No.

REPORT
ON
THE MINERAL EXPLORATION
IN
THE KRIB-MEJEZ EL BAB AREA
THE REPUBLIC OF TUNISIA

(PHASE I)

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 Republic of Tunisia, the Japanese Government decided to conduct a Mineral Exploration in the Krib- Mejez el Bab Area Project and entrusted the survey to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

The JICA and MMAJ sent to the Republic of Tunisia a survey team consisting of one geologist and three geophysicists from February 7 to March 17 in 2000.

The team conducted a field survey in the Krib- Mejez el Bab Area and completed it in cooperation with the Ministry of Industry and National Office of Mines.

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

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

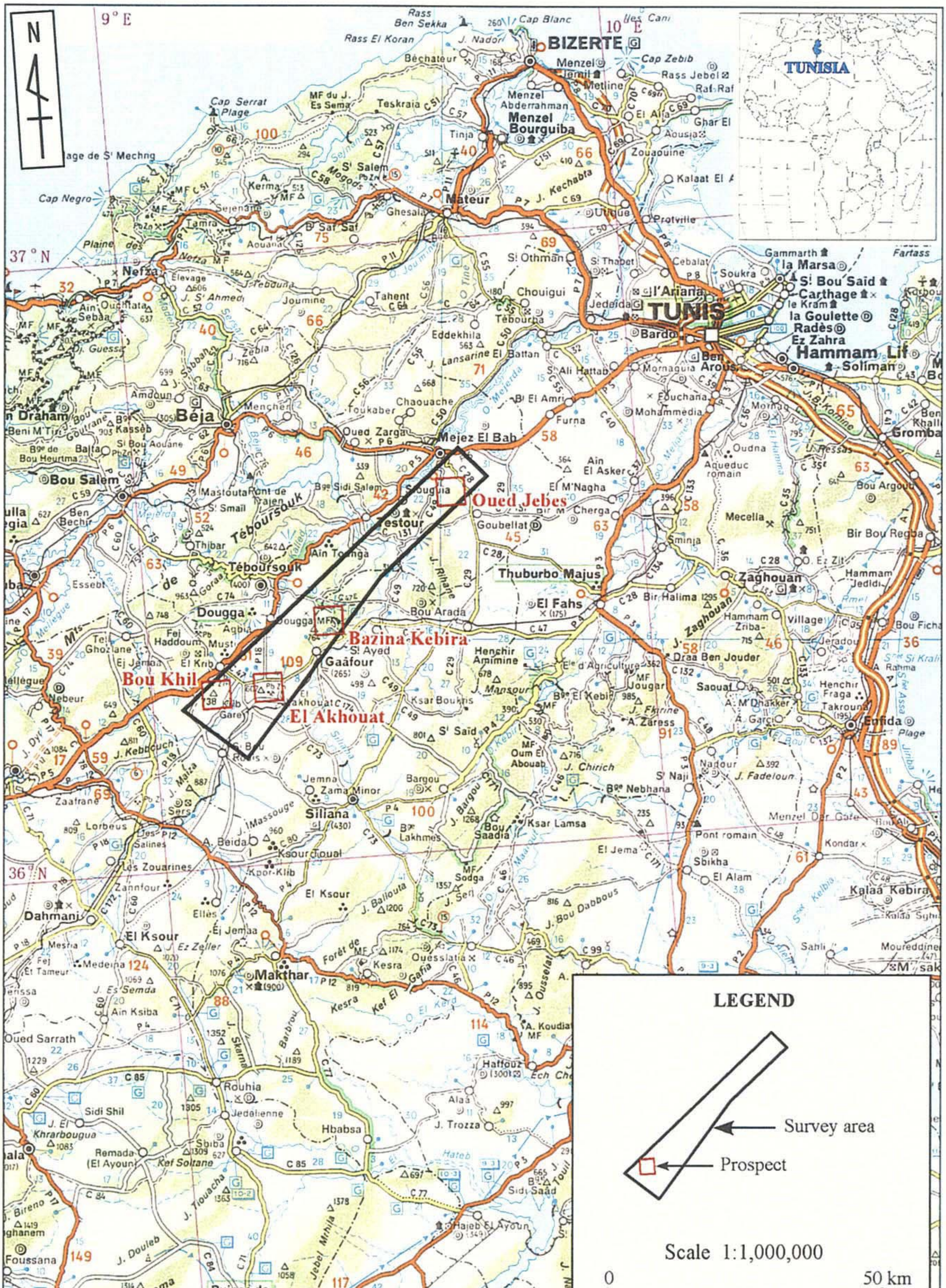
March 2000

Kimio Fujita

Kimio FUJITA
President
Japan International Cooperation Agency

Naohiro Tashiro

Naohiro TASHIRO
President
Metal Mining Agency of Japan



Location map of survey area

Summary

This report is prepared to describe the First Year's result of the Cooperative Mineral Exploration (Resources Development) Project for in the Krib- Mejez el Bab Area of the Republic of Tunisia.

The first Year's field operation was carried out in the periods between February 7th and March 17th, 2000 by the survey team dispatched from Metal Mining Agency of Japan and Japan International Cooperation Agency.

The first Year's programme included collection of existing documents, satellite image analysis, photogeologic interpretation of air photos, geological prospecting and geophysical surveys (Gravity, IP and Magnetic Methods). The collection of existing documents and the satellite image analysis were carried out for the entire Krib- Mejez el Bab Area (550 km^2), the photogeologic interpretation of air photos and the geological prospecting, for the selected 4 prospects, namely, the Bou Khil (25 km^2), El Akhouat-Argoub Adama (25 km^2), Bazina Kebira (25 km^2) and Oued Jebes (25 km^2). The geophysical surveys were applied to a limited area of 3 km^2 in the Bou Khil prospect with the gravity and IP methods and in the El Akhouat- Argoub Adama prospect with the gravity, IP and magnetic methods.

Potential mineralization in the Project Area is categorized into the Mississippi Valley or Carbonate Hosted Pb-Zn type.

Exploration principles are set up based on the first Year's result as follows;

① Structural highs, such as domes and horsts, are regionally regarded as primary targets, because they play a role of traps for hydrocarbons generating reducing environment favourable for precipitation of sulfides. Such structural highs are demonstrated as areas of gravity high in the regional gravity map.

② Steep gradient zones in the regional gravity highs may indicate extensive development of fractures that have provided conduits for ascending hydrothermal solutions.

③ It is necessary to specify targets based on detailed subsurface structures constructed by adequate interpretation of geology and geological, gravity and resistivity structures.

According to the above principles, a primary regional target for the second Year Programme will be the area of gravity high located in the central-northeast of the Project Area. Steep gravity gradient zones associated with this gravity high are

appreciated for mineral potential, since known mineral occurrences, such as Assioud, Siliana and Mahjoubia, are included. It will become possible by carrying out detailed geological and geophysical surveys for selected targets to estimate precise subsurface structures, locations and sizes of mineralization and geological circumstances.

The outcomes of the current year programme are, however, still hypothetical, without elaborated examination on the processes of geological evolution and of ore genesis, and should be proved by further investigations in the second year onward. In order to prove the hypothesis, it is also recommended to explore by drilling the target identified as the result of the geophysical work in the El Akhouat- Argoub Adama prospect.

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PART Ⅰ　Project Overview

Chapter 1　Introduction

1.1 Background and Objectives

In response to the request by the Government of the Republic of Tunisia, Japanese Government decided to execute a mineral exploration project in the Krib-Mejez el Bab Area in accordance with the Scope of Work agreed upon between the two Governments on the day of 17th December, 1999. The details of implementation program were further discussed between the two Governments, represented by Japan International Cooperation Agency (JICA) and Metal Mining Agency of Japan (MMAJ) for Japanese side and by Ministry of Industry and National Office of Mines for Tunisian side, and were signed by both sides upon agreement. The Mineral Exploration Project in the Krib- Mejez el Bab Area was commenced for its first year's investigation according to the agreed implementation program in the Japanese fiscal year of 1999 ending March 31st, 2000.

The objectives of the Project are to comprehend the geology and mineralization in the Krib- Mejez el Bab Area and to transfer technology for mineral resource development to engineers and scientists of pertinent institutions of the Republic of Tunisia.

1.2 Outline of Project

1.2.1 Project Area (Krib-Mejez el Bab)

The Project Area is located approximately 50 km southwest of Capital, Tunis, in the northern part of the Republic of Tunisia (Figure 1). It occupies an area of about 500 km^2 bounded by the latitudes of 36° 10′ and 36° 39′ N and by the longitudes of 09° 03′ and 09° 43′ E.

1.2.2 Implementation Program

The kinds and amounts of work, which were implemented in the first Year's program, are presented in Table 1 for the geological and geophysical prospecting and in Table 2 for the laboratory tests.

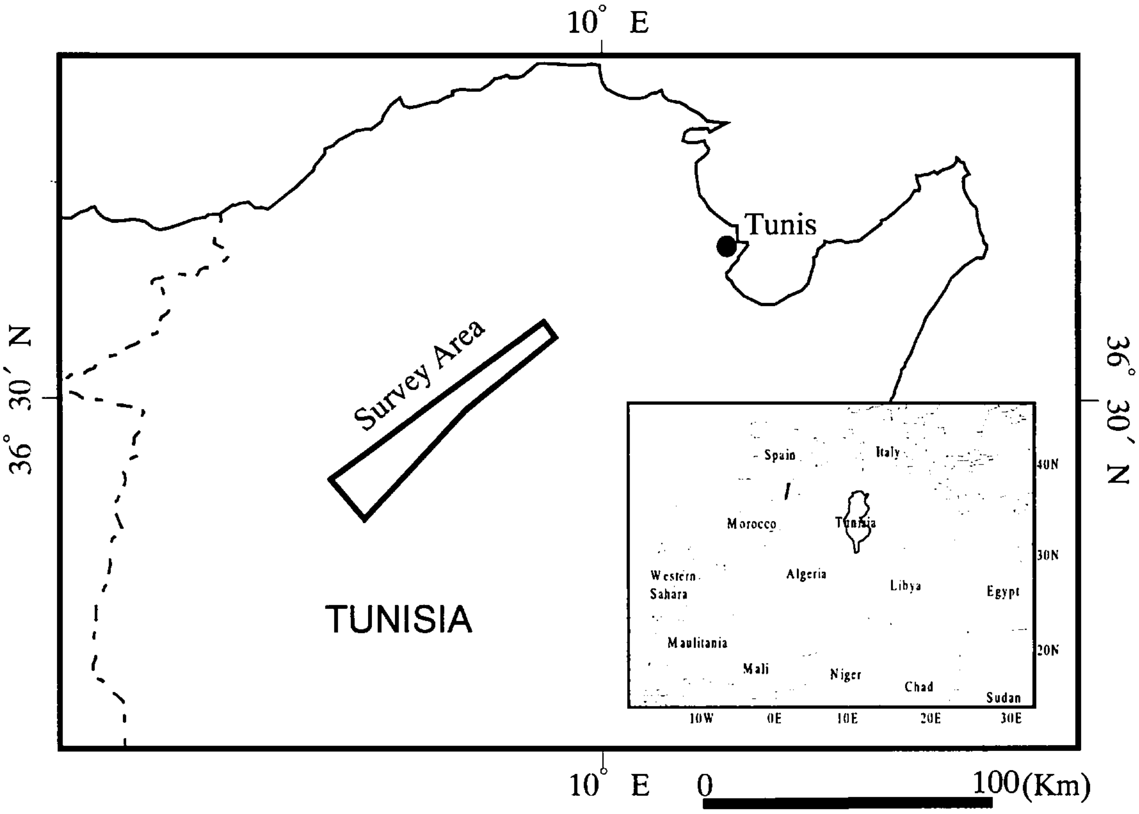


Figure 1 Location map of the survey area

Table 1 Geological and Geophysical Prospecting

Kind of Work	Amount
Landsat TM Image Analysis JERS-1 SAR Image Analysis	Area of Analysis: 550 km² Area of Analysis: 550 km²
Airphoto Interpretation (Bou Khil, El Akhouat-Argoub Adama, Bazina Kebira & Oued Jebes Prospects)	Area of Analysis: 550 km²
Geological Investigation (Bou Khil, El Akhouat-Argoub Adama, Bazina Kebira & Oued Jebes Prospects)	Prospecting Area: 100 km² Total Traverse Length: 20 km
Geophysical Prospecting	
1) Gravity Survey (Bou Khil & El Akhouat-Argoub Adama)	Survey Area: 6 km² Rectangular Grid, Interval: 250 by 250 m Number of Measuring Points: 96
2) IP Survey (Bou Khil & El Akhouat-Argoub Adama)	Survey Area: 6 km² Total Traverse Length: 18km Number of Measuring Points: 524
3) Magnetic Survey (Bou Khil & El Akhouat-Argoub Adama)	Survey Area: 3 km² Rectangular Grid, Interval: 50 by 250 m Number of Measuring Points: 240

Table 2 Laboratory Tests

Test Item	Amount
Geological Prospecting	
1) Microscopic Observation: Thin Sections	8 rock samples
Polished Sections	12 ore samples
2) X-ray Diffraction Analysis	Mineral Identification, Non-oriented 8 rock samples
3) Chemical Analysis: Cu, Pb, Zn, Fe, Mn, Cd, Mg, Ca, Sr, Ba	20 ore samples
Geophysical Prospecting	
1) Gravity: Density Measurement	20 rock samples
2) IP: Apparent Resistivity & Chargeability	30 rock samples
3) Magnetic: Natural Remanent Magnetization	10 rock samples
Magnetic Susceptibility	30 rock samples

1.3 Project Team

The members, who have participated in the Project, are as follows.

(1) Project Planning and Coordination

(a) Japanese Side

Shinya Aoki (MMAJ)

Koji Yamashita (JICA)

Noboru Fujii (MMAJ)

Nobuyasu Nishikawa (MMAJ, Paris Office)

(b) Tunisian Side

Monsieur Lajimi (Ministry of Industry)

Larbi Cherif (Ministry of Industry)

Neila Govngi (Ministry of Industry)

Adel Benahmed (National Office of Mines)

Habib Mahjoubi (National Office of Mines)

Rachid Sahli (National Office of Mines)

(2) Field Operation Team

(a) Japanese Side

Atsushi Takeyama: Team Leader, General Assignment (Sumiko Consultants Co., Ltd.)

Akihiko Chiba: Geophysical Prospecting (Sumiko Consultants Co., Ltd.)
Takumi Onuma: Geophysical Prospecting (Sumiko Consultants Co., Ltd.)
Noboru Matsumoto: Geophysical Prospecting (Sumiko Consultants Co., Ltd.)

(b) Tunisian Side

Hammami Mongi (National Office of Mines)
Sellami Ahmed (National Office of Mines)
Arfaoui Mohamed (National Office of Mines)
Djebbi Mongi (National Office of Mines)

(3) Supervision of Field Operation

Koji Hirai (MMAJ)

1.4 Project Duration

The First Year's program was implemented in the periods between Feb. 7th and March 17th, 2000 for the field operation and between March 18th and 24th, 2000 for preparation of the report.

Chapter 2 Geography of Project Area

2.1 Location and Access

The Project Area is located to the southwest of the Capital, Tunis, in the northern part of the Republic of Tunisia and is bounded by the latitudes of 36° 10' N and 36° 39' N and by the longitudes of 9° 03' E and 9° 43' E. The base for this year's field campaign was set in the town of Gaafour, approximately 90 km south east of Tunis. The national route No. 4, as well as associated trunk roads, runs through from Tunis to Gaafour, via le Fahs. It takes about one and a half hours from Tunis to Gaafour by driving. Trunk roads are available for the accesses from Gaafour to each prospect. It takes about 20 minutes for a distance of 20 km to Bou Khil to the west, about 15 minutes for a distance of 10 km to Lakhout-Argoub Adama to the southwest, about 15 minutes for a distance of 5 km to Bazina Kebira to the north, and about 45 minutes for a distance of 40 km to Oued Jebes to the northeast, from Gaafour by driving (see the location map of the survey area).

2.2 Topography and River System

The Project Area consists of mountainous or hilly areas, composed mainly of Triassic and Cretaceous systems, and low, flat lands. The mountainous-hilly areas are divided by major water courses into three districts, namely Jebel Ech Chied, Jebel Bou Khil and Jebel Mourra. Peaks of these mountainous- hilly areas range from 400 to 750 m in their elevations, with elevation differences of 200 to 550 m from their bottoms. The highest peak is the triangulation point of Jebel Ech Cheid at an elevation of 764 m above mean sea level, which is located in the southwestern corner of the central part of the Area. Taluses and colluvial slopes are often formed at foothills, while low, flat lands are largely composed of alluvial deposits.

Oued Silyana, Oued Khllau and Oued Malah are major rivers in the Area, which take considerably meandering courses. Oued Silyana runs northward for a distance of more than 6 km within the Area, changes its course eastward and then joins Oued Madjerda to the northeast. Oued Khllau flows northeastward along the northwestern flank of Jebel Ech Cheid and also joins Oued Madjerda. Oued Malah takes, on the contrary, a southeasterly course along the northwestern flank of Jebel Bou Khil.

2.3 Climate and Vegetation

The land of the Republic of Tunisia is divided into four climatic regions, namely Tell Atlas, the northwestern axial range, the eastern steppe and the southern desert. The Project Area, belonging to Tell Atlas, is characterized by a number of hills with affluent vegetation. Its climate is typically mediterranean with the hot-dry summer and mild-wet winter. Rainfall is annually totaled to 400 mm or more, with monthly precipitation exceeding 50 mm for the period from October to February and declining to 10 mm or less in the three month period of summer. Seasonal average temperatures are 24° C for spring, 30° C for summer, 25° C for autumn and 16° C for winter. The climatic record in Tunis is shown in Table 3.

The vegetation is typically of a wet-winter climatic zone, characterized by evergreen, broad leaf species. Although individual trees may shed their leaves for a week or two in a year, no defoliation of forest as a whole is observed. The Project Area is generally well vegetated except in the circumstances of abandoned mine sites. Reforestation is being vigorously practiced around such mine sites.

Table 3 Climatic Record in Tunis

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Temp. (° C)	11.4	11.8	13.2	15.4	19.1	22.9	26.3	26.6	24.1	20.1	15.8	12.4
Precip. (mm)	56.4	59.0	45.3	38.2	24.3	10.7	2.4	6.3	35.3	69.8	57.8	61.9

Temp.; Monthly average temperature of daily mean

Precip.; Monthly total precipitation

Chapter 3 General Geology

3.1 Regional Geology of the Republic of Tunisia

3.1.1 Geology and Geological Structure

The geology of Tunisia can be structurally divided into the northern and southern geologic provinces in principle. The northern geologic province, situated in the east end of Atlas Range extending from northern Morocco through northern Algeria, belongs to the Alpine Orogenic Belt and consists of Mesozoic and Cenozoic groups. The southern geologic province is situated in the northern end of Sahara and consists of Palaeozoic, Mesozoic and Cenozoic groups.

Terrestrial sedimentary rocks of Tertiary extensively distribute in the southern province, forming aeolian sand-dunes in the desert of Sahara, and largely cover the Palaeozoic and Mesozoic groups with limited exposures. The Palaeozoic group comprises terrestrial or neritic sediments in the Saharan platform, while the Mesozoic group consists of sedimentary rocks equivalent to that in the northern province as described below.

Mesozoic and Cenozoic groups, consisting mainly of sedimentary rocks, extensively distribute in the northern province and form a stratigraphic sequence without major hiatus. Since their distribution is largely controlled by the NE-SW trending structures, the geologic province is subdivided into five structural zones from northwest to southeast, namely, the Nappe, the Dome, the Trough, the N-S Axial and the Eastern Platform zones (Orgeval, 1994). The geologic map and the map of the structural zones of the northern part of the Republic of Tunisia are shown in Figure 2 and 3 respectively.

The Mesozoic group in the northern geologic province comprises Triassic (dolomite, marl, argillite, sandstone, limestone, clay, gypsum and rock salt), Jurassic (limestone, dolomite, marl, argillite and sandstone) and Cretaceous (limestone, marl, argillite, sandstone and dolomite) systems. The Cretaceous system widely distributes in the entire geologic province, while the Triassic system forms a number of blocks of variable sizes. Distribution of the Jurassic system is very much localized. Igneous rocks are extremely rare in their occurrences which include granite forming Galite Island, the northernmost landform in the territory of the Republic of Tunisia, and very minor Neogene basalt distributing in the Nappe zone.

The Triassic system occurs mainly in the Dome zone, forming discontinuous domes or evaporite diapirs elongating and arranged in the NE-SW direction. The

Jurassic system is sporadically exposed in 'small windows' in the N-S Axial zone trending in the N-S direction, but rarely distributes in the Dome zone. Distribution of the Cretaceous system is particularly extensive in the Dome and Trough zones. Its sedimentary structures are often deformed by intrusion of diapirs of the Triassic system. However, its strata generally strike in the NE-SW direction that corresponds to the distribution trend of the Triassic system. Major thrust faults and folding axes also trend in the NE-SW direction, while most strike-slip faults and associated fracture systems indicate the NW-SE direction.

The Cenozoic group comprises sedimentary rocks of the Tertiary and Quaternary system systems. The Tertiary system is further subdivided into Palaeogene (Palaeocene, Eocene and Oligocene series) and Neogene (Miocene and Pliocene series) subsystems. The Tertiary system consists mainly of flysh sediments (marl, argillite, limestone and sandstone) in the Nappe zone in the north, and mainly of limestone, argillite, marine and terrestrial sandstone, and marl in the Dome and Trough zones. The geological structure of the Nappe zone is extremely complicated by considerable development of a number of thrust faults and overturned folds. The sedimentary structure of the Dome zone is also highly disturbed due to intrusion of diapirs of the Triassic system. The principal structure of the Tertiary system in the Dome zone is represented by the fracture systems trending in the NE-SW and the NW-SE directions as is the case for the Cretaceous system. The Quaternary system consists of gravel, terrestrial sandstone and aeolian, colluvial and alluvial deposits.

A majority of metalliferous deposits in Tunisia are those of lead-zinc, followed by copper, iron and mercury deposits as well as non-metallic deposits such as phosphate and fluorite. A number of Pb-Zn deposits are located mainly in the Dome zone in northern Tunisia. They occur spatially in close association with diapirs of the Triassic system at or in the proximity to their contacts with the Cretaceous and Tertiary systems, and are categorized into the Mississippi Valley type. Cu and Hg deposits are genetically related to granitic rocks mainly distributing in the Nappe zone. Phosphate deposits are of a sedimentary type formed in marine sediments of Cretaceous to Eocene and mainly distribute in central Tunisia.

3.1.2 Geologic History

A platform sedimentary basin was formed in a vast area of the present northern margin of African Shield during the period of the latest Precambrian to early Palaeozoic. The sediments that deposited in the basin in the periods of Cambrian to Ordovician and of Carboniferous comprise marine sequences in the present location of Algeria and alternation of marine and terrestrial sequences in that of Libya. These

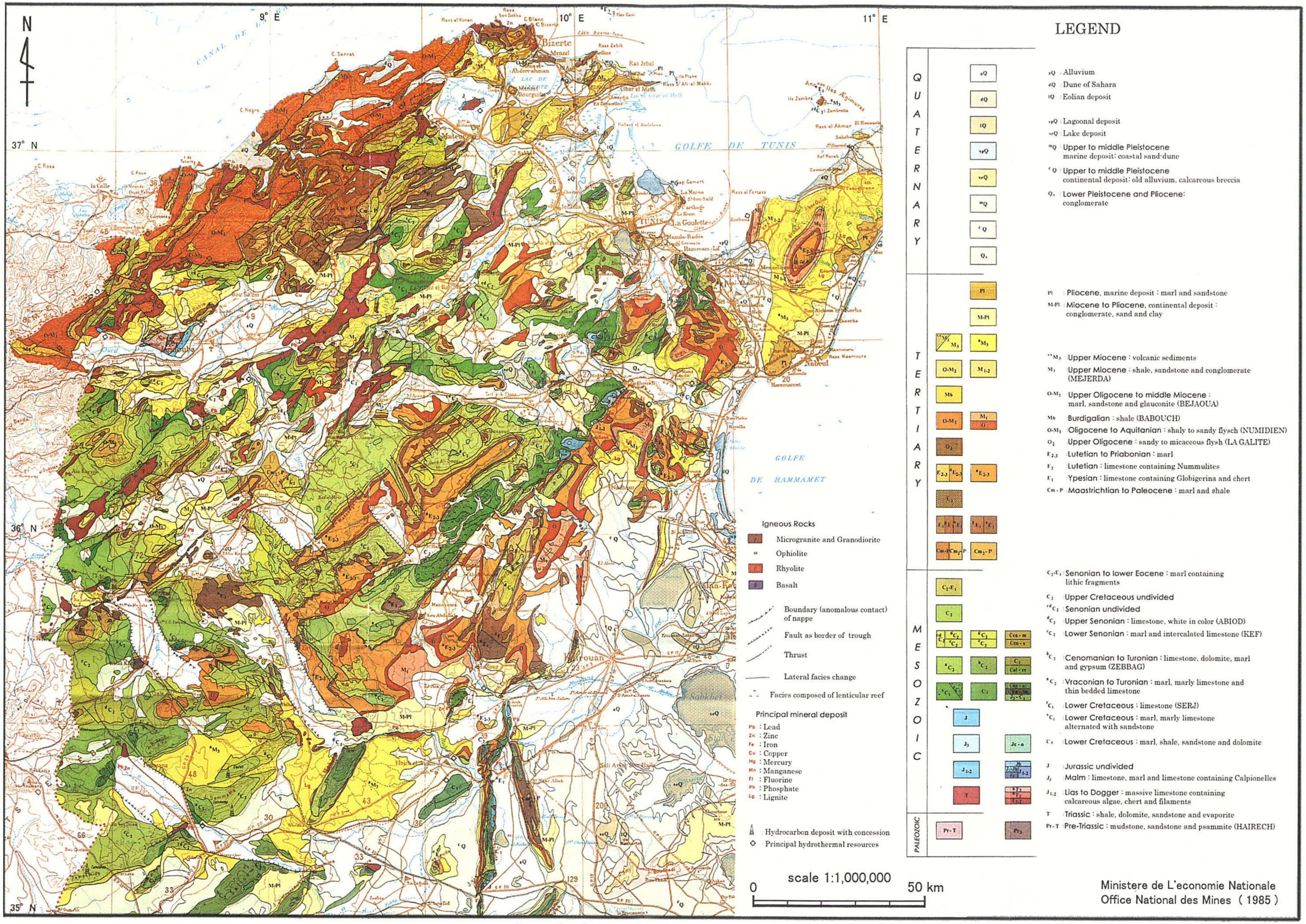
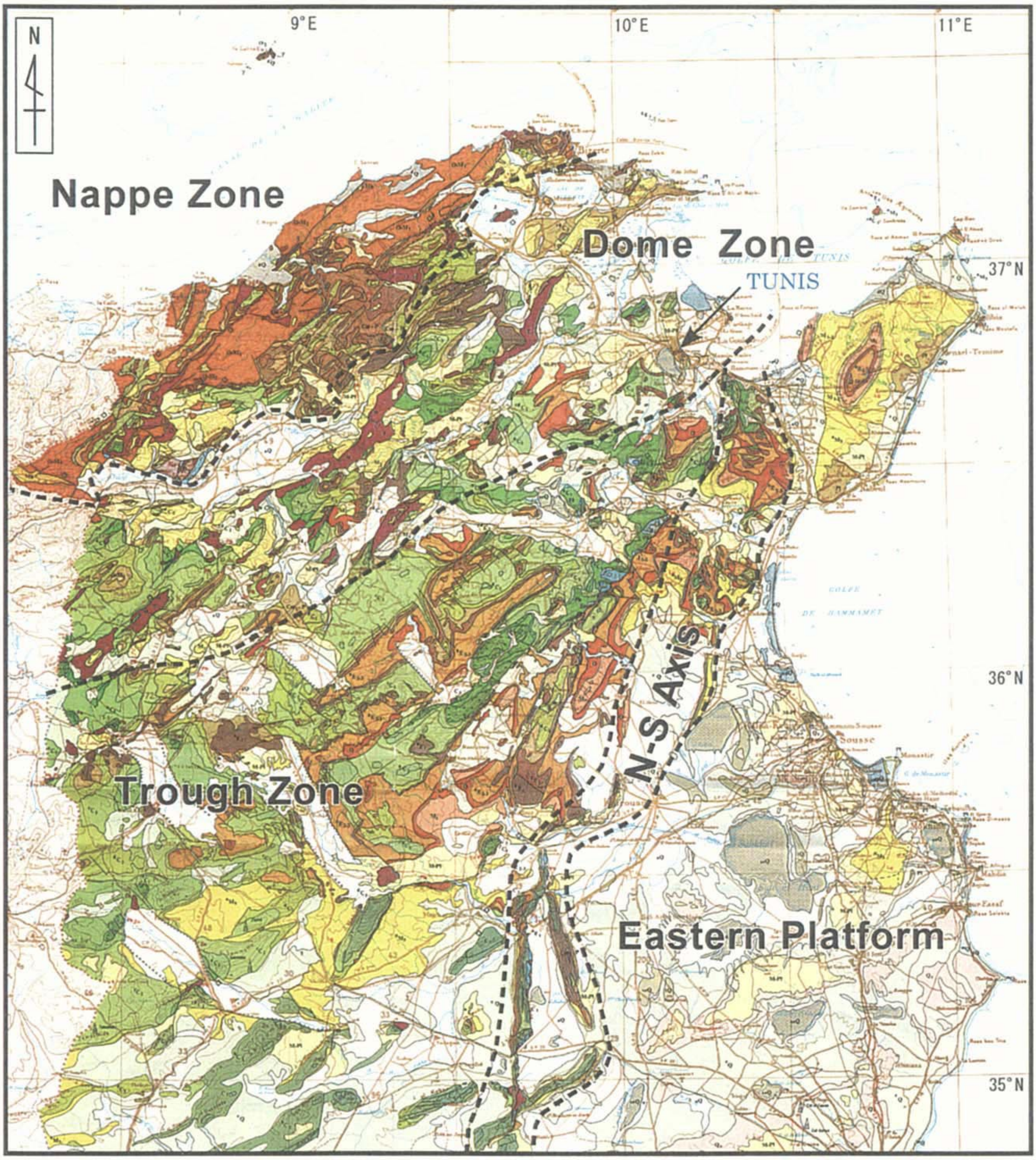


Figure 2 Geologic map of northern Tunisia



Structural division simplified is quoted from J.J. Orgeval (1994).

Geological base map is published in 1985 by Ministere de L'economie Nationale. (Legend of the map is shown in Figure 2)

Figure 3 Structural zones of northern Tunisia platform sediments, showing nearly flat attitudes, have been least affected by Variscan (Hercynian) Orogeny of late Palaeozoic. This region of northern Africa, including Tunisia, was placed under a neritic sedimentary environment during Triassic. This neritic sedimentary basin intermittently emerged above sea surface during Triassic, which resulted in deposition of neritic sediments including evaporite components such as gypsum, rock salt and dolomite.

Towards Jurassic, the Super Continent, Pangea, was broken into Eurasian in the north and Gondwana in the south, with development of Tethys Sea in between. As Tethys Sea transgressed, the sedimentary basin of this region along the northern margin of Gondwana was separated into the northern trough (Tunisian trough) and the southern neritic shelf. Thick sequences of upper Jurassic to Cretaceous sedimentary rocks of deep-water facies were deposited in the Tunisian trough, with the estimated thickness of some 5000m for the Cretaceous system alone. On the other hand, the stratigraphic equivalents in the southern neritic shelf were much less in their thickness and characterized by reef facies.

Prior to middle Cretaceous, relative movement of structural blocks prevailed in the region and initiated diapirism in late Aptian. As the Alpine diastrophism emerged in late Cretaceous, the sedimentary basin became progressively shallower towards early Tertiary and more and more continental in nature. The Tunisian trough no longer existed as a palaeogeographic unit by middle Eocene.

The Alpine diastrophism, with its peak stage in Oligocene, brought about intense deformation of rocks in the region by folding, faulting and thrusting during the period of Neogene. These structures were formed under the prevailing stress field in the period, indicating mostly the principal trend of NE-SW direction. Particularly, a number of nappes were tectonically brought into the region from north to form the 'Nappe zone'. The entire region continued uplifting towards Pliocene or later and was elevated to the present level of Atlas Range.

Most of diapirs, comprising Triassic evaporites and other neritic sediments, were halocinetically introduced in the period of late Cretaceous and were reformed and rearranged in the course of the tectonic development as above explained. A number of Pb-Zn ore deposits, together with other associated minerals, were formed in close association, spatially or genetically, with diapirs in various stages of sedimentary and tectonic processes.

3.2 General Geology of the Krib- Mejez el Bab Area

The Krib- Mejez el Bab Area is situated within the Dome zone, to the southwest of Tunis. The Dome zone is about 50 km wide and some 200 km long in the NE-SW direction, bounded by the Mediterranean Coast to the northwest, and continues southwestward across the international border to Algeria. A number of Triassic diapirs are discontinuously aligned in the NE-SW direction within the Dome zone, forming 3 or 4 major diapir alignments. The Project Area is located in the middle part of the southeastern-most alignment.

The geology of this Area comprises Triassic, Cretaceous, Palaeogene, Neogene and Quaternary systems in stratigraphically ascending order. The Triassic system forms diapirs which have intrusive contacts with the Cretaceous, Palaeogene and Neogene systems or partly overlie these systems. The geology is shown in Plate 1.

The Triassic system, comprising gypsum, clay, dolomite, argillite, sandstone and limestone, is generally inhomogeneous in its facies and often indicates disturbed sedimentary structures. No Jurassic system crops out in the Area. The Cretaceous system consists of stratigraphycally continuous successions of Barremian through Maastrichtian comprising limestone, marl, argillite, sandstone and dolomite. Beddings of these sedimentary rocks strike generally in the NE-SW direction, however, are often disturbed near contacts to diapirs or along faults. The Tertiary system also consists of stratigraphically continuous successions of Palaeocene, Eocene, Oligocene, Miocene and Pliocene series. The Palaeocene series is composed of argillite, the Eocene, of conglomerate and limestone, and the Oligocene, the Miocene and the Pliocene, of sandstone. The general strikes of beddings run in the NE-SW direction, however, vary near contacts to diapirs or according to structures of sedimentary basins. Strata of the Cretaceous and Tertiary systems are extremely turned over in the vicinity of diapir bodies, indicating vertical or reversed attitudes. The Quaternary system comprises sandstone, conglomerate, alluvial deposits, talus deposits and so forth.

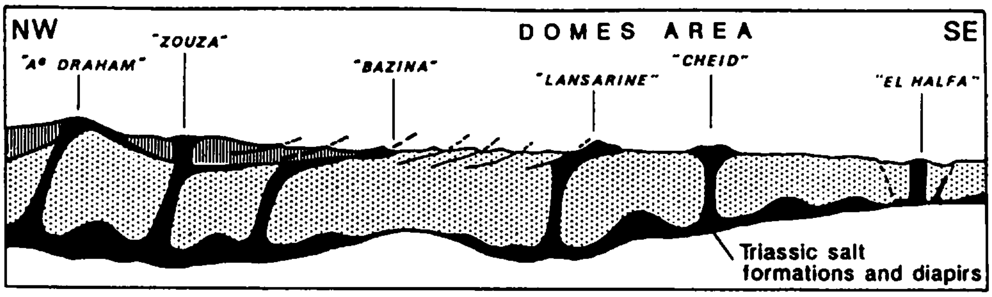
There are three sizable diapir bodies in the Project Area and called Mourrha, Jebel ech Cheid and Bou Khil respectively from northeast to southwest. Several smaller diapir bodies are also known around these major diapirs and are mostly elongated in the NE-SW direction. A number of Pb-Zn ore deposits or mineral occurrences are located in association with these diapirs. They indicate specific spatial relationship with the diapirs, being mostly positioned at either edge of elongated diapirs or along their southeastern flanks. The modes of occurrences of the three major diapirs are summarized below.

- Mourrha: This diapir shows a 5x3 km rectangular form with rounded corners on plan and a mushroom shape on cross section. Its southeastern flank contacts mainly with the Cretaceous system and partly with Eocene or Oligocene series. Other parts of its outer limit are covered by the Quaternary system. Kef Lasfar and Oued Jebes ore deposits are located along the southeastern flank.
- Jebel ech Cheid: This diapir is 23 km long and 5 km wide, and by far the largest of all in the general area. It takes a bamboo leaf form on plan and a mushroom shape on cross section. Its northeastern half contacts with the Eocene, Oligocene or Miocene series, while the southwestern half mostly contacts with the Cretaceous system. A roof-pendant of the Oligocene and Miocene series covers the top of the diapir body in its center. There are known a number of ore deposits and mineral occurrences along the southeastern flank of the diapir, such as Koudiat Tlilett, Koudiat Soda, H'Zamel Assoued, Koudiat Bazina Kebira and Argoub Adama. El Akhouat deposit is located in the vicinity of the diapir body, to the southwest of its southwestern edge.
- Bou Khil: This diapir body forms a crescent shape, 7 km long and 3 km wide. Its southeastern flank contacts with the Cretaceous system, Oligocene series or Pliocene series, while the northwestern flank is covered by the Cretaceous system. There is located Bou Khil deposit in the central southeast of the diapir body and Jebel Ouiba mineral occurrence at its northeastern edge.

In addition, Fedj el Adoum Mine, one of the two Pb-Zn mines being currently operated in Tunisia, is located about 10 km northwest of Bou Khil diapir, outside of the Project Area, and is associated with Fedj el Adoum diapir.

Figure 4 is a cross section showing a schematic profile of Triassic diapirs across the Nappe through the Dome zones. Each diapir has its own size and shape, and varies in its period of diapirism. The following process is generally accepted for formation of diapirs in this region.

The diapirism, which initiated in mid-Cretaceous in this region, was upheaval of the Triassic system, containing evaporite components, into the overlying Cretaceous system mainly due to difference in density between the two systems. The upheaval in its early stage may have taken place in accordance with the morphology of the sedimentary basins or the prevailing stress field in those days. Most diapirs were emplaced during the period of late Cretaceous, as aforementioned. As the diapirism proceeded, sedimentation of the late Cretaceous sequences became slower nearing diapir bodies and faster away from them. It is also reported that some of diapirs emerged out of the sea bottom through the overlying Cretaceous system at some stages of the diapirism. The Alpine diastrophism reached its climax in Oligocene and tectonically affected the entire region and therefore emplacement of diapirs. Simple original forms of diapirs, such as domes or mushrooms, were deformed and dislocated by faulting, thrusting and folding under the compressive stress field in the NW-SE direction before taking the present forms and positions.



Simplified cross section, from the Nappe zone to central Tunisia, showing the distribution of Triassic structures and the progressive dying out of the tangential tectonics from northwest to southeast. The Domes area corresponds to the Lansarine and Cheid diapirs. (After Perthuisot 1978)

Figure 4 Schematic profile of Triassic diapirs (J.J. Orgeval, 1994)

The Pb-Zn mineralization is categorized into the 'Mississippi Valley' or 'Carbonate Hosted' type. It is interpreted that the mineralization is formed in the process that (1)intra-strata water dissolves Pb, Zn and other metals in sediments, (2) moves laterally along stratification, (3) ascends along diapirs and then (4) precipitates these metals in fractures, cavities or other open spaces within or in the vicinity of diapirs. Most Pb-Zn mineral occurrences are localized in the southeastern flanks of diapirs (in the right hand side in Figure 4). This implies that minor faults and fractures for sites of mineralization are well developed in the Cretaceous and Tertiary strata under diapir overhangs in the southeastern flanks due to over-folding. Another possibility may be that the southeastern flanks provide conduits favorable for ascending mineralized solutions and pressure and temperature conditions suitable for precipitation of metals.