4) There exists the possibility that metalliferous sediments grade laterally into massive sulphide ore bodies in the case that the sediments contain many magnetic with clear stratification and copper mineralization.

Since this area is widely covered by Quaternary sediments, the distribution of mineral showings is rather limited in the surface and for this reason, the mineral exploration can be more effective if the following steps are taken into account:

1) The selection of potential areas for this type of deposits can be achieved by first selecting the most suitable zones by means of geological and airborne magnetic methods. The airborne magnetic method is useful to delineate demagnetized zones associated to mineralization.
2) The zones selected by the above methodology can be further investigated by appropriate ground geophysical methods in order to delineate in more detail areas with high potentiality.
3) A suitable exploratory drilling program can finally confirm the results of the geophysical methods.

Regarding ground geophysics used in the above-mentioned methodology, the first step is to carry out TDIP survey in order to clarify the mineralized zones, and as a second step, TEM geophysical method is utilized as a suitable method to extract possible ore bodies from the mineralized zone. It is very effective if a program of small loops (50 by 50m) by TEM survey method is used before the drilling survey. Fig.I-1-1 illustrates the flow diagram of all the exploration methodology utilized in the searching of massive sulphide deposits in Batinah Coast.

Based on the results obtained during the surveys carried out in the Phase II of the Cooperative Mineral Exploration in the South Batinah Coast area, the third phase was executed during this fiscal year by undertaking the following tasks:

- Geophysical and drilling surveys in the areas of Ghuzayn, Maqail and Zuha areas.
- Geophysical survey in Salahi area.

Survey amounts of geophysics and drilling surveys, as well as laboratory studies are all indicated in Tables I-1-1 and I-1-2.

Flow for massive sulphide deposits exploration in Batinah Coast

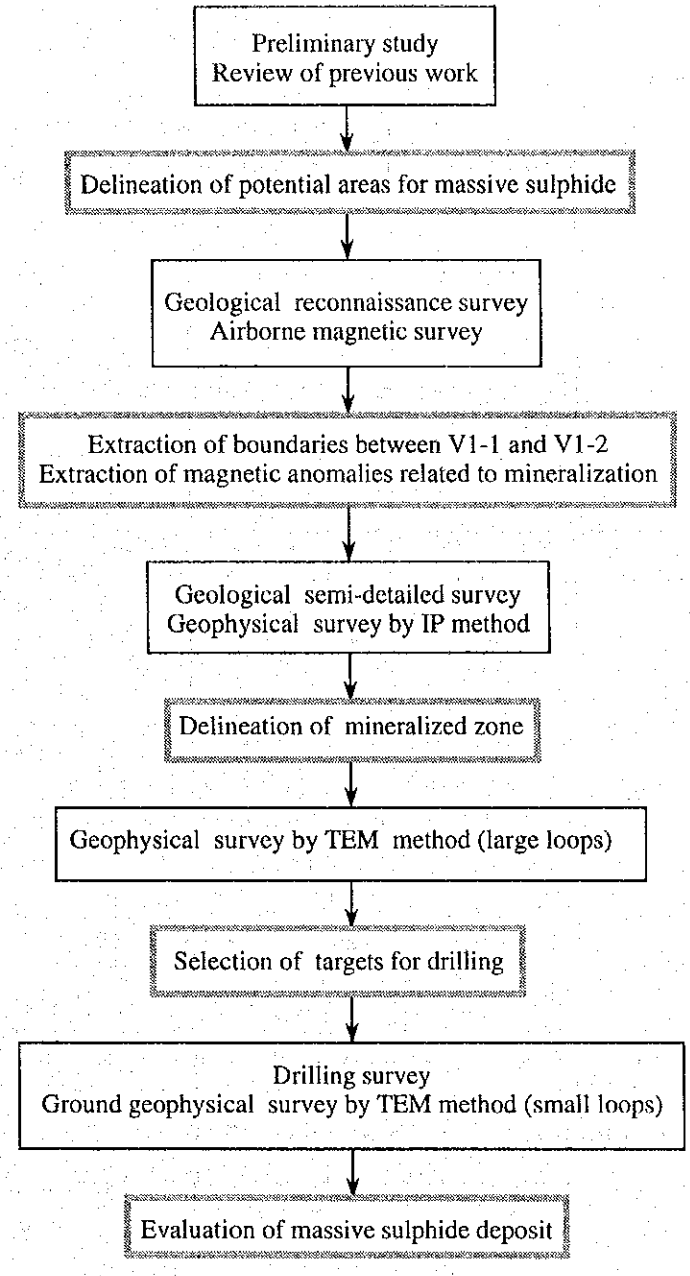


Fig. I -1-1 Flow for massive sulphide deposits exploration in Batinah Coast

Table I-1-1 Content and amount of work of Phase III

CONTENT AND AREA		AMOUNT OF WORK	
1. Geophysical Survey			
1) IP method		Total line length	Number of measurements
	Ghuzayn area	30.2 km	Total 3,232 points
	Zuha area	34.5 km	Total line length:
	Maqail area	12 km	98.3 km
	Salahi area	21.6 km	
2) TEM method		Number of loops	Number of measurements
	Ghuzayn area	2 loops	Total 972 points
	Zuha area	7 loops	Total length of loop:
	Maqail area	3 loops	28.8 km
2. Drilling Survey		Total length	Grand total length
	Ghuzayn area	1,153.5 m	2,135.80 m
	Zuha area	250.90 m	
	Maqail area	731.40 m	

Table I-1-2 Laboratory work in Phase III

LABORATORY WORK	AMOUNT
1. Geophysical Survey	
Resistivity and polarizability measurement	30 samples
2. Drilling Survey	
Chemical analysis	
ore assay (6 elements: Au,Ag,Cu,Pb,Zn,Fe)	82 samples

1-3 Members of the Project

The members of the project were as follows:

(1) Inspection of field work

Noboru Fujii	Senior Geologist	Metal Mining Agency of Japan
Kazuo Masuda	Geophysicist	Metal Mining Agency of Japan

(2) Field work

Japanese Counterpart

Yoshiaki Shibata	Team leader	Mitsubishi Materials Natural Resources Development Corp.
Junichi Sasaki	Geophysical Survey	Mitsubishi Materials Natural Resources Development Corp.
David Escobar	Geophysical Survey	Mitsubishi Materials Natural Resources Development Corp.
Hirohisa Horiuchi	Geophysical Survey	Mitsubishi Materials Natural Resources Development Corp.
Takeharu Takahashi	Geophysical Survey	Mitsubishi Materials Natural Resources Development Corp.
Susumu Endo	Geophysical Survey	Mitsubishi Materials Natural Resources Development Corp.

Omani Counterpart

Salim Omer Abdullah Ibrahim	Director	Ministry of Commerce and Industry
Ali Salim Al-Rajhi	Geologist	Ministry of Commerce and Industry

1-4 Survey Period

The negotiation and field works were conducted in Oman during the following period:

Inspection of fieldwork:	January 25, 2000 to February 6, 2000
	February 4, 2000 to February 9, 2000
Geophysical survey:	December 7, 1999 to March 10, 2000
Drilling survey:	December 7, 1999 to March 15, 2000

CHAPTER 2 GEOGRAPHY OF THE SURVEY AREA

2-1 Location and Access

The Sultanate of Oman is situated in the southeast corner of the Arabian Peninsula with an area of about 300,000km^2. The population is approximately 2 millions and the capital city is Muscat (Fig. 1).

The survey area is located to the west of the capital city of Muscat and has an extension of about 2,900km^2 running parallel to the Oman Mountains and the Gulf of Oman. The center of the investigation area has approximately latitude of 23°50'N and a longitude of 57°00'E. It takes about 2 hours by vehicle for 170km driving along coastline from Muscat to Al Khaburah, near the central part of the survey area.

2-2 Topography and Drainage System

The survey area consists of a hilly land between an altitude of about 100m and 1,000m, forming the foot of the Oman Mountains and a coastal plain along the Gulf of Oman (Batinah Coast Plain).

Dry rivers, so-called wadis, run almost S-N in the Batinah Coast Plain from hilly land in the south to the Golf of Oman. Major wadis from east to west are: Wadi Hawqayn, Wadi Mabrah, Wadi Halhal, Wadi al Hawasinah, Wadi Shafan, Wadi Sarami, Wadi Sakhin and Wadi Hilti.

2-3 Climate and Vegetation

Climate of the Batinah Coast Plain is semi-dry type, though it presents high temperature and some humidity because it is separated from the desert region by the Oman Mountains. As the humidity coming from the sea is stopped by the Oman Mountains, usually the rain falls in the mountain region in winter season. The infiltrated water from the rain is supplied to coastal plain, so that many kinds of vegetables are cultivated there in addition to the representative agricultural products of Oman such as lime, mango, tobacco, etc. However, excepting cultivated land, vegetation is very scarce and the vegetation of acacia, etc. is observed only in and around the wadis.

The maximum temperature in summer season (April to October) reaches more than 40°C and sometimes goes up to 50°C. Humidity is 40% during daytime but goes up to nearly 100% during night-time. The maximum temperature in winter season (November to March) goes down to about 25°C.

CHAPTER 3 GEOLOGY AND ECONOMIC GEOLOGY OF THE SOUTH BATINAH COAST AREA

3-1 General Geology

The geology of the project area, according to 1: 250,000 geological map published by Ministry of Petroleum and Minerals, is as shown in Fig.I-3-1. It consists of Hawasinah Nappe and Samail Nappe assumed to have thrust over the Autochthonous to Parautochthonous units, Post-Nappe units and Quaternary sediments, which are distributed in this order from south to north.

Hawasinah Nappe is composed of the Late Permian to Jurassic Hamrat Duru Formation distributed in the north and central of the area, and of the Triassic Umar Formation cropping out in a limited way in the central part of the area. The Hamrat Duru Formation consists of quartz sandstone, shale, chert, limestone, basalt, andesite and keratophyre. The Umar Formation consists of chert, limestone and breccia.

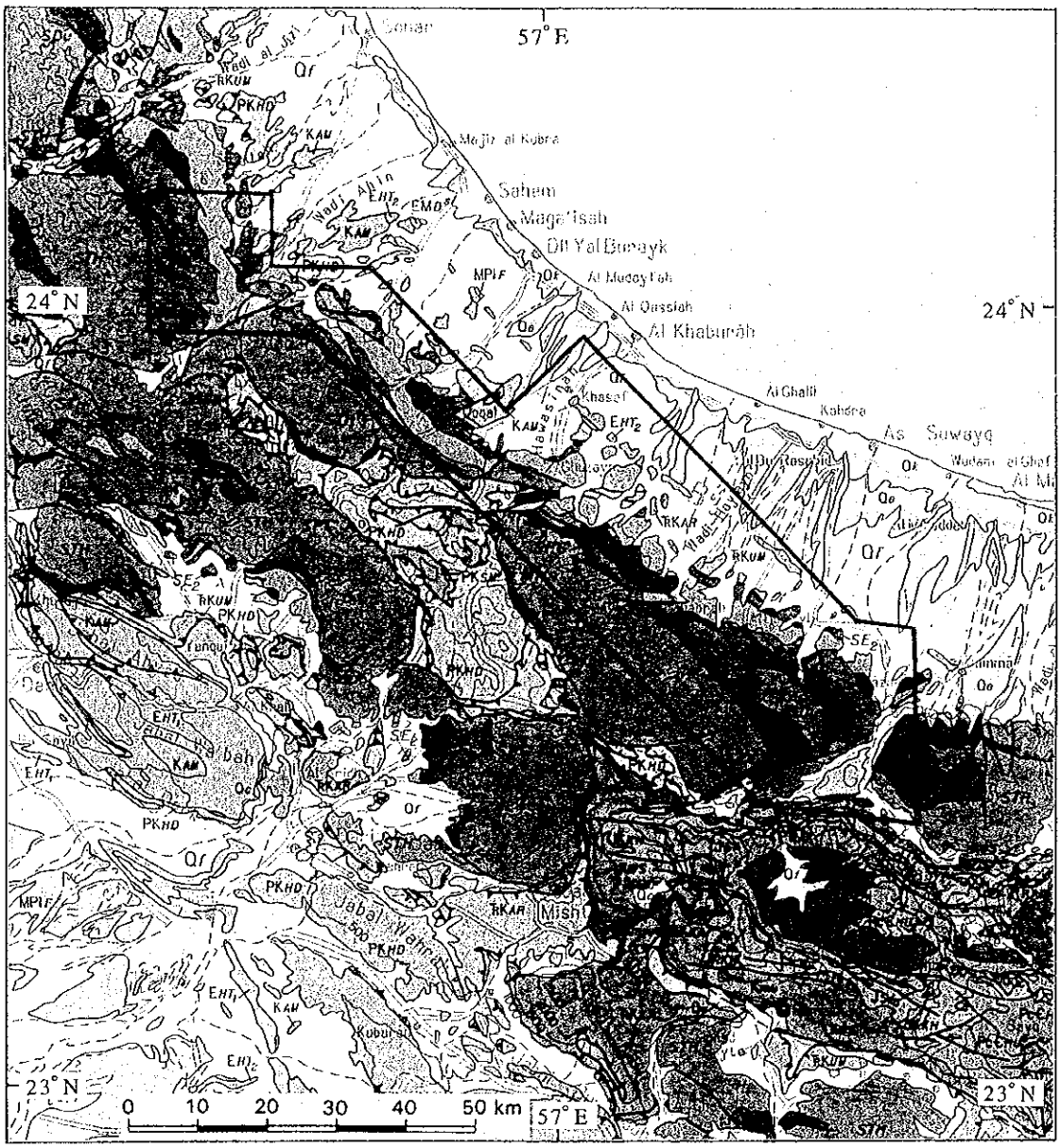
Samail Nappe is mostly composed of Ophiolite (Samail Ophiolite) and extensively distributed in the area. Succession of the Samail Ophiolite, is described as follows:

(Bottom) (1) Tectonites
(2) Cumulate Sequence
(3) High-level Gabbro
(4) Sheeted-dyke Complex
(Top) (5) Samail Volcanic Rocks

Post-Nappe units consist of the Upper Cretaceous Aruma Formation and Tertiary Hadhramut Formation, and which are cropping out along a line almost parallel to the coastal line. The Aruma Formation is composed of polymict conglomerate and marl, while the Hadhramut Formation is composed of limestone, carbonate rocks and marl.

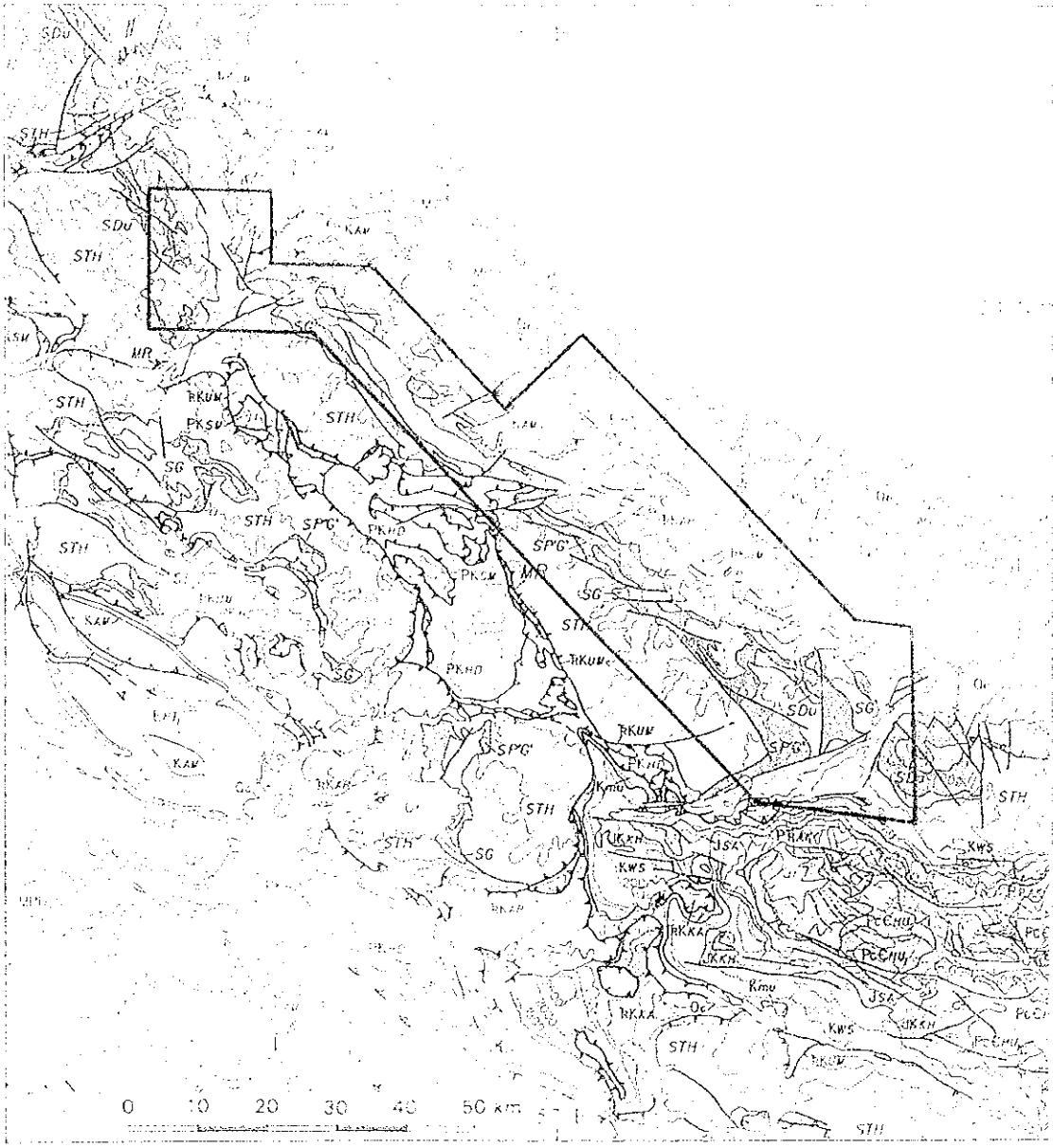
Quaternary sediments are comprised of fan deposits, terrace deposits and stream sediments, which are well exposed in the northern side of the area.

Principal geologic structure of the area consist of the piled-up structure formed in the time when the Samail Nappe was detached from the ocean floor and obducted over the Arabian platform during the Late Cretaceous Alpine orogenic cycle. Many thrust faults are found in the area which constitute boundaries of structural and tectonic units of the Samail nappe, such as Tectonite-Cumulate Sequence-Sheeted dyke Complex -Volcanic rocks.



Ministry of Petroleum and Minerals (1993)

Fig. 1 -3-1 Geologic map of the South Batinah Coast area



Ministry of Petroleum and Minerals (1993)

Fig. 1-3-1 Geological map of the South Batinah Coast area

3-2 Mineralization and Mining Activities

3-2-1 Mineralization

Occurrences of copper deposits, the main target of the project, are schematically shown in Fig.I-3-2. Massive sulphide deposits in the Oman Mountains are situated in the lower part of the Samail Volcanic Rocks and are classified into the Cyprus-type copper deposits. In general, it is understood that the Cyprus-type copper deposits are formed on the sea floor and accompanied with basic volcanics rocks.

Major Cyprus-type copper deposits in Oman Mountains consist of Lasail, Aarja and Bayda deposits in the Sohar area, Rakah and Hayl as Safil deposits in the Rakah area. Additionally, as a result of this cooperative mineral exploration survey, the Ghuzayn deposit has been discovered.

Based on the survey results around the Ghuzayn deposit, its geological structure and mineralization can be schematically described as shown in Fig.I-3-3. As indicated in this figure, the following characteristics in geological structure and alteration about the deposit can be summarized as follows:

Characteristics of the geological structure

(1) The ore body is situated in the lower part of the Samail Volcanic Rocks and occurs in the contact between V1-1 and V1-2.

(2) One side of the ore body is limited by the fault that formed before the ore body formation, for which the ore body shows its maximum thickness in the vicinity of this fault.

(3) The ore body shows sedimentary structure on its edge where the ore body grade laterally into metalliferous sediments that are rich in abundant magnetite.

Characteristics of the alteration

(1) Alteration due to mineralization consists of silicification, chloritization (Clinochlore) and epidotization.

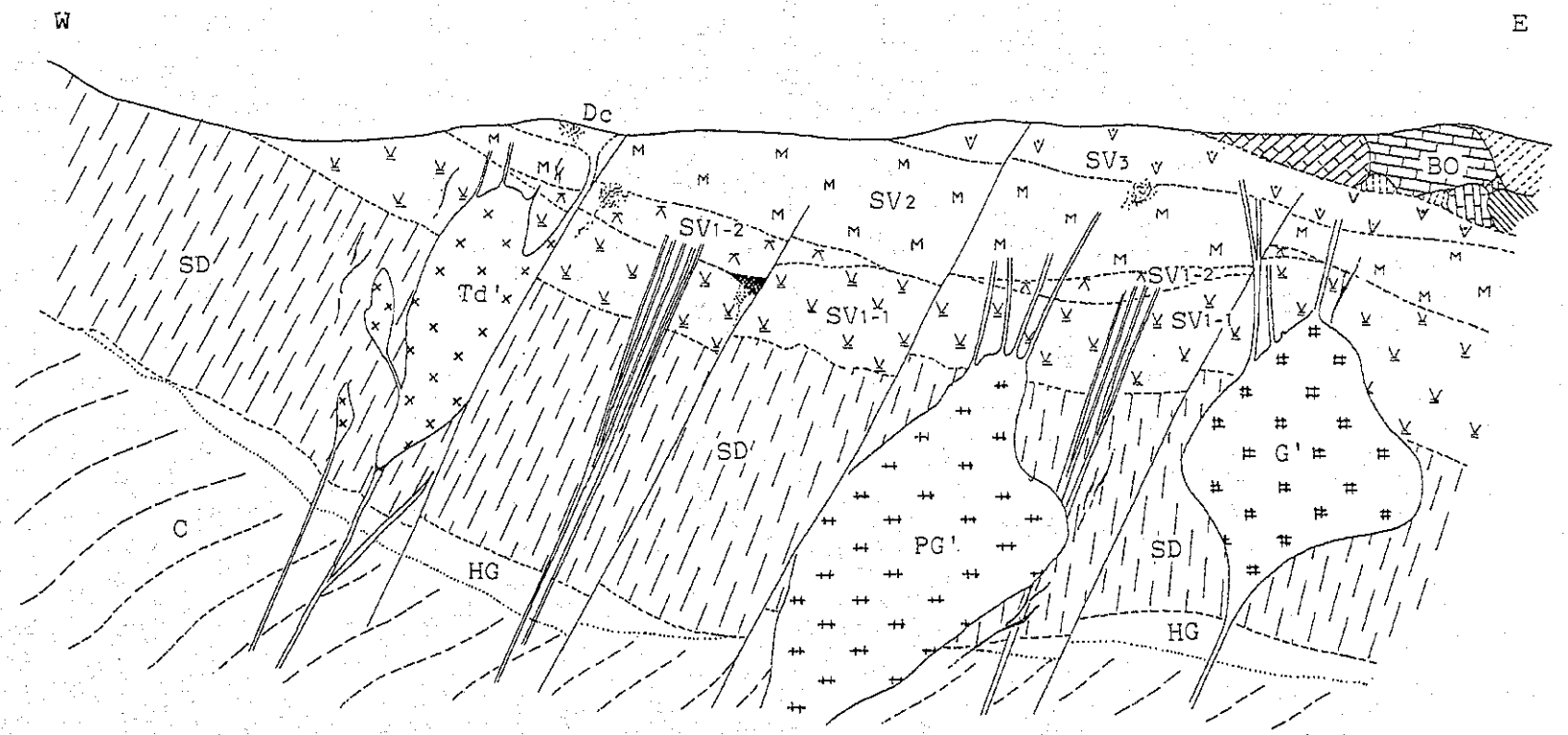
(2) These alterations show stronger intensity when closer to the ore body. At the footwall side this alteration is stronger than at the hanging wall side.

3-2-2 Brief history of mining

The Oman Mountains region in the northern part of Oman is known as a major producer of copper during the era of Mesopotamia. It has been said that the exploitation and smelting of copper in the ancient times continued up to around 940 AD of the early era of Islam. The copper deposits operated in that period are presumed to be in the same location as the Lasail mine and Rakah deposit and a great volume of slag and ancient smelter sites can be observed in these sites even at the present days.

The modern exploration activity, mainly aimed to copper deposits in the Oman Mountains, commenced by Prospection Ltd. of Canada in the decade of 1960. Presently known deposits of Lasail, Bayda, Aarja in Sohar area and Rakah deposits in Rakah area were explored at that period up to diamond drillings, confirming the existence of those deposits.

In the decade of 1970, the Government of Oman purchased the title of property owned by Prospection



C : Cumulate sequence
HG: High-level gabbro
SD: Sheeted-dyke complex
SV1-1 : Lower extrusives 1
SV1-2 : Lower extrusives 2

SV2 : Middle volcanic rocks
Dc : Dacite
SV3 : Upper volcanic rocks
BO : Batinah olistostrome
G' : Gabbro

PG' : Peridotite and gabbro complex
Td' : Trondhjemite
: Massive type mineralization
: Vein type mineralization
: Stockwork/dissemination type mineralization

Fig. I -3-2 Schematic distribution of Samail Volcanic Rocks and mineralization in Sohar area

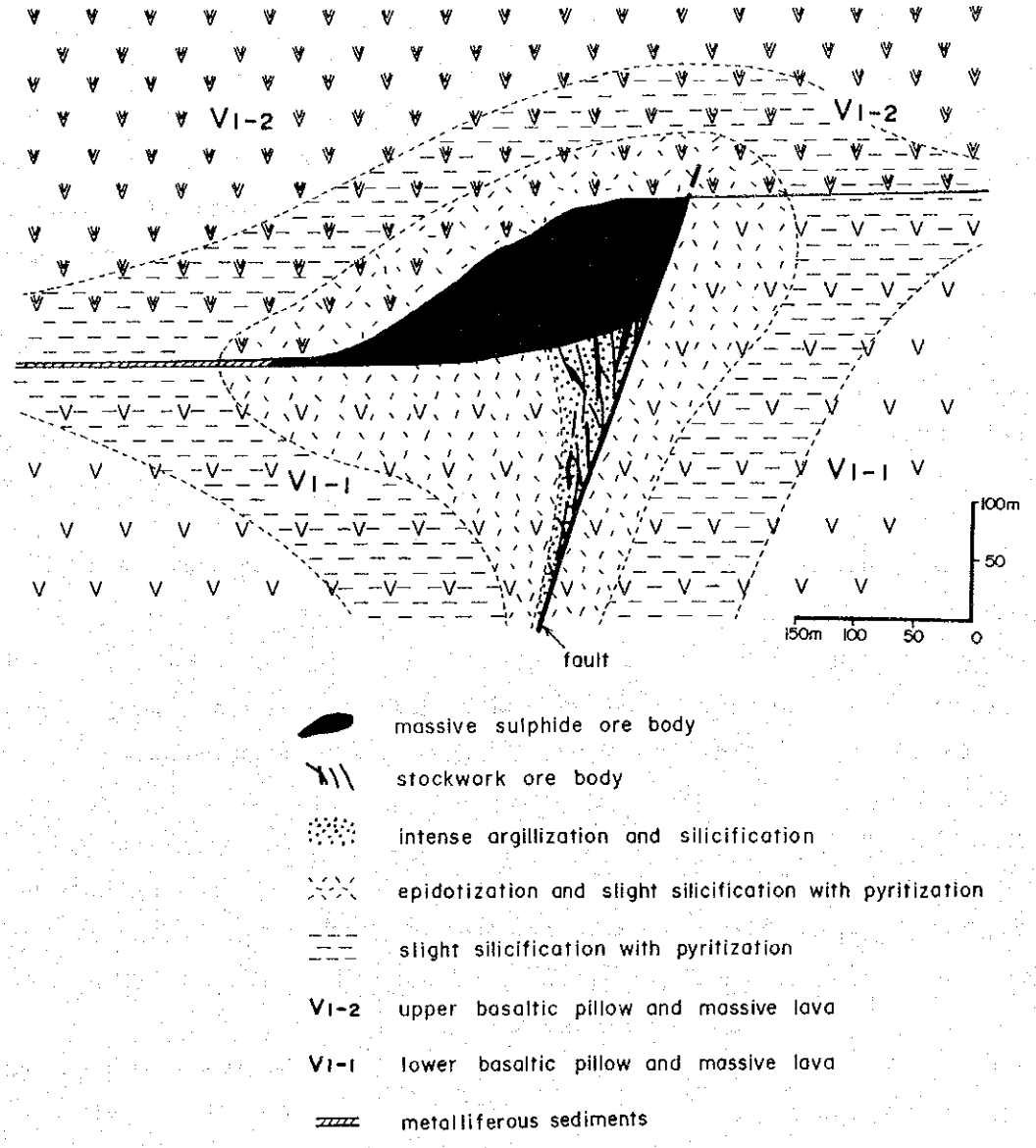


Fig. I -3-3 Schematic model of massive sulphide deposits in Ghuzayn area

Ltd. and started the mine development in Sohar area. Consequently in 1983, the operations of Lasail and Bayda mines and Sohar copper smelter were commenced by OMCO(Oman Mining Company) which was established and fully owned by the Government of Oman. The capacity of this smelter has a copper metal production of 24,000 tons per year.

For the purpose of keeping a stable supply of raw material to the Sohar smelter, the Government of Oman awarded in 1984, through international tender, to Bishimetal Exploration Co., Ltd. a contract for a copper exploration program in an area of 8,000 km^2. surrounding the Sohar smelter. Investigations were carried out for a period of 4 years up to 1987 and some ore reserves were newly obtained in and around the known deposits, and at the same time, many mineralized zones were confirmed.

On the other hand, BRGM of France was awarded in 1983, a project of geological mapping in the northern Oman Mountains region by the Government of Oman and carried out such works until 1985.

During the course of their mapping program, a zone of large scaled gossan was discovered together with the confirmation of several mineralized zones near the village of Hayl as Safil, located at the western foothills of the Oman Mountains.

The Government of Oman awarded in 1985 to BRGM a contract until 1986 for the exploration of 13 major copper mineralized zones discovered in the course of mapping. As a result, the existence of massive sulphide deposits was confirmed in the gossan zone near the village of Hayl as Safil. The objective areas of the present cooperative mineral exploration program, such as Ghuzayn, Buwayrick, Daris West, Daris 3A5, Daris, Mahab6, Mahmum and Bir Mohsen were included in the above mentioned 13 mineralization zones.

In 1988, the Government of Oman requested to the Government of Japan to investigate the possibility of developing the Hayl as Safil and the Rakah deposits. In response to such request, the Government of Japan carried out a Cooperative Mineral Exploration Program (Regional Development Plan) through Japan International Cooperation Agency (JICA) and Metal Mining Agency of Japan (MMAJ) in order to study the possibility of mining development in this area.

On the other hand, in 1988 OMCO commenced the mine development of Aarja deposit in Sohar area by supplying raw material to the Sohar smelter due to the exhaustion of ore reserves at Lasail and Bayda mines. However, the Aaja deposit was mined out in 1993 and as such, the smelter operates by the purchased ore from abroad. The total production and grade of closed mines are as follows:

Lasail Mine	9,183,677 tonnes	1.42% Cu
Aaja Mine	2,561,887 tonnes	0.97% Cu
Bayda Mine	790,891 tonnes	1.60% Cu
Lasail West Mine	434,478 tonnes	1.02% Cu

From the above-mentioned background, the Government of Oman and OMCO are aggressively continuing exploration activities for the development of the domestic mines. Especially in Hayl as Safil deposit, intensive exploration works has been carried out and the three satellite ore bodies of Al Jadeed,

Al Asgher and Al Bishara have been confirmed in the periphery of the main deposits. The ore reserves and grade obtained by these exploration are about 11 millions tons with 1.44% Cu and 0.73g/t Au including Hayl as Safil deposit, its satellite ore bodies and Rakah deposits.

In 1994, Rakah gold mine started the operation utilizing gold rich gossan near surface and has been produced about 500kg gold annually.

Furthermore, to reconsider the results of the exploration works already carried out, the Government of Oman conducted an airborne magnetic survey in the northeastern side of the Oman Mountains from 1990 to 1992, and as a result, magnetic anomalous zones related to mineralization were delineated.

On this basis, conducting mainly geophysical and drilling surveys since 1995 has commenced the present cooperative project.

CHAPTER 4 SURVEY RESULTS

The results obtained during this Phase III are based on the geophysical and drilling surveys carried out in the areas of Ghuzayn, Zuha, Maqail, and Salahi.

4-1 Geophysical Survey

High chargeability and low resistivity characterize the geoelectrical structure reflected by massive sulphide deposits. In these regards, the geophysical methods TDIP and TEM are quite effective for prospecting sulphide deposits.

The TDIP method is generally carried out along lines. This method has the advantage of measuring at the same time the two parameters of chargeability and resistivity, and as such, it is an effective method to delineate horizontally anomalous zones due to mineralization by covering a wide area by the survey lines spread on the area. On the other hand, the TEM method is sensitivity to the electrical response from the underground structure below the observed station, and therefore this method is useful to define in more detail, conductive zones such as massive sulphide deposits.

For these reasons, we used the TDIP survey as a reconnaissance method, and TEM as a detailed method.

4-1-1 TDIP survey

TDIP survey was carried out in 4 areas: Ghuzayn, Zuha, Maqail and Salahi in order to extract mineralized zones related to the existence of massive sulphide deposits.

With reference to Ghuzayn area and based on the results of the previous years, it was decided to extend the TDIP geophysical survey to the east and west of the surveyed area. High chargeability distribution zones were detected in the lower extrusive rocks of the lower volcanics (V1-1) and low resistivity distribution zones in the middle volcanic rocks (V2). But in the places of the favorable horizon where the ore body could be distributed, no anomaly related to the existence of massive sulphide deposits was detected.

In relation to the Zuha area, high chargeability distributions were detected not only in V1-1 but also in the contact zone between V1-1 and V1-2. However, remarkable low resistivity anomalies were found only distributed in V2.

In Maqail area, the TDIP survey in this year was extended to the north of the previous TDIP survey. In this year survey, high chargeability distributions were detected in the north part and the west part of the survey area. Within these high chargeability anomalies only the west part was accompanied by relatively low resistivity anomalies.

In the same manner, in Salahi area, high chargeablity anomalies were detected in V1-1 as well as in the contact zone between V1-1 and V1-2, and low resistivity anomalies in V2. These results can not be

considered as caused by the existence of any massive sulphide ore in the area.

4-1-2 TEM survey

This year, wide chargeability anomalies were detected in Zuha as well as in Maqail by the TDIP survey. When accompanied by low resistivity, the anomalies may indicate the existence of possible favourable horizons for massive sulphides. To investigate in more detail these studies, TEM survey consisting of 10 loops were carried out in both areas.

According to the TEM results, in Maqail from the 3 loops carried out, only one loop, which detected high TEM responses, suggested the existence of massive sulphide. In Zuha area no promising high TEM response was detected.

Additionally, in Ghuzayn area the TEM survey did not cover some IP anomaly zones previously obtained and which deserved further exploration. For this reason, a TEM survey was carried in two zones by means of two large loops, but only the TEM loop carried out to the east of the gossan detected high TEM responses at shallow levels.

4-2 Drilling Survey

Drilling survey was carried out in selected places in the areas of Ghuzayn, Zuha and Maqail. In Ghuzayn area, 3 drillings were carried out around the ore body No. 3 in order to delineate even more its extension. At the same time, one drilling was also carried out in the west part of A'Ruwydhat where an IP anomaly was detected last year and another drilling in the east part of the gossan in the place where a shallow TEM anomaly was detected during this year survey.

As a result of the drilling survey, it was clear that the east and west parts of the ore body are not symmetrical, and instead, the ore body gets thicker towards the west and becomes suddenly thin in the west edge. It also became clear that from north to south, the ore body has a length of about 300m and dipping about 20 degrees to the north as evidenced by the 3 meters of the ore body detected in borehole G44. In other hand, in A'Ruwydhat, weakly disseminated pyrite was intersected although silicification was found widely distributed. In the drilling carried out in the east of the gossan, only weak alteration and mineralization was intersected.

In Zuha area, the drilling carried out in the east part of the gossan in the IP anomaly zone, detected strong pyritization as well as alteration in V1-1 but no massive sulphide was intersected.

In Maqail, 3 drillings were carried out based on the results of the IP and TEM detected anomalies. As a result it was found strong silicification and pyrite disseminations within V1-2 and V1-1, however, no massive sulphide was intersected.

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

5-1 Conclusions

This fiscal year is the last year of this project. We carried out geophysics and drilling in Ghuzayn, Zuha, Maqail and Salahi. The survey results can be summarized as conclusions as follows:

(1) Ghuzayn area

It has become clear that in Ghuzayn, mineralization can be found in a wide extent, but massive sulphide can be found distributed only in the central part of the investigated area. According to the drilling results carried out within the surroundings of ore body No. 3, it was found that the west part of the ore body presents bigger dimensions than in the east part and continuously extended for about 300m from south to north. Preliminary results shows that this ore body can be estimated in 8.6 million tons with an average grade of 1.5%.

(2) Zuha area

It can be considered that in Zuha area, the mineral showing in existing gossan presents almost same scale as the existing in Ghuzayn area, with abundant copper oxides in the surroundings. The TDIP survey detected high chargeabilities surrounding the favorable horizon around the north part of the gossan. However, clear low resistivities could not be detected in this part. To confirm the detected high chargeabilities, TEM survey was carried out by setting up several loops around the gossan but no promising TEM anomaly was found to show the existence of any massive sulphide ore body. Drilling survey was carried out in the east part of the gossan in a place where high chargeability was detected, but it was found only predominant pyritization and alteration related to mineralization in V1-1 formation. In can be concluded that no massive sulphide can be found in this area.

(3) Maqail area

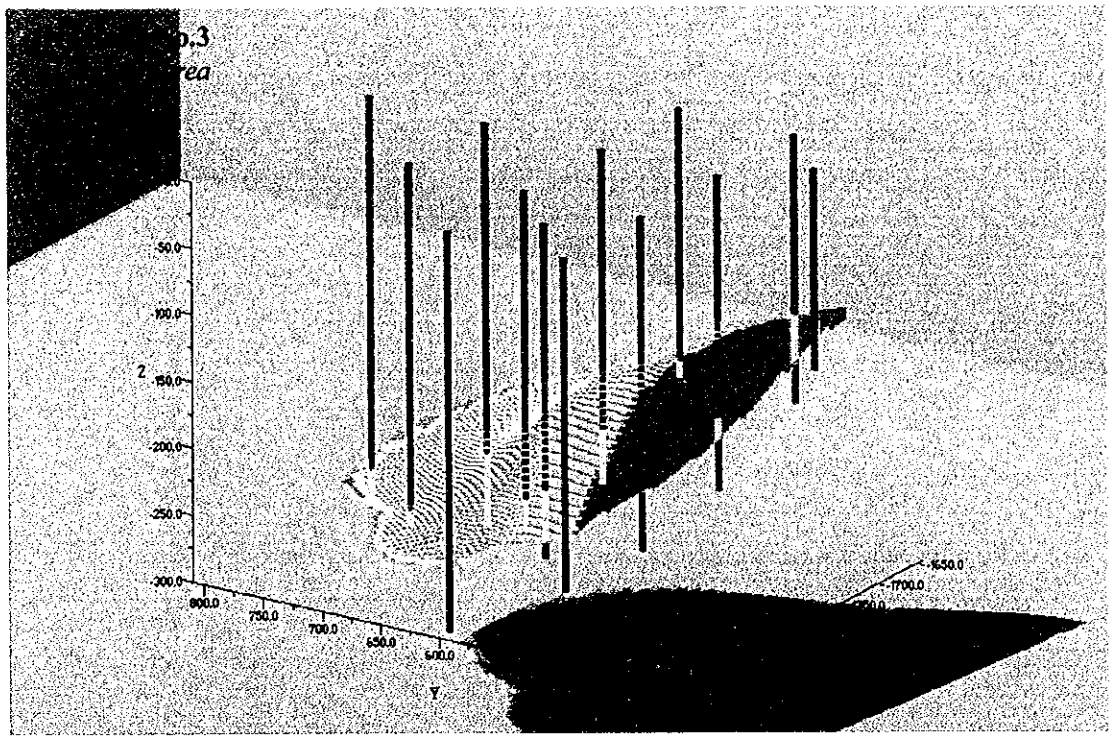
By the TDIP survey, high chargeability with low resistivity were found in 2 parts of the survey area. In one of them, it was found a clear TEM anomaly but the drilling survey intersected only silicification and pyritization within V1-1 and no massive sulphide was intersected.

(4) Salahi area

This area which is located to the south of Zuha area, copper showings and alteration related to mineralization can be widely seen. Although high chargeability was detected in V1-1, no low resistivity anomaly was detected. Consequently, no massive sulphide is expected in this area.

5-2 Recommendations

Based on the above results, and although mineralization was found in many places in South Batinah Coast area, it became clear that the massive sulphide considered to be economically feasible is limited to the deposits discovered in Ghuzayn area. From the 3 ore bodies detected in Ghuzayn, a preliminary estimation of the reserve resulted in about 14 million tons. Therefore, to obtain an economical evaluation of the reserve it is recommended to carry out a more detailed investigation. However, since the ore body in Ghuzayn is rather deep and not accompanied by gold, it is expected to meet difficulties to develop this area in an independent manner. For an efficient mining development, it is recommended to carry out an economical evaluation together with Yanqul area.



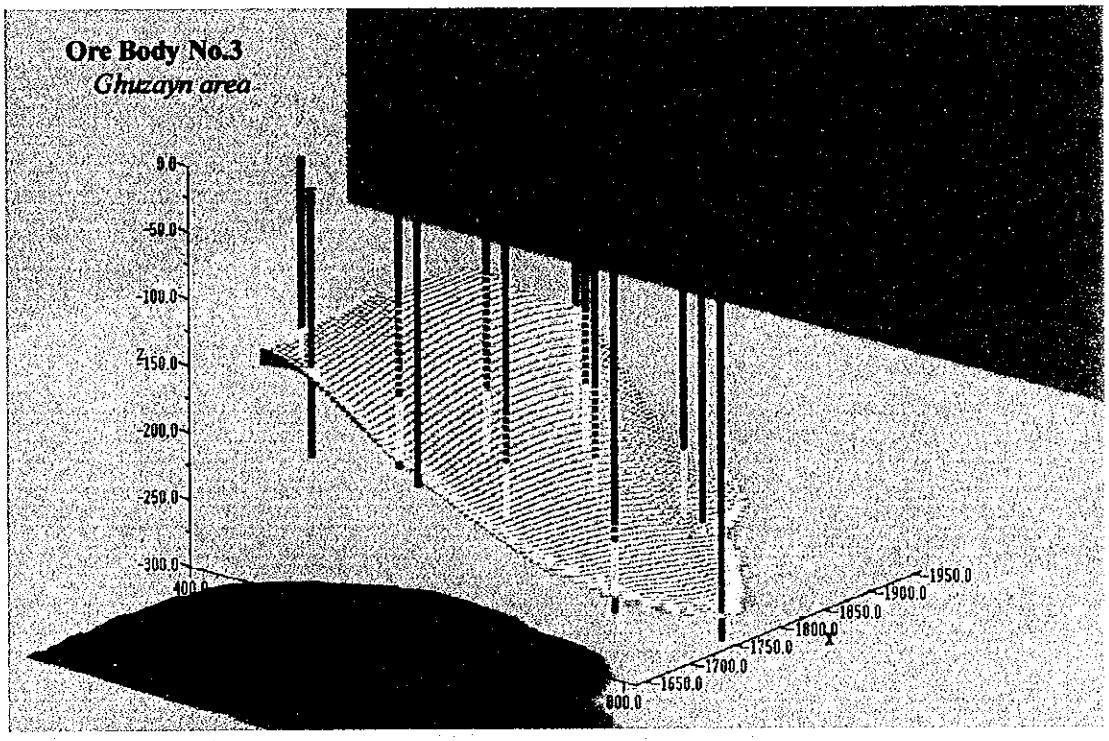
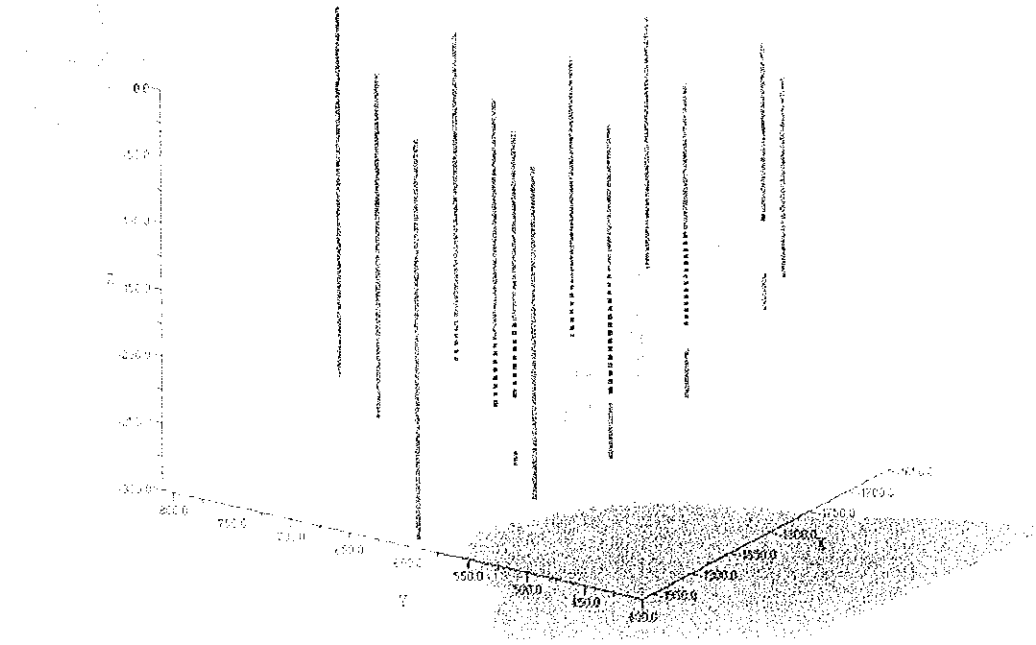


Fig. I -5-1 Schematic view of Ghuzayn No.3 ore body

Ore Body No.3
Ghuzayn area



Ore Body No.3
Ghuzayn area

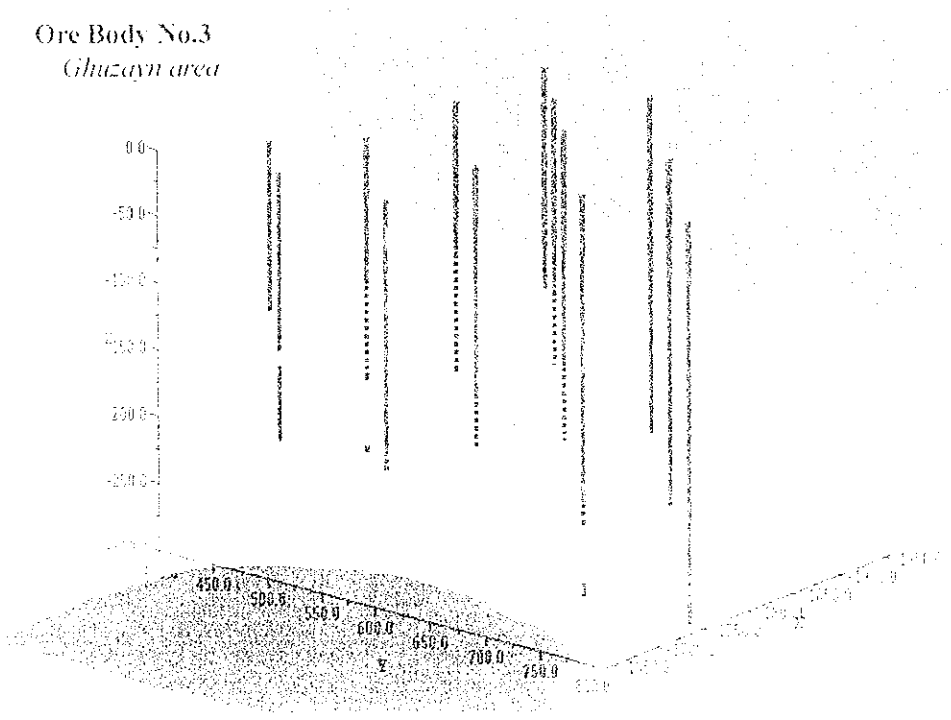


Fig. 1-54 Schematic Diagram of Ore Body No.3