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DOKUZ EYLÜL UNIVERSITY
GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

MINING GEOLOGY AND MINERALIZATION OF INLER YAYLASI (Şebinkarahisar-GİRESUN) Pb-Zn MINE

A Thesis presented to
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by

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SUMMARY

Investigations concerning geological, metallogenic and mineral potential of Pb+Zn veins located in an extended 5 km^2 area at Inler Yaylası, Şebinkarahisar (GIRESUN), have been carried out partly in-situ partly at the Geology Engineering Sections of Dokuz Eylül University With these studies it is determined that rock associations of the region are formed by acid alkalic, calc-alkalic volcanism and interbedding of sedimentary units. These rocks have been separated into two groups as Lower Series and Upper Series; and lower Series in which mineralization and hydrothermal alteration occur has been investigated in details.

At the investigation area where fracturing tectonism is dominant, it is determined that faults were formed in three periods, and relations of these faults with mineralizations were determined as follows;

1. East-West and North-South directed, partly dike bearing faults that have been formed previous to the mineralization

2. East-West (80°-90°) and Northwest-Southeast (100°-120°) directed ore-bearing faults that have been formed just after the dike settlement

3. East-West (80°-90°), Northwest-Southeast (100°-120°) and North-South directed oreless faults that have been formed during the post mineralization period.

Dereköy Mineralizations contain pyrite-blende-galena-less chalcopyrite ore minerals and quartz-barite-carbonate gangue minerals. They also shows low paregenesis and epithermal-mezothermal characteristic. They are seen to be vein groups 2000-2500m in length and a few ten meter in thick. These mineralizations show the same features with the Sisorta Koyulhisar type veins at the East Blacksea Metallogenic Belt.

At the surface, mineralization is represented by the barite-bearing silica diffluences independent from the vein direction. Deeper down, the ore-bearing zone gains a more orderly characteristic, but in detail it was located within the fault and fracture zone as lenses. To the deep, mineralization ends as branches, thin-massive veins, small heaps and/or scatterings in the andesitic agglomerates.

It has been determined that hydrothermal alteration at the adjacent rocks mostly seen as silicification, carbonatization, chloratization. kaolinization, sericitization. albitization. zeolitization and in some places as propylitization. It has also been determined there is not any zone has taken place at the hydrothermal alteration.

The investigation of the research areas reveals that the Maden Tepe, Balkovan Dere, Kuzuluk Mevkii ve Odalar Yaylası mineralizations did not develop any economical potentials. Evaluation of the data obtained, demonstrates that mineralizations of Inler Yaylası contain %7.63 Zn; % 3.15 Pb; % 0.11 Cu; 9.45 ppm Ag within the 2.163.531 ton potential reserve, and 1.348.375 ton mineable reserve containing % 11.53 Zn; % 5.36 Pb; % 0.14 Cu; 9.06 ppm Ag according to the exploiting parameters that have been determined by CINKUR AS. Studies that should be further carried out in order to determine continuity of the veins and to increase mineral potential have been presented for consideration and concerning suggestions have been submitted.

PREFACE

This thesis was prepared as a Masters Thesis for Dokuz Eylül University, Faculty of Science, Geological Engineering Department. This thesis was prepared as an investigation of the mining engineering of ÇİNKUR, Dereköy (Şebinkarahısar-Giresun) lead-zinc mineralization.

The research was conducted in three stages: In April and May the preliminary research and evolution was conducted. In June-July-August-September the field investigations were conducted. The laboratory work was conducted in December according to the ÇİNKUR management analysis results. The reserve calculations were conducted using the obtained analysis results. The laboratory work and computer applications were done at Dokuz Eylül University, Engineering Faculty, Geological Engineering facilities.

I would like to personally thank Prof. Dr. Faruk Çalapkulu for his valuable knowledge, comments, and suggestions. I would also like to thank Prof. Dr. Özkan Pişkin and Prof. Dr. Altan Gümüş for their valuable knowledge, comments, and suggestions. I would also like to thank ÇİNKUR A.Ş. General Manager, Aydan Keskin, Asst. Manager, Cemal Alp, Geological Engineer Hüsnü Akyol, and the ÇİNKUR A.Ş. management personnel. The General Manager, Geological Engineer of Ben Oner, Hasan Berkpınara has my deepest gratitude for his insight, assistance, and contributions that he made during the field work.

I would also like to thank my wife, Engineer Leyla Demirkiran; Mining Engineer, Hakan Altınışık; Geological Engineer, A. Bahadır Yavuz, Geological Engineer Sungur Kedek and D.E.Ü. Torbali Meslek Yüsek School personnel for their assistance and support during the writing, drawing, and designing of the graphics in this thesis.

INTRODUCTION

I. INTRODUCTION

I. 1. GEOGRAPHY

The study area is located in the province of Giresun, near the town of Şebinkarahisar, and to the north of the village of Uğurluca on the İnler Plateau. It covers a 5 km^2 area on a 1: 25,000 scale topographic map of Turkey's Giresun H 40 b part of the map.

The study area shows a very rough morphology in the eastern Black Sea Mountain chain. The highest altitude of the area is Soğukoluk Tepe at 2,260 m. and the lowest altitude is found in Balkovan Dere at 1,300 m.

This area is located between the transition zones of the Inner Anatolia and Black Sea climatic zones. The climate is characterized by warm and moderately wet spring and summer seasons, and rainy autumns followed by cold and snowy winters. The most productive time of the year for working is found between the months of June and October in this area.

To reach the mines located in this area the Suşehiri-Şebinkarahisar highway must be used to the village of Uğurluca and then a dirt road must be utilized for 11 km. To reach the mine sites in rainy weather special vehicles must be used. Due to flash rainstorms and the lack of cover vegetation, landslides, mudslides, and debris slides are common occurrences and this requires continuous maintenance on the local roads.

In the İnler Plateau working area there is a low capacity spring. During the winter and summer months, Hızar Dere, which is located 1,200 m. above sea level, contains water continuously.

I. 2. PURPOSE OF STUDY

A metallogenic study of the mineralization was conducted to determine the morphological and mining parameters of the Maden Tepe and Balkovan Dere. An evaluation of the work done by ÇİNKUR, A.Ş. on the İnler Plateau was conducted to determine if further studies were necessary. The production parameters, including the reserve, of ÇİNKUR A.Ş. were also investigated.

1.3. PREVIOUS STUDIES

There is limited knowledge concerning the uranium, lead, and zinc mineralization of the study area and surroundings. However, some previously conducted studies are outlined below.

Between 1957-1961 some studies were conducted concerning the primary mineralization. During this era, instrumental prospections were conducted by H. Reum (1959); H. Gabette (1959); W.K. Muller (1959); B. Blanchet (1959); and H. Drezet (1959). However, these researchers did not report any significant uranium mineralization in this area.

H. Kaplan (1970), separated the geological formations as: eruptive rocks and Eocene aged sedimentary series intercalated volcanics. The formation mostly contains eruptive rocks. In the eruptive rocks there are plutonic to granitic masses; volcanic to andesites; rhyolite to rhyolitic tuffs; and basalt to basaltic tuffs are observed. The oldest unit is the granitic and andesitic series. Above these units rhyolite and rhyolitic tuffs, Eocene sedimentary series basalt and tuffs are sequentially placed.

In 1975, as a part of the "United Nations Development Program, Merzifon-Ispir Project" the study area and Asarcık Pb-Zn mineralizations were investigated. As a result of this research, the authors mentioned the economical existence of Pb-Zn in the study area.

M. Aslaner (1977), conducted geological and sectional classifications of the Pb-Zn-Cu beds and investigated the subject plate tectonically.

Y. Ogün (1980), gives the age order of the observed rock units and formations as follows:

- Possibly Paleozoic aged alkali granite and syenite with tourmaline.
- Paleocene aged old valley sediments which consist of 10-70 cm. thick charcoal bands.
- Post Eocene andesites with biotite, marine Eocene sequences, tuffite Eocene sequences, anglomera, vein type basaltic and andesitic dikes.

Y. Tahir (1980), divided the rocks in the study area into two groups:

- Base: granite, granite porphyry, syenite, and also rhyolite andesite and rhyolitic tuff.
- Cover: Middle Eocene aged transgression products of sedimentary rocks and tuff, tuffite, anglomera, basaltic and andesitic rocks.

F. Çalapkulu (1982), in this study, conducted a study of the Asarcık area mining beds where tourmalization, hydrothermal alteration, radioactive anomaly and Pb-Zn-Cu-Sb mineralization were observed together north of Şebinkarahısar. He explained the places where these three events occurred and there relationship to each other in the metallogenic evolution of the area. This author showed that the Asarcık area was geologically effected by Upper Cretaceous aged magmatic rocks. Çalapkulu showed that high radiocactivity of the Asarcık vein was caused by primary uranium minerals. In the Upper Cretaceous the vein developed a NE-SW (135°) directional vertical fracture line. Following the thermalization hypo, meso, and epithermal stages formed. The primary uranium mineral (peşblende) was determined in the paragenesis of the vein containing sulfur. It was discovered that rarely observed primary uranium mineral in Turkey occurred as a formation in the paragenesis containing sulfur.

F. Çalapkulu and Z. Ayan (1982), investigated the Etir Plateau fluorite mineralogical occurrence NW of Şebinkarahısar (Giresun) and determined the formation as a liquid closure procedure. These authors determined that the occurrence was located in the Upper Cretaceous aged andesitic volcanites and Lutetian aged volcano sedimentary rocks settled on these units with a conglomera base. Fluorite capillaries settled in a N10°W-N40°W fracture system. These authors state that kaolinization and silicification were observed on the edge of the vein as a result of the mineralogical investigation of the mineralization. They also show that phyllo gives the following paragenesis: green fluorite, sphalerite, galena, tennanite, chalcopyrite, pink fluorite, quartz, and purple fluorite.

The liquid closure investigation of fluorite and sphalerite reveal that the mineralization developed in two different stages.

M. Yılmaz (1983), studied the Subak-Dereköy area which is north of the Şebinkarahısar (Giresun) study area. This author revealed that the rock assemblages formed between Upper Cretaceous and Quaternary magmatic rocks and sedimentary and volcano sedimentary rocks which show the acid, alkaline, and calcalkaline characteristics. This author also investigated the Pb-Zn-Cu mineralization and suggests that the tectonic lines, where the veins are observed, are concordant with Pondite Structural Unity and are controlled by 60°-120° system developed faults.

As a result of the mineralogical investigation conducted by this author on the ore samples, he determined a zincblede, chalcopyrite, galena, smithsonionite, anglesite, cerussite, malachite, geothite, hydrozincite mineral paragenesis.

T. Anaç (1983), studies were conducted north of Şebinkarahısar (Giresun) at the Gamgali-hizar Deresi area. This author studied the area geology and Fe mineralization. The associations determined as a result of this investigation, are Upper Cretaceous and later aged rocks form the base and cover. There are two main vulcanization stages determined in the area: acid alkaline volcanism and basic calcalkaline volcanism. The tectonic lines where the mineralization is observed, are controlled by faults which developed at the 60-120° system. The mineralization is densely located at the 140-190° fault system. Sulfur containing paragenesis and radioactive anomalies were not observed in the veins in the study area. The general paragenesis was determined as: magnatite, hematite, chalcopyrite, pyrite, covelline and iron oxides along with the bedding characteristics of the minerals which were determined as vein and contact metazomatic.

N. Karaoğlu (1985), divided the rocks in the study area into two groups as the upper and lower series. The mineralization and hydrothermal alteration of these rock groups are blocked by lower sequence rocks which contain Upper Cretaceous (Campanian) aged limestones. The area rocks formed in the two main volcanism stages (acid alkaline-basic calcalkaline). The direction of the mineral containing veins are WNW-ESE. They are dipped N-S with thicknesses of 75-150 m.. The author also determined that the Pb-Zn-Cu containing sulfur minerals at the base decrease towards higher sections and are represented by barite and quartz.

A. Aktan (1992), investigated the local geology and Pb-Zn-Cu mineralization north of Şebinkarahısar (Giresun) in the Balkovan Dere area. This author illustrated that the tectonic lines where the mineralization is observed are 80-120° directional and dipped to the north. The primary paragenesis in this area consists of pyrite, zincblende, chalcopyrite, and galena. The second paragenesis consists of hydrozincite, malachite, azurite, iron oxides and lead oxides, gang minerals, quartz and barite.

GEOLOGY OF THE AREA

II. GEOLOGY OF THE AREA

The research area is located to the north of the North Anadolu Fault Zone inside the Pontid structural complex (Keith, 1966). Many researchers suggest that the Cretaceous aged subduction zones and the magmatic activity of island arcs have played an important role in the geologic evolution of this area (Akın, 1979; Bergougna, 1976, 1978; Gedikoğlu, 1978; Gedikoğlu et al., 1979, 1982; Ercan et al., 1984; Ercan and Gedik, 1986; Baş, 1986; Ketin et al., 1980; Aydın et al., 1984; Peccerillo and Taylor, 1975, 1976; Şengör and Yılmaz, 1981; Seymen, 1975; Tokel, 1972, 1973, 1983, 1985).

There are Upper Cretaceous aged plutonic and volcanic sedimentary rocks, Paleocene terrestrial units, Eocene aged marine volcanic sedimentary units, and Oligocene-Miocene aged sedimentary units. In certain places volcanic units at brackish facies, may be observed.

Upper Cretaceous aged volcanic sedimentary units, which display hydrothermal alterations, cover most of the İnler Plateau and Balkovan Dere area. There are andesitic and basaltic dikes with quartz and barite veins, which cut the volcanic sedimentary sequences.

In the Upper Cretaceous aged plutonic intrusions, rocks with monozonitic, syenitic and alkaline granite characteristics, which are the result of dioritic magma differentiation, may be observed in the area surrounding the research area (Çalapkulu, 1982; Karaoğlu, 1985; Ayan, 1991).

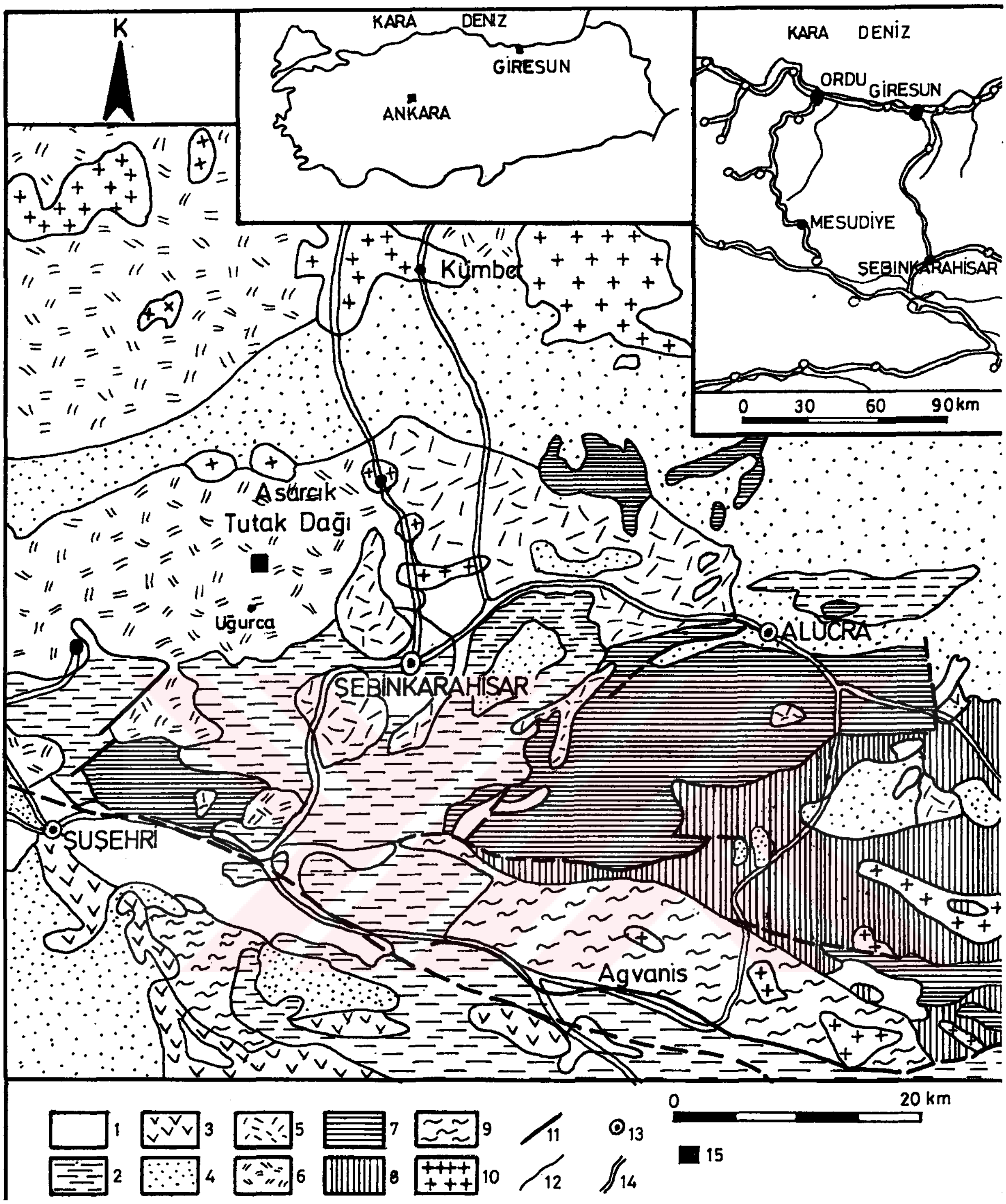


FIGURE 1: Location Map: 1. Quaternary; 2. Oligo-Miocene; 3. Ophiolite; 4. Eocene volcanic; 6. Upper Cretaceous volcanic; 7. Cretaceous; 8. Jurassic; 9. Unseparated metamorphic; 10. Granite-Syenite; 11. Fault; 12. Contact; 13. Residential area; 14. Road; 15. Study area.

II. 1. STRATIGRAPHY

Volcanic sedimentary units, which are closely related to the mineralization, are Upper Cretaceous in age. Units in the area are divided into upper units and lower units according to their stratigraphic relationships. The stratigraphy of the lower units consists of: rhyodacitic, andesitic volcanites, tuff and tuffite, and limestone zones in succession (Fig. 2).

II. 1.1. LOWER UNITS

II 1.1.1. Rhyodacite Rocks

In the Balkovan Dere and Kuzuluk Location area the rhyodacite rocks are observed as an outcrop. The whiteness related to kaolinization and the redness related to pyrite oxidation form speckling. The silicified zones morphological extensions make very interesting scenery.

An indepth analysis of these rocks showed that an outcrop morphology, mainly determined by the alteration types, and in most places the volcanic flow structure, were erased. Tuff, tuffite and volcanic breccia may be identified even in units that have experienced extensive alteration in the Balkovan Dere where the unit is exposed as large outcrops.

Microscopic investigation showing the petrographic characteristics of these rocks is detailed below:

Rhyodacitic (?) Tuff:

In general, widespread vitric tuff has been adhered to glass like materials. Some examples show a fine tuffitic, laminated structure sometimes perlitic and/or kolloform tissue. The glass like material has encountered devitrification from kaolen, sometimes limonite, ferrous and hydroxide infiltrations, cryptocrystalline quartz veins and/or cloudy silicification and also shows carbonatization. In the matrix, besides kaolinization, there is an active sericitization effect shown.

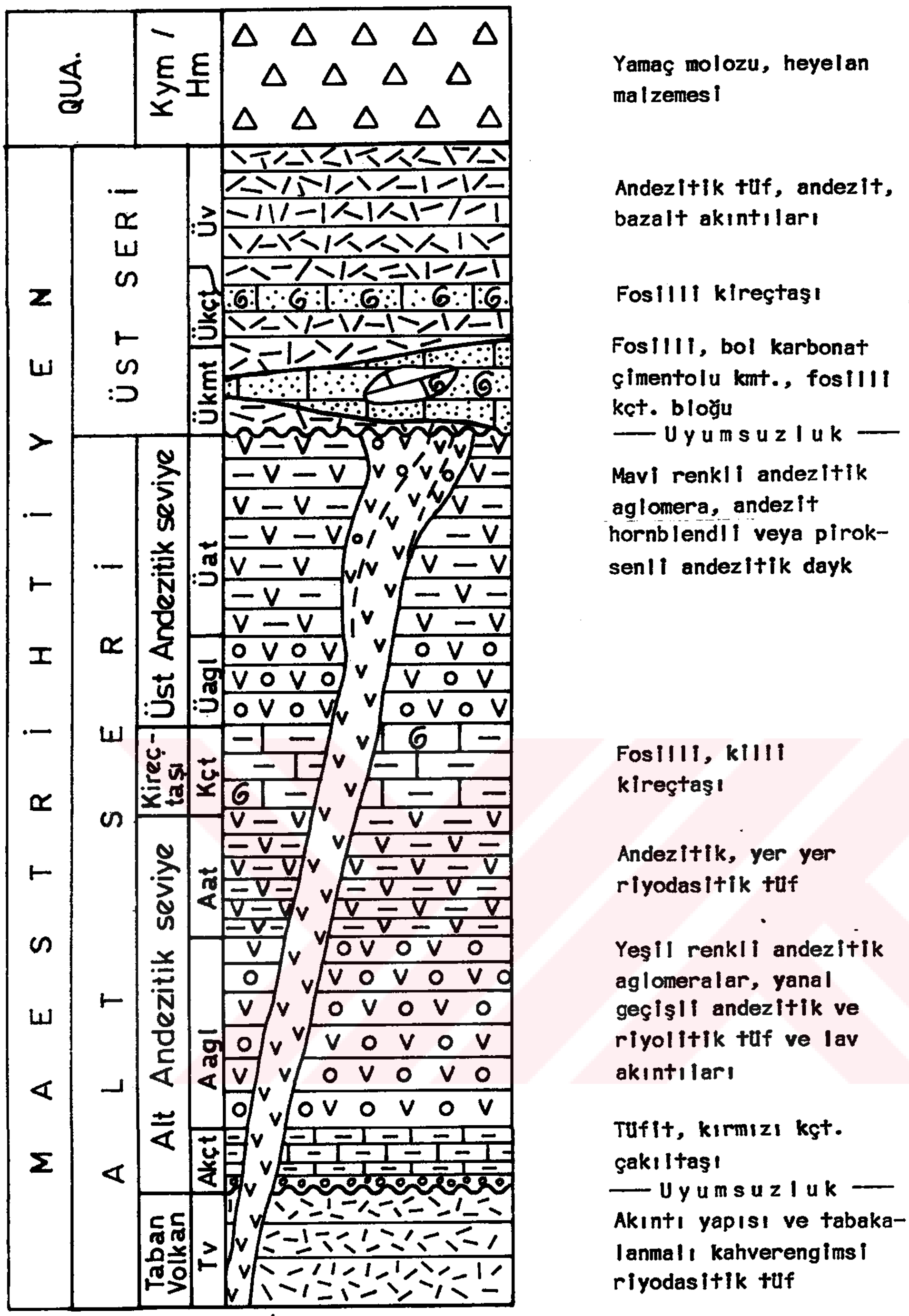


FIGURE 2: Generalized column profile of the study area.

In the areas where there is dominant silicification there are scattered opaque materials (pyrite) beside the quartz veins that are comprised of opaque minerals (chalcopyrite, galena, and blende).

Rhyodacitic (?) Volcanic Breccia:

Macroscopic tuffites may be seen around this unit. Sometimes the tuffitic matrix contains conglomerate characteristics. The microscopic investigation of these rocks shows that within the rhyodacitic (?) tuff matrix there is an alteration which results in the loss of the basic characteristics. Sericitization, kaolinization silicified acidic rock parts (rhyodacite ?) formation are observed. These rocks are sometimes chert, volcanic glass, pumice, and rarely they contain limestone pebbles. Examples of silicification may be seen in the scattered opaque minerals or they may appear in the small veins.

II. 1.1.2. ANDESITIC BOTTOM ROCK UNITS (Conglomerates, Limestone, and Tuffs)

These rocks are probably tied to the sedimentary environment which formed as a result of the volcanic activity in the sea and they may show different characteristics. Around the Balkovan Dere and Filikalik Ridge, under the conglomerate and above the red colored calcarenitic limestone representation these units are observed, although 150 m. to the east on the same level, they continue as a thick tuffite. This unit lays disconcordantly on the surface of the rhyodacitic unit which begins with the conglomerate and tuffite units. In the upper parts the unit sometimes changes to lava flows, breccia, and agglomerates. Conglomerates, at the most 4 m. in thickness, extend and penetrate where the tuffites occur. The conglomerate is comprised of chert, limestone, andesite, volcanic breccia, blocks and gravel. The matrix is also sandy and silty and shows carbonate characteristics in the upper levels.

Limestones:

This unit is at the most 3.5 m. thick and occurs upon a bed that has a thickness variation from 0.1-15 cm.. The bottom section of this unit is sandy and clayey with a yellowish-gray color. It thins laterally and changes into tuffites. It rises straight and sometimes exhibits calcarenitic textured limestones and than is later covered the tuffite and volcanic breccia sections.

Tuffites:

Around Balkovan Dere and Maden Tepe the most widespread unit of tuffites, which is 12 m. in thickness, may be observed. The bed thickness varies from 0.1-3 cm. in thickness. Gray-white, dirty-white colored alteration zones occur and through iron coloring there is a reddish-yellow color associated with this unit.

II. 1.1.3. ANDESITIC LAVA, AGGLOMERATE AND RHYODACITIC TUFFS:

A large proportion of the green colored agglomerates, concordantly cover one another. Sometimes laterally in transition, and sometimes in succession with a lower amount of andesitic tuff, rhyodacitic tuff. Lava flows nearly 200 m. in thickness, show widespreading over the slopes of Balkovan Dere. Agglomerates are thickly bedded and are spread between each other sometimes with thin iron oxide and chert units. The stratigraphic incline of Maden Tepe is, southern south 30°-40° incline, and northern north 70°- 80° northeast. Agglomerates sometimes together with the volcanic breccia encounter the surrounding rocks and show the possibility of crossings.

The microscopic examination of the agglomerate grain size show extensive differences. Generally, the edges are slightly to very rounded, densely formed clay, sericitization, and carbonization developed in the andesitic pieces show cementation with the quartz-chlorite matrix. Less widespread cavities are filled with secondary quartz and calcite. Breccia facies, alone or in groups, exhibit breaks, carbonization, sericitizated plagioclase pieces and a lower amount of volcanic rock pieces cemented with fine quartz-sericitic and carbonate.

Andesitic Tuffs:

The outer covering is light green and the fresh surface is dark green in color. It shows a bedded structure with 2-20 cm. thickness in the bed. The best outcrops are at the southern slopes of Balkovan Dere and Odalar Plateau. There are thin tuffite successions in the bedding. The petrographic results show that andesitic tuff pieces exhibit mostly low or high carbonatization, clayey-serisitified olgioclase, and a smaller amount of detrified glassy material from andesines, some of which formed from corroded rare quartz, are included in this form. Cement is fine grained and composed mostly of quartz-feldspatic. Sometimes chlorite is included in this matrix and sometimes carbonate was injected. Cracks are filled with secondary quartz. Low or higher degree propylitization occurred as a result of the formation of ziosite+chlorite+albite.

Rhyodacitic Tuffs:

The best outcrops are located to the north and northwest of the Odalar Plateau and in the southern part of the Inler Plateau. The bed thickness ranges from between 1-30 cm.. At the Odalar Plateau these tuffs are white in color because of the dominant kaolinization and they are whitish-greenish in color at the southern part of the Inler Plateau.

The result of petrographic studies of these rocks shows their vitric tuff nature. They were formed by the accumulation of glassy pieces which were more or less flattened. The glassy material is affected detrification and rarely shows silicified volcanic rock pieces in it.

Andesitic Lava:

Volcanic flows, which may be seen in places in the agglomerates and tuffs, are andesitic in nature. In general, the microlitic flowing texture and andesine microlites consist of varied amounts of hornblende and plagioclase phenocrysts. The hornblendes sometimes are effected by chloritization, and in these zones opaque mineral crystals (magnetite) may be seen. The matrix is usually glassy. Spheryte hollows are filled with epidote, zeolite, calcite, and albite cavities. Andesitic lavas were effected by alterations near the tectonic lines and mineralization, which mainly lost its primary structure, shows kaolinization, epidotization, chloritization and silicification. Heavily populated pyrite spreads can be seen in these samples.

II. 1.1.4. Argillaceous Limestones:

This unit has outcrops at the southern section of Balkovan Dere, the eastern section of the Inler Plateau, and on the way to the mine. Yellowish-white, sometimes gray colored, and common debris occurrences surrounding the outcrops make them easily identifiable in the field. They may be observed as blocks at the tuff borders on the way to the mine road, however, limestones at Uzunoluk Tepe in the east and Balkovan Dere to the south reached their maximum thickness in these areas. On the way to Maden Tepe from this area limestones are thinned and wedged out. In the lower sections they are interconnected with andesitic tuffites and contain a large amount of clay. From time to time in succession with marl and clay levels. The bedding thickness of this unit is from between 1-30 cm., however, the southern section of the Balkovan Dere unit thickness may reach up to 12 m.

The unit age is determined as Upper Senonian and possibly Maestrichtian by the presence of Globotrunca Lapperenti, Globostrunca cf. Contusa (CUSHMANO). The depositional environment of these fossils is pelagic in character (personal communication, S. Ozer).

II. 1.1.5. Upper Andesitic Zone:

To the north of Balkovan Dere and Uzunoluk Tepe, this unit lies concordantly upon limestone. The lithographic characteristic differences of these units may be seen locally here. Sometimes tuffite and at other times agglomerate and volcanic breccia are represented, and rarely andesitic lava flows are seen. The lithographic characteristics resemble the underlying andesitic zone, although the stratigraphy which is upon the limestone is differentiated. In addition, this unit takes up to a 200 m. thickness sometimes, and tuffs joining under this zone show differences. In the İnler Plateau Mineralization area this tuff unit is dominant in the lithology.

İnler Plateau Tuffs:

In the Inler Plateau and the surrounding andesitic agglomerates and lava formations came under tectonic control later forming pits full of tuffs that through active kaolinization were given their white coloring.

Sections close to the bottom units and the areas near the mineralization show heavy chloritization, sillicification, pyritization, and carbonization. The unit thickness in some places is over 200 m.

Microscopic studies of the carot samples of the different samples show that in general, tuffs are dominant in the lower sections and in the upper levels acidic tuffs (usually with rhyodacitic contents) are common. Andesitic tuffs of the lower levels have acidic tuff successions and the upper level acidic layers have andesitic tuff layers in them. For example, in the 4/1 (92/4) different facies were differentiated.

- 12.15-106.00 m.:

They are possibly acidic tuffs in some places mixed with andesitic agglomerates and tuff, along with a greenish-white color, silicified and widespread pyrite. In the andesitic transition zones, chloritization is combined with silicification. In this zone the mineralization may be seen in centimeter long sphalerite veins or in the quartz veins.

- 106.00-132.90 m.:

This unit is represented by silicified and carbonatified tuffs most likely acidic in nature. In general, micro and from time to time, cryptocrystalline with irregular shaped calcite-ankerite, are widespread inside the glassy quartz-feldspatic matrix. Widespread synoptic shaped opaque (pyrite), and a few iron oxide infiltrations may be seen.

-132.90-153.10 m.:

Between these points there is most probably silicification carbonatization acidic tuff. Medium sized grains of quartz cemented with feldspar pieces may be transformed to sericite and quartz, calcite and a smaller amount of ankerite natured irregular carbonatization, secondary barite veins, idiomorph and dandritic opaque widespreads may be seen.

-153.10-154.40 m.:

This section is most probably carbonated rhyodacitic tuff.

Microcrystalline quartz which are cemented to medium grained fragmented plagioclastic crystals with albite are seen. Veins or irregular cabonatization (calcite+ankerite) large grained formations in the form of veins or compact groups, rare idiomorph opaque pieces and in the crushed zones iron oxide infiltrations may be seen.

-154.40-168.65 m.:

Dominant carbonatization (mostly calcite and a smaller amount of ankerite) masks the area and prevents the use of microscopic studies. Mostly microcrystalline and sometimes larger sized grain units may be differentiated.

-168.35-187.90 m.:

Possibly silicified, chloritified, lithical/crystalline tuff with rhyodacitic composition. Quartzo-chloritics are cemented to less sericitified and plagioclase pieces affected by kaolinization. The rock pieces are enriched with these types of pieces are, feldspar pieces effected by kaolinization and quartz pieces. In the same matrix mostly idiomorph opaque widespreads may be seen besides carbonatization (calcite) in someplaces and large grained quartz formations.

-187.90-233.50 m.:

There are andesitic, mostly crystalline and sometimes lithical/crystalline tuff. Plagioclase pieces which are under the effect of albitinization and carbonatization are in the quartzo-chloritic and quartzo-chloritic feldspatic matrix. Carbonatization developed to a lesser degree in the matrix and goes along with silicification. Xenomorphic opaque widespreads are not.

-233.50-275.90 m.:

There is most probably silicified andesitic tuff in this unit. Chlorified volcanic rock pieces (andesite ?) that have become more opaque and less common quartz pieces are in the microcrystalline, and sometimes larger sized grains of quartz, feldspar (?) in a chlorite matrix. In this matrix idiomorph opaque widespreads and secondary quartz formations in the form of veins and compact groups, and veins filled with quartz+calcite+ankerite+opaque minerals may be identified.

-291.75 m. and later:

Microcrystalline quartzo-feldspatic matrix may be seen in some places because of the ankeritization.

Balkovan Dere Andesitic Agglomerate and Tuffs:

The andesitic agglomerate and tuff are on top of argillaceous limestones at the southern slope of Balkovan Dere, Odalar Plateau and Uzunoluk Tepe. In some places, these andesitic agglomerate and tuffs show chloritization, epitolization and surface decomposition and limonitization. Andesitic agglomerates and tuffs are dominant in the unit but there are thick rhyolitic tuff sequences differentiated to the south of Balkovan Dere. Andesitic agglomerates which show the same microscopic characteristics with the lower andesitic units were found. The andesitic tuff thickness varies from 1-5 m. and sometimes the beddings were effected by kaolinization and chloritization interbedded with the thin tuffitic zones.

II. 1.1.6. Andesitic Dikes:

Andesitic dikes are seen especially in the Balkovan Dere area in accordance with the main direction of two fault systems. The E-W

N 10-20 E E-W dikes are located east of Kuzuluk Location, the southern slopes of Balkovan Dere, Filikalık Ridge and Maden Tepe. The N 10-20 E dike extendeds towards the western slopes of Uzunoluk Tepe, to the İnler Plateau towards the north and towards Uğurluca village in the south. The andesitic dikes surfaced east of Kuzuluk Location at N 70 E trend approximately 150 m. in length and 10 m. in thickness, at the southern slopes of Balkovan Dere N 80 E trend with fault zones in the middle with a thickness of 20 m. and is 1 m. in length, Filikalık Ridge with an E-W trend has a 350 m. length and 20 m. thickness, and at Maden Tepe a N 70 E trend 350 m. length and a 50 m. thickness. These andesitic dikes were easily differentiated from the other units by their cooling cracks.

Most probably the andesitic dikes were emplaced at the end of the Early Cretaceous at the earliest because they were crossed by all of the units of the lower sequences which were mentioned in earlier sections. At the same time these units most probably cut the Maestrichtian aged argillaceous limestones.

The dike, which was formed by fault at the southern slopes of Balkovan Dere, is composed of diopsite and andesite and the other dikes are composed of hornblende andesite.

Petrographic investigation results show that hornblende andesites are composed of an abundant amount of plagioclase and a smaller amount of hornblende phenocrystallines. The plagioclases show a zonation structure and consist of 25-30 % An. They were saussurified because of the formation of sometimes fresh and sometimes carbonatified, sericitified and sometimes epidote+chlorite+albite formations. The hornblendes mostly turned into chlorite because of the existence of iron oxide and there cracks are filled with calcite. Rarely corroded quartz grains may be noticed. The matrix may be composed of microlithic or fine grained chlorito-feldspatic or sometimes is comprised of epidote compact groups. Gas cavities are filled with calcite and opaque minerals may be seen as a by-product. In some samples carbonite injections are common.

Zonated plagioclase phenocrystals (60 % An) of diopsite andesites were more or less effected by sericitification and kaolinization. Diopsite augite form smaller phenocrystals than the plagioclase. Rare biotite sheets are chlorified because of the existence of iron oxide. The matrix is composed of microlithical flow or fine grains of chlorite-feldspatic. Widespread opaque grains and sometimes carbonatization may be seen.

II. 1.2. Upper Units:

These units, where hydrothermal alteration is replaced by meteorite decomposition, are discordantly covering the lower formations. This series is composed from bottom to top of: fossiliferus limestone, andesitic tuff, andesite and basalt flows. The basalt flows were not studied in detail because they were not located inside the study area and are not directly related to the mineralization.

Carbonate cemented sandstone extendeds over the southern slopes of Balkovan Dere, the eastern part of Odalar Plateau and the western slopes of Uzunoluk Tepe. Siderolites calcitropoides (LAMARK), Oribitoides sp. Orbitoids cf. medius (d'ARCHIAC) Omphalocyclu cf., rudist pieces, shell fragments, echinoderm plates and coral reef pieces were discovered in the sandstones. These findings give a Maestrichtian age and a very shallow water depth for this environment (personal communication, S. Özer). On the slopes of Uzunoluk Tepe in the limestone samples there were Orbitoides cf. medius (d'ARCHIAC), Orbitoides sp., Textularidae, rudist and unrecognizable shell fragments found. By examining these findings the age is placed as Maestrichtian and contains a shallow water environment (personal communication, S. Özer). This unit is covered successively by andesitic tuff, andesite with biotite, andesitic tuff, diopsitic andesite and slope debris.

II. 2. STRUCTURAL GEOLOGY:

A common point of the suggested models, related to the geotectonical evolution of the Eastern Pontides, are the subduction zone between the Eurasian plate from the north and the Anatolian plate in the south is agreed by all researchers. According to these studies, the oceanic crust subducted equivalent to the north and the southern zone of the Eastern Pontides equivalent to the oceanic trench. The zigana height and its east-west extensions equivalent to the volcanic arc and the Black Sea shores are equivalent to the marginal sea region. However, Bektaş (1984) and Bektaş and Gedik (1987) suggested that the subduction direction is towards the east.

At the beginning of the Jurassic it is accepted today that there was an oceanic ridge and oceanic crust formation between the Anatolid and the Pontides. Plate separation, which started in the Liassic turned into subduction at the lower end of the Lower Cretaceous, where oceanic crust from the Erzincan line subducted under the Pontides. Effective magmatism developed between the Lower and Upper Cretaceous connected with this subduction. Ophiolitic rocks of northern Anatolia are the remains of the subducted oceanic crust which borders the island arc from the south.

At the end of the Lower Paleocene the major folding stage began and the result of a volcanic arc (Pontid) continent (Anatolid) crash. Eocene volcanic depositional formations and flysch positions are common. It is discussable that produced volcanite is a product of island arcs (Tokel, 1977; Gedikoğlu, 1978) or else developed connected with inner plate N-S directional compressional regime (Terzioğlu, 1985). Miocene, Pliocene, and Quaternary volcanism were not a result of island arc development, however, they developed in a continental plate.

II. 2.1. DISCORDANT BEDDING:

Many discordant beddings developed related to the magmatic development in the study area. Two of these discordants are very distinguishable.

The first of these discordants may be observed west of the Balkovan Dere between the lower andesitic level, with brown colored rhyodastic tuffs with andesitic tuffs or agglomerates. This discordance begins with a thin conglomerate level which covers the rhyodastic tuffs. Red and sometimes white colored limestones and/or whitish-green tuffites developed over the conglomerate sequence.

The second discordance may be observed between the lower and upper sequence. Blue colored andesitic agglomerate, which developed after the lower sequence, developed on the elevations erosional platform, which formed as a result of refraction tectonics, where from place to place dikes form. This discordance is represented by fossiliferous, carbonate cemented sandstones, which are angularly discordant on the lower sequence. This discordance may be observed in the western slopes of Uzunoluk Tepe.

II.2.2. Folding:

In the study area, folding tectonics are not common. Folding is only observed in limited areas.

II.2.3. Faults:

In the study area, active magmatic development during the premineralization and related to refraction tectonics developed, however, the refraction tectonics results were covered and hidden by tuff, tuffite, and breccias, which formed as a result of volcanic activities. For this reason, there has been no detailed investigation concerning the refraction tectonics development during the volcanic activities.

As a result of the detailed investigations in the study area, andesitic dikes which cross cut the volcanic sequence and settled on the large fault zones were revealed.

As the investigation of the gallery and drilling data reveal, there are many small or large slip faults in the study area. These faults, which were discovered during this study, are illustrated on the 1:500 scale gallery maps. There is very limited data which shows the slip of some of these faults. For this reason, important faults which are illustrated on these maps, only are explained. However, the small faults are mentioned as a group with consideration to their development period and directions.

As a result of the investigations conducted in this area, it has been determined that three main reflection tectonic periods occurred:

1. East-West and North-South directional faults, sometimes including dikes, occurring faults during premineralization:

    a. Uzunoluk Tepe Fault

b. Balkovan Dere Fault

c. Filikalık Ridge Fault

2. East-West (80°-90°) and Northwest-Southwest (100°-120°) directional ore containing fault, which was formed during the dike forming period:

1. East-West Directional Ore Containing Faults (80°-90°):

a. İnler Plateau
- Mortaş Vein Fault
- Kuzey Vein Fault
- Sarı Vein Fault
- Main Vein Fault
- Secondary Vein Fault
- No. 2 Vein Fault
- No. 3 Vein Fault

b. Maden Tepe Ore Containing Fault (80°-90°)

c. Balkovan Dere Ore Containing Fault (70°-80°)

d. Odalar Plateau Ore Containing Fault (80°-90°)

2. Northwest-Southwest Directional Ore Contain Faults:

a. İnler Plateau Fault (Northwest-Southwest directional fault (100°-120°))

b. Maden Tepe (Northwest-Southwest directional fault (100°-120°))

c. Balkovan Dere (Northwest-Southwest directional fault (100°-120°))

3. East-West (80°-90°) Northwest-Southwest (100°-120°) and North-South directional faults containing no ore, which formed during the post mineralization period:

a. East-West directional faults

b. Northwest-Southwest directional faults

c. North-South directional faults

Faults found in the study area are categorized with consideration to their regional location, development period and direction. According to this the premineralization period developed faults are locally named. The post mineralization faults are categorized as in the İnler Plateau area, and given code I moving from the south to the north. The Balkovan Dere area, given code K moving from the east to the west in sequential numerical order.

II. 2.3.1. Faults with Dikes Formed During Premineralization:

These types of faults formed during the premineralization period. They are characterized by andesitic and/or basaltic dike intrusions along the fault line. They are observed in the lower volcanic sequence. They play an important role in the tectonic framework of the study area.

Uzunoluk Tepe Fault:

This fault is located on the western slopes of Uzunoluk Tepe and extends in a north-south direction until Uğurluca. Hornblende-andesitic dikes intrude in this fault zone.

The Uzunoluk Tepe Fault extends in a 180°-190°/70° west direction and is a normal slip fault. Studies show that the western section of the block dropped or fell and the eastern section of the block rose.

Fossiliferous argillaceous limestones of the lower sequence slip vertically 70-80 m. towards the İnler Plateau as a result of the Uzunoluk Tepe Fault movements. There are andesitic flows and breccia deposition observed in some areas. The color changes as a result of hot dike contact. Dikes which are settled on Uzunoluk Tepe Fault Zone are cut by mineral veins at the southern and eastern slopes of Balkovan Dere. It has been observed that mineralization occurred after the dike intrusions based upon these observations.

Balkovan Dere Fault:

This fault may be observed in the Kuzuluk Location as a dike with hornblende and northeast of Odalar Plateau to the western slope of Uzunoluk Tepe as an andesitic dike emplacement zone. Between the side rock and the dike, breccias, flow structures and a trace of a baked material may be observed.

The Balkovan Dere fault extends in a 80°-90°/82° north direction and is a normal slip fault. The northern section of the block fell and the southern section of the block rose. A vertical slip of 20-60 m. is determined with the assistance of the limestones in the lower volcanic sequence.

Fossiliferous argillaceous limestone units contact the andesitic dike northeast of Odalar Plateau. The east-west directional unit of the limestone (andesitic dike with pyroxene) is cut by the Balkovan Dere 300 m. southeast of the Balkovan Dere road junction.

Mineralization in the crushed zones may be seen along this dike in some areas. There is an intrusion of a pyroxene-andesitic dike into the mineral rich quartz veins. The fault zone showed that this fault developed during the premineralization period.

Filikalık Ridge Fault:

This fault may be observed as a hornblende-andesitic dike emplacement zone along the Filikalık Ridge and Maden Tepe. Between the dikes and side rock, breccia, flow structures, and a trace of baked material may be observed.

It was determined that the Filikalık Ridge fault extends in a 85°-90°/70°-85° south direction based on the volcanic origin of the units in the lower sequence and contains a slope. The lack of a guide level, which may show the degree of the slip, does not allow for the determination of the slip degree. Mineral rich quartz veins intrude the pyritization, silicification, and hornblende-andesitic dike alteration zones, where the mineralization may be observed in some places, and the fault zone. For these reasons, it has been determined that this fault, like the Uzunoluk Tepe Fault, developed during the premineralization period.

II. 2.3.2. Mineralized Faults:

Mineralized faults are common in the İnler Plateau area. These faults may be observed towards the north at Maden Tepe and the Odalar Plateau. They usually extend in an east-west direction, however, their is rarely a 120° direction extension observed. The veins in the north systematically dip in a northern direction and the veins in the south dip variably north or south. These fault zones mostly mineralized and in someplaces exhibit silicification and pyritization. The length of the faults reaches up to a few hundred meters and the mineralized zones may be from a few meters to 10 meters thick. In someplaces, the slip surface may be observed, however, as a result of hydrothermal alteration and silicification, the fault data may not always be observed. It is even possible that the mineralized zones may be fractured zones.

These faults are in order from north to south and are explained in more detail in the mineral section below:

II. 2.3.2.a. East-West Directional Mineralized Faults (80°-90°):

Mortaş Vein Fault:

This fault is located north of the İnler Plateau between the X:67875-Y:38530 and X:67820-Y:38735 coordinate points around 170m..

As a result of the field study, the drill hole and gallery observations, it has been determined that in the western section there is an extent of 90°/90°, and it gains a dip. In the eastern section an extent of 90°/75° north direction and also gains a dip. As an effect of the 190° faults between X:67875-Y:38565 and X:67850 -Y:38635 coordinate points, there is a turn towards the 120° line and is due to the effect of this fault. Kaolinization and brecciaitization in the crushed zones and reduced mineralization may be observed.

Mineralized hydrothermal liquids of the fault zone intrude the side rock. They form approximately 1-1.5 m. thick mineralized zones. These zones show enrichments such as lenses. The gallery and drill data illustrates that there is thinning from east-west and then the vein thins out.

It has been determined that this fault formed during the premineralization period based on the gallery, drill and outcrop data.

<u>Kuzey Vein Fault:</u>

This fault controls the development of the Kuzey Vein and may be observed on the surface. This fault is cut by the 4/1, 5/1, 6/1, 7/1, 8/1, 9/1, 9/2, and 10/2 drill holes around the 1850 m. elevation area. It continues over a 150-400 m. area as illustrated in the drill data. Studies conducted on this mineralized fault, in the western section of the vein, shows an extension of 80°-90°/75° north direction with a dip. In the eastern section a 100°/85° north direction with a dip. The degree of the slip may not be determined because of the lack of a guide level.

A 6-9 m. thick mineralized zone developed in the fault zone. Breccia material cemented with the hydrothermal mineralized liquids of the fault zone and resemble breccia. In the drill hole the mineralized zone shows a fractured structure, and for this reason it has been determined that this fault moved after the mineralization. As a result, the Kuzey Vein Fault is a fault which continued its movements after the mineralization period.

Sarı Vein Fault:

This fault controls the development of the Sarı Vein and is located at X:67610-Y:38700 coordinate points. This vein extends towards the west around 250-300 m.. In someplaces, this vein shows silicification, baritification and kaolinization crushed zone qualities. In the eastern section it may not be seen on the surface, however, through the help of the drill holes it continues for an area of 175 m.. This fault is located 30-35 m. south of the Kuzey Vein and 30 m. north of the Main Vein.

Field studies and the drill hole investigations show that this fault extends 90°/80°-85° north direction and contains a dip. As a result of these investigations this fault zone shows a silicified, kaolinated, and in someplaces, mineralized vein quality. This fault thickens towards the west and shows mineralization at the Aşcı Quarry. At X:67630-Y:38420 coordinate points, the fault is effected by a northwest-southeast directional premineralization fault and the eastern block of the 120° fault is forced to move 30 m. south.

Side rock breccia, which is cemented by mineralized solutions in the fault zone, show that this fault developed during the premineralizatoin period.

Main Vein Fault:

This fault controls the development of the Main Vein and is the most traceable fault on the surface. In the field, it is represented by baritified, silicified heads and in someplaces, alteration zones. Vein outcrops in; the west may be seen at X:67550-Y:38630 coordinate points towards the east for 350-400 m. and towards the west at X:67600-Y:68485 coordinate points for 100m..

As a result of the drill holes, and gallery investigations, the fault extends 80°/65°-70° north direction with a dip. In the western section of the fault there is an extension of 90°/85°-90° north direction with a dip towards the east. In the western section, the fault turns towards the north as a result of a 120° directional fault. This fault continues to the west of the 120° directional fault until the X:67600-Y:38485 coordinate points as an alteration zone with pyritization, silicification, and ankaritization. The drill hole and gallery investigations show that after X:67600-Y:38900 coordinate points this fault branches towards the east and is represented by the Main Vein I and Main Vein II Mineralizations. Further east, this fault connects with the Uzunoluk Tepe Fault and may not be differentiated on the surface. The drill hole and gallery data does not supply sufficient information to explain this connection until now.

In the mineralized zone, the side rock, which is fragmented as a result of tectonic activities, is cemented by hydrothermal solutions along these zones and appears as breccia. Besides this, after the mineralization developed the fault movements continued and as a result, the ore gained a breccia-like structure.

There is an average of 14-17 m., in someplaces over 20 m., thick mineralized zone that developed in the continuation until the 1725 m. elevation. As a result, the Main Vein Fault developed during the premineralization period and continued its movement during the post mineralization period.

Secondary Vein Fault:

This fault controls the development of the Secondary Vein and is represented on the surface between X:67550-Y:38750 and X:67550-Y:38820 coordinate points with baritified and silicified heads. Drill holes in the area showed that at the X:67575-Y:38750 coordinate points, towards the east for approximately a 275 m. area, it continues to the 1850 m. elevation.

The fault extends in ;the west 90°/85° north direction and contains a dip. In the east its direction tends to turn to the south and its dip becomes steeper. A 4-9 m. thick mineralized zone formed on the fault zone. The mineralized zone is land shaped going deep or rising side cut branches from the Main Vein in nature.

Mineralized solution intrusions of the side rock and cementation of the side rock breccias in the fault zone show that this fault formed during the premineralization period.

No. 2 Vein Fault:

This fault controls the development of the No. 2 Vein and may be seen on the surface. As a result of the gallery studies between X:67535-Y:38680 and X:67545-Y:38910 coordinate points for a 230 m. area at the 1805 m. elevation, the drill hole studies showed a continuation to the 1635 m. elevation.

This fault extends 80°-90°/90° direction and contains a dip. It is effected by a 120° directional fault between X:67547-Y:38723 and X:67537-Y:38755 coordinate points. The eastern block of the 120° directional fault was forced to move 30 m. to the south. Their is no guide level to determine the slip amount.

There are 1-1.5 m., sometimes 4.5 m., thick veins formed in the fault zone. In the west, at X:67535-Y:38680 coordinate points, this vein, which is filled inside with propylitified andesite, lens out as a scattered mineralization. Towards the east the fault extends 75°/90° direction and gains a dip. Its continuation until X:67345-Y:38910 coordinate points was determined by gallery investigations.

Mineralized solution intrusions of the side rock and cementation of the side rock breccias in the fault zone, show that this fault developed during the premineralization period.

No. 3 Vein Fault:

This fault controls the development of the No. 3 Vein. It is located in the southern section of the İnler Plateau. On the surface between X:67500-Y:83730 and X:67505-Y:38715 coordinate points in a 110 m. area, it is represented by baritified, silicified, and in someplaces mineralized, heads. The gallery and drill hole data correlations show that at the 1800 m. elevation, at X:67525-Y:38700 coordinate points, it continues for 175 m. towards the east.

This fault extends 90°/60°-80° north direction and contains a dip. A 2-8 m. thick mineralized zone formed in the fault zone. This zone in the west at X:67520-Y:38690 coordinates lances as a disseminated mineralization. This fault continues towards the east after the X:67520-Y:38870 coordinate points, and its continuation may not be determined because of the limited drill hole data.

Mineralized solution intrusions of the side rocks and cementation of the side rock breccia in the fault zone show that this fault developed during the premineralization period.

Maden Tepe Mineralization Fault (80°-90°):

This fault is located in the north of the study area and extends around a 1700 m. area towards the Filikalık Ridge, Maden Tepe, Azak and Yarar Quarrys and to the northern slopes of Uzunoluk Tepe.

It is observed in someplaces as mineralized veins and in other places as alteration zones. This fault extends 80°-90°, in someplaces 100°, direction and dips 70°-80° north direction. This fault slipped in someplaces 160°-190° as extensional early faults. The Balkovan Dere Fault Zone cuts the hornblende-andesitic dikes in this fault.

In this fault zone, between the Azak and Yarar Quarrys, a 6-7 m. thick (1-1.5 m. of this is massive), mineralized zone formed. Mineralized solutions cut the side rocks and the side rock breccias, which were formed as a result of the tectonic activities in the fault zone, and were cemented by these solutions.

As a result of these observations it has been determined that the mineral emplacement happened after the development of the fault.

Balkovan Dere Mineralized Fault:

These faults are located in the west of the study area to the south of the Filikalık Ridge. It has been determined that the fault, which forms the Balkovan Dere alteration zone, continues in an approximately 520 m. area between X:67850-Y:36700 and X:67900-Y:38200 coordinate points. It is characterized with pyritization and silicified heads.

This fault extends 80°-90° direction and dips 65°-70° to the south. There is no guide level to show the slip amount and so the slip amount may not be determined. There is a 2-3 m. thick mineralization zone formed in this fault zone.

The dip of the vein is the same as the slope, and so a large area is considered as an alteration zone. In the side rock, towards the fault zone, epidotization, kaolinization, hematitization and silicification may be observed.

It is determined that another mineralized fault, which is observed at the Balkovan Dere area, continues for approximately a 280 m. area between X:67690-Y:38200 and X:67790-Y:37450 coordinate points. It is in someplaces a mineralized, silicified zone in the field. This fault extends 70°/60°-65° south direction and is dipped. There is a 20-25 cm. thick mineralized zone formed in the fault zone.

This fault is located between the andesitic and acidic units. Epidotization, kaolinization and heavy silicification maybe observed at the base and upper rocks of the fault. Studies show that this fault developed during the premineralization period.

Odalar Plateau Mineralized Fault (80°-90°):

These faults are located in the southern section of the study area. The largest of these faults continues to the 1800 m. elevation area from the east of Kuzuluk Location to the southwest section of Uzunoluk Tepe. This fault is represented by silicification zones in someplaces, and in other places pyritization zones. Also, in someplaces, there are crushed zones which show mineralization in the field.

As a result of these studies this fault extends 80°-90°/75°-80° south direction and is dipped. This fault cuts the Uzunoluk Tepe Fault in the eastern section of the research area. Mineralized solutions cemented the fault breccia in the fault zone.

Another mineralized fault is located to the northwest and southeast of the Odalar Plateau.

Mineralized faults, which were located northwest of the Odalar

Plateau, are represented by seven ore veins in a 75-125 m. area. These faults extend 60°-70°/80° north direction and are dipped.

A 1-35 m. thick mineralization may be observed in the fault zone. Besides this mineralization, up to 20 m. thick quartz and barite veins may be seen. These faults are located in the andesitic anglomera and epidotization, kaolinization, limonitization and hemetitization are observed.

Faults, which were located in the southwest of the Odalar Plateau represent nine parallel ore veins and extend in an east-west direction, in a 5-55 m. area, and are lined up from the north to south. These faults extend 70-140 m. and are dipped 60°-65° north direction.

A 0.25-1 m. thick mineralization developed in the fault zone. There is silicification and in someplaces kaolinization in the fault zone.

Epidotization, chloritization, kaolinization, hemetitization and silicification may be observed in the base and roof of the fault zone.

Observations show that these faults formed before the dike emplacements and during the premineralization period.

II. 2.3.2.b. Northwest-Southeast Mineralized Faults:

İnler Plateau Fault:

This fault is located in the southern section of the İnler Plateau between X:76690-Y:38400 and X:67370-Y:38890 coordinate points and continues in a 700 m. area.

As result of the drill and gallery investigations, this fault appears as a bunch of faults at the 1805 m. elevation gallery. It effected the Sarı Vein and Main Vein at the surface and forced them to accumulate a 30 m. slip. This fault cuts the argillaceous limestones in the west.

Observations on the fault zone show that there is no tectonic brecciaitization where the İnler Plateau effects the veins. At the same time, this fault crosses the 1805 m. elevation gallery at the 200 m. point, and forced the No. 2 Vein. This fault gained a slip between X:67547-Y:38723 and X:67537-Y:38755 coordinate points. However, the No. 2 vein between these coordinate points may be observed as a 5-10 cm. thick, 30 m. long and 120° directional fault. There is no tectonic brecciaitization along the 120° directional fault.

In the gallery, around this fault zone, there are mineralized quartz capillaries at the 120°/90° direction with a dip and they are approximately 1-2 cm. thick.

At the surface, 200 m. north of the İnler Plateau fault, at the Maden road-cut, there is a 5-10 cm. thick mineralized quartz capillary at the 120°/90° directional with a dip. These capillaries at the X:67555-Y:38640 coordinate points intersect the east-west mineralization (Fig.).

Based on all of these observations and obtained data this fault developed after the east-west fault and before the ore developed.

<u>Maden Tepe Northwest-Southeast Directional Mineralized Fault (100°-120°):</u>

This fault is located in the northeast section of the Balkovan Dere. It continues between the eastern section of the Maden Tepe and the southwestern slopes of the Uzunoluk Tepe in approximately a 1600 m. area.

This fault extends 120°/125° south direction with a normal slip fault. This fault forced fossiliferous argillaceous limestones to gain a 30-35 m. vertical slip in the lower sequence. Observations show that the northern section of the block rose and the southern section fell.

Along this fault zone, inside the crushed zone, mineralization, silicification, kaolinization and in someplaces, pyritization may be observed. Side rock pieces in the fault zone were cemented by mineralized solution.

This fault is cut by north-south early faults in someplaces. In the east, this fault cross cuts the Uzunoluk Tepe Fault.

The obtained data shows that this fault developed following the east-west fault development period at the mineralization stage development and moved during the post mineralization period.

Balkovan Dere Northwest-Southeast Directional Mineralized Fault (100°-120°):

This fault is located southwest of the study area. It continues between Filikalık Ridge and to the southeast of Uzunoluk Tepe in approximately a 1800 m. area.

Observations show that this fault extends for 120°/65° south direction and has a dip. The northern block of the fault rose and the southern block fell It is a normal fault.

In someplaces, mineralization may be observed in the crushed zones along the fault zone.

This fault is cross cut by the north-south directional early faults. In the south it cuts the east-west directional Balkovan Dere Fault. Based on this data (Balkovan Dere, 120° directional fault), the Balkovan Dere northwest-southeast directional fault developed after dike forming east-west directional faults and east-west directional mineralized faults and before the ore deposition.

II. 2.3.3. Post Mineralization Fault Development:

East-West Directional Faults:

Due to tectonic brecciaitization observations on the mineralized zones, it has been determined that these faults moved during the post mineralization period.

Northwest-Southeast Directional Faults (120°-160°):

I/1 No. Fault:

This fault is located northeast of the study area. It continues between X:67775-Y:38400 and X:67140-Y:38890 coordinate points in approximately a 700-750 m. area.

As a result of the drill, gallery and surface observations this fault extends 120°/70° north, 130°/90° directional and contains a dip.

This fault effects the Sarı Vein in the west and the No. 3 Vein and argillaceous limestones in the east, and slipped them towards the south a few cm..

Observations in the galleries concerning this fault reveal that an approximately 5-50 cm. thick kaolinization, and in someplaces, breccias are observed, and are determined in the fault zone. Due to this observation, this fault developed during the post mineralization period.

I/2 No. Fault:

This fault is located northeast of the study area. It continues between X:67855-Y:38400 and X:67580-Y:39000 coordinate points in an approximately 700-750 m. area. In the field it is represented by brecciatization and crushed zones in someplaces.

It extends for 120°/60°-75° north direction and is a normal slip fault with a dip. The northern block of this fault fell and the southern block rose.

This fault cross cuts the argillaceous limestones in the west and it slips the Main Vein baritified and silicified heads.

Due to the results of the studies, this fault developed during the post mineralization period.

I/3 No. Fault:

This fault is located northeast of the study area. It continues at the X:37950-Y:39000 coordinate points for 600-700 m. area.

This fault extends for 120°/70° north direction, dips and is a normal slip fault. The northern block of this fault fell and the southern block rose. This fault cuts the Mortaş Vein at the X:67845-Y:38680 coordiante points and blocks the argillaceous limestones in the sooutheast section of the Maden road-cut. Its effects may not be determined in the east because of landslides.

In someplaces, cm. long crushed zones and brecciaitization may be observed at the fault zone.

As a result, this fault developed during the post mineralization period.

I/4 No. Fault:

This fault is located north of the İnler Plateau. It continues along the Karaorman Deresi in an approximately 450-500 m. area. In the field it is represented by kaolinization and brecciaitization inside the crushed zones.

It extends 130°/75°-80° south direction, dips and is a normal slip fault. The northern section of the block rose and the southern section of the block fell.

In the southern section of this fault, as a result of the fault movements, brownish rhyodacitic tuffs, which were located at the base of the sequence, outcropped.

As a result of the investigations, it has been determined that this fault developed during the post mineralization period.

As a result of the movement of this fault in the İnler Plateau, a graben formed and this graben caused the deposition of 150-200 m. thick tuff.

North-South Directional Faults:

K/1 Fault:

This fault is located east of the study area. It continues between the X:67660-Y:38440 and X:67240-Y:38570 coordinate points to the west of the Balkovan Dere for approximately a 950 m. area. In the field it is represented in someplaces by crushed zones.

This fault extends 160°/85° west direction, dips and is a normal slip fault. The eastern section of the block rose and the western section of the block fell. It has a 20-30 m. vertical slip.

In the north, it caused the Maden Tepe mineralization (80°-90°) and in the south, it slipped the Maden Tepe northwest-southeast directional mineralized fault (120°).

As a result of these investigations, these faults are the earliest developed faults in the post mineralization period.

K/2 Fault:

It continues between the eastern section of Maden Tepe and along the Odalar Plateau around a 1650-1700 m. area. In the field it is represented in someplaces by crushed zones and brecciaitization. This fault extends 190°-200°/75° east direction, dips and is a normal slip fault. The eastern section of the block fell and the western section of the block rose. Studies show that this fault slipped 10-20 m.

In the north this fault cross cuts the east-west directional and northwest-southeast directional Maden Tepe Mineralizations. In the south it caused the east-west directional Odalar Plateau Mineralizations and crushed brecciaitization, also slipping the pyroxene-andesitic dike.

As a result of the studies, the K/2 fault is one of the earliest faults developed in the post mineralization period.

K/3 Fault:

This fault is located in the western section of the study area and is 200-250 m. west of the K/2 fault. It continues to the east of the Maden Tepe and Kuzuluk Location, around a 1500-1550 m. area. In the field this fault is represented by crushed zones in someplaces.

As a result of the investigations, this fault extends 190°-

200°/70°-75° east direction, dips, and is a normal slip fault. The eastern section of the block fell and the western section of the block rose. Studies reveal a 10-150 m. slip.

This fault blocks the east-west directional Filikalık Ridge Fault, which is located in the northern part of the Balkovan Dere. In the south, it slipped the Odalar Plateau Mineralization (80°-90°).

As a result this fault developed during the post mineralization period.

K/4 Fault:

This fault is located in the western part of the study area and is 200-250 m. west of the K/3 Fault. This fault continues from west of the Maden Tepe, in the south up to the Balkovan Dere in an area of approximately 700 m..

This fault extends for 190°/75° west direction, dips and is a normal slip fault. The eastern section of the block fell and the western section rose. Studiews reveal a 10-15 m. slip.

At the north, this fault effects the east-west dike and the east-west mineraliztion and slipped them.

Due to this data, it has been determined that the fault developed during the post mineralization period.

K/5 Fault:

This fault is located in the western part of the study area 150-200 m. west of the K/4 fault. It continues from Filikalık Ridge south to the Balkovan Dere in an approximately 450-500 m. area. In the field it is represented by crushed zones.

This fault extends 200°/70°-75° west direction, dips and is a normal slip fault. The eastern section of the block fell and the western section of the block rose. Studies reveal a 3-5 m. slip.

This fault caused the Maden Tepe east-west mineraliztion and effected the east-west dike. This fault also slipped the dike.

These investigations concluded that, this fault developed during the post mineralization period.

II. 3. RESULT OF THE GEOLOGICAL EVOLUTION:

The variety and richness of the magmatic activities dominate the geological characteristics of the study area and its surroundings. Studies conducted on the plutonic rocks in the neighboring area shows the existence of magmatism which evolved from dioritic composition beginning in the Cretaceous and which continued to an alkali syenitic compostion (Çalapkulu, 1982; Ayan, 1991).

This magmatism most probably is acidic in compostion in Campanian and developed by the release of eruption by-products into the marine environment. Conglomeras, which cover the Balkovan Dere and Filikalık Ridge rhyodasitic tuffs, show that in this period the environment was very shallow in depth. After this acidic phase, the magmatic composition became basic and an important amount of andesitic agglomera, tuff, and tuffites formed. Acidic eruptions joined these units from time to time.

The calm periods consisted of when the volcanic activities slowed down or completely stopped, the sedimentation on the marine environment continued with argillaceous limestone deposition.

Due to the preliminary data obtained from the radiometric age determination of the plutonic rocks and contact metamorphic Fe mineralization between the Hizar Dere intrusion rocks and the rhyolite-rhyodacite volcano-sedimentary sequence, it was concluded that the plutonic intrusions settled on the depth zone in this period (Arac, 1983).

Sometimes the east-west and north 10°-20° east directional normal faults, where dike emplacements occur in someplaces, followed development of the the volcano-sedimentary sequençe. Thus deep faults developed which reached the magma chamber and andesitic dikes settled in this fault zone at the southern slope of the Balkovan Dere; Filikalık Ridge and Maden Tepe east-west directional; Uzunoluk Tepe north 10°-20° directional and possibly up to Ugurluca village.

Later the horst graben structure formed with the development of east-west directional faults, which did not go as deep as the previous faults. In this geological environment, today one may say that, the İnler Plateau is equivalent to a depression, Maden Tepe is equivalent in elevation, and Balkovan Dere is equivalent to the graben in the south (Fig.). The Maden Tepe horst sometimes rises up to sea level and erodes. Most of the erosional material is deposited in the İnler Plateau graben. In the later period, mineralization settled on the east-west directional faults and the north 120° fault, which were developed during the last part of the mineralization, effected the mineralization in negative ways.

The geologic evolution has a transgressive character at the end of the Maastrichtian, when the area became a terrestrial environment following the erosion and peneplanation stage. This continued at the shallow environment with carbonated cemented sandstones covering the other units discordantly. These units continued sequentially: andesitic tuff, biotitic-andesite, and in someplaces pillow lava basalt propagations. The last tectonic phase formed the north-south directional faults which effect all of these units.

DEREKÖY LEAD-ZINC MINERALIZATION

III. DEREKÖY LEAD-ZINC MINERALIZATIONS:

These mineralizations are located inside the study area and may be observed northwest of Sebinkarahisar, around İnler Plateau, Balkovan Dere and Odalar Plateau.

The study area mineralization is located in the Eastern Black Sea Metalogenic Belt, where the most important Pb-Zn-Cu mineralizations in Turkey are located (Çalapkulu, 1987). These mineralizations are categorized as: Koyulhisar and Sisorta type mineralizations. They are characterized by a poor paragenesis. They are dm.-m. thick and a few 100 m. in length. They are channeled in acidic and intermediate composition units. They are grouped according to their locations. These locations are as follows:

1) İnler Plateau Mineralization:

This section is located in the northeast area of the study area. This mineralization formed in the andesitic, dacitic-rhyodacitic units. It is represented by seven veins.

2) Maden Tepe Mineralization:

This mineralization is observed north of the Balkovan Dere and in the southern and southwesten sections of the İnler Plateau. This mineralization begins in the southern section of Filikalık Ridge, follows the southern section of Maden Tepe, and along the Azak and Yara Quarries all the way to the southern section of the İnler Plateau. This area is represented by one vein.

3) Balkovan Dere Mineralization:

This mineralization is located in the western section of the study area, the southern section of Filikalık Ridge and the northern section of Balkovan Dere. It appears as a very wide alteration zone. This mineralization is represented by various veins.

4) Kuzuluk Location and Odalar Plateau Mineralization:

The Kuzuluk Location Mineralization is located southwest of the study area, and the southern section of the Balkovan Dere. The Odalar Plateau Mineralization is located in the southwest section of the study area. These mineralizations are represented by nine veins in the western part of the Odalar Plateau and by 17 veins northwest of the Odalar Plateau.

III. 1. İnler Plateau Mineralizations:

This mineralization is located in the southwest section of Tutak Dag and the surrounding area of the İnler Plateau. Through this mineralization the following amounts of core holes were drilled with their corresponding years: 1988, 304 m.; 1989, 1779 m.; 1990, 1381 m.; 1992, 4165 m.; for a total amount of 7629 m. of core holes drilled. Ber Oner Mining Co. opened a 260 m. long prospecting gallery at various elevations.

The İnler Plateau mineralization is observed in seven different veins. These veins are from north to south: Mortaş Vein, Sarı Vein, Main Vein, Secondary Vein, No. 2 Vein and No. 3 Vein.

The mineralizations are strikes of 80°-100° and dip 60°-90° north. The length of the veins vary from 100-450 m. and continue vertically for 100-300 m. The thickness of the veins changes from dm. to 10 m. or more.

The most important part of the Morats Vein has been exploited and prospecting is continuing in the rest of the veins.

III. 1.1. MORTAŞ VEIN:

a) Geographical Location and General Characteristics:

This vein is located in the northern section of the study area and to the far north of the İnler Plateau. It may be observed on the surface between the X:67875-Y:38530 and X:67820-Y:38735 coordinate points, and continues for 210 m. with baritified and silicified heads. In someplaces the vein has alteration zones with minerals.

The 1790-1756 and 1725 m. elevations were previously exploited, however, there is data for the continuation of the lower elevations and the quality of the vein in/or after the 1725 m. elevation.

The vein extends 80°-90°/80°-90° north direction and dips.

The vein developed inside the andesitic units and 5-120 cm. long capillaries may be seen in the same direction in the side rock veins. There is silicification, chloritization, and carbonatization observed towards the side rock to the vein.

The zone at the top of the vein is kaolinized, approximately 5-10 cm. thick, and in someplaces, chloritization may be observed. The base is an angular transition to the side rock.

The vein is lenticular and angularly enriched. The thickest section of the lenses is approxitely 2 m. at the 1750 m. elevation. The horizontal length is 90 m. and is disseminated and/or thinned to the east and west and then disappears.

The vertical length is 75 m.. After the 1725 m. elevation it is branched and disseminated, mineralized and/or disappears as a very thin vein.

Studies conducted at the 1725 m. elevation gallery show that the vein is in general, 10-50 cm. thick, however, in someplaces the thickness reaches 1-1.5 m.. The mineralization is crushed and has brecciatization. At the point where the gallery cuts the vein towards the east is between 40-120 m. with a 120° fault. In the fault zone an approximately 1 m. thick kaolinized zone may be traced. The eastern block of the fault slipped 30 m. to the south.

In the minrealization zone, it has been observed that the mineralized solution cemented the side rock elements with the ore minerals. As a result, the vein appears as a breccia. The mineralization is usually massive structure.

b) Drill and Gallery Data:

<u>Drill Data:</u>

The drill holes which cut the vein are from west to east: 89/6, 89/7, 90/5, 90/2, 90/3, and 90/4 drill holes.

Through the previous exploitation, most of the vein was extracted and because of this the drilling data has not been considered.

<u>Gallery Data:</u>

There were galleries opened at the 1790 and 1756 m. elevations, however, they were closed for exploitation for a long time and as a result they were not investigated in detail.

Studies in the 1725 m. elevation gallery illustrate that the majority of the vein at this elevation mostly disseminated and in someplaces the mineralization zone contains 0.2-0.5 m. thick massive capillaries.

The vein in this elevation extends 90°/60° north extension and dips. It developed in the andesitic units. From the side rock to the vein, chloritization, silicification, and carbonatization may be observed.

c) Evaluation of the Drilling and Gallery Data:

This vein is disseminated and/or disappears as a thin massive capillary to the west of X:67875-Y:38530 corrodinate point and east of X:67820-Y:38535 coordinate point. Studies show that the vein is lenticular and thins out in depth around the 1725 m. elevation. It is expected that below this elevation it disappears as a disseminated mineralization. The vein has a massive structure which reaches 1-1.5 m. in someplaces. The majority of the vein was previously exploited. Due to this exploitation there was no study for the economical evaluations of this vein.

III. 1.2. KUZEY VEIN:

a) Geographical Location and General Characteristics:

This vein is located northeast of the study area and 170-175 m. south of the Mortaş Vein. It may not be observed on the surface, however, the 4/1, 5/1, 6/1, 7/1, 8/0, 9/1, 9/2, and 10/1 drill holes cut this vein. The observed length of the vein is 350 m. and the approximate actual length of the vein is 400 m. The drill holes cut the vein between the 1843 and 1780 elevations. The vein reaches its maximum thickness between the 1840 and 1810 m. elevations. At these elevations the vein thickness is 5-8 m.. The vein becomes thinner at the 1870 m. elevation and drops to 50 cm. in thickness. The vein continues for 50-60 m. in a vertical direction, and possibly up to 150 m.. Under the 1780 m. elevation the vein thins, is a disseminated mineralization and/or is expected to thin as massive capillaries.

In the west it extends 80°-90°/75°-85° north direction, with a dip. In the east 100°-110°/90° directional and is also dipped.

Above the 1787 m. elevation the Kuzey Vein developed in a white colored acidic tuff, interstratified with andesitic tuff. There is no drill data to determine the units at the lower elevations.

Between the side rock and the vein contact zone, heavy silicification and chloritization and in someplaces ankerite may be observed.

The investigation on this vein does not reveal the roof and base faults. It was determined that there are graded transitions to the side rock.

The side rock minerals cemented with ore minerals at the mineralization zone. As as a result, the mineralization zone has a brecciated appearance.

The Kuzey Vein is a back formed mineralization settled on the east-west fault line (?).

The relation of the post mineralization period faults may not be determined because the vein is not outcropped and it may not be followed through the use of a gallery.

b) Drill and Gallery Data:

Drill Data:

Information concerning the drill data that cuts the vein is given below from west to east.

No. 4/1 Drill Hole:

This drill hole cuts the vein between the 1829 and 1821 m. elevations, with a 9-15 m. apparent thickness and a real thickness of 6.47 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	51.55								
	52.15	Intensly veinlet mineralization	0.42	8.5	4.56	0.057		0.0014	
	52.55								
	52.85		0.49	0.3	0.29	0.036		0.0005	
		Sterilized	1.09						
	54.40								
	54.65	Coarse disseminated mineralization	0.17	6.0	1.76	0.076		0.0005	
			0.88						
	55.90								
	56.20	Sligthly veinlet mine.	0.21	8.9	2.12	0.089		0.0011	
		Sterilezed	0.84						
	57.40								
	57.90	Sligthly veinlet mine.	0.35	10.3	2.26	0.40		0.0019	
	58.50		0.42	10.5	2.48	0.70		0.0027	
		Fine diss. mine.	1.08	2.5	0.74	0.31		0.0011	
	60.05								
	61.05	Intensly veinlet minaralization	0.7	9.9	5.48	0.11		0.0011	
	62.05	Sterilized	0.7	0.6	0.13	0.090		0.0005	

T: True Thickness (m)

No. 5/1 Drill Hole:

This drill hole cuts the vein between the 1843 and 1835 m. elevation. The apparent thickness is 8.85 m. and the real thickness is 5.07 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	74.00	Fine disseminated mineralization							
	80 50	Coarse disseminated	068	4.3	1.70	0.082		0.0008	
	81 70	Fine diss. mine.	028	0.6	0.42	0.019		0.0005	
	82 20	Slightly veinlet mine.	031	6.8	2.28	0.061		0.0005	
	82 75								
	82.85								

T: True Thickness (m)

No. 6/1 Drill Hole:

The drill hole cut the vein between the 1843 and 1822 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 13.95 m. and the real thickness is 8.78 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	84 30	Fructured oxidation zone with PbS and ZnS Crystals							
	86 70 86.95	Fine diss. mine.	0.15	3.5	0.73	0.035		0.0010	
			2.45						
	90.85 91.55	Very poor mineralization	0.44	0.2	0.23	0.018		0.0006	
		Sterilized	0.91						
	93.00 93.20	Sligthly veinlet mineralization	0.12	7.0	5.1	0.059		0.0020	
		Sterilized	1.76						
	96.00 96.30	VEry poor mine.	0.19	0.2	0.34	0.045		0.0010	
	96.55	Sterilized	0.16						
	98.15 98.25	Coarse disseminated mineralization	1.00	6.1	2.6	0.024		0.0005	

T: True Thickness (m)

No. 7/1 Drill Hole:

The drill hole cut the vein between the 1835 and 1828 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 9.85 m. and the real thickness is 7.80 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	86.55	Mineralized quartz vein							
		Very poor mineralization							
	92.40 92.85	Sligthly veinlet mineralization	0.33	8.9	1.7	0.012		0.0011	
		Sterilized	1.09						
	94.30 94.95	Fine diss. mine.	0.49	2.8	0.61	0.008		0.0005	
	95.35	Sterilized	0.30						
	95.80	Sligthly veinled mine.	0.33	8.5	2.44	0.038		0.0008	
	96.15		0.26						
	96.60	Coarse disseminated mineralization	0.33	7.3	0.49	0.007		0.0005	
		Sterilized	1.96						
	99.20 99.85	Fine diss. mine.	0.49	1.2	0.25	0.009		0.0005	
		Sterilized	1.36						
	101.65 102.25	Coarse diss. mine.	0.42	6.5	2.28	0.050		0.0008	

T: True Thickness (m)

No. 8/0 Drill Hole:

The drill hole cut the vein between the 1823 and 1813 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 10.8 m. and the real thickness is 6.8 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	96.55	Fine diss. mine							
	98.60 – 99.00	Fine diss. mine.	0.25	3.9	0.98	0045		0.0005	
		Sterilized ; İntensly kaolinization (Brecciated)	2.76						
	103.40 – 103.75	Coarse diss.mine.	0.22	4.8	0.76	0.073		0.0006	
		Sterilized	2.89						
		Thinly quartz vein.							
	108.35 – 109.40	Massive mineralization	0.66	26.50	3.1	0.094		0.0030	

T: True Thickness (m)

No. 9/1 Drill Hole:

The drill hole cut the vein between the 1817 and 1808 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 7.95 m. and the real thickness is 3.70 m.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	131.00 – 131.85	Fine diss. mine.	0.40	1.6	0.17	0.18		0.0008	
	131.85 – 132.30	Sterilized	0.21	0.3	0.07	0.008		0.0005	
	132.30 – 132.85		0.25						
	132.85 – 133.20	Fine diss. mine.	0.16	1.1	0.33	0.008		0.0005	
	133.20 – 133.70	Massive mineralization	0.24	13.8	3.20	0.028		0.0005	
	133.70 – 135.70	Fine diss. mine.	0.94	0.8	0.37	0.006		0.0005	
	135.70 – 136.40	Massive mineralization	0.33	16.6	1.28	0.11		0.0005	
	136.40 – 138.95	Sterilized							

No. 9/2 Drill Hole:

The drill hole cut the vein between the 1789 and 1787 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 1.8 m. and the real thickness is 0.54 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	146.15 – 146.55		0.12	0.3	0.04	0.13		0.0005	
	146.55 – 147.00	Fine diss. mine.	0.14	0.6	0.92	0.19		0.0011	
	147.00 – 147.55	Coarse veinlet mine	0.17	10.5	4.20	0.28		0.0019	
	147.55 – 147.95		0.12	0.3	0.05	0.11		0.0005	

T: True Thickness (m)

No. 10/1 Drill Hole:

The drill hole cut the vein between the 1799 and 1797 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 2.65 m. and the real thickness is 1.59 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	193.95								
		Fine diss. mine.	0.98	2.4	0.54	0.030		0.0008	
	195.60								
		Very poor mineraliza-tion	0.60	0.6	0.39	0.036		0.0006	
	196.60								

T: True Thickness (m)

Gallery Data:

The Kuzey vein was not checked by gallery.

c) Evaluation of the Drilling and Gallery Data:

As a result of the correlation of the drill data between the 1840 and 1800 m. elevation, the vein reaches its economical dimensions. It is determined that in this elevaiton at X:67665-Y:38600 coordinates points, the vein extends from the west towards the east, 350 m., possibly a 400 m. area. In the east, the No. 10/1 drill hole showed that further east of the X:67655-Y:38990 coordinate points, the vein thins out as a disseminated mineralization.

In the vertical direction below the 1780 m. elevation the vein thins out as a disseminated mineralization and/or massive capillaries.

As a result of the vein quality distribution, it was determined that there is ore enrichment at the base of the mineralization zone, which is 0.70 m. thick and in someplaces reaches up to 1.5 m. thick. The northern section of this enriched mineralization level is where lenticular lower quality levels are located. Between these lenses there are sterile levels with thicknesses up to 4 m. (See Appendix 11).

III.1.3. SARI VEIN:

a) Geographical Location and General Characteristics:

This vein is located northeast of the study area, 30-35 m. south of the Kuzey Vein and approximately 30 m. north of the Main Vein. At the surface between the X:67630-Y:38700 and X:67625-Y:38627 coordinate points there is a silicified thin zone is observed. At the X:67625-Y:38627 coordinate points towards the west there is a 490 m. length mineralized and in someplaces hydrothermally decomposed mineral zone. At the coordinate points of X:67630-Y:38700 towards the east the vein may not be observed, however, the 89/1, 5/1, 6/1, 7/1, 89/5, and 90/1a drill hole data shows that the vein continues for 150 m. longer. The vein is in someplaces a disseminated mineralization and a mostly thin alteration zone in this location. Drill holes in the area show that the mineralization continues up to the 1740 m. elevation and vertical continuation is approximately 150-200 m.. In general, the vein extends 80°-90°/80° north direction and is dipped.

This vein in the east developed in white colored acidic tuff interstratified with andesitic tuff. West of the Aşcı Quarry inside the andesitic units the vein is observed.

It is observed that the silicification increases and in someplaces is effected by chloritization, towards the side rock vein.

This vein is a graded transition at the base and roof. The vein is effected by the İnler Plateau fault at the X:67630-Y:38420 coordinate points. The eastern block of the fault slipped approximately 20-30 m. to the south. Due to the observation of the crushing and brecciatization at the mineralization zone, it was determined that this fault developed in the premineralization period and/or at the last stage of the post mineralization period. This vein was effected by a 120° direction at the X:67625-Y:38630 coordinate points and crushing and brecciatization may be observed. The eastern block of the fault slipped 15-20 m. to the south.

b) Drill and Gallery Data:

Drill Data:

<u>No. 88/1 Drill Hole:</u>

This drill hole cut the vein at the 1739 m. elevation. The thickness of the vein was cut by the drill hole and the apparent thickness is 0.6 m. and the real thickness is 0.4 m.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	59.25 59.85		0.40	4.40	1.40	2.47	8.30	0.018	

T: True Thickness (m)

<u>No. 89/8 Drill Hole:</u>

This drill hole cuts the vein betweeen the 1753 and 1752 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 1.6 m. and the real thickness is 1 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	112.15 – 113.05		0.33	9.40	6.60	0.17			
	113.05 – 114.00	Steril	0.63	0.20	0.10	0.006			
	114.00 – 114.15		0.10	9.70	2.30	0.22			

No. 89/1 Drill Hole:

This drill hole cuts the vein between the 1860 and 1857 m. elevations. The thichness of the vein was cut by the drill hole and the apparent thickness is 2 m. and the real thickness is 1.34 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	44.70								
	44.90		0.05	3.50	0.80	0.052			
	45.40	Steril	0.53	0.60	0.22	0.010			
	46.20								
	46.40 – 47.40		0.67	1.00	0.84	0.026			

No. 5/1 Drill Hole:

This drill hole determined that at the 1788 m. elevation the vein is a crushed zone and contains 1-2 cm. thick mineralized quartz capillaries.

No. 6/1 Drill Hole:

The drill hole data shows that this vein is 50 m. thick at the 1792 m. elevation. The vein at this elevation is a limonited mineralized zone cemented with hematite.

No. 90/1a Drill Hole:

The drill hole data shows that the vein has a 2.58 m. real thickness at the 1950 m. elevation. The vein at theis elevation is an oxidized mineralized zone, which in someplaces contains quartz veins.

No. 7/1 Drill Hole:

The drill data shows that at the 1790 m. elevation the vein is 30 cm. thick. The vein at this elevation is a disseminated mineralization level.

Gallery Data:

The 1805 m. elevation gallery cuts the Sarı Vein at the 110 m. depth. The vein at this elevation is an enriched mineralization zone which is 1-1.5 m. thick. It was determined that the vein at this elevation developed acid tuffs. There is an increase of silicification along with chloritization towards the vein from the side rock. The vein shows a graded transition at the base and roof. The vein turns towards the north through the effect of a 120° fault.

c) Evaluation of the Drill and Gallery Data:

As a result of the drill, gallery, and outcrop data correlations, it was determined that the vein is lens shaped at the Aşcı Quarry.

The maximum thickness of this lens is 1.5-2 m. and continues up to the 1740 m. elevation.

As a result of these studies it was also determined that the Sarı Vein did not developed any economical mineralization.

III. 4.1. MAIN VEIN:

a) Geographical Location and General Characteristics:
This vein is located in the northeastern section of the study area, and 30 m. south of the Sarı Vein. It is the most distinguishable vein because of the baritified and silicified heads on the surface. The vein outcropped at the X:67550-Y:38630 coordinate points in the west and continued for 300-400 m. towards the east.

In the west, this vein extends 80°-90°/60°-80° north direction and it is dipped. In the east, this vein extends 100°/90° direction and is dipped.

In the 1725 m., 1805 m., and 1850 m. elevations, the vein was investigated. At the 1805 m. elevation, containing a 210 m. long prospecting and exploitation gallery, the morphology, the quality distribution and the continuation towards the east were investigated. The correlation results of the obtained gallery and drill data show that the vein may be branched after the X:67600-Y:38875 coordinate points.

The investigation reached its maximum real thickness of 21.30 m. between the 1750 and 1850 m. elevations. Below the 1700 m. elevation, the vein is thinned, and in someplaces disseminated and/or appears as thin massive capillaries.

As a result of the drill and gallery investigation, the vein is located above the 1700 m. elevation in the acidic tuffs and below the 1700 m. elevation, in the andesitic units. In the western section of the vein, with the connection of the rising andesitic units south of the ore road, the vein developed.

There is an increase of silicification and chloritization, with in someplaces the development of carbonatization, observed from the side rock to the vein.

The generic characteristics of the side rock control the morphology and enrichment of the vein. In the acid tuffs, the vein thickness increases and the quality is enriched. However, in the andesitic units, the vein is thinned,in someplaces disseminated and/or thinned out as thin massive capillaries.

The roof of the vein is characterized with kaolinization, where 5-10 cm. thick chloritization may be observed. The base of the vein is a zone where there is graded transition to the side rock.

The vein is characterized at the surface by baritified and silicified heads around a 300-400 m. area. These heads are 30-35 m. thick. The drill data shows that baritification and silicification continued down to the 1900-1925 m. elevation. At the surface at the 1925 m. elevation, the zinc blende galena crystals and crystal cavities, which formed as a result of the washing out and transportation of these crystals, were observed.

The vein in the upper elevation between the 1900 and 1850 m. elevations, in someplaces down to the 1800 m. elevation, were effected by heavy meteoric alterations. The data obtained from the 89/5, 90/1a, and 8/2 drill holes, along with the 1880 m. and 1850 m. elevation galleries, show that the quality of the zinc in this zone is very low.

The vein thickness reaches its maximum at the 1800 m. elevation. The real thickness is 22 m. in this area.

Below the 1750 m. elevation the vein thins and at the 1700 m. elevation is branched as massive thin capillaries and then thins out.

The vein developed in the andesitic units west of the Maden road-cut. The vein is characteristically a disseminated mineralization and/or thinned capillaries in this area. The mineralization has a massive structure towards the east.

The vein reached a 22 m. thickness at the 1800 m. elevation and Y:38850 coordinate point. Towards the east of this coordinate point, in a 30 m. long area, the vein is a disseminated mineralization in character. It was determined that the vein may be branched in the eastern section of this area based on the 9/1, 9/2, 10/1, and 10/2 drill hole data. There is no data to determine the vein continuation towards the east.

Observations along the mineralization zone show that the ore solutions cemented the side rock breccias along the fault zone. As a result the mineralized zone appears as a brecciatization.

The vein is settled in a 80°-90° directional fault and backformed mineralizations.

In the west, 80-90 m. east of the Maden road-cut, the vein is effected by the 120° directional İnler Plateau fault and the eastern block of the fault slips 20-30 m. to the south. The investigation of the fault zone does not reveal any tectonic brecciatization on the mineralization along the fault zone.

b) Drill and Gallery Data:

Drill Data:

The drill data concerning the vein is as follows from the west to the east.

<u>No. 4/1 Drill Hole:</u>

The drill hole cuts the vein between the 1750 and 1733 m. elevation. The thickness of the vein was cut by the drill hole and the apparent thickness of the vein is 19.65 m. and the real thickness of the vein is 16.66 m.. The vein in this area has disseminated mineralization characteristics although massive ore capillaries around 33-63 cm. thick at 3 level may also be observed.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	143.95								
	144.00		0.76	0.3	0.14	0.036		0.0005	
	144.85	Sterilized	0.97						
	146.00	Fine disseminated mineralization	1.27	3.0	1.10	0.23		0.0005	
	147.50	Sterilized Crushed zone Sterilized	5 04						
	153.45	Cholorization	0.59	0.6	0.32	0.26		0.0005	
	154.15	Sterilized	0.42						
	154.65	Sligthly veinlet mine.	0.33	11.1	0.69	0.45		0.0008	
	155.05	Sterilized	0.29						
	155.40	Sligthly veinlet mine.	0.55	7.7	1.52	0.18		0.0008	
	156.05	Fine diss. mine.	0.63	3.4	0 54	0 68		0.0005	
	156.80	Veins with coarse ZnS crystals Fine diss. mine.							
	163 60								

No. 89/1 Drill Hole:

The drill hole cuts the vein between the 1780 and 1770 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 10.6 m. and the real thickness is 8.06 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	128.00 – 129.15		0.94	21.40	6.40	0.15			
	129.15 – 129.50	Steril	0.29	0.20	0.27	0.05			
	129.50 – 132.05		2.09	11.70	5,50	0.41			
	132.05 – 135.10	Steril	2.49						
	135.10 – 136.55		1.19	4.50	1.90	0.12			
	136.55 – 137.25		0.57	15.50	2.50	0.09			
	137.25 – 137.70		0.37	3.80	0.76	0.04			
	137.70 – 138.60		0.82	33.00	8.90	0.18			

T: True Thickness (m)

No. 88/2 Drill Hole:

The drill hole cuts the vein between the 1838 and 1832 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 7.45 m. and the real thickness is 6.10 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	80.60								
			1.80	1.80	0.88				
	82 85								
			1 80	12.80	4.20	0. 24	2.80	0.0015	
	85.05								
			2.62	2 20	0 55	0 15		0.0007	
	88.25								

T: True Thickness (m)

No. 89/5 Drill Hole:

The drill hole cut the vein between the 1906 and 1887 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 22.85 m. and the real thickness is 12.85 m.. It is a lower quality mineralization zone.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	53.65								
	54.70		0.57	4.20	2.00	0.009			
		Steril	0 97						
	56.40								
	56.55		0.09	1.00	0.07	0.002			
		Steril	1 99						
	60.05								
	60.85		0.46	1.40	0.44	0.10			
		Steril	6.15						
	71.65								
			1.51	0.40	0.005	0.009			
	74.30								
	76.20		1.08	1.00	0.23	0.005			

No. 90/1a Drill Hole:

The Main Vein was cut by the drill hole between the 1915 and 1903 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 14.7 m. and the real thickness is 6.3 m.. It is represented as a disseminated mineralization and located in the acid tuff.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	61 80								
			0.86	0.20	0.08	0.06			
	63 80								
			1.46						
	67 20								
			0.56	0.20	0.10	0.004			
	68 50								
			0.34						
	69 30								
			0.54	0.20	0.10				
	71 55								
			2.02						
	76 20								
			0.17	0.20	0.10				
	76 50								

No. 5/0 Drill Hole:

The drill hole cut the vein between the 1691 and 1688 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 2.95 m. and the real thickness is 2.82 m.. It is represented as a disseminated mineralization and is located in the chlorified, silicified andesitic units.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	223.20								
		Fine dissaminated Mineralization	1.72	0.7	0.3	0.035		0.0009	
	225.00								
		Poor mineralization	1.09	0.7	0.20	0.11		0.0005	
	226.15								

T: True Thickness (m)

No. 5/1 Drill Hole:

The drill hole cut the vein between the 1761 and 1747 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 16.5 m. and the real thickness is 13.5 m. It is located in the acidic characterized white tuff.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	168.60								
	168.90	Coarse disseminated mineralization	0.24	6.4	1.68	0.12		0.0008	
	169.20	Ore mineral vein (5–10cm) with coarse PbSand ZnS crystals Sterilized	3.80						
	173.90		1.13	19.3	4.20	0.19		0.0034	
	175.30		1.15	17.1	4.24	0.33		0.0023	
	176.75	Massive mineralized	2.54	34.0	14.64	0.19		0.0059	
	179.90	Sterilized	1.74						
	182.05	Intensly veinlet mine.	1.33	9.9	3.24	0.21		0.0025	
	183.70	Sterilized	0.68						
	184.55	Massive mineralization	0.24	25.7	6.80	0.12		0.0028	
	184.85	Massive mineralization	0.24	15.8	5.40	0.17		0.0023	
	185.20								

No. 6/1 Drill Hole:

The drill hole cut the vein between the 1761 and 1744 m. elevations. The thickness of the vein was cut by the drill hole. The apparent thickness is 20.75 m. and the real thickness is 15 m.. Hematitization and brecciatization may be observed in the vein.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	182.10	Thinlg veinlet mineralization with hematite							
		Very poor mineralization							
		Mineralized quartz veinlet with 10cm thickness							
		Mineralization such as disseminated							
		Mineralized quartz veinlet with 5-10 cm thickness							
	193.20	Sligthly veinlet mine.	0.65	6.1	3.1	0.55		0.0013	
	194.10	Coarse diss. mine.	0.65	4.8	2.1	0.28		0.0006	
	195.00	sligthly veinlet mine.	1.61	7.4	2.8	0.086		0.0005	
	197.20	Mineralized quartz veinlets with 5-10cm thickness (seen four-times)							
		very poor mine							
	202.85								

No. 7/1 Drill Hole:

The drill hole cut the vein between the 1776 and 1769 m. elevations. The thickness of the vein was cut. The apparent thickness is 9.4 m. and the real thickness is 8.4 m.. The vein is located in the acid tuffs.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	172.35 173.05	Coarsedisseminated mineralization	0.62	3.6	1.40	0.51		0.0011	
		Sterilized	1.47						
	174.70 175.10	Intensly veinled mineralizateon	0.35	11.7	4.0	0.20		0.0022	
			0.67	0.2	0.20	0073		0.0005	
	175.85 176.35		0.44	1.1	0.28	0.054		0.0005	
		Fine diss. mine.	2.40	1.5	0.69	0071		0.0006	
	179.05		0.62	10.5	0.31	0073		0.0006	
	179.75	Sligthly veinled mine							
		Massive mineralization	0.67	30.4	19.7	0.32		0.0045	
	180.50 180.85	Fine diss. mine.	0.31	2.4	1.22	0.28		0.0006	
		Sligthly mineralizet quartz veinlets							

T: True Thickness (m)

<u>No. 8/0 Drill Hole:</u>

The Main Vein I was cut by the drill hole between the 1734 and 1727 m. elevations. The thickness of the vein was cut by the drill hole. The apparent thickness is 4.6 m. and the real thickness is 2.77 m..

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	199.45	Mineralization (2cm) Fine dissemineted mineralization with sligthlykaolinization	-						
	202.40	Coarse disseminated mineralization	0.87	5.6	3.1	0.16		0.0010	
	203.85	Sterilized	0.12						
	204.05	Fine diss. mine.	0.21	1.0	0.25	0.009		0.0005	
	204.40		1.32						
	206.50	Fine diss.mine.	0.30	1.0	0.74	0.033		0.0005	
	207.00								

T: True Thickness (m)

No. 8/0 Drill Hole:

The Main Vein was cut by the drill hole between the 1706 and 1691 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 16.55 m. and the real thickness is 10.4 m.. The vein is located in the andesitic units and is represented as a 22 cm. thick massive capillary and disseminated mineralization.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	231 20	Fine diss. mine.							
	232 15 232 50	Massive mineralization	0.22	34.0	5.6	0.33		0,0050	
		Quarts veinlets with ore minerals							
		Sligthly fine dissemi-nated mineralization							
	246.45 247.75	Sterilized	0.85	0.2	0.55	0.033		0.0010	

No. 8/1 Drill Hole:

The drill hole cut the vein between the 1827 and 1803 m. elevations. The thickness of the vein was cut by the drill hole. The apparent thickness is 31.25 m. and the real thickness is 21.35 m.. The vein is located in the silicified acidic tuffs. The mineralization has a fractured structure.

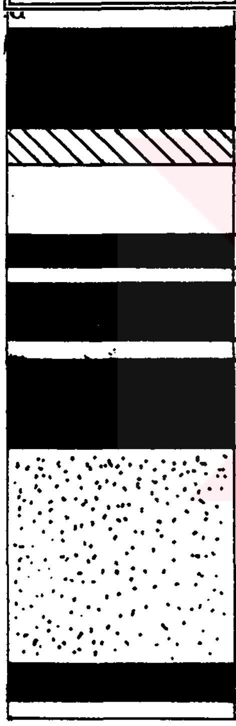
VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	137.20		0,98	0.5	0.28	0,021		0.0005	
	138.65	Sligthly veinlet mine.	1.74	6.9	2.42	0.36		0.0028	
	141.20	Massive mineralization	0.34	28.0	20,03	0.075		0.010	
	141.70	Fine diss. mine.	1.87	1.1	0.13	0.015		0.0008	
	144.45	Coarse diss. mine.	0.78	5.6	1.42	0.044		0.0023	
	145.60		1.36	1.5	0.63	0.039		0.0005	
	147.60	Fine diss. mine.	3.89	1.1	0.12	0.0070		0.0005	
	153.30	Sligthly veinlyet mine.	0.37	7.7	1.88	0.026		0.0020	
	153.85		0.95	1.1	0.17	0.011		0.0005	
	155.25	Fine diss. mine.	1.53	1.1	0.45	0.012		0.0006	
	157.50		1.67	1.5	0.31	0.037		0.0005	
	159.95	Sterilizet	0.47	0.20	0.17	0.012		0.0005	
	160.65		0.30	2.4	1.0	0.059		0.0006	
	161.10		1.46	3.0	1.60	0058		0017	
	163.25	Fine diss. mine.	1.23	3.4	3.04	0.14		0.0017	
	165.05	Coarse disseminated mineralization	1.94	4.7	1.7	0.093		0.0016	
	167.90	Sligthly veinlet mineralization	1.05	8.5	3.52	0.14		0.0011	
	169.45								

No. 8/2 Drill Hole:

It was observed that the vein is between the 1963 and 1962 m. elevations with an accumulation of pyrite, baritified, silicified, and in someplaces kaolinified levels.

No. 9/1 Drill Hole:

The drill hole cut the vein between the 1746 and 1739 m. elevations. The thickness of the vein was cut and the apparent thickness is 8.7 m. and the real thickness is 4.0 m.. The vein is located in the acid characterized tuff.



VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	212.05 – 213.40	Massive mineralization	0.61	29.6	4.80	0.22		0.0018	
	213.40 – 213.85	Sligthly veinlet mineralization	0.20	7.7	2.48	0.15		0.0008	
	213.85 – 214.80	Sterilized	0.44						
	214.80 – 215.25	Massive mineralization	0.20	22.3	9.10	0.19		0.0023	
	215.25 – 215.45		0.09						
	215.45 – 216.20	Massive mineralization	0.34	19.5	5.60	0.32		0.0022	
	216.20 – 216.45		0.12						
	216.45 – 217.60	Massive mineralization	0.52	21.9	7.20	0.21		0.0022	
	217.60 – 220.50	Fine diss. mine.	1.32	1.1	0.86	0.055		0.0005	
	220.50 – 220.95	Massive mineralization	0.20	15.4	7.28	0.20		0.0040	

T: True Thickness (m)

No. 9/1 Drill Hole:

The Main Vein II was cut by the drill hole between the 1702 and 1697 m. elevations. The thickness of the vein was cut by the drill hole. The apparent thickness is 6.85 m. and the real thickness is 3.0 m.. The vein is located in the andesitic units.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	264.30 – 264.70	Intensly veinlet mineralization	0.17	11.3	1.80	0.068		0.0015	
	264.70 – 266.25	Sterilized	0.69						
	266.25 – 267.40	Sligthly veinlet mine.	0.51	8.1	2.80	1.03		0.0011	
	267.40 – 268.65	Coarse diss. mine.	0.55	4.0	1.76	0.27		0.0005	
	268.65 – 269.25	Sterilized	0.26	0.6	0.31	0.28		0.0005	
	269.25 – 270.85	Sligthly veinlet mine.	0.71	8.5	2.20	0.76		0.0019	

No. 9/2 Drill Hole:

The Main Vein I was cut by the drill hole between the 1672 and 1671 m. elevations. The thickness of the vein was cut by the drill hole. The apparent thickness is 45 cm. and the real thickness is 14 cm.. It is represented as a massive vein and it is located in the andesitic units.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	271.00 – 271.45	Intensly veinlet mine.	0.14	12.2	2.80	0.33		0.0005	

T: True Thickness (m)

No. 9/2 Drill Hole:

The Main Vein II was cut by the drill hole between the 1602 and 1593 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 10 m. and the real thickness is 3 m.. It is represented as a disseminated and scattered mineralization.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	344.50 – 344.95		0.14	0.6	0.25	1.28		0.0005	
	344.95 – 346.65	Sterilized	0.51						
	346.65 – 346.95		0.09	0.3	0.06	1.21		0.0005	
	346.95 – 349.80	Sterilized	0.85						
	349.80 – 351.65	Sterilized	0.55	0.3	0.23	0.55		0.0005	
	351.65 – 354.50	Sterilized	0.85	0.3	0.14	0.58		0.0005	

T: True Thickness (m)

No. 10/1 Drill Hole:

The Main Vein I was cut by the drill hole between the 1743 and 1736 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 9 m. and the real thickness is 5.3 m.. It is represented as a mostly disseminated mineralization, and in someplaces massive.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	260.75 – 263.30	Very poor mine	1.51	0.6	0.08	0.029		0.0005	
	263.30 – 264.80								
	264.80 – 265.90	Fine diss. mine.	0.65	1.5	0.29	0.082		0.0005	
	265.90 – 269.25	Sterilized	1.97						
	269.25 – 270.10	Sligthly veinlet mine.	0.50	8.1	4.4	0.096		0.0022	
	270.10 – 271.10	Fine disbs. mine.	0.59	2.4	0.4	0.040		0.0006	
	271.10 – 272.35	Sterilized	0.73						
	272.35 – 273.35	Coarse disseminated mineralization	0.59	5.7	2.28	0.18		0.0011	
	273.35 – 273.85	Fine diss. mine.	0.29	0.7	0.56	0.28		0.0008	

T: True Thickness (m)

No. 10/1 Drill Hole:

The Main Vein II was cut by the drill hole between the 1709 and 1706 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 4 m. and the real thickness is 2.43 m.. It is represented as a 1.25 m. thick massive ore capillaries including a mineralized zone.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	307.70–308.70	Massive mineralization	0.61	13.4	8.60	1.29		0.0045	
	308.70–309.75	Sligthly veinlet minè.	0.64	13.4	2.32	1.57		0.0022	
	309.75–311.35	Sterilized	0.97						
	311.35–311.70	Sligthly veinlet mine.	0.21	8.5	1.48	0.85		0.0008	

No. 10/2 Drill Hole:

The Main Vein I was cut by the drill hole between the 1845 and 1840 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 7.65 m. and the real thickness is 4.70 m.. It is represented as a disseminated mineralization.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	165.30–166 20	Fine diss mine.	0.56	0.2	0.07	0.015		0.0005	
		Sterilized	3.72						
	172.20–172.95	Fine diss. mine.	0.46	1.9	0.30	0.021		0.0005	

No. 10/2 Drill Hole:

The Main Vein II was cut by the drill hole between the 1709 and 1706 m. elevations. The thickness of the vein was cut by the drill hole and the apparent thickness is 14.7 m. and the real thickness is 9.25 m.. It is represented by a disseminated mineralization.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	190.40								
			0.51	3.1	1.14	0.011		0.0008	
	191.20								
			0.63	1.5	0.55	0.010		0.0008	
	192.20								
			0.79	1.0	0.18	0.015		0.0005	
	193.45								
			0.54	0.5	0.52	0.025		0.0005	
	194.30								
		Fine diss. mine.	1.83	1.1	0.41	0.016		0.0005	
	197.20								
			1.55	1.9	0.72	0.052		0.0013	
	199.65								
			1.04	1.9	0.31	0.031		0.0021	
	201.30								
			1.46	3.5	0.70	0.056		0.0013	
	203.60								
			0.95	1.1	0.77	0.033		0.0008	
	205.10								

T: True Thickness (m)

Gallery Data:

For prospecting purposes, at the 1721 m. elevation 400 m., 1805 m. elevation 380 m., 1850 m. elevation 110m., and 1880 m. elevation 70 m., a gallery was opened for a total gallery of 950 m..

At the 1725 m. elevation, the vein was cut at the 310 m. length of the gallery. The thickness of the vein is 7-8 m. in this location. It extends 80°-90°/60° north direction and is dipped. it developed inside the andesitic unit. Silicification, chloritization, and carbonatization may be observed from the side rock to the vein. The vein shows a graded transition to the side rock at the base and roof. This elevation has disseminated mineralization characteristics. Between the 310 and 330 m. area of the gallery, the vein was forced to turn towards the north through the effects of 190° faults. In this area, a 100°-120° extensional, 70° north dipped, 5-10 cm. thick massive mineralization may be observed.

In the 1805 m. elevation gallery, the vein was cut between the 150-160 m. area of the gallery. From this point to the north the vein was traced with a 210 m. gallery. For the vein thickness and quality distribution, a 5 "T" 's were opened. The vein thickness changes from between 9-21 m. at this elevation. It extends 80°-90°/64°-90° north direction and is dipped. It developed in the white colored tuff, which has acidic characteristics. Extensive silicification, chloritization, and carbonatization may be observed from the side rock to the vein. There is a kaolinified zone where chloritization is also observed at the roof of the vein. The transition to the side rock is graded.

Disseminated mineralization occurs west of the 1805 m. elevation gallery cut. Between 10-180 m. of the gallery, the mineralization is mostly massive and in someplaces a disseminated structure in the east. At the 90 m., 200 m., and 210 m. of the gallery, the mineralization is completely disseminated.

In the west, a 120° directional fault forced the vein to turn to the north and the eastern block of the fault slipped sideways 20-30 m. to the south. There are 100°-120° directional faults observed towards the east. There are 10-15 cm. thick crushed zones observed at the fault and it has been determined that these faults contain cm. long slips. Besides these directional faults there are 130°-160° directional fracture zones observed in the vein. The fractures have 5-10 cm. thick crushed zones and they show very small slips.

The vein at the 1850 m. elevation was investigated with a 110 m. long gallery. The vein thickness at this elevation is 9-10 m. long. They are 90°-100°/65°-70° north directional and dipped. It was determined that they developed in the acidic units. Silicification and chloritization may be observed from the side rock to the vein. There is a 5-10 cm. thick kaolinified zone observed at the roof of the vein. The transition to the side rock is graded at the base. In this elevation, the mineralization shows dominate oxidation.

At the 100 m. mark of the gallery, a 120° directional, 70° north dip fault was observed. The eastern block of the fault slipped 5-10 m. south. The vein cut the 1880 m. elevation gallery at the 15th and 35th meters. The vein extends 80°/70° direction at this elevation and is dipped. It was determined that it developed in the acidic tuffs. There is heavy silcification observed from the side rock to the vein. At the base and roof, there is a graded transition to the side rock. In this elevation the vein was effected by a heavy meteoric alteration. There are 120°-130° directional faults which cut the mineralization along the gallery. In someplaces, the mineralization developed around the crushed zone of the fault.

c) Evaluation of the Drill and Gallery Data:

At the 1900 m. elevation the vein is cut by the 89/5 and 90/1a drill holes. According to this drill data the vein at this elevation has a 6-12 m. real thickness. Also at this elevation, a lot of barite and quartz are observed along with the ore minerals. Besides this, at the 1900 m. elevation an oxidized zone is observed. The investigations show that the quality of this zone is low.

Based on the distribution map, in the Çinkur A.Ş. analyzed results of the samples collected from the 1800 m. elevation, there are higher quality levels of the vein that are lenticular in shape in the mineralization zone (See Appendix 7 & 9). One of the largest of these zones starts at the point where the 1805 m. gallery cuts the Main Vein and extends 90 m. towards the east. The maximum thickness of the lens is 5 m. In the northern and southern parts of the lens, lower quality mineralizations developed.

Another large lens begins 10 m. to the east of the previously mentioned lens. It may have formed in the Main Vein I north of the Y:38850 coordinate point, based on the drill hole data correlations. The maximum thickness of the lens is 4 m.. The observed length of the lens is 100 m. and the probable length is 250 m..

Smaller lenses are located in the northern section of the above mentioned lens. From the north to the south in sequence, the length of the first lens is 75 m., and it has a maximum thickness of 5 m.. Another lens is 50 m. long and the maximum thickness is 4 m.. Based on the drill hole data obtained in the east, small lenses may have formed the Main Vein II mineralization. The Main Vein II extends 100°-105° direction and dips 85°.

As seen in the vertical quality distribution based on the drill and gallery analysis results of the 4-4', 5-5', 6-6', 7-7', 8-8', 9-9', and 10-10' profiles of the Main Vein (See Appendix 7, 8, 9, and 10) the economical mineralization is located between the 1850 and 1750 m. elevations. The vein reaches its maximum thickness at the 1800 m. elevation.

Above the 1850 m. elevation the mineralization zone thickness does not change, however, the zinc and lead qualities decrease. Below the 1750 m. elevation, the vein thins and the mineralization is disseminated and/or thinned out as massive thin capillaries.

III. 3.1.5. SECONDARY VEIN:

a) Geographical Location and General Characteristics:

The vein is located in the northeastern part of the study area and 20-30 m. south of the Main Vein. It is characterized as a 70 m. long baritified and silicified head, which is located between the X:67550-Y:38750 and X:67550-Y:38820 coordinate points. The drill data shows that at the 1900-1850 m. elevations around 270 m., 1800 m. around 250 m., and the 1750 m. elevation around 205 m.. In the west probably the 1830 m. elevation and in the east the 1675 m. elevation.

A 80°-90°/80°-90° north directional and dipped vein extends towards the east 100°/90° directional and is dipped.

Below the 1725 m. elevation, it developed in the andesitic units and above this elevation developed in the andesitic tuff interstratified white colored acidic characteristic tuffs. The vein shows economical dimensions in the acidic tuffs, however, it does not mineralize well enough in the andesitic units.

In the northern part of the vein, there is chloritization, carbonatization, seritization, and poor propylitization observed in the side rock. In the southern section, carbonatization and silicification are dominant. Besides, there is an increase of the silicification from the side rock to the vein.

The vein shows a graded transition to the side rock at the base and roof of the vein.

At the surface the Secondary Vein outcrop is 7-15 m. thick. This outcrop has baritified and silicified zone characteristics. The continuation of the baritified and silicified zone was traced down to the 1900 m. elevation by the examination of the drill hole data. The vein below the 1900 m. elevation and in someplaces the 1850 m. elevation, is meteaorically altered and has a vesicular structure.

This zone was researched through the use of the 89/5, 90/1a, and 8/2 drill holes. This data revealed that the zinc and lead quality is less in the lower elevations.

The drill and gallery data shows that at the 1805 m. elevation the vein thickness is 4-13.5 m. with over 17 % Pb + Zn quality zone characteristics. In the south, the 1675 m. elevation drill data shows that the vein is 1.75 m. thick and has disseminated mineralized zone characteristics. Below this elevation it is supposed that the disseminated mineralization and /or thin massive capillaries thin out.

In the west, from the X:67530-Y:38655 coordinate points towards the west, the vein is thinned out as massive thin capillaries.

In the east, the most eastern section of the Y:37970 coordinate point there is no data to show that it continues.

The vein at the surface is effected by 120° directional fault at the X:67545-Y:38745 coordinate point and the eastern section of this fault block is slipped to the south 5-10 m.

It is observed that there is a 50 cm. thick crusted zone located within this fault zone.

b) Drill and Gallery Data:

Drill Data:

Information concerning the drill holes which cut the vein is given from the west-east direction below.

<u>No. 89/5 Drill:</u>

At the 1866-1852 m. elevation it has a 17.35 m. possible thickness and a 9.9 m. real thickness. The mineralization was cut within these elevations. It is located in the acid tuffs.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	102.00 – 102.70		0.40	10.70	3.20	0.57			
	102.70 – 104.00		0.70	0.20	1.30	0.016			
	104.00 – 105.05		0.60	1.50	0.40	0.11			
	105.05 – 110.00	Steril	2.80	0.40	0.30	0.013			
	110.00 – 114.55		2.59	1.80	0.60	0.07			
	114.55 – 119.35		2.73	4.60	0.30	0.03			

No. 90/1a Drill:

The drill hole cut the vein at the 1862-1853 m. elevations. There is an 18.6 m. probable thickness and a 8 m. real thickness. The vein is located in the acid tuffs.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS % Zn	Pb	Cu		Ag	
	126.00								
			3.48	0.20	1.00				
	130.00								
			2.00	0.20	0.80				
	132.30								
			1.04	0.20	2.00	0.14			
	133.50		0.35	25.20	35.10	0.066			
	133.90								
			2.91	4.30	1.00	0.035			
	137.25								

T: True Thickness (m)

No. 7/1 Drill:

The drill hole cut the vein at the 1736-1734 m. elevation. There is a 1.6 m. probable thickness and a 1.37 m. real thickness. The vein is a disseminated mineralization zone located within the andesitic units in this elevation.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	226.10 226.25 227.85 228.10	Fine diss. mine.	1.37	2.0	1.20	0.060		0.0006	

T: True Thickness (m)

No. 8/0 Drill:

The drill hole cut the vein at the 1672-1670 m. elevation. The probable thickness is 2.7 m. and the real thickness is 1.77 m. The vein is mineralized with scattered thin capillaries. The vein is located in the andesitic units in this elevation.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	255.00 256.35	Fine diss. mine.	0.88	0.5	0.55	0.18		0.0006	

No. 8/1 Drill:

The drill hole cut the vein at the 1798-1794 m. elevation. The probable thickness of the vein is 2.7 m. and the real thickness is 3.6 m. The vein is located in the acid characteristic white tuff unit in this elevation.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %				
				Zn	Pb	Cu		Ag
	174.15 174.50	Intensly veinlet mineralization	0.21	11,3	2,52	0.15		0.0011
		Sterilized	1.10					
	176.30 177.40	Sligthly veinlet mineralization	0.67	9.0	3.90	0.23		0.0013
		Sterilized	0.80					
	178.70 179.15	Massive mineralization	0.27	27.40	11.48	0.20		0.0045

T: True Thickness (m)

No. 8/2 Drill:

The drill cut this vein at the 1929-1921 m. elevation. The probable thickness is 11.5 m. and the real thickness is 8.9 m. The vein at this elevation contains disseminated mineralization characteristics with an argillaceous limonite oxidized zone. The mineralization zone has a fractured structure and is located in the acidic tuffs.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	62 70	Oxidized mineralization zone	3.73	1.2	0.72	0.040		0.0031	
	67.50	Clayey Brecciahad mineralization zone with oxidized							
		Intensly limonited zone							
		Clayey brecciated							
	74.20								

T: True Thickness (m)

No. 9/1 Drill:

The drill hole cut the vein at the 1675-1672 m. elevations. The probable thickness is 3.65 m. and the real thickness is 1.75 m. It has disseminated mineralization characteristics and is located in the andesitic units in this elevation.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	296.50	Mineralized quartz veinlet (10 cm)							
		Sterilizad							
	300.15								

No. 10/2 Drill:

The drill hole cut the vein at the 1805-1798 m. elevations. The probable thickness is 9.85 m. and the real thickness is 6.20 m.. The vein is located in the andesitic tuffs in this elevation.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	217.85								
		Slightly vcinlet mine.	0,95	7.8	1.5	0.10		0.0008	
	219.35								
		Massive mineralization	1,30	19.0	3.8	0,052		0.0027	
	221.40								
			0.95	14.8	4.1	0.071		0.0024	
	222.90								
		Very poor mine.	0.57	0.5	0.31	0.23		0,0008	
	223.80								
		Sterilized	0.28						
	224.25								
			0.69	1.5	0.69	0.28		0.0008	
	225.35	Fine diss. mine.							
			0.85	7.8	1.4	0.29		0.0013	
		Slightly veinled mine.							
	226.70								
		Fine diss. mine.	0.63	1.5	0.33	0.025		0.0005	
	227.70								

No. 10/1 Drill:

The drill hole cut the vein at the 1681-1679 m. elevation. The probable thickness is 2.56 m. and the real thickness is 1.54 m.. The mineralization has disseminated ore zone characteristics.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	344.03								
		Fine diss. mine.							
	346.58								

Gallery Data:
The investigation results concerning this vein do not reveal any information concerning the structure of this vein.

At the 1805 m. elevation gallery, along the same direction as the Main Vein, another gallery was opened within this gallery at the 65th m. towards the south. There was no sign of the Secondary Vein cross cut in the second gallery.

Within the Main Vein another gallery was opened at the 210th m. to the south. This gallery cuts the vein at the X:67585-Y:39000 coordinate points. The vein is 4 m. thick and is represented as a massive over.

One gallery was opened at the X:67600-Y:38730 coordinate points to the south and does not cut the Secondary Vein. Another gallery opened at the 1805 m. elevation cuts the vein at the X:67585-Y:38900 coordinate points. Other drill holes in the east cut the vein at the lower elevations. All of these findings show that:

a.) The intercut of the Secondary Vein branched up from the Main Vein.
b.) It is explained as a lens which closed at the bottom.

According to this data, the Secondary Vein may be explained as an intercut plunge to the east or as a lens vein which travels to deeper depths as it goes north.

c) Evaluation of the Drill and Gallery Data:
The vein at the 1850 m. elevation shows an 8-9 m. thickness and a probable length towards the west of 270 m..

The economical mineralization thickness around this area is between 2.7-3.5 m.. The Pb + Zn quality changes from 5-12 %.

At the 1800 m. elevation the vein is 4-6.2 m. thick and probably extends towards an east-west direction for approximatley 215 m.. The economical thickness in this area is 3.2-4 m. and the Pb + Zn quality is + 17 %.

At the 1750 m. elevation the vein is observed as 1.5-1.8 m. thick. There is no economical mineralization observed in this elevation. The mineralization has disseminated characteristics. The probable east-west direction length is 205 m..

According to this data, the east-west directional length of this vein is between 205-270 m. The vertical length is between 110-200 m. The economical mineralization is between 1850-1750 m. elevations.

III. 1.6. No. 2 VEIN:

a) Geographical Location and General Characteristics:

This vein is located in the northeastern section of the study area and may be observed on the surface. Through the use of the 89/5, 90/1a, 7/2, 8/0, 8/1, and 8/2 drill holes and the 1805 m. elevation gallery, the continuation and structure of the vein was investigated. The 1805 m. elevation gallery entered the ore at the 230 m. eastern direction. The area drill data shows that in the western section of the vein area in the 1755-1780 m. elevations and in the eastern section at the 1630 m. elevation the vein continues.

The vein has a east-west 75°-85° directional dip.

The vein at the 1760 m. elevation developed in the acid tuffs. Below this elevation, it developed in the andesitic units. In the west, it is connected to a rise of the andesitic units and the vein developed in the same units in the upper elevations.

The mineralization is best developed in the acid tuffs, and it reaches its economical dimensions and quality here. However, in the andesitic units the vein thickness decreases and the quality also decreases.

Chloritization and silicification increase from the side rock towards the vein. The roof of the vein is characterized by a 5 cm. thick zone, and in someplaces, chloritified and kaolinified zones. The base is characterized by graded transition levels.

The between the 1897-1900 m. elevations a disseminated mineralization zone is observed.

At the 1805 m. elevation gallery, it was determined that the vein is a 230 m. long, massive mineralization zone. At this elevation the vein thickness reaches 1-1.5 m. and in someplaces up a 4-5 m. thickness. At the X:67530-Y:38675 coordinate points towards the west the vein thins out in the andesitic units.

In the east its continuation was determined by the gallery at the X:67545-Y:38912 coordinate points. Further east of this set of coordinates points there is no drill hole or gallery data to show the continuation of this vein.

Below the 1750 m. elevation the real thickness thins. At this elevation the mineralization is disseminated.

The mineralization cemented to the side rock material and the vein zone appears as a breccia.

This vein is a mineralization zone where the lithologic development goes besides the fault development. The vein is back formed and settled on the east-west fault line.

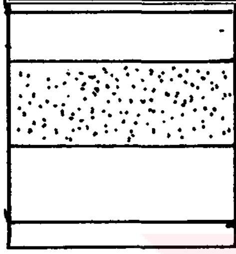
As a result of the 80°-90° fault movements during the post mineralization period, where the vein developed, the mineralization zone has a fractured and crushed structure.

No. 7/2 Drill:

This drill hole shows that at the 1903 m. elevation the vein is characterized as a 1 m. thick dense pyritization and in someplaces mineralized zone.

No. 8/0 Drill:

This drill hole cut the vein between the 1636-1633 m. elevation. The apparent thickness is 2.75 m. and the real thickness is 2 m. in this area.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	311.05	Fine diss. mine.							
			0.84	2.6	0.56	0.30		0.0006	
	312.20								
			0.76	0.2	0.20	0.13		0.0005	
	313.25								

T: True Thickness (m)

No. 8/1 Drill:

The drill hole cut the vein between the 1755-1742 m. elevations. The apparent thickness of the vein is 16.22 m. and the real thickness is 12.42 m..

At the 1805 m. elevation at the X:67533-Y:38757 coordinate points, the 120° directional İnler Plateau Fault slipped the vein 30 m. to the south. The vein appears as 5-10 cm. thick capillaries along the fault zone up to the X:67533-Y:38757 coordinate points. Due to the observations of the fracturization and brecciaitization on the capillaries, it was concluded that the 120° directional fault developed after the 80°-90° directional faults during the premineraliztion period and/or at the mineralization stage. There are 120° directional fractures observed along the gallery. along these fracture zones 5-10 cm. long crushed zones and a few cm. long slips may be observed.

b) Drill and Gallery Data:

Drill Data:

The drill holes which cut the vein from the west-east direction are given below.

No. 89/5 Drill:

This drill hole shows that at the 1815-1814 m. elevations the vein is characterized as a 5-10 cm. thick mineralization zone.

No. 90/1a Drill:

This drill hole cuts the vein between the 1807-1804 m. elevation. The apparent thickness is 3.1 m. and the real thickness is 1.33 m.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	194.10								
			0.87	0.20	0.40				
	195.10								
			1.04	8.60	4.70	0.23			
	196.30								
		Steril	0.35						
	196.70								
			0.35	7.60	3.20	0.73			
	197.10								

T: True Thickness (r

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	225.30	Sligthly veinlet mine.	0.88	8.5	1.48	0.16		0,0006	
	226.45	Sterilized	1.60						
	228.55	Fine diss. mine.	0.61	1.1	0.97	0.032		0,0005	
	229.35	Intensly veinled mine.	0.53	11.5	4.32	0.22		0,0028	
	230.05	Coarse diss. mine.	0.96	5.8	2.20	0.12		0,0011	
	231.30	Intensly veinlet mine.	0.49	11.5	4.5	0.26		0,0028	
	231.95	Sterilized	0.72	0.2	0.70	0.14		0,0005	
	232.90	Coarse diss. mine	1.07	4.7	3.5	0.41		0,0027	
	234.30	Fine diss. mine.	0.38	1.6	0.70	0.34		0,0014	
	234.80	Sligthly veinlet mine	0.27	7.7	1.44	0.50		0,0017	
	235.15		080	1.0	0.72	0.53		0,0017	
	236.20	Fine diss. mine.	1.26	0.6	1.24	0.72		0,0011	
	237.85	Coarse diss. mine.	0.57	4.7	3.52	0.55		0,0040	
	238.60		0.53	0.6	2.36	1.82		0,0034	
	239.30	Fine diss. mine.	1.14	2.1	1.40	0.23		0,0008	
	240.80								

No. 8/2 Drill:

The drill hole shows that at the 1897 m. elevation the vein is characterized as a 0.5 m. thick silicified disseminated mineralization zone.

Gallery Data:
At the 1805 m. elevation, a 230 m. long prospecting gallery was opened in the No. 2 Vein. There is no gallery work started for the lower and upper elevations. Investigations in the gallery show that in this elevation the vein is 1-1.5 m. thick and in someplaces the thickness reaches up to 4-5 m.. At this elevation, the vein is 85°-90°/70° north directional and dipped. There is silicification and chloritization from the side rock to the vein. It was determined that there are 5-10 cm. thick kaolinified zones located at the roof of the vein. There is a graded transition from the vein to the side rock. The mineralization is a massive structure in this elevation.

In the west, in the andesitic units, the vein is characterized as a disseminated mineralization. In the east, east of the Y:38920 coordinate point, there is no gallery or drill hole data to show the continuation and structure of the vein.

c) Evaluation of the Drill and Gallery Data:
As a result of the drill and gallery data the 1900 m. elevation of the vein shows disseminated mineralization characteristics.

As seen from the gallery data at the 1800 m. elevation, the vein is 1 m. thick and in someplaces the thickness reaches 5 m. and is massive in character. The analysis results conducted by Çinkur A.S., reveal that the Pb + Zn quality of the vein is over 17 % in this elevation.

There is limited data for the 1750 m. elevation. In this elevation, at the 8-8' profile area, the mineralization zone is 12.40 m. thick. This thickness was determined by the No. 8/1 drill hole data. In the mineralization zone there is a 1.98 m. thick level with a 12.04 % Pb + Zn quality is observed.

At the 1700 m. elevation, the 4/1, 5/0, 5/1, 6/1, and 7/1 drill holes do not cut the vein. As a result of this observation it was determined that in the west at the 1700 m. elevation the vein lenses out. In the east, the 8/0 drill hole shows that the vein continues down to the 1636 m. elevation and it is characterized as a 0.84 m. thick disseminated mineralization.

The data shows that the economical mineralization is found at the 1800 m. elevation. The vein goes deeper towards the east as a lens vein.

III. 1.7. No. 3 VEIN:

a) Geographical Location and General Characteristics:

The vein is located in the northeastern section of the study area and the southern section of the İnler Plateau. At the surface between the X:67500-Y:38730 and X:67505-Y:38815 coordinate points in a 110 m. area, the vein is characterized as baritified, silicified, and in someplaces a mineralized zone. The observed length of the vein is 150 m., however, the probable length is 300 m.. It was determined that the vertical continuation of the vein goes down to the 1670-1720 m. elevations.

The vein is 80°-90°/70°-80° north directional and dipped.

The vein below the 1780 m. elevation developed in the andesitic units. Above this elevation the vein developed in the acid tuffs. Due to the rise of the andesitic units, in the western sections of the area, and at the X:67525-Y:38700 coordinate points, the vein developed in these units.

The side rock lithology controls the vein thickness and the enrichment. As a matter of fact, the mineralization in the andesitic units is a disseminated mineralization and/or thin capillary. In the acid characterized units it reaches its economical dimensions.

There is chloritization, ankeritization, and silicification from the side rock to the vein. The roof and base fault of the vein are not observed. The vein has a graded transition to the side rock.

The vein outcrop is 2-5 m. thick and it is heavily silicified,and in someplaces contains baritified and mineralized zone characteristics. As a result of the meteoric alteration on the outcrop has a cavity-like structure. The drill hole data shows that, the meteorically altered mineralization zone continues up to the 1883 m. elevation.

At the 1800 m. elevation in the west at the X:67525-Y:38720 coordinate points, the vein has thin massive capillary characteristics. The vein thins out from this coordinate point towards the west. In the east, according to the 89/5 drill hole data, the vein thickness reaches 3.7 m.. At this elevation, the further eastern section of the 89/5 drill hole data, there is no information to show the thickness and continuation of the vein.

At the 1690 m. elevation, the vein has disseminated mineralization characteristics and/or branched and thinned out as massive thin capillaries. The vein has a breccia appearance as a result of the ore liquid cementing the side rock breccia.

The drill holes show that the vein has a fractured structure. The correlation of the drill hole data shows that at the X:67523-Y:38783 coordinate points, the İnler Plateau fault slipped the vein 20-30 m. to the south.

b) Drill and Gallery Data:

Drill Data:

The drill holes which cut the vein are given below from the west to the east.

No. 89/5 Drill:

The drill hole cut the vein at the 1807-1794 m. elevations. The apparent thickness of the vein is 11.6 m. and the real thickness of the vein is 6.5 m.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	179.20 – 180.15		0.53	1.20	0.80	0.004			
	180.15 – 183.00	Steril	1.60						
	183.00 – 183.60		0.34	2.40	0.70	0.015			
	183.60 – 184.20		0.34						
	184.20 – 186.25	Steril	1.15						
	186.25 – 186.90		0.36	1.20	0.70	0.054			
	186.90 – 187.55		0.36	11.80	7.50	0.98			
	187.55 – 187.75		0.11	7.00	3.50	0.039			
	187.75 – 188.45		0.39	17.00	44.50	0.013			
	188.45 – 188.80		0.20	0.90	0.30	0.16			
	188.80 – 189.80		0.56	26.00	11.00	0.52			
	189.80 – 190.80		0.56	19.40	8.60	0.14			

T: True Thickness (m)

No. 7/1 Drill:

The drill hole cut the vein between the 1690-1689 m. elevations. The apparent thickness of the vein is 1.8 m. and the real thickness of the vein is 1.7 m.. At this elevation the vein is located in the andesitic units.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	287.70								
		Fine diss. mine.	0.85	0.6	1.10	0.35		0.0014	
	288.60								
		Intentsly veinled mine.	0.85	4.4	9.28	1.27		0.0071	
	289.50								

No. 7/2 Drill:

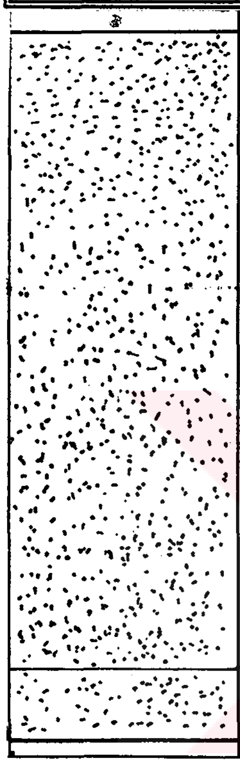
The drill hole cut the vein between the 1690-1689 m. elevations. The apparent thickness of the vein is 3.35 m. and the real thickness of the vein is 2.51 m.. This vein is located in the acidic tuffs.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	114.20								
		Intensly veinlets mineralization	0.27	1.2	12.6	0.057		0.0057	
	114.65								
		Sterilized	0.54	0.7	1.0	0.0009		0.0009	
	115.35								
		Slightly oxsidizied fine disseminated mineralization	0.89	3.4	0.96	0.093		0.0012	
	116.50								

T: True Thickness (m)

No. 8/1 Drill:

The drill hole cut the vein between the 1727-1717 m. elevations. The apparent thickness of the vein is 9.4 m. and the real thickness of the vein is 7.2 m.. The vein in someplaces contains 1-2 cm. thick mineralized quartz capillaries.

VEIN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	260.30 269.70	Fine diss. mine.							

T: True Thickness (m)

:ness of the vein is 6.5 m..

:IN LOG 1/100	Depth (m)	DESCRIPTION	T. m.	TENORS %					
				Zn	Pb	Cu		Ag	
	147.00								
	147.90	Sterilized	0.69	0.3	0.08	0.005		0.0005	
	149.50	Intensly veinlet mine.	1.24	12.0	3.0	0.088		0.0018	
	150.30		0.62	0.3	0.040	00037		00005	
	151.35		0.81	0.3	0.18	0.071		0.0006	
		Very poor mineralization	1.36	0.3	0.20	0.12		0.0005	
	153.10		0.62	0.7	0.15	0.015		0.0005	
	153.90		1.98	0.3	0.40	0.051		0.0006	
	156.45		0.42						
	157.00								
	157.35	Fine diss. mine.	0.27	0.3	1.1	0.18		0.0009	

ue Thickness (m)

ery Data:

1805 m. elevation gallery cut the No. 3 Vein between the 240-ı. area. At this elevation the mineralization has massive thin llary characteristics. The vein developed in the andesitic s in this area. Dense chloritization may be observed on the rock. The roof and base of the fault may not be clearly seen.

The gallery work does not yet reveal any post mineralization fault in relation with the vein.

c) Evaluation of the Drill and Gallery Data:

The drill hole and gallery data results show that at the 1880 m. elevation the vein thickness is 1.24-1.07 m.. At this elevation the observable length of the vein is 100 m. and the probable length is 200 m.. In this elevation the Pb + Zn quality is 5-15 %.

At the 1800 m. elevation and at the X:67525-Y:38700 coordinate points towards the west, the vein is branched as capillaries and thinned out. In the east, according to the 89/5 drill hole data, the vein is 2.18 m. thick and has a Pb + Zn quality of 31.5 %. Further east of the 89/5 drill hole, there is not enough data to show the thickness or the quality of the vein.

At the 1690 m. elevation, the vein has a 0.85 thickness and a Pb + Zn quality of 13.68 %.

The investigation results show that between the 1880-1790 m. elevations, the vein shows its economical mineralization.

III. 1.8. MINERALOGIC AND PARAGENETIC INVESTIGATIONS OF THE İNLER PLATEAU MINERALIZATION AND SIDE ROCK:

The petrographic investigations of the samples collected from the surface, galleries and drill holes, show that the side rock, in general, contains acid characteristics (dacite, rhyodacite). They also consist of hydrothermally altered volcanic tuffs and breccias. The petrographic investigation of the core samples do not reveal any trace of any zonation on the hydrothermal alterations.

The investigations show that the alterations developed as silicification, kaolinizition, carbonatization, and limonitization to various irregular degrees. The mineralization developed from andesitic origins (tuff or lava flow) rocks. Hydrothermal alteration in the side rock usually developed as chloritization, albitization, zeolitization and in someplaces, propylitization towards the deeper elevations.

The side rock samples evaluation for their origin and their hydrothermal alteration nature did not reveal any obvious horizontal zonation. The vertically obtained data is similar to the horizontally obtained data; that is the veins developed in the acid characterized and silicified, carbonatified, and kaolinified tuff and tuffite side rocks. In the andesitic composition; chloritified, zeonitified, albinitified and in someplaces propylitified side rocks branched as thin capillaries and/or scatteredly thinned out.

The İnler Plateau Mineralizations are under lithologic and tectonic control in the fractures and cracks of the east-west fault zone acidic volcanites as stock-verk type. In the tectonically active areas as a cementation of the brecciaitified rocks or as a massive type filling in the breccia cavities as nodules or lenses.

They show very simple paragenesis compared to the Asarcik type mineralization (Çalapkulu, 1982). Microscopic investigation of the gallery samples and drill holes reveal that the İnler Plateau veins contain extensive amounts of pyrite, blende, galena, and a small amount of chalco-pyrite and rarely, tetraedrite-tenanite anargite and loozonite. As a result of the decomposition of the secondary minerals they are formed as: malachite, azurite, chalcosine, covelline, limonite, serussite, smithsonite, and anglesite. The gang minerals consisting of quartz, carbonate, (calcite ankerite) minerals and barite are observed in the samples close to the surface.

The ore minerals observed on the paragenesis and the observations made on the gang minerals are discussed below:

Pyrite:
It is a primary mineral, if it has a specific shape and it is scattered in small grains. Besides, it may appear in a larger grain sizes or as gel pyrite and fill the capillaries or cavities within the quartz, which comes with the same generation. In the limonitization alteration zones, it was formed in various amounts in the mineral fractures and outer face wall.

Chalco-Pyrite:
It is not widespread. In general, at the outer zones of the blende it is seen as small round exsolution grains or in the same mineral as large grained closures.

Blende:
This is the most widespread ore mineral. Xenomorph and chalcopyrite exsolutions in the large grained sfalerites densification at the side zones of this mineral shows that these two minerals in the beginning were a mixed mineral. As a result of the decrease in heat the Cu immigrated towards the edges of the mixed minerals and separated as chalcopyrite.

Inside the blende, the specific structure of the pyrite, quartz, and xenomorph chalcopyrite closures may be observed. The inner reflection colors of yellowish-white show that the iron content is very low.

Galena:
It is a xenomorph final production of the ore minerals and substitutes the others by cutting them or surrounding them.

Quartz:
It is a primary gang mineral and is repeated three times at the paragenesis.

Carbonate Minerals:
They are formed as calcite and ankerite.

Liquid closure studies (Karaoglu, 1985; Ayan, 1991) on quartz, blende, and barite minerals for their formation temperature show that these mineralizations developed at the mesothermal and epithermal stages. The succession of the general minerals in the İnler Plateau is shown below:

Mesothermal	Epithermal	
Pyrite I		
quartz I		
chalcopyrite		
	Sphalerite	
	quartz II	
	Calcite-Ankerite	
	quartz III	
	Pyrite II	
		Secondary minerals

III. 2. MADEN TEPE MINERALIZATION:

This mineralization is represented as: silicified heads at the southern section of the İnler Plateau mineralization area; the south southwestern area of the Azak and Yarar Quarries east-west mineralization; and in the west it crosses the southern section of the Maden Tepe, which reaches up to the Filikalık Ridge. It is quartz and in someplaces barite and/or ore mineral mineralization zones. The length of the mineralization is approximately 1700 m..

The Maden Tepe mineralization zone was blocked out by the 140°-160° directional fault and was slipped. Its thickness changes from between 30 to 37 cm.. In this mineralization zone, especially at Azak Quarry, there are barite capillaries and their thickness changes from 0.1-10 cm..

From the side rock to the mineralization zone, carbonatization, epidotization, kaolinization, limonitization, and in someplaces, hematitzation developed. The mineralization is represented as three oxidized zones within the andesitic agglomeras in the south and southwestern sections of the Maden Tepe. The oxidized zones are north 100°-110° directional 80° north dipped at the Yarar Quarry and perpendicular to the Azak Quarry. In the middle section, it is 78° directional and it is perpendicular to the Maden Tepe and Filikalık Ridge.

The Maden Tepe Mineralization has no economical importance in the west, however, it shows economical importance towards the east. The Azak Quarry in the past was exploited by galleries which were opened at three different levels of the creek (Fig. 3). Further east, at the Yarar Quarry, mining activities are limited by prospecting. The mining activities were limited because the mineralization developed at the silicified zone. The vein is usually located in the quartzose zones as scattered and/or capillaries. Rarely at the Azak Quarry it develops as a 60-80 cm. thick massive ore.

Further east, at the southern section of the İnler Plateau mineralization, the observations on the north 100° directional silicified heads, the zinc blende and the galena are not observed. However, a lot of cavities were formed as a result of the pyrite minerals, which were transported by the meteoric transformations. This silicified zone reached up the NW slopes of the Uzunoluk Tepe.

The authorized persons from Çinkur A.S. stated that obliquely drilled holes at the İnler Plateau valley area towards the south do not cut the vein. The drilled holes at the Azak Quarry Hill cross cut the vein, then entered the side rock. The various geological studies done on the vein clarify the results and give further detail. The lower dipped basement border at the north and the vein discontinuity to the lower elevations resulted because the drill holes do not cut the vein.

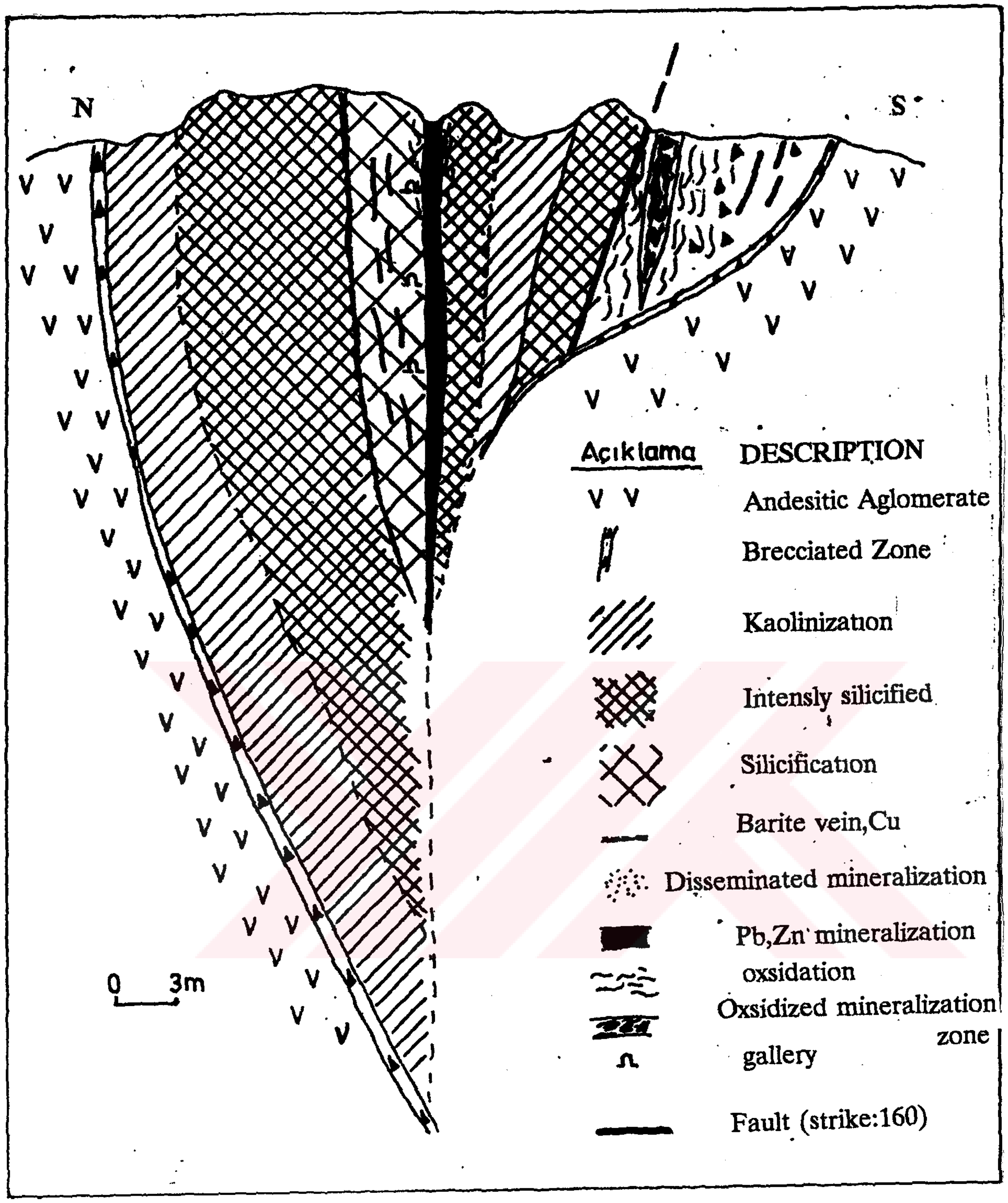


Figure 3: Azak Quarry Profile

An important observation is that the vein is dipped from the west towards the east at the lower elevations. The same situation is observed in the Secondary Vein, as mentioned before.

c) Evaluation of the Data:

The Maden Tepe Mineralization continues for a 1700 m. area with some discontinuations. The vein thickness changes from between 10 cm. to 37 m.. In the zone at the Azak Quarry, a scattered stockverk mineralization with a 0.7 m. thick massive vein is also observed. At the Yarar Quarry the vein thickness of the massive ore changes from between 0.5 m. to 1.2 m.. At the Maden Tepe and Filikalık Ridge, the vein is located in the oxidized zones (See Appendix 16).

An important mineralization is not expected in the western section of the Azak Quarry, however, in the eastern section of the Azak Quarry, there may be prospecting potential in the future. This potential will give Çinkur A.Ş. future reserve potential. Concerning this matter, it is important to investigate the tuff containing levels of the vein which contain quartz crystals at the eastern part of the mine road.

III. 3. BALKOVAN DERE MINERALIZATION:

This mineralization is located to the south of Filikalık Ridge in the Balkovan Dere.

In this area, an east-west directional ore containing silicified zone cut the southern horizontally dipped volcanic sequence Dominate silicification and kaolinization may be observed at the side rock. The sequences are fragmented by a 130°-140° directional silex containing outcrops lineation, which gives the false appearance for the mineralization direction.

The lithologic sequence starts with the bottom of the alterations of tuff and agglomera and thin laminated tuff cover the alteration sequence. Above this there are conglomerate and/or silex nodules in sequences equal to all of the discordant plane where the mineralization is scattered within. This sequence is followed by a sequence where the conglomerates are located at the base and in someplaces reddish-light grey colored pelagic limestone lenses are observed. These sequences are vertical transitions to the tuffites.

The mineralization is observed as a cementation of the newly formed silex material which cuts the system where the silex nodule sequence is located. The mineralization is wider than the other units sequence where the conglomeras in someplaces and the reddish-yellowish sandy argillaceous limestones are located in the east-west section of the mineralized zone. Epidotization, kaolinization, effective limonitization, hematitazation, and silicification may be observed in the side rock. Erosion of the silicified zone and the appearance of kaolinization in this zone, along the 130°-160° directional faults and crushed zones, cause the interpretation of the mineralization development as being connected with the 130° extensional fracture zones. However, the drill hole data shows that this interpretation is a morphological mistake (See Appendix 17-18).

The east-west directional silicifcation zones in the Balkovan Dere Mineralization area developed as vein bunches the same as in the İnler Plateau. The effective alteration caused the oxidation of the mineralization from the environment. At the silicified zones a lot of cavities may be observed which developed as a result of sulfur containing minerals which originated in the post alteration period. The Balkovan Dere Mineralization paragenesis is similar to the İnler Plateau Mineralization, however, the copper minerals are more abundant in this area. The analysis of the drill holes show the following values: Cu up to 2.3 % and the Au quality is 1.4 g/ton.

Drill Data:

<u>No. 91/1 Drill:</u>

This hole was drilled on the outcrop which is parallel to the vein. It entered 20 m. into the ore. The analysis results are illustrated in Table . This drill hole data shows that the quality of the Zn is 0.2-14 %; Pb is 0.04-1.3 %; Cu is 0.7-1.9 % and the Ag is 4-20 g/ton.

<u>No. 91/2 Drill:</u>

This drill hole was drilled west of the outcrop which is parallel to the vein. Since the drill hole was drilled parallel to the ore roof, it did not penetrate the ore zone.

<u>No. 91/4 Drill:</u>

This drill hole was drilled perpendicular to the vein direction. This drill hole cut the mineralization zone between 0.00 and 18.8 m.. The thickness of the mineralization zone is 18.8 m.. The drill hole cuts the 3.5 m. thick sterilized zone at the 3.05-6.65 m. area of the core. The analysis of the results of the mineralized zones conducted by Çinkur A.Ş. show that the Zn is 1.1-12.9 %; Pb is 0.1-1.2 %; the Ag quality is 10-10-30 g/ton; and the Au is 1.2-1.4 g/ton.

<u>No. 91/5 Drill:</u>

This drill hole cut the ore outcrop towards the north with a 80° slope. It cut the 19.20 m. mineralized zone. There are sterilized zones located between the 4.05 and 6.35 m. which is 2.3 m. thick and between the 10.95 and 17.25 m. which is 6.3 m. thick in the mineralization zone. The analysis of the results conducted by Çinkur A.S. on the mineralization zone are given below:

Zn: 1.7-7.7 %
Pb: 0.04-1.0 %
Cu: 0.4-3.2 %
Ag: 0.01-0.02 %

c) Evaluation of the Data:

The Balkovan Dere Mineralization is characterized by east-west directional lenticular veins. The vein is effected by alterations at the surface. As a result of the drill hole investigations there is a mineralization which was moved by meteoric alterations at the surface, and which is represented as a stock-verk. In the deeper elevations thin veins are observed.

There is no important mineralization data observed in the Balkovan Dere area. However, as a result of the north-south directional geophysical (electric and seismic) profile data, which should cut the east-west directional veins, shows the true quality of the mineralization in the depths through the use of the drill hole data.

III. 4. KUZULUK LOCATION AND THE ODALAR PLATEAU MINERALIZATIONS:

Kuzuluk Location Mineralization:

This mineralization is located in the southern slopes of the Balkovan Dere. It is 2100 m. long from the west at the Kuzuluk Location to the east at the Uzunoluk Tepe Fault. The mineralized zone has alteration zone characteristics where the sulfur minerals are also observed. Rarely massive capillaries are observed. It is a 20 m. thick mineralization zone in the andesitic agglomerates and developed under the tectonic control of the east-west directional fault.

The mineralized zone cuts the andesitic dike at the Uzunoluk Tepe and the Balkovan Dere. These observations show that the mineralizations developed after the dike emplacement in this area.

The mineralization appears in the east-west directional fault surface basement after the thin kaolinified zone. In the Kuzuluk Location there are 3 drill hole entrances, which later collapsed, and surrounding the area previous prospecting gobs may be observed. Kaolinization, carbonatization, limonitization, and silicifcation developed from the side rock to the vein. The detailed plan of the vein is illustrated in Fig. 4 and its geology is illustrated in Appendix 19.

The chalcopyrite is more widespread than in the İnler Plateau Mineralization in this area. It has 3.5 cm. thick massive capillaries.

Drill Data:
There was only one drill hole drilled in this area and the obtained data shows that:

- At the 122.5 m. there is a 10 cm. massive ore enriched by copper.
- At the 124.8 m. there is a 105 cm. thick disseminated and in someplaces capillares containing, a mineralized zone enriched by Pb + Zn.

c) Evaluation of the Data:
This mineralization continues around the 2100 m. with some discontinuations. The thickness is cm. up to 10 m.. It is located in the andesitic units and it cuts the andesitic dike at the Balkovan Dere and Uzunoluk Tepe.

Investigation results show that the ore development happened after the andesitic dike emplacement.

The evaluation of the obtained data shows that the Kuzuluk Location mineralization does not have any important reserve to contribute to the potential of the area.

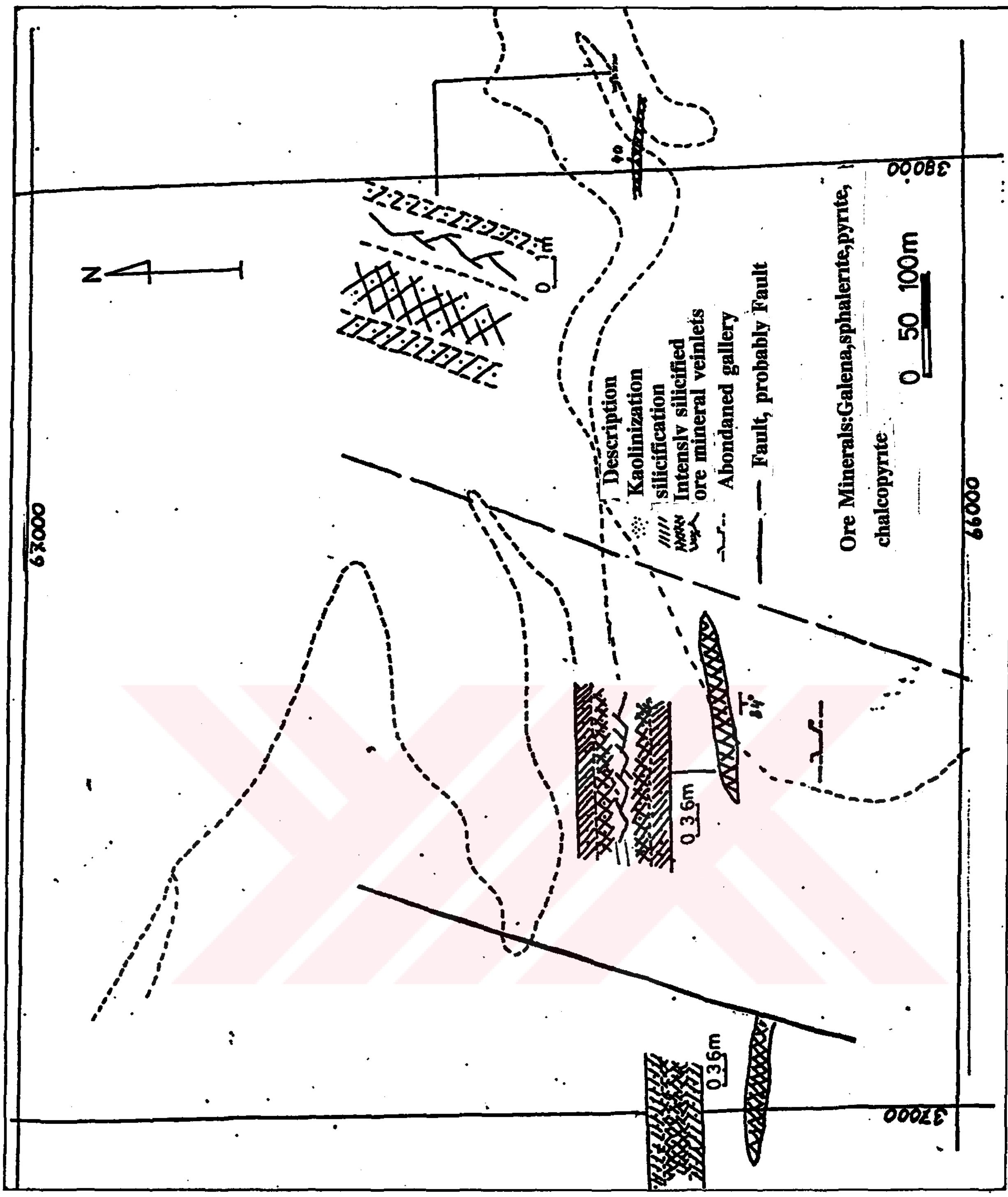


Figure 4: Detailed plan of the Kuzuluk Location Mineralization.

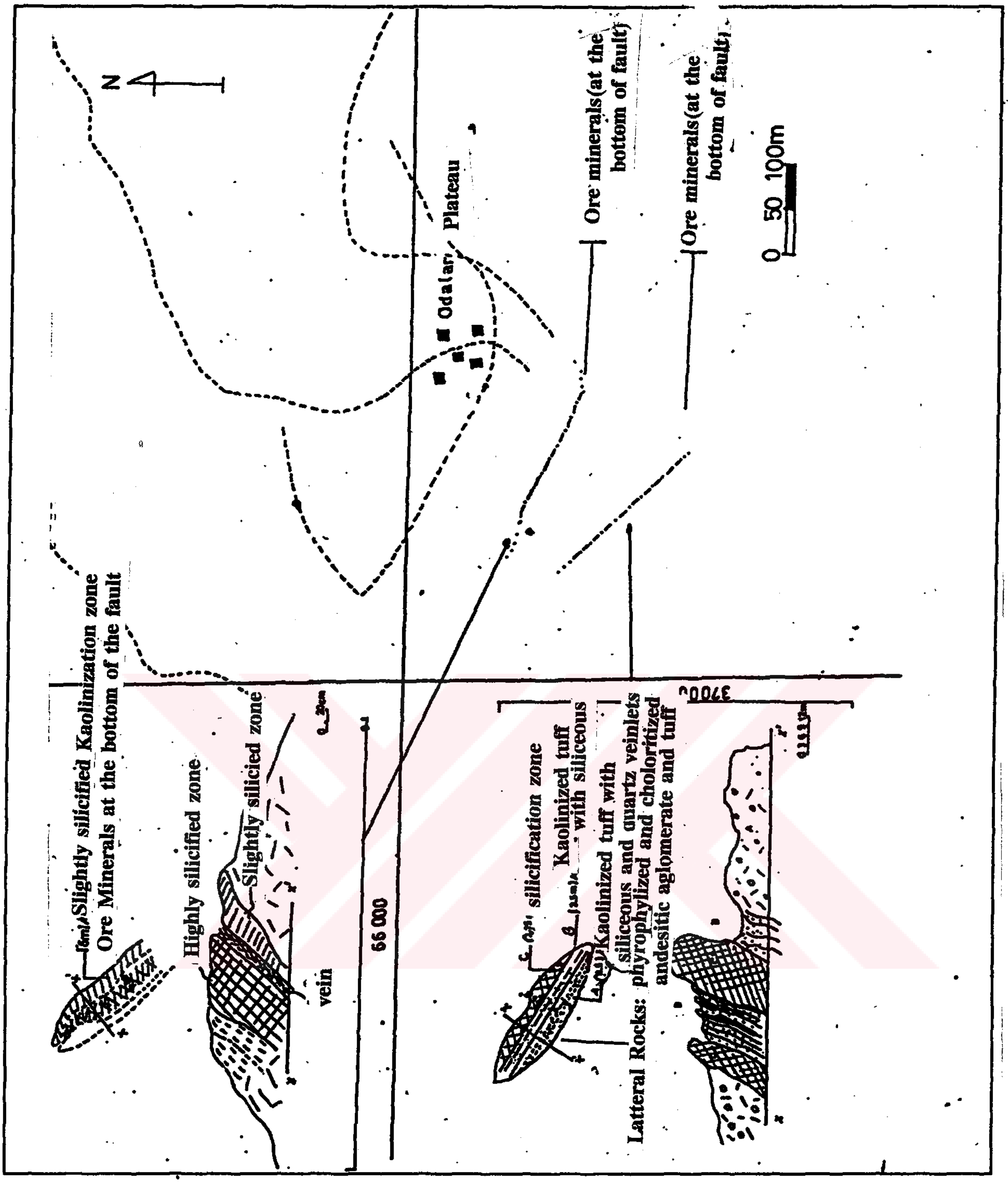


Figure 5: Detailed plan of the Odalar Plateau Mineralization.

Odalar Plateau Mineralization:
The Odalar Plateau Mineralization consists of many thin oxidized zones and is observed in two areas.

The first area is located in the northwest section of the Odalar Plateau. It developed in the andesitic tuff agglomeras. It is represented by a north 60°-70° east direction and is between seven veins which are 1-3.5 m. thick. The length of the veins vary from 75-125 m.. There are quartz and barite veins with thicknesses up to 20 cm. observed in the mineralization zone. Kaolinization, limonitization, and hematitzation may be observed from the side rock to the vein. The mineralization is thinned out in the andesitic agglomeras located at the base.

One of these zones was prospected by incision, however, it was terminated because it had no economical value. The detailed plan is illustrated in Fig. 5.

The other mineralization is located in the southwest section of the Odalar Plateau. It is represented by nine mineralization zones which extend north 70°, 140°, 120°, 135° and east-west direction. It is developed in the andesitic agglomera and tuffs. Propyletization, chloritization, and effected silicification may be observed in the side rock. The vein consists of capillaries of quartz with galena, heavy pyrite and galena, and a small amount of blende.

Four of these zones all with traces of exploitation are observed, however, they were terminated because they were not economical. The detailed plan is given in Fig. 5.

At the Odalar Plateau, in general, from the northeast-southwest the silicification decreases and limonitization, hematitization and kaolinization increase.

ECONOMICAL EVALUATION OF DEREKÖY LEAD-ZINC MINERALIZATION

c) Evaluation of the Data:

The investigation results of the area show that there were no important mineralizations located in the area to contribute to the area potential.

Maden Tepe, Balkovan Dere, Kuzuluk Location, and Odalar Plateau Mineralizations Mineralogy in General:

The primary paragenesis consists of pyrite, blende, chalcopyrite, and galena ore minerals with quartz and barite gang minerals. The secondary minerals consist of hydrozincite, malachite, azurite, iron oxide, iron hydroxides and lead oxides.

It is considered that these mineralizations were formed at the mesothermal and epithermal stages. Their mineral successions are summarized below.

Mesothermal-Epithermal

quartz |
Pyrite |
sphalerite |
chalcopyrite |
Galena
quartz II |
| seondary Minerals

IV. ECONOMICAL EVALUATION OF DEREKÖY LEAD-ZINC MINERALIZATION:

The preliminary study results concerning the Dereköy lead-zinc mineralization, which is located in the Eastern Black Sea metallogenic region, where Turkey's most important Pb, Zn, and Cu, mineralizations are located, show that the İnler Plateau Mineralization has the most economical value compared with the other mineralizations in the area. For this reason all of the studies were concentrated in this area.

Between the 1988 and 1990 studies, a total of 7,629 m. of drill holes were drilled by M.T.A. for Çinkur A.Ş. to determine the economical potential of the İnler Plateau Mineralization. Also, Ber Oner Mining Co. opened prospecting galleries which totaled 2,260 m. at various elevations. From the drill holes a total of 451 ore samples were extracted. From the galleries 254 ore samples were extracted and analyzed by Çinkur A.Ş..

IV. 1. PARAMETERS IMPORTANT FOR RESERVE CALCULATIONS:

The reserve calculations were conducted under the guidance of the Turkish Standards Institute (TSE).

IV. 1.1. General Concepts:

a). The real reserve thickness was calculated using the drill holes with the help of the drill hole direction, slope and extensions. For the galleries, the Çinkur A.Ş. thickness data was used.

b). Çinkur A.Ş. analysis values were used for the reserve calculations.

c). Çinkur A.Ş. thickness and analysis values were used for areas where the core percents were low.

d). Exploited areas were not discounted from the calculations.

e). Exploitation losses were excepted as "0" zero because of the lack of exploitation projections. The necessary corrections must be made according to the exploitation methods and exploitation results.

IV. 1.2. Important Points for Potential Reserve Calculations:

a). The drill hole and gallery findings sphere of influence is accepted as 25 + 25 = 50 m..

b). For the potential reserve:

- The quality border is accepted as : % (Pb + Zn) = 1
- The vein thickness is not considered as a limit.

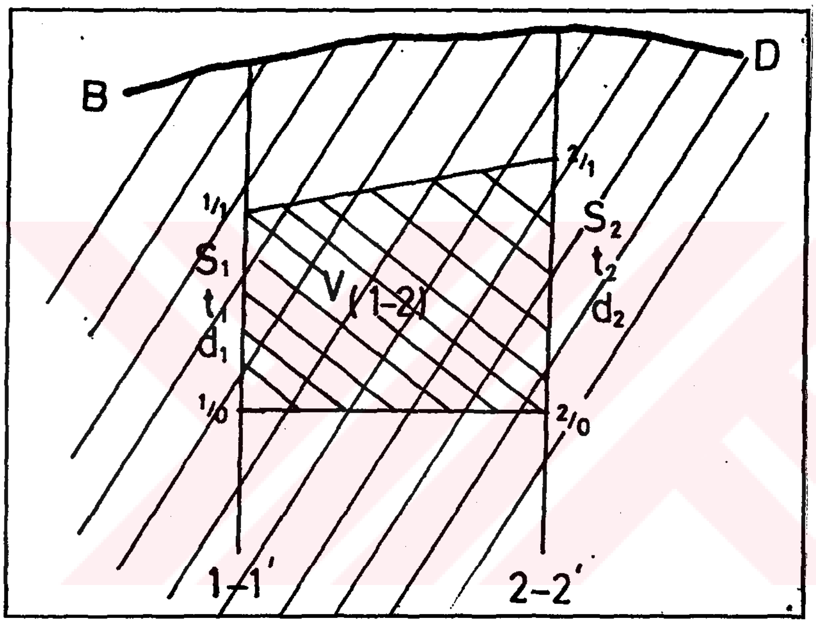
c). For the reserve category determinations:

- The reserve vein categories are:
  - For a 3 point determination vein A.
  - For a 2 point determination vein B.
  - For a 1 point determination vein C.

d). The profile areas are geometrically calculated and controlled by planimeter.

e). If the distance between the two findings is between 50-100 m., the reserve is considered a category lower in number. If the distance between the two findings is between 100-150 m., the reserve is considered two categories lower.

f). Profile methods were used for the reserve calculations.



$N = (a_1 + a_2)/2 \quad M = (k_1 + k_2)/2 \quad S_1 = N \times M = M^2$

1/0, 1/1 : Drill Hole

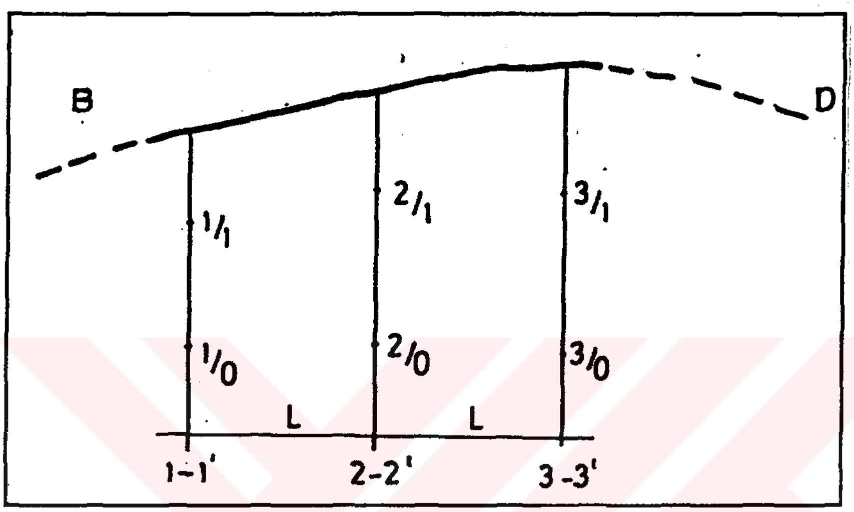
k_1, k_2: Real mineralized zone thickness (m)

a_1, a_2: Distance between the drill hole data (m).

N: Average of the real reserve thickness (m).

M: Average distance between the two drill holes data (m).

Figure 6: Sample figure for the area calculations.



$V_{1-2} = 1/3 \times 1 \times [S_1 + S_2 + (S_1 \times S_2)^{1/2}] = m^3$

1-1': trace of the profile

1: Distance between the two profiles

V_{1-2}: Volume between the two profiles

Figure 7: Sample figure for the volume calculations.

g). If there is no finding, a 25 m. long volume is formed in the one lower category of the first finding. If this volume is in the "C" category, the vein in this area is lensed out.

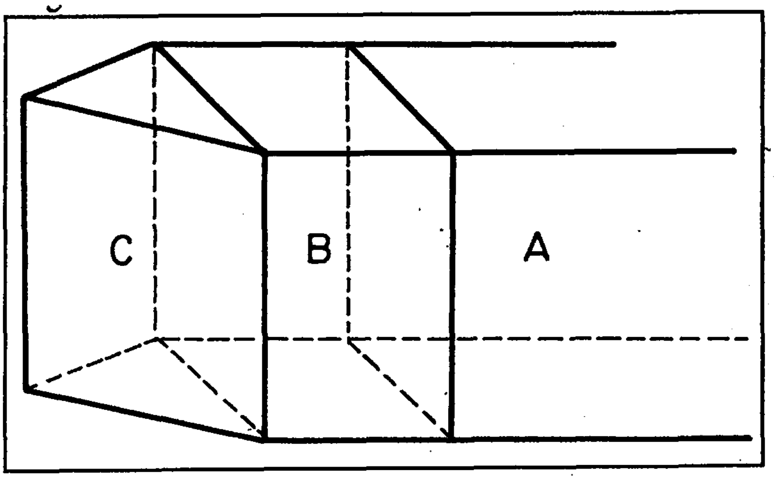


Figure 8: Reserve Categories

h). The density, weighted quality, and average density calculation samples are as follows:

1). **Density Calculation Sample:**

PbS % 7.4 ton/m^3

ZnS % 4.0 ton/m^3

Cu % and Ag % the quality is to low so it is discarded from the density calculations.

Gang 3.00 ton/m^3 is accepted.

According to this sample the density is 10.5 % Zn, 2.48 % Pb, and a 87.02 % gang is calculated as follows:

- Percentage of Zn within the blende is 67.07 %.
- Percentage of Pb within the galena is 86.60 %.
- 100/g. ore sample with a 10.5 % Zn value within the ZnS: 10.5/67, 07 x 100 = 15.65 gr.
- 15.65 gr. blende volume: 15.65g/4g/cm^3 = 3.9/cm^3
- 100/g ore sample with a 2.48 Pb value within the PbS: 2.48/86.60 x 100 = 2.86
- 2.86 gr. galena volume: 2.86gr./7, 4ge./cm^3 = 0.38 cm^3
- 100 gr. ore sample gang volume: 100 - (15.66+2.86) = 81.49 gr.
- 81.49 gang volume: 81.49/3 = 27.1 cm^3
- Ore volume: 3.91 + 0.38 + 27.1 = 31.39 cm^3
- Ore density: 100/31.39 = 3.18 cm^3

2) **Weighted Quality and Density Averages:**

- The average quality of the thicknesses cut from the drill holes.

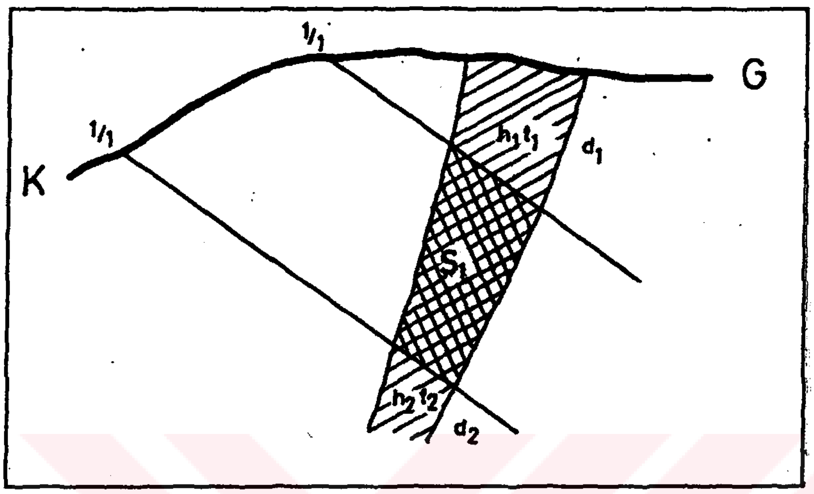
VEIN LOG 1/100	Depth (m)	DESCRIPTION		T. m.	TENORS % Zn	Pb	Cu		Ag	
	129.50									
			3.19	2.09	11.70	5,50	0.41	.00001		
	132.05									
		Steril	3 00	2.49	0 1	0 1	0 01	.00001		
	135.10									
			3.09	1.19	4.50	1.90	0.12	.00001		
	136.55									
			3.24	0.57	15.50	2.50	0.09	.00001		
	137.25									
			3.06	0.37	3.80	0.76	0.04			
	137.70									

Figure 9: Average Density and quality calculations for a sample drill stamp.

$$tort = \frac{11.t1 + 12.t2 + 13.t3 + 14.t4}{11 + 12 + 13 + 14}$$

$$dort = \frac{11.d1 + 12.d2 + 13.d3 + 14.d4}{11 + 12 + 13 + 14}$$

- The average density and quality for the thickness between two drill holes.



S1: Area between the drill hole cuts.

1/0, 1/1: Drill holes.

h1: Thickness for 1/1 drill hole cut.

h2: Thickness for 1/0 drill hole cut.

t1: Average thickness of the mineralization zone cut by the 1/1 drill hole.

t2: Average quality of the mineralization zone cut by the 1/0 drill hole.

d1: Average density of the mineralization zone cut by the 1/1 drill hole.

d2: Average density of the mineralization zone cut by the 1/0 drill hole.

S1 averaged d and t.

$$tort = \frac{h1.t1 + h2.t2}{h1 + h2} \qquad dort = \frac{h1.d1 + h2.d2}{h1 + h2}$$

Figure 10: Sample figure for the average density and quality calculations on an area basis.

- Average density and quality for the volume between two profiles.

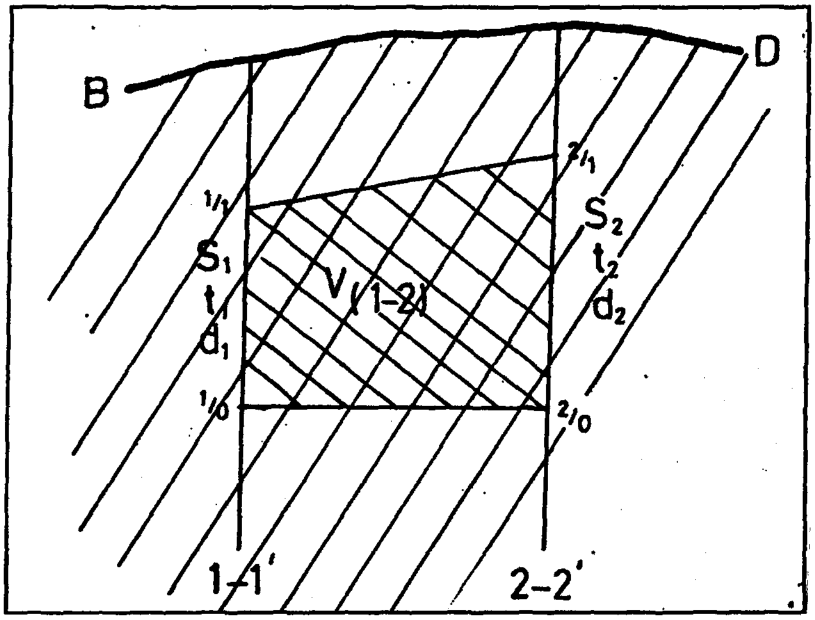


Figure 11: Sample figure for the density and quality calculations on a volume basis.

1/1, 1/0, 2/1, 2/0: Drill Holes 1-1', 2-2' profile traces.
S1: 1-1' profile area.
t1: Average quality for S1.
d1: Average density for S1.
S2: 2-2' profile area.
t2: Average quality for S2.
d2: Average density for S2.
v(1-2): Volume between 1-1' and 2-2' profiles.
v(1-2): Average density and quality.

$$tort = \frac{S1.t1 + S2.t2}{S1 + S2} \qquad dort = \frac{S1.d1 + S2.d2}{S1 + S2}$$

- Average density and quality for all areas.

$$tort = \frac{R1.t1 + R2.t2 + ...}{R1 + R2 + ...} \qquad dort = \frac{R1.d1 + R2.d2 + ...}{R1 + R2 + ...}$$

R1, R2: Tonnage between the two profiles
t1: Average quality for tonnage between two profiles
d1: Average density for tonnage between two profiles.

IV. 1.3. IMPORTANT POINTS FOR MINABLE RESERVE CALCULATIONS:

a) The exploration loss did not compromise the values because of the lack of an exploitation project.

b) The sphere of influence of the drill hole and the gallery data area duplicated from the potential reserve calculations.

c) For 10 % Pb + Zn, a 1 m. vein thickness is accepted as economical for Çinkur A.S.
   - % (Pb + Zn) = 10 and higher values are considered.
   - The quality thickness is illustrated for the practical evaluation of the different quality mineralizations (Fig. 12).
   - If the mixing of the lower quality ores with the higher quality ores are included in the exploitation if they are under the economical borders.
   - If the intercut is thin and mixing with the ore is under the economical limits it is included in the ore.

d) If the intercuts and side rock are analyzed, the results are considered. If they are not analyzed the sterile area is represented by 0.1 % Zn, 0.1 % Pb, 0.01 % Cu and 0.1 g/ton Ag quality.

e) Density and quality are calculated by using the weighted averages as in the potential reserves.

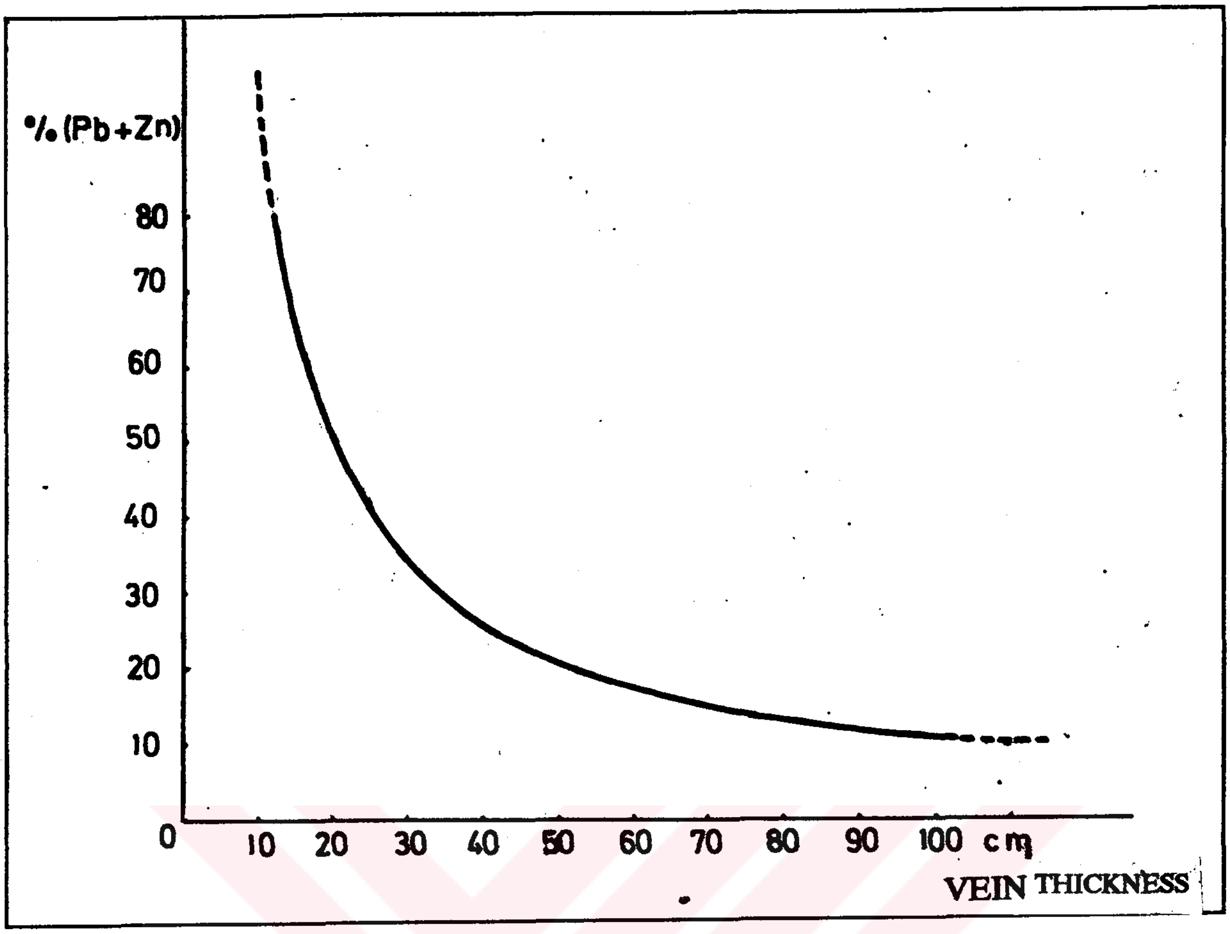


Figure 12: Quality thickness graphic.

IV. 1.4. DEREKÖY LEAD-ZINC MINERALIZATION RESERVES:

IV. 1.4.1. MORTAŞ VEIN RESERVE:

The important part of the reserve was withdrawn by the previous exploitations. For this reason, it was not considered in the reserve calculations.

IV. 1.4.2. KUZEY VEIN RESERVE:

The vein outcrop is not observed at the surface. The drill holes between the Y:38650-Y:38992 coordinate points determined that this vein is continuous towards the east. With these drill holes the vein was traced to the east in the 1780 m. elevation and in the west in the 1843 m. elevation. The continuation of the vein was not determined because of the lack of drill hole data for the lower elevations. The observable length of the vein is 360 m. and the probable length is 400 m..

In the vertical direction the vein continues for 50-60 m., and probably 150 m.. The vein reaches its maximum thickness between the 1840 and 1810 m. elevations. The vein thickness is 5-8 m. in these elevations. At the 1780 m. elevation the vein is thinned and the thickness drops to 50 cm.. The quality distribution maps, based on the drill hole data, show that high quality zones are located at the base of the vein with 0.7-1 m. thicknesses (See Appendix 11).

Drill and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
4/1	51,55	62,05	10,5	7,42	3,26	2,55
5/1	80,50	82,75	2,25	1,79	1,27	1,27
6/1	86,70	98,15	11,45	7,20	1,27	1,00
7/1	92,40	102,20	9,8	7,40	2,39	0,92
8/0	98,60	109,40	10,8	6,79	1,13	0,66
9/1	124,75	136,40	11,65	5,48	2,07	1,51
9/2	146,15	147,95	1,8	0,54	0,31	0,31
10/2	193,95	196,60	2,65	1,59	0,8	-

A total of 35 samples were collected from the mineralized zones cut by the drill holes and there analysis were conducted by Çinkur A.Ş.

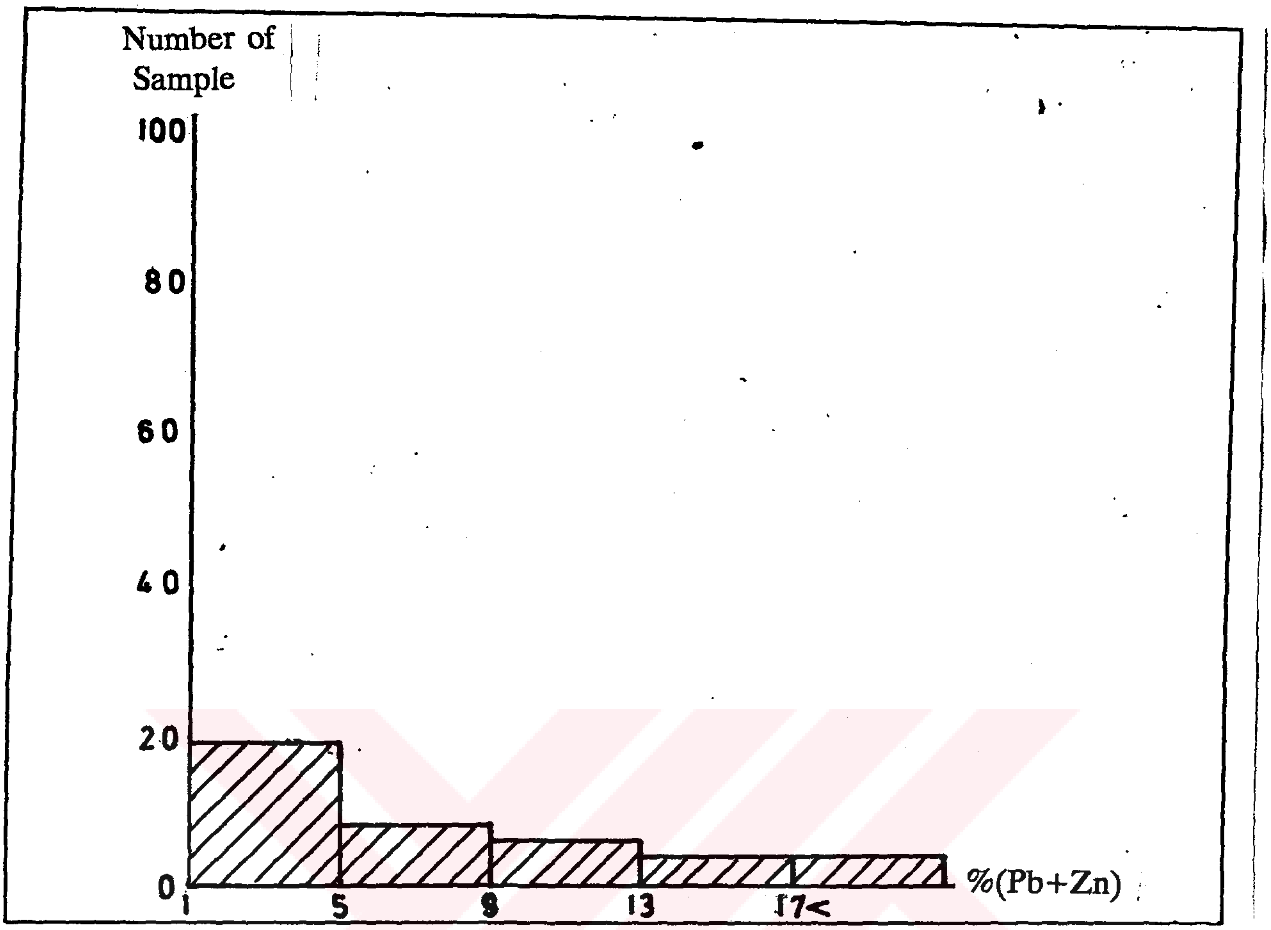


Figure 13: Pb + Zn quality histogram of the Kuzey Vein.

The average ore thickness is 1.6 m.. The average exploitable ore thickness is 1.17 m.. The gallery prospecting for this has not yet started.

For the potential and exploitable reserve calculations between the 9-9' and 10-10' profiles "C" group reserves under the "B" reserve did not form because the No. 9/2 drill hole cut the thin mineralized zone.

Potential Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m_3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
6.66	1,72	0,083	9,63	3,12	75 684,7	B
6.79	1,70	0,099	10,13	3,12	55 451,2	C
6.71	1,71	0,089	9,84	3,12	131 135,9	B+C

Minable Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m_3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
8,19	2,00	0,117	10,07	3,14	47 784,2	B
9,08	1,98	0,127	11,17	3,16	39 458,3	C
8,59	1,99	0,122	10,57	3,15	87 242,5	B+C

Suggestions:
At the 1800 m. elevation and the lower elevations continuations may not be determined because of the limited drill hole data. Through the planning of the drill holes, which cut the vein between the 1800 and 1750 m. elevations, the reserves belonging to this vein may be turned into "A" category reserves and the continuation of the vein to the lower elevations may be determined.

The parameters connected to the reserve calculations are illustrated in Table 1.

IV. 1.4.3. SARI VEIN RESERVE:

At the surface from X:67635-Y:38627 coordinate points towards the west, around a 490 m. area, the vein is represented as a mineralized hydrothermally decomposed mineral containing zone. Towards the east it may not be seen on the surface, however, its continuation has been determined for 150 m. or more. The vertical continuation of the vein is approximately 150-200 m..

The Aşçı Quarry mineralized zone shows a lenticular massive structure. The mineralized lens thicknesses are 1-1.5 m., and their length is 50-60 m.. The vertical length is probably 50 m.. Towards the western section of this area no economical dimensions were developed, however, towards the east it was observed that the vein contains thin alteration zone characteristics.

Drill Hole and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
88/1	59,25	59,85	0,6	0,4	-	-
89/8	112,55	114,15	1,6	1,07	0,43	-
89/1	44,70	47,40	2,00	1,34	-	-
5/1	138,80	139,70	0,90	0,60	-	-
6/1	143,00	146,50	0,50	0,33	-	-
7/1	152,50	153,50	1,00	0,66	-	-
90/1A	13,00	19,00	6,00	2,58	-	-

Six samples were taken by the drill holes of this vein and were analyzed by Çinkur A.Ş.. The gallery work used to determine the structure of this vein was not extensive.

The average potential thickness is 0.34 m. and the exploitable thickness was not determined.

As a result of these investigations the vein does not have any economical dimensions in conjunction with the mineralization. For this reason it was not included in the reserve calculations.

IV. 1.4.4. MAIN VEIN:

The outcrop of this vein may be seen 350-400 m. towards the east of the X:67550-Y:38630 coordinate points. The studies determined that it continues vertically to the 1700 m. elevation. At the 1800 m. elevation it reached its maximum thickness of 22 m.. The vein at this elevation is mostly a massive mineralization. At the 1700 m. elevation the vein thickness is between 0.6-5.5 m. and is represented as scattered and/or thin capillaries. The drill hole data correlation results show that the vein may be branched after the X:67600-Y:38875 coordinate points. At the 1800 m. elevation at the X:67600-Y:38875 coordinate points the vein has disseminated mineralization characteristics around a 20-30 m. area.

The vein is slipped 20-30 m. south by the 120° north directional fault in the south. The gang minerals, especially the quartz, quality decreases towards the fault. Based on the data obtained from the No. 9 and No. 10 drill holes correlation show high quality mineralization occurs towards the lower elevations.

The reserve calculations of the northern branch of the Main Vein is considered as Main Vein I and the southern branch of the Main Vein is considered as the Main Vein II. Both of these veins were separately considered in the reserve calculations.

a) Main Vein:

Main Vein Drill and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
4/1	143,95	156,80	12,85	10,89	2,78	1,80
89/1	128,00	138,60	10,06	8,68	6,27	5,9
88/2	80,60	88,25	7,65	6,26	6,22	1,8
5/0	223,2	206,15	2,95	2,81	1,72	-
5/1	168,90	185,20	16,3	13,19	6,87	9,09
6/1	193,2	197,2	4,0	2,93	2,91	2,91
89/5	53,65	76,20	22,65	12,85	2,2	1,00
7/1	172,35	180,85	8,5	7,57	5,41	1,6
90/1A	61,80	76,50	14,7	6,32	4,2	-
8/0	232,15	247,75	15,6	10,23	0,22	0,22
8/1	137,20	169,45	32,25	22,00	2,48	2,08
8/2	10,93	11,43	0,5	0,30	-	-
9/1	264,30	270,85	6,55	2,95	1,94	1,06

From the mineralization zone a total of 59 drill hole samples and 219 gallery samples were collected. A total of 278 samples were analyzed by Çinkur A.Ş..

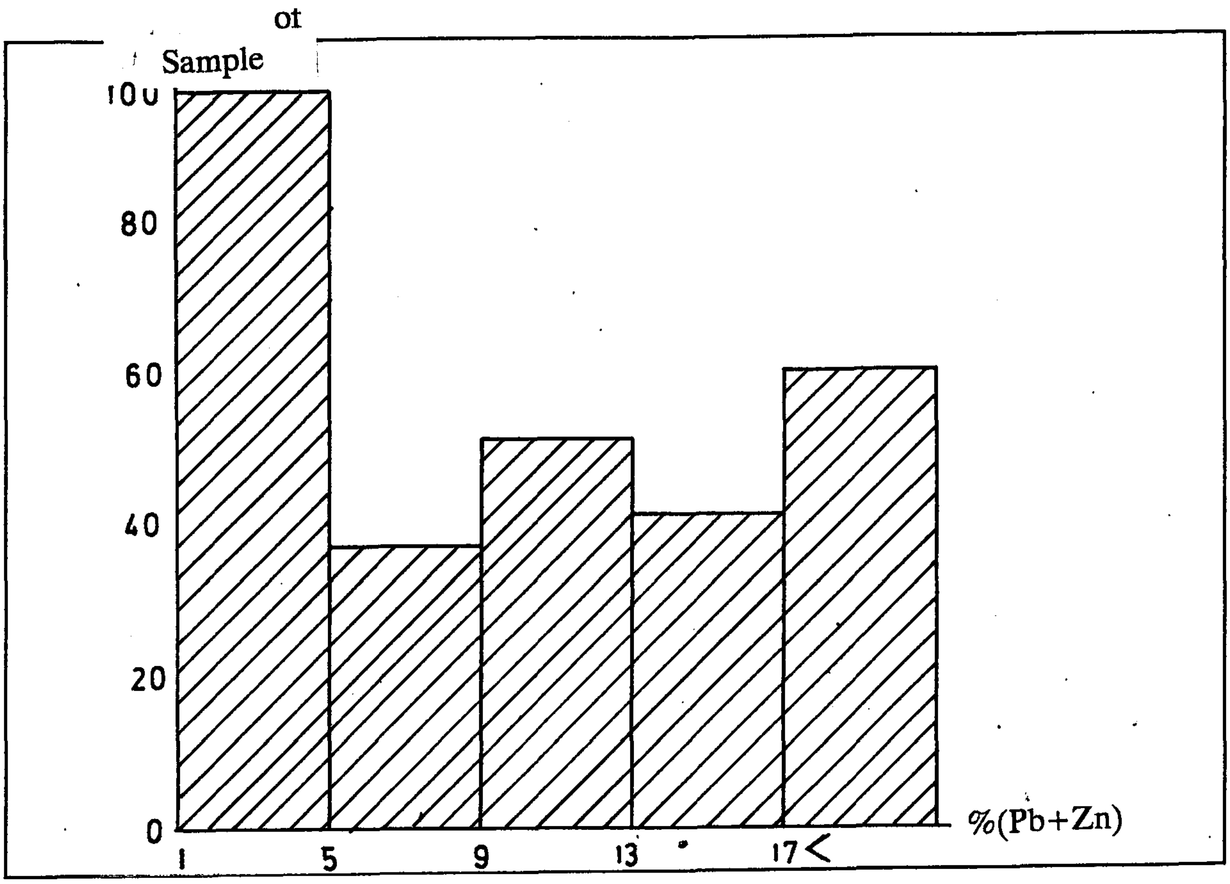


Figure 14: Main Vein Pb + Zn quality histogram.

The quality of the collected samples is discussable. The discrepancies are in the collecting of the furrow samples, which are usually obtained from the gallery walls. As observed in Fig. 2, the samples numbered 2, 3, and 5 were collected in a small amount, however, the samples numbered 1 and 4 form 2/3 of the collected sample. For this reason the sample representation is discussable.

The No. 8/2 drill hole shows that at the 1950 m. elevation the vein contains oxidized, baritified, and silicified zones. The analysis results of the drill hole samples show that the Pb + Zn is under 1 %.

The gallery opened at the 1725 m. elevation cuts the vein between 310-400 m.. In this elevation a "T" was opened to determine the thickness of the vein. This "T" shows that the mineralization zone thickness is 5.5 m. and most of the mineralization is observed as disseminated 5-10 cm. thick massive capillaries.

The vein was investigated at a 2.1 m. area at the 1805 elevation by prospecting galleries. There were seven "T"'s opened to determine the thickness and quality of this vein. It was determined that the thickness of the vein is between 14-22 m. and the high quality of the mineralization is sequential in the lenses (See Appendix 7, 8, 9, 10.1, 10.2).

These lenses are 50-90 m. long and their thickness changes from between 5-7 m.. The drill hole data chow that the high quality lenses continue up to the 1750 m. elevations.

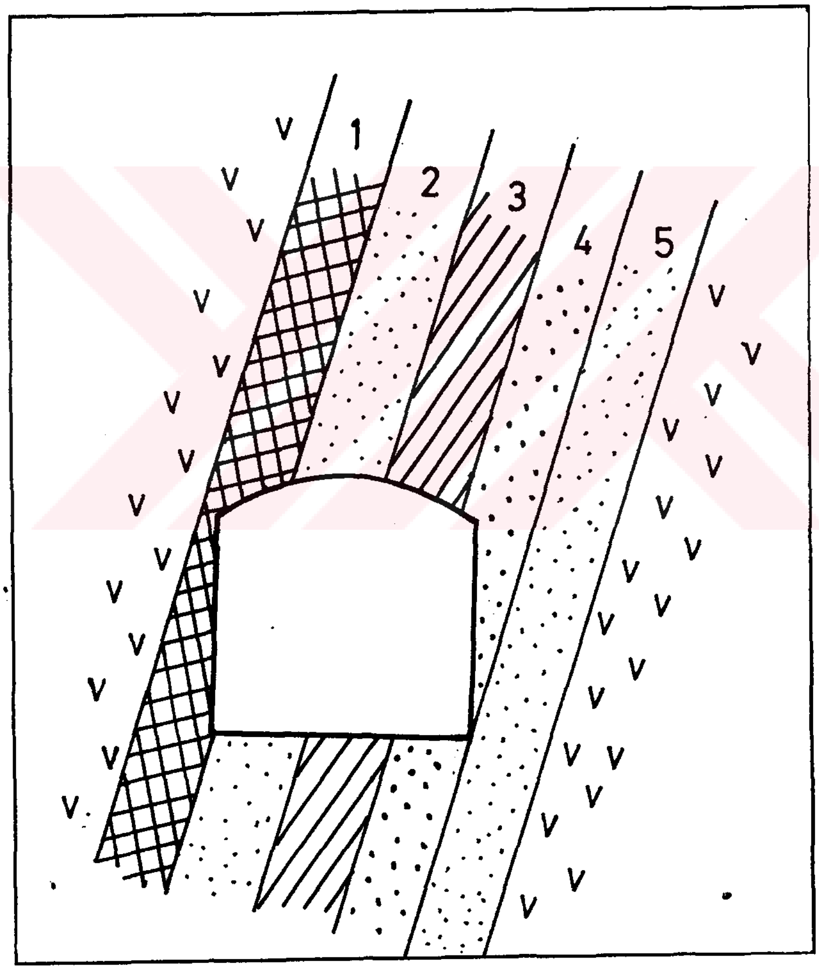


Figure 15: Critic figure for the gallery samples.

At the 1850 m. elevation gallery the vein was studied in a 110 m. area. There were two "T"'s opened to study the thickness and the quality distribution of the vein. The investigations in this gallery show that the mineralized zone thickness is 10 m. and the zone was effected by meteoric alterations in someplaces. The vein is slipped 15-20 m. south by the north 120°-130° directional fault at X:67590-Y:38777 coordinate points.

At the 1880 m. elevation the gallery was opened around the 70 m. area and the western section of the gallery was investigated. In this elevation the vein is characterized as a heavily oxidized mineralization zone.
The average thickness of the vein is 6.53 m. and the exploitable thickness of the vein is 5.53 m..

At the 1850 m. elevation at the Y:38800 coordinate point, a 0.5 m. furrow sample length was considered as a mineralized zone thickness because of the lack of a "T".

The 10/1 and 10/2 drill hole data is projected on the 10-10' profile.
The 8/2 drill hole data was not evaluated because it was under the 1 % (Pb + Zn) value.

Potential Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m$_3$	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
9,78	3,15	0,059	7,1	3,19	610439,5	A
6,47	2,41	0,110	9,06	3,13	165029,6	B
5,21	1,98	0,090	10,72	3,11	196065,3	C
8,54	2,85	0,080	8,34	3,17	971234,4	A+B+C

Exploitable Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
11,60	5,09	0,066	5,60	3,24	329350,5	A
12,83	4,74	0,230	14,21	3,29	138083,1	B
11,83	4,90	0,320	19,88	3,27	25620,6	C
11,96	4,98	0,150	10,05	3,26	439054,2	A+B+C

Suggestions:

The planning of the drill holes which will cut the upper elevations of the vein between the Y:3885 and Y:38900 coordinate points should be made.

Planning the drill holes and/or galleries to determine the connection between the Main Vein I and Main Vein II mineralizations in the east.

In the west, the western section of the 120° north directional fault investigation of the Main Vein should be continued.

The related parameters for the reserve calculations are shown in Table 2.

b) Main Vein I:

Main Vein I Drill and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
8/0	202,40	207,00	4,6	2,77	1,38	0,87
9/1	212,05	220,95	8,9	4,10	3,39	2,52
9/2	271,00	271,45	0,45	0,14	0,14	-
10/1	264,80	273,85	9,05	5,33	2,62	1,09
10/2	172,20	172,95	0,75	0,46	0,46	-

A total of 19 samples were collected from the mineralized zone and analyzed by Çinkur A.Ş.. The average thickness of the vein is 1.6 m. and an average exploitable thickness of 1.49 m. was found. The gallery works were not started in this vein.

The 10/1 and 10/2 drill hole data are projected on the 10-10' profile. The distance between the 9-9' profile drill hole data and the 10-10' profile drill hole data is 50 m..

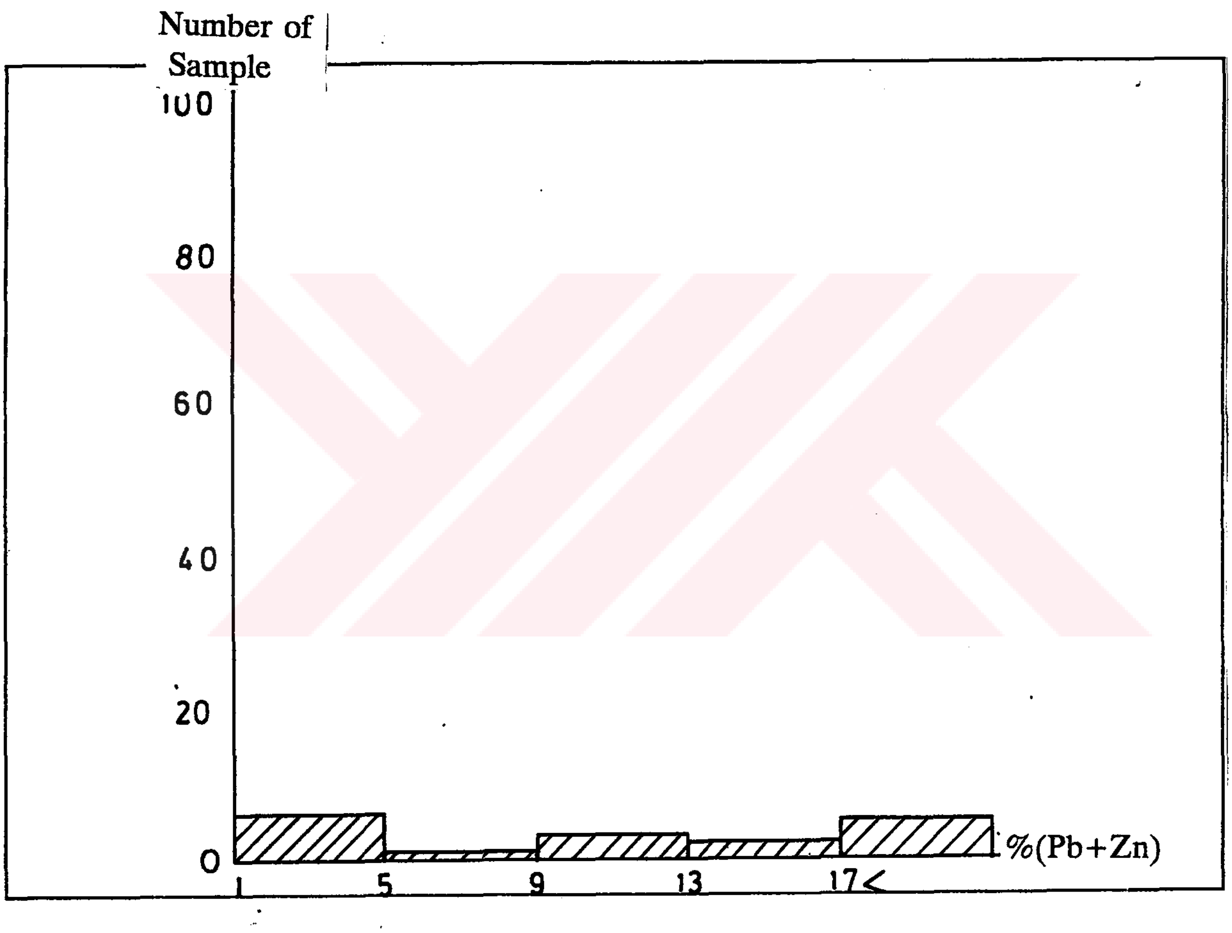


Figure 16: Pb + Zn quality histogram of the Main Vein I.

Potential Reserve:

AVERAGE TENORS				AVERAGE ton/m_3	RESERVES ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
9,09	2,82	0,140	12,30	3,18	11044,0	A
7,52	2,56	0,130	11,14	3,16	46621,1	B
7,52	2,56	0,130	11,14	3,16	64943,8	C
7,66	2,58	0,130	11,24	3,16	122608,9	A+B+C

Exploitable Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m_3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
11,39	2,53	0,150	12,86	3,23	23170,8	B
11,89	3,67	0,150	12,92	3,24	31067,7	C
11,68	3,61	0,150	12,89	3,24	54238,5	B+C

Suggestions:

The vein must be controlled between the Y:38850 and Y:39000 coordinate points at the 1850 m. and 1800 m. elevations. In the eastern section of the Y:39000 coordinate point at the 1850, 1800 m. and 1750 m. elevations, by the planned drill and gallery investigations the vein must also be controlled.

The continuation should be investigated at the 1805 m. elevation gallery towards the north of the X:67655-Y:38860 coordinate points around the 15 m. long gallery.

The parameters for the reserve calculations are given in Table 3.

c) **Main Vein II:**

Main Vein II Drill and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
9/1	264,30	270,85	6,55	2,95	1,94	1,06
9/2	344,50	354,50	10,00	3,00	-	-
10/1	307,7	311,70	4,00	2,44	1,46	1,25
10/2	190,4	205,10	14,70	9,26	9,3	-

A total of 25 drill hole samples were collected from the mineralized zone and were analyzed by Çinkur A.Ş..

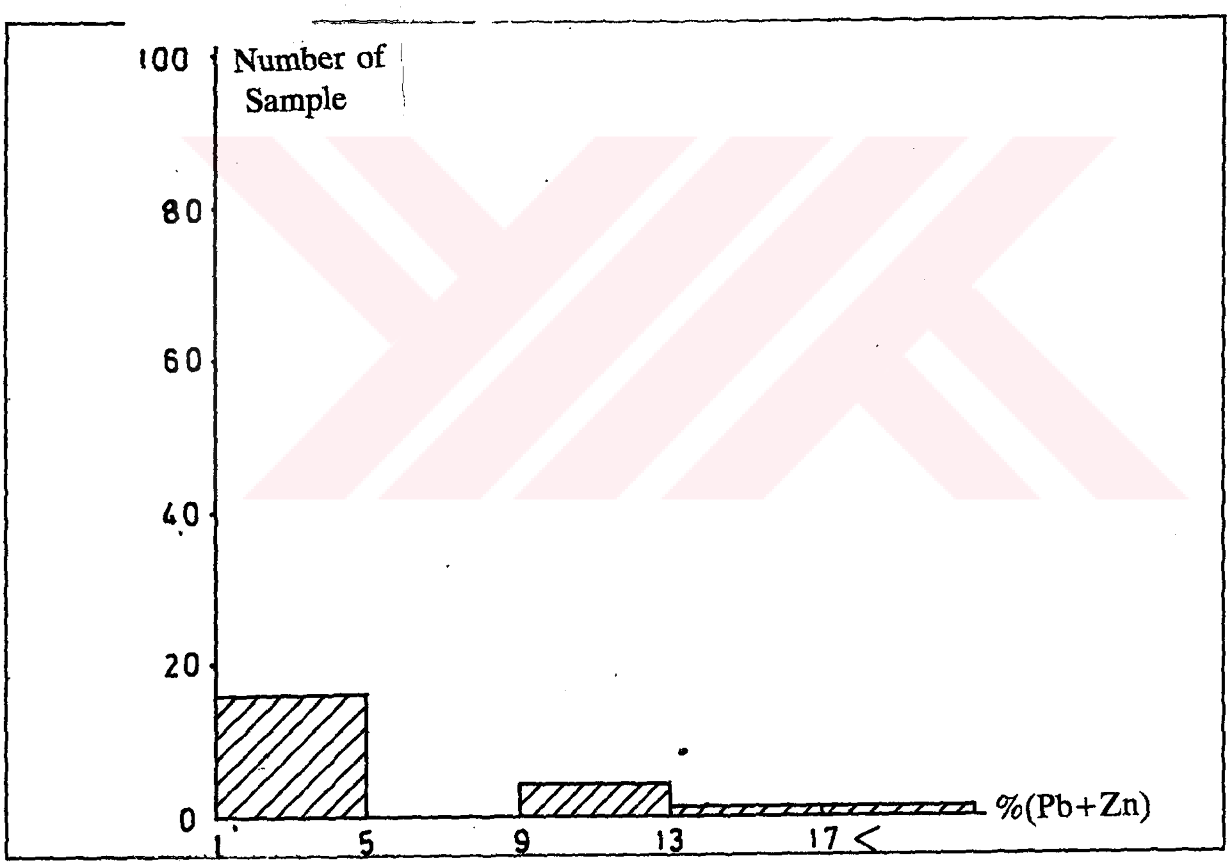


Figure 17: Pb + Zn quality histogram of the Main Vein II.

The No. 9/2 drill hole sample shows that the 1600 m. elevation of the vein has disseminated mineralization characteristics. The analysis results are below the Pb + Zn 1 % level.

As a result of the gallery investigations, from the east of the Y:38850 coordinate point, around a 20-30 m. area, the vein contains disseminated mineralization characteristics.

The gallery investigations do not reach the level which shows the exact structure of this vein.

Potential Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m_3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
3,83	1,29	0,270	12,70	3,07	39059,8	B
3,66	1,34	0,300	12,79	3,07	37829,9	C
3,74	1,31	0,280	12,74	3,07	76889,7	B+C

Exploitable Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m_3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
9,99	3,95	1,260	21,84	3,21	7406,7	B
10,04	3,97	1,270	22,02	3,21	8340,7	C
10,02	3,96	1,260	21,94	3,21	15747,4	B+C

Suggestions:

Between the Y:38850 and Y:39000 coordinate points the Main Vein II characteristics should be investigated by a horizontal gallery. At the 1850, 1800, and 1750 m. elevations the continuation and characteristics of the vein should be vertically investigated by the drill hole data.

The reserve parameters are given in Table 4.

The Total Reserves, Average Quality and Density for the Main Vein, Main Vein I, and Main Vein II Mineralizations:

Potential Reserve:

VEINS	AVERAGE TENORS				AVER. DENS. d ton/m^3	RESERVE (ton)	CAT.
	Zn %	Pb %	Cu %	Ag ppm			
MAIN VEIN	9,78	3,15	0,059	7,1	3,19	610439,5	A
MAIN VEIN 1	9,09	2,82	0,14	12,30	3,18	11044,0	A
MAIN VEIN 2	-	-	-	-	-	-	-
TOTAL	9,77	3,14	0,06	7,19	3,19	621483,5	A
MAIN VEIN	6,67	2,41	0,11	9,06	3,13	165029,6	B
MAIN VEIN 1	7,52	2,56	0,13	11,14	3,16	46621,1	B
MAIN VEIN 2	3,83	1,29	0,27	12,70	3,07	39059,8	B
TOTAL	6,25	2,26	0,14	10,00	3,13	250710,5	B
MAIN VEIN	5,21	1,95	0,09	10,72	3,11	196065,3	C
MAIN VEIN 1	7,52	2,56	0,13	11,14	3,16	64943,8	C
MAIN VEIN 2	3,66	1,34	0,30	12,79	3,07	37829,9	C
TOTAL	5,51	2,02	0,14	11,18	3,12	299838,0	C
TOTAL	9,77	3,14	0,06	7,19	3,19	621483,5	A
TOTAL	6,25	2,26	0,14	10,00	3,13	250710,5	B
TOTAL	5,61	2,02	0,14	11,18	3,12	229838,0	C
ULTIMATE TOTAL	8,11	2,71	0,09	8,66	3,16	1172033,0	A+B+C

Exploitable Reserve:

VEINS	AVERAGE TENORS				AVER. DENS. d ton/m^3	RESERVE (ton)	CAT.
	Zn %	Pb %	Cu %	Ag ppm			
MAIN VEIN	11,60	5,09	0,066	5,60	3,24	329350,5	A
MAIN VEIN 1	-	-	-	-	-	-	A
MAIN VEIN 2	-	-	-	-	-	-	A
TOTAL	11,60	5,09	0,066	5,60	3,24	329350,5	A
MAIN VEIN	12,83	4,74	0,23	14,21	3,29	138083,1	B
MAIN VEIN 1	11,39	2,53	0,15	12,86	3,23	23170,8	B
MAIN VEIN 2	9,99	3,95	1,26	21,84	3,21	7406,7	B
TOTAL	12,51	4,40	0,26	14,35	3,29	168660,6	B
MAIN VEIN	11,83	4,90	0,32	19,88	3,27	25620,6	C
MAIN VEIN 1	11,89	3,67	0,15	12,92	3,24	31067,7	C
MAIN VEIN 2	10,04	3,97	1,27	22,02	3,21	8340,7	C
TOTAL	11,63	4,19	3,36	16,83	3,25	65029,0	C
TOTAL	11,60	5,09	0,066	5,60	3,24	329350,5	A
TOTAL	12,51	4,40	0,26	14,35	3,29	168660,6	B
TOTAL	11,63	4,19	0,36	16,83	3,25	63029,0	C
ULTIMATE TOTAL	11,88	4,78	0,16	9,52	3,26	563040,1	A+B+C

IV. 1.4.5. SECONDARY VEIN RESERVE:

The vein outcrop may be observed around a 70 m. area between X:67550-Y:38750 and X:67550-Y:38820 coordinate points. Between the 1900 and 1850 m. elevations 270 m., at the 1800 m. elevation 215 m., and at the 1750 elevation an approximately 205 m. continuation was determined by the drill data. The vertical continuation of the vein was determined in the west at the 1830

m. elevation and in the 1675 m. elevation.

The Secondary Vein outcrop thickness at the surface is 7.15 m.. The outcrop is characterized as baritified and silicified zones. This baritified zone continues up to the 1900 m. elevation.

At the 1805 m. elevation, at the 65th m. of the gallery, which goes towards the south and which also follows the Main Vein, there is no trace of the Secondary Vein in this gallery. Further east, the obtained drill hole data shows that the vein is 4-13.5 m. thick. At the 1675 m. elevation the vein is thinned to 1.75 m. and has disseminated mineralization characteristics.

According to this data the Secondary Vein may be:

a) A side cut which branched upwards from the Main Vein.

b) A lenticular vein which is closed towards the bottom.

Drill and Gallery Data:

Borehole No	Entering Ore body (m)	Existing Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
89/5	102,00	119,35	17,35	9,89	7,02	2,73
90/1A	61,80	76,50	14,7	6,32	9,95	3,47
7/1	226,7	288,60	1,6	1,37	1,37	-
7/2	11,95	29,89	17,94	15,37	-	-
8/0	269,35	272,05	3,00	1,77	-	-
8/1	174,15	179,15	5,00	3,08	1,15	1,74
8/2	62,70	67,50	4,8	3,73	3,73	-
9/1	296,50	300,15	3,65	1,75	-	-
10/2	217,85	227,70	9,85	6,20	3,37	3,20

A total of 24 samples were collected from the mineralized zone which was cut by the drill holes and the data was analyzed by Çinkur A.Ş..

This vein was cut by the No. 7/2 drill hole at the 1950 m.

elevation. The mineralization zone at this elevation has heavily oxidized, baritified and silicified characteristics. The samples collected from this zone were not analyzed.

The No. 8/0 drill hole shows that the vein at the 1670 m. elevation has disseminated mineral characteristics because of this disseminated mineralization characteristic of the sample, no analysis was conducted.

The No. 9/1 drill hole shows that at the 1670 m. elevation the vein contains thin mineralized quartz capillaries and has disseminated mineralization characteristics. No analysis was conducted. The vein is cut by a gallery at the 1805 m. elevation and at the X:67580-Y:38900 coordinate points. The gallery investigation does not show the level which may show the structure of the vein.

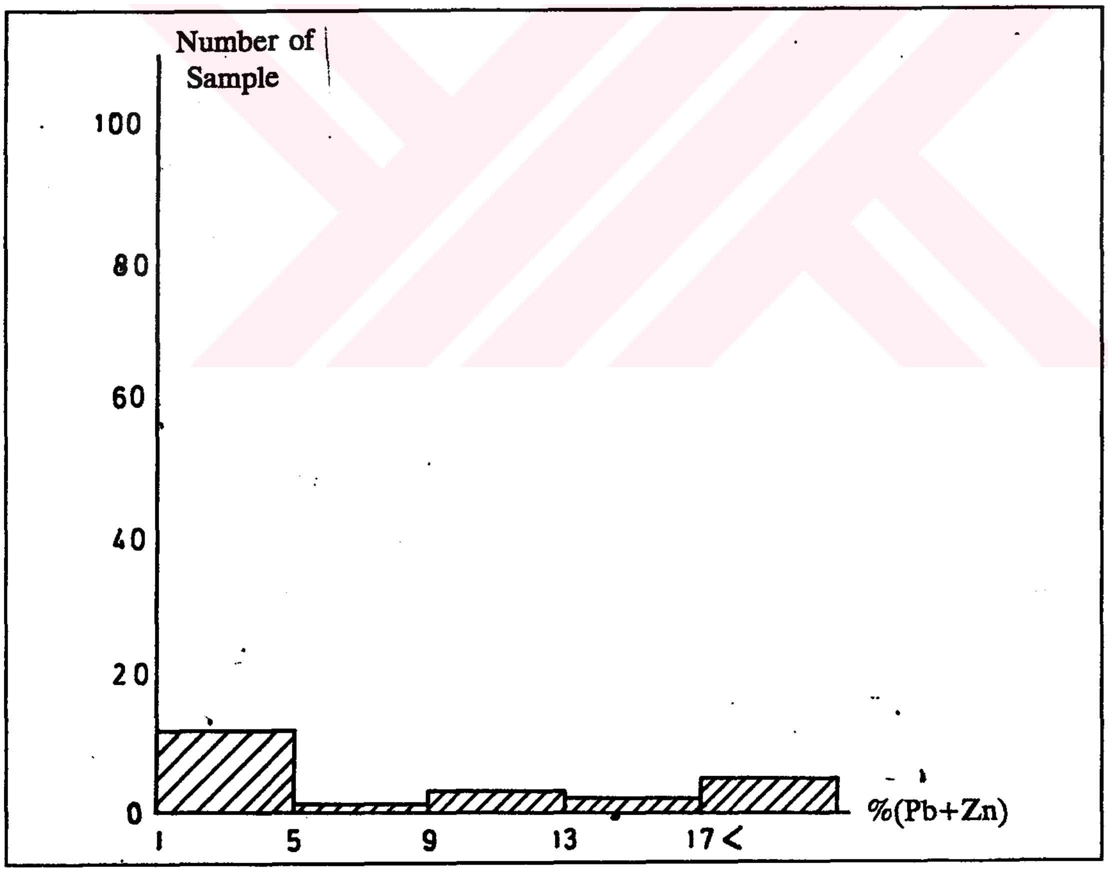


Figure 18: Pb + Zn quality histogram for the Secondary Vein.

The average vein thickness is 4.37 m. and the exploitable average thickness is 3 m.. The Pb + Zn quality is considered under 1 % and was not calculated because there were no analysis results for Nos. 7/2, 8/0, and 9/1 drill holes.

Potential Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
4,33	2,39	0,08	10,13	3,10	42 801,5	A
5,06	2,28	0,066	7,57	3,11	191 480,2	B
5,14	2,11	0,06	8,30	3,11	197 744,1	C
5,02	2,21	0,065	7,97	3,11	432 025,8	A+B+C

Exploitable Reserve:

AVERAGE TENORS				AVERAGE DENSITY ton/m3	RESERVES Ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
9,78	3,71	0,053	7,52	3,22	93 642,3	B
11,23	3,71	0,047	8,66	3,23	102 481,5	C
10,54	3,71	0,050	8,12	3,23	196 123,8	A+B+C

Suggestions:
The drill holes which will cut the vein between the Y:38850 and Y:38930 coordinates at the 1850 and 1750 elevations should be planned.

The drill holes which will cut the vein between the Y:38930 and Y:38992 coordinate points at the 1750, 1800 and 1850 m. elevations should be planned.

The drill hole which will cut the vein 50 m. east of the Y:38992 coordinate point at the 1850, 1800, and 1750 m. elevations should be planned. The continuation of the vein towards the east should be investigated according to the obtained results of these analyses.

At the 1800 m. elevation, the rökups opened towards the east of the gallery which follows the Main Vein.

The reserve calculations related to this vein are illustrated in Fig. 5.

IV. 1.4.6. No. 2 VEIN RESERVE:
The vein outcrop was not observed at the surface. The continuation and situation of the vein was investigated by the 89/5, 90/1a, 7/2, 8/0, 8/1, and 8/2 drill holes and the 1805 m. elevation gallery data. It was determined that at the 1805 m. elevation gallery the vein continues for a 230 m. area. At this elevation the vein thickness in the west is 1-1.5 m. and in the east it reaches 4-5 m.. The drill holes in the area show that the vein continues down to the 1775-1780 m. elevations in the west. In the east it continues down to the 1630 m. elevation.

In the east at the X:67530-Y:38675 coordinate points the vein was thinned out as a disseminated mineralization in the andesitic units.

Towards the east between the Y:67523-Y:38757 coordinate points and X:67533-Y:38757 coordinate points the vein was slipped 30 m. south by the north 120° directional fault. Towards the east up to the X:67545-Y:38912 coordinate points the vein was traced by a gallery. Further east of these coordinate points the gallery and drill hole data were not used and so the continuation of the vein was not determined.

The vein was traced to the 1775 and 1780 m. elevations in the west and to the 1650 m. elevation in east by the drill hole data. It was observed that in these elevations the vein is heavily disseminated and in someplaces, has thin massive mineralization characteristics.

The correlation of the data from the analysis results shows that the vein is a lenticular vein which goes deeper in the east (See Appendix 6).

Drill and Gallery Data:

Borehole No	Entering Ore Body (m)	Existing Ore bady (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
89/5	-	-	-	-	-	-
90/1A	194,10	197,10	3,00	2,61	1,39	1,39
7/2	87,00	89,95	2,95	2,56	--	--
8/0	311,05	313,25	2,20	1,60	0,84	--
8/1	225,30	240,80	15,50	11,87	9,49	1,98
8/2	110,80	111,70	0,90	0,69	--	--

A total of 58 samples were taken from the mineralized zone which was cut by the drill holes and galleries. These samples were analyzed by Çinkur A.Ş..

The No. 89/5 drill hole cut the fault lacuna.

The disseminated mineralization zone characteristics and heavy meteoric alterations were determined by the No. 7/2 drill hole at the 1903 m. elevation. The No. 8/2 drill hole cut at the 1897 m. elevations. No analyses were conducted.

The average thickness of the vein is 3.13 m. and the exploitable average thickness is 2.26 m..

The No. 7/2 and 8/2 drill hole data were not analyzed and so they were not calculated in the final analysis results.

In the west at the X:67535-Y:38680 coordinate points the vein has disseminated mineralization characteristics. For this reason, the "B" and "C" type reserves were not formed in the west.

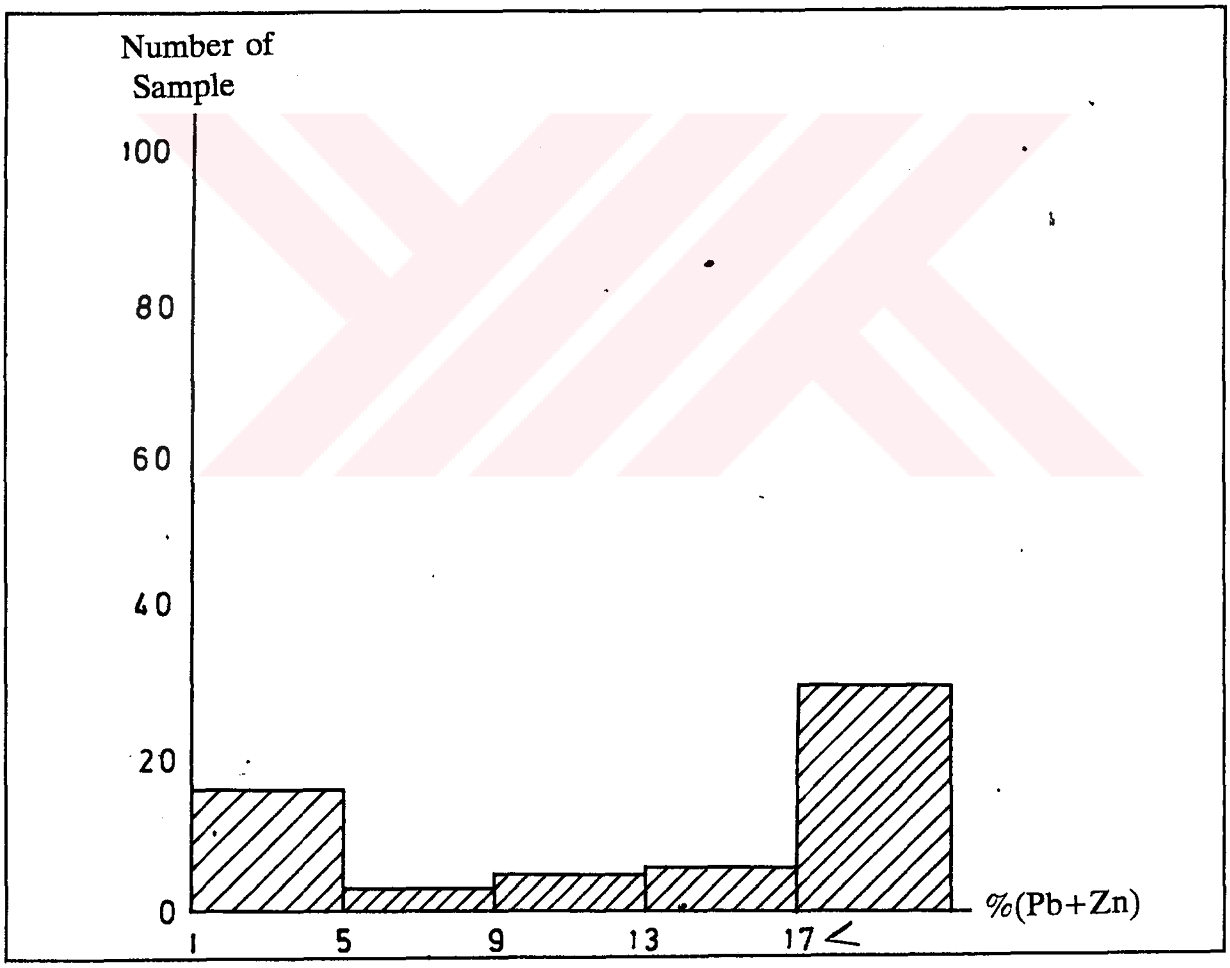


Figure 19: Pb + Zn quality histogram of the No. 2 Vein.

Potential Reserves:

AVERAGE TENORS				AVERAGE DENSITY ton/m^3	RESERVES ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
10,35	7,26	0,22	7,65	3,31	95 917,7	A
10,65	6,49	0,17	5,86	3,30	123 155,4	B
8,54	4,49	0,24	8,57	3,16	103 329,9	C
9,88	6,08	0,21	7,76	3,26	322 403,0	A+B+C

Exploitable Reserves:

AVERAGE TENORS				AVERAGE DENSITY ton/m^3	RESERVES ton	CATEGORIES
Zn %	Pb %	Cu %	Ag(ppm)			
14,24	10,01	0,06	2,83	3,44	80 443,6	A
14,19	8,62	0,14	2,03	3,40	92 116,4	B
14,09	8,16	0,13	1,85	3,38	50 083,2	C
14,19	9,02	0,11	2,28	3,41	222 643,2	A+B+C

Suggestions:
The gallery and drill hole data must be planned to investigate the continuation of the vein towards the east at the 1850, 1800, and 1750 m. elevations.

The related parameters concerning the reserve calculations are given in Table 6.

IV. 1.4.7. No. 3 VEIN RESERVE:
The vein outcrop at the surface is represented in a 110 m. area by baritified, silicified, and in someplaces, mineralized zones

between the X:67500-Y:38730 and X:67505-Y:38815 coordinate points. The observable length of the vein is 150 m. and the probable length of the vein is 300 m.. The investigations show that the vein continues up to the 1670 and 1720 m. elevations.

At the surface the vein outcrop is 2.5 m. thick. The outcrop has heavily silicified and in someplaces baritified and mineralized characteristics. The outcrop has a structure that includes cavities, which are a result of dense meteoric alterations. The drill hole data shows that the meteorically altered mineralized zone continues up to the 1833 m. elevation.

In the west at the 1800 m. elevation at the X:67525-Y:38720 coordinate points, the vein has thin massive capillary characteristics. The vein was thinned out towards the east at these coordinate points. In the east according to the 89/5 drill hole data, the vein reached a 3.7 m. thickness. At this elevation to the east of the 89/5 drill hole, there was no data obtained. For this reason the characteristics of the vein were not determined.

At the 1680 m. elevation, the vein has disseminated mineralization characteristics and/or thinned out as thin massive capillary fringes.

The No. 8/1 drill hole shows that at the 1728 and 1719 m. elevations the vein mostly disseminated and in someplaces 0.05-0.1 m. thick thin massive capillary zone characteristics may be observed.

The average thickness of the vein is 2.08 m.. and the average exploitable thickness is 1.49 m..

The No. 8/1 drill hole was not analyzed and so it was not evaluated.

Potential Reserves:

AVERAGE TENORS				AVERAGE DENSITY ton/m^3	RESERVES ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
5,91	4,46	0,33	28,07	3,22	46738,2	A
5,09	4,96	0,35	31,87	3,20	59196,1	B
5,45	4,74	0,34	30,19	3,21	105934,3	B+C

Exploitable Reserves:

AVERAGE TENORS				AVERAGE DENSITY ton/m^3	RESERVES ton	CATEGORIES
Zn %	Pb %	Cu %	Ag ppm			
7,94	7,21	0,38	23,86	3,29	34 867,4	B
6,83	6,72	0,40	26,67	3,26	44458,5	C
7,32	6,94	0,39	25,43	3,27	79325,9	B+C

Suggestions:
The drill holes in this vein are defined in two general dimensions. For this reason the acceptable "A" category reserves were not formed.

For the development of the vein reserves:

- At Y:38500 coordinate point at the 1850 and 1750 m. elevations.
- At Y:38750 coordinate point at the 1850 and 1750 m. elevations.
- At Y:38800 coordinate point at the 1800 and 1750 m. elevations.

Drill and Gallery Data:

Borehole No	Entering Ore Body (m)	Exiting Ore Body (m)	Cutting Ore Body (m)	Vein Thickness (m)	Ore Body Thickness (m)	Mineable Thickness (m)
89/5	183,00	190,80	7,80	4,37	3,14	2,18
7/1	287,70	289,50	1,80	1,70	1,7	0,85
7/2	114,30	117,55	3,25	2,53	1,7	1,7
8/1	258,70	269,70	11,00	8,42	-	-
8/2	147,00	137,35	10,35	8,04	1,51	1,24

A total of 24 drill hole samples were collected from the mineralized zone and were analyzed by Çinkur A.Ş..

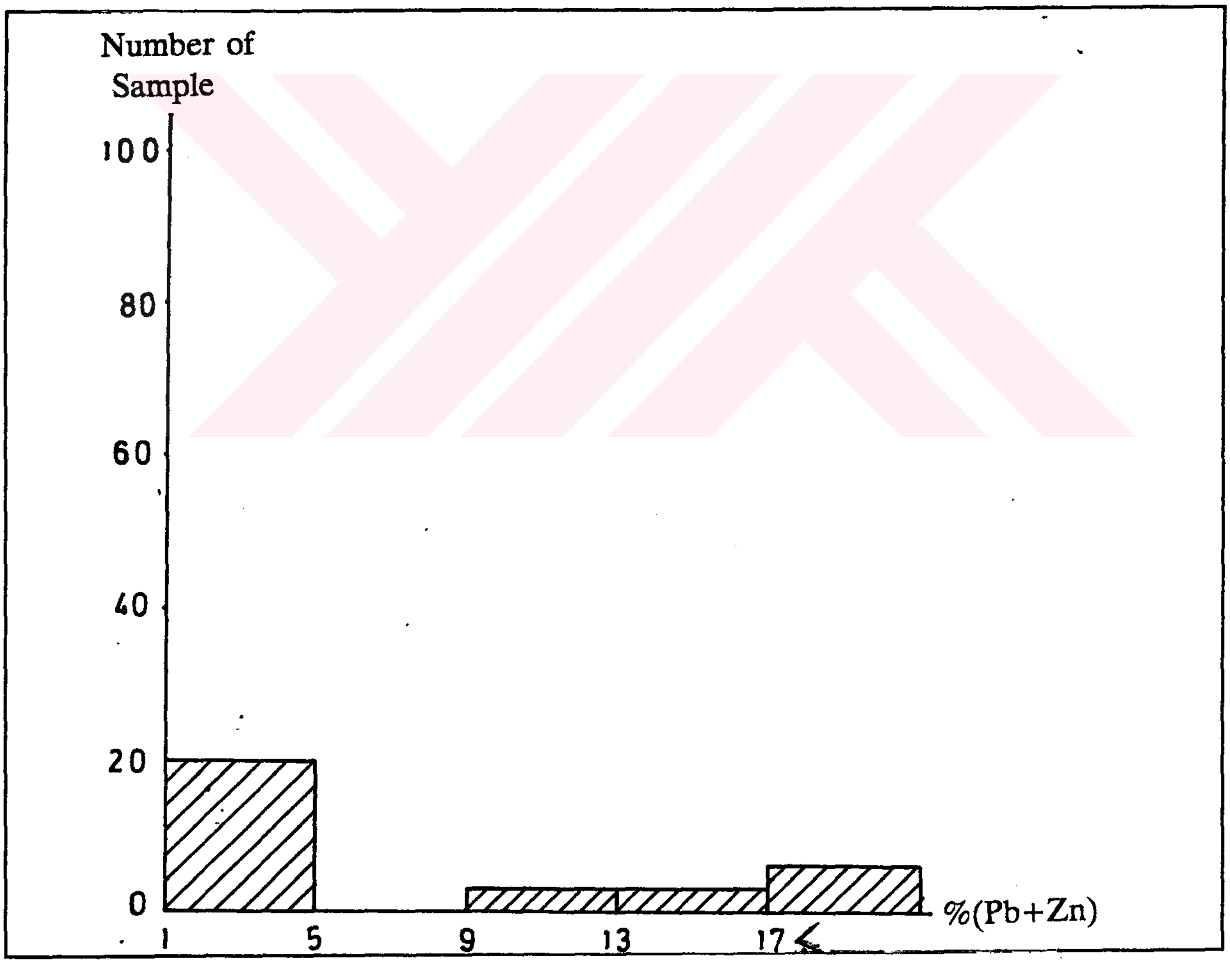


Figure 20: Pb + Zn quality histogram for the No. 3 Vein.

RESULTS AND SUGGESTIONS

The drill holes should be planned to cut the vein at the Y:38850 coordinate point at the 1800 and 1750 m. elevations.

The continuation of the vein at the 1850, 1800, and 1700 m. elevations towards the east should be investigated.

The related parameters for the reserve calculations are shown in Table 7.

The potential reserve for the İnler Plateau Mineralization is given in Table 8 and the exploitable reserve is given in Table 9.

V. RESULTS AND SUGGESTIONS:

V. 1. Results:

From the investigation of the Pb-Zn mineralization for Dereköy the following results were obtained.

A) Geological Results:

1) Detailed maps of 1:5,000 scale of the study area along with the İnler Plateau area 1:1,000 scale map were constructed. The area rocks show two types of volcanism, acid volcanism and calc-alkaline volcanism. These rocks are stratigraphically divided as lower and upper sequences. The lower sequence, where the mineralization and hydrothermal alterations occur, was investigated in detail.

The lower sequence consists of: rhyodasitic, andesitic volcanites, sedimentary tuffites and limestones in sequence from top to bottom. Andesitic dikes, which contain hornblende and paraoxon, cut the lower sequence. The upper sequence discordantly covers these units.

The paleontologic investigation of the fossiliferous, argillaceous limestones of the lower sequence revealed that this lower sequence is Upper Cretaceous (Campanian) in age. The sandy limestones, which cover these units, are Maestrichtian aged.

The mineralization cuts the lower sequence and the Maestrichtian aged units transgressively cover the units where the mineralization occurs. These two observations show that the mineralization occurs after the Campanian age and before the Maastrichtian age (Fig. 21).

2) Faults located in the study area were formed in 3 main periods. The connection of the faults to the mineralization are given below:

1) Premineralization period faults, East-West and North-South directional. In someplaces with dikes.
2) East-West (80°-90°) and Northwest-Southeast (100°-120°) mineralized faults formed after the dike emplacements.
3) East-West (80°-90°), Northwest-Southeast (100°-120°), and North-South directional nonmineralized faults formed in the post mineralization period.

3) In the northwest section of the study area, graben tectonics developed in the Inler Plateau in connection with the 120° directional faults. An approximately 300 m. thick tuff deposition occurred at the post grabenization period.

The physical mechanic characteristics of these tuffs control the formation of the fractures which are suitable for mineralization development.

B) Results of the Ore Deposition:

1) The geographical location of the area mineralized from the north to the south is divided into four groups as follows:

- Inler Plateau Mineralization
- Maden Tepe Mineralization
- Balkovan Dere Mineralization
- Kuzuluk Location and Odalar Plateau Mineralization

2) The mineralizations may be traced as several kilometer long thin vein bunches. Their thicknesses reach up to 25-30 m. and

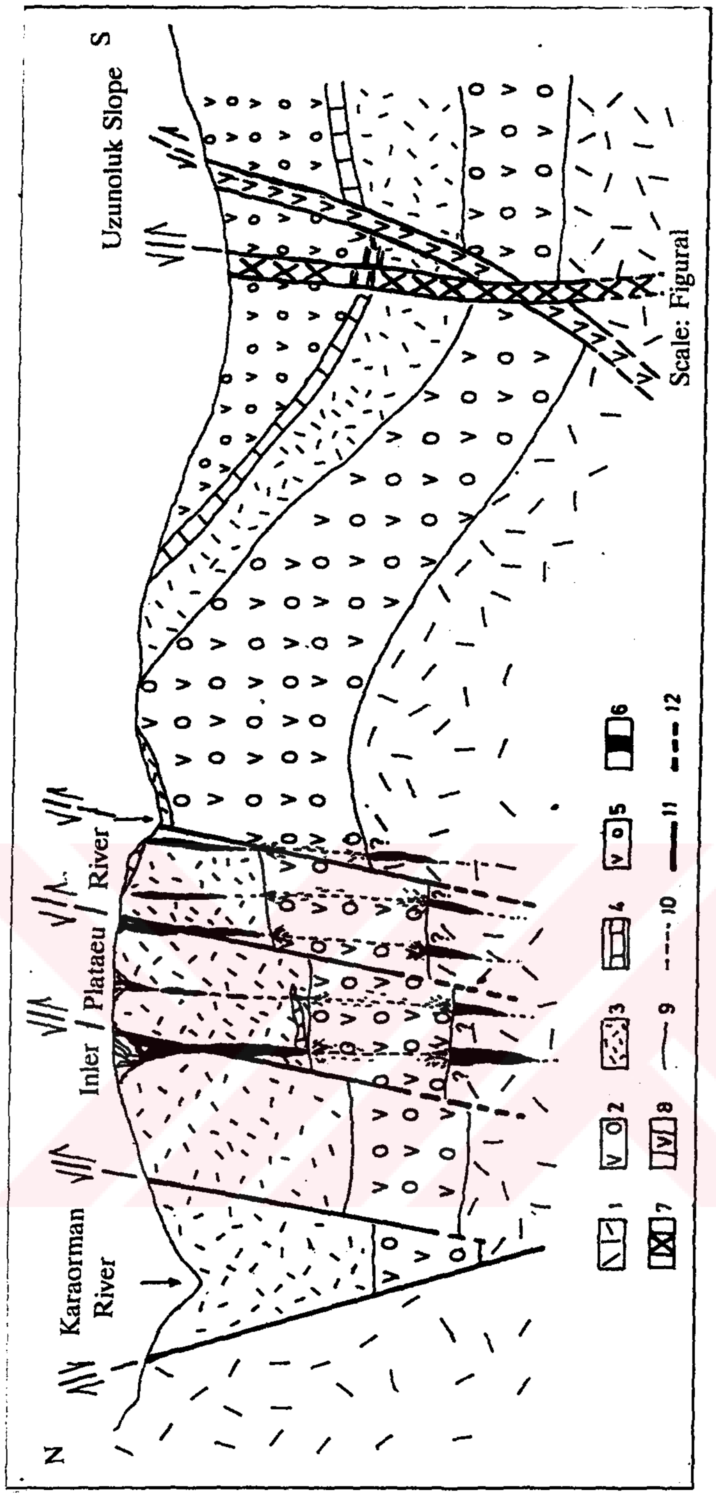


Figure 21: Interpretational profile of the Inler Plateau. 1.Basement volcanits; 2. Anglomera; 3. Tuff; 4. Limestone; 5. Anglomera; 6. Mineralization Zone; 7. crushed zone (mineralized in someplaces); 8. Andesitic Dikes; 9. Contact; 10. Probable Contact; 11. Fault; 12. Probable Fault.

they may be continuous from the surface to 150-300 m. depths.

3) Mineralization occurred in the andesitic agglomera tuff, tuffites and andesitic tuff. Heavy hydrothermal alteration may be observed as silicification, chloritization, kaolinization, carbonatization, hematitization, and limonitization in the side rocks.

4) The mineralization enriched the acid tuffs and decreased in the basic composition rocks in connection with the side rock lithology.

5) The mineralization usually developed in the east-west directional tectonic track, rarely in the northwest-southeast (100°-120°) directional tectonic tracks. They are dipped 65°-85°south directional, and in someplaces 80° south directional.

6) It was determined that the mineralization has mesothermal-epithermal characteristics by the joint evaluation of the previous studies (Çalapkulu et al., 1985)

The paragenesis of these mineralizations were formed by pyrite, blende, galena, chalcopyrite, tetrahydrite-tenanitite smithsonianite. The gang is formed by ankerite, barite, and quartz.

The undeveloped paragenesis with up to 2000-2500 m. lengths and several 10 m. thicknesses, are included in the pontide metallogenic belts sisorta koyulhisar type vein groups (Çalapkulu, 1982).

7) At the surface silica with barite dissipation independently developed in the same direction as the vein. Towards the lower depths of the mineralized zone there are more orderly characteristics at the macroplan, however, it is represented in detail as lenticulates in the fold and fracture zones. Towards

even lower depths, andesitic agglomeras branched out and thinned out as thin massive capillaries, small masses, and/or scatterings.

C) Economic Results:

1. Kuzuluk Location and Odalar Plateau Mineralization:

1.1. Kuzuluk Location Mineralization:

This mineralization settled under the control of an east-west directional tectonic fault. It is continuous with cuts in someplaces, around 2100 m. between the Kuzuluk Location to the Uzunoluk Tepe Fault. The thickness changes from cm. to several 10 m..

Through the evaluation of the obtained data results, it has been determined that the Kuzuluk Location Mineralization does not have any important economic reserve to contribute to the ore potential of the area. The data obtained from the Kuzuluk Location backs up this data.

1.2. Odalar Plateau Mineralization:

This mineralization is represented by seven veins in the northwest section of the Odalar Plateau and nine veins in the southwestern section of the Odalar Plateau. The direction of the veins change from E-W, N 60°, 70°, 120°, 135°, 140°. The thickness of the veins changes from cm. to m. thicknesses. This mineralization was exploited in someplaces.

Through the evaluation of the obtained data results, it has been determined that the Odalar Plateau Mineralization does not have any important economic reserve to contribute to the ore potential of the area.

2. Maden Tepe Mineralization:

2.1: The Maden Tepe Mineralization is observed on the surface from the Filikalik Ridge to the south of the İnler Plateau, around a 1700 m. length. This mineralization is west directional and dipped 70°-80° north.

2.2: This mineralization may be observed from the west of the Azak and Yarar Quarries to the Filikalik Ridge. The mineralization is in someplaces barite and/or alteration zones with ore mineral characteristics.

2.3: This mineralization is located in the silicified zone and was previously exploited by the Azak and Yarar Quarries. It may be observed scattered in the quartz zone and/or capillaries. It rarely shows a 60-80 cm. thick massive ore thickness in the Azak Quarry.

2.4: According to the investigations, further east in the ENE-WNW (100°) direction a silica-quartz zone surfaced in the southern section of the İnler Plateau Mineralization. This zone is 3-5 m. thick and the mineral cavities containing sulfur may be observed in the outcrop.

2.5: Through the evaluation of the obtained data results, it has been determined that the Maden Tepe Mineralization does not have any important economic reserve to contribute to the ore potential of the area. However, in the east, in the southern section of the İnler Plateau, the silica-quartz zone, which is an extension of this mineralization, should be investigated by planned drill holes and/or galleries in the continuation of the sequence with the tuff. This investigation may contribute to the ore mineral reserve of the area.

3. Balkovan Dere Mineralization:

3.1: This mineralization is located in the southern section of the Filikalık Ridge and Balkovan Dere.

It was determined that the 130°-140° mineralization direction of the previous studies are a morphological mistake. An evaluation of the investigation shows that the mineralization is east-west directional and dipped 55°-60° south.

3.2: The mineralization is effectively altered at the surface. An evaluation of the obtained data shows that the meteorically altered mineralization on the surface is represented by stockverk and thin veins in the depths. It is separated out at the conglomerate and silex nodule level.

3.3: The investigation results show that their is no economic mineralization at the surface. However, under the guidance of the east-west directional mineralization tracks, the drill holes towards the north will help the investigation of the continuation and characteristics of the mineralized veins towards the deeper depths and this will show the extra ore potential for this area.

4. İnler Plateau Mineralizations:

The İnler Plateau Mineralizations are represented by 7 veins. These veins are from north to south: Mortaş Vein, Sarı Vein, Kuzey Vein, Main Vein, Secondary Vein, No. 2 Vein and No. 3 Vein. Their economic potentials were calculated and for this mineralization the following results were obtained.

4.1: Thirteen drill hole cores, which were obtained by M.T.A. for the area reserve calculations were investigated and their drill stamps were completed.

4.2: The 1725, 1805, 1850, and 1880 m. elevation galleries were drawn on 1:500 scale detailed geological maps.

4.3: The 1750, 1800, 1850, 1900 and 1950 m. elevations were drawn on 1:500 scale elevation maps.

4.4: The Main Vein 1:500 scale 1805 m. elevation isoquality map was drawn, and also seven 1:500 scale north-south isoquality profiles were drawn.

4.5: The Kuzey Vein 1:250 scale isoquality map was drawn.

4.6: A 1:1000 scale north-south directional and 1:2000 scale east-west directional profiles were drawn to illustrate the İnler Plateau mineralization reserve groups.

4.7: The Mortaş Vein surfaced between X:67875-Y:38630 and X:67820-Y:38755 coordinate points around the 2100 m. area. The vein extends east-west (80°-90°) direction and is dipped 80°-90° north. At the 1790, 1750 and 1725 m. elevations were previously exploited and most of the vein has been taken out.

4.8: The Kuzey Vein is located around 170-175 m. south of the Mortaş Vein. The drill hole between the Y:38650-Y:38992 coordinate points cuts the vein between the 1843 and 1780 m. elevations. The vein developed in the east-west fault track and dipped 75°-80° north. Between the 1840-1810 m. elevations the vein reached its maximum thickness of 5-8 m.. The vein is vertically continuous for 50-60 m. and the probable vertical continuation is 150 m..

4.9: The Sarı Vein surfaces 30-35 m. south of the Kuzey Vein and around 30 m. north of the Main Vein. The vein is observed in someplaces as a mineralized and hydrothermally decomposed ore containing zone from the X:67635-Y:38627 coordinate points towards the west around a 490 m. area. The vein was not observed on the surface towards the east and the drill holes show that it is 150 m. longer. The vertical continuation is 150-200 m..

The investigation results show that the Sarı Vein Mineralization did not reach any economical dimensions.

4.10: The Main Vein is the most important economic mineralization in this area. It is surfaced from X:67550-Y:38630 coordinate points towards the east at the 350-400 m. area. The vein is east-west directional and 60°-80° north dip. The drill holes show that it is continuous down to the 1690 m. elevation.

The vein reaches its maximum thickness of 22 m. at the 1800 m. elevation. Towards the 1785-1700 m. elevations the vein thickness decreases and the mineralization has disseminated characteristics.

The investigation results show that the vein may be branched towards the east after the X:67600-Y:38850 coordinate points.

4.11: The Secondary Vein surfaced 20-30 m. south of the Main Vein. It is east-west directional and dipped 80° north. It was determined that the vein is continuous to the 1675 m. elevation. The vein thickness changes from between 4-13.5 m. and it reaches its maximum thickness at the 1805 m. elevation. Towards the 1675 m. elevation the vein thickness decreases to 1.75 m. and the mineralization is disseminated and/or massive thin capillaries.

As a result of the investigations it was determined that this vein is:

a) A branched side cut from the Main Vein to the surface.

b) Lens shaped closing towards the base.

According to the obtained data, the characteristics of the vein may be explained as side cut dipped towards the east or a lenticular vein going deeper towards the east.

4.12: The No. 2 Vein was not observed on the surface and its characteristics were determined by drill hole and gallery investigations. The vein extends east-west direction and is dipped 75°-85° north. It was determined that it is 230 m. long and the drill hole data shows that it is continuous to the 1630 m. elevation.

At the 1800 m. elevation, the vein contents are very high quality and its thickness reaches its economical dimensions and high quality.

The obtained drill hole and gallery data illustrate that the No. 2 Vein is lensed out and dipped towards the east.

4.13: The No. 3 Vein is located farther south than the rest of the Inler Plateau veins. The investigation results show that the vein is east-west directional and dipped 70°-80° north. The observable length of the vein is 150 m. and the probable length is 300 m.. Vertically it continues to the 1670-1720 elevations.

The obtained data shows that the vein gives its economical mineralization between the 1880 and 1790 m. elevations.

VEINS	RESERVES				t Zn %	t Pb %	t Cu %	t Ag ppm	d gr/ton	Kl_{avr} (m)
	CATEGORY A	CATEGORY B	CATEGORY C	TOTAL						
NORTH VEIN	------	75 684,70	55 451,20	131 135,90	6,66	1,72	0,83	9,63	3,12	1,60
MAIN VEIN	621 438,50	250 710,50	299 838,00	1 172 032,00	8,11	2,71	0,09	8,66	3,16	4,07
SECONDARY VEIN	42 801,50	191 480,20	197 744,10	432 025,80	5,02	2,21	0,07	7,97	3,11	4,37
VEIN NUMBER 2	95 917,70	123 155,40	103 329,90	322 403,00	9,88	6,08	0,21	7,76	3,26	3,13
VEIN NUMBER 3	------	46 738,20	59 196,10	105 934,30	5,45	4,74	0,34	30,19	3,21	2,08
ULTIMATE TOTAL	760 202,70	687 769,00	715 559,30	2 163 531,00	7,53	3,15	0,11	9,45	3,16	----

VEINS	RESERVES				t Zn %	t Pb %	t Cu %	t Ag ppm	d gr/ton	Kl_{avr} (m)
	CATEGORY A	CATEGORY B	CATEGORY C	TOTAL						
NORTH VEIN	------	47 784,20	39 458,30	87 242,50	8,59	1,99	0,12	10,57	3,15	1,17
MAIN VEIN	329 350,50	168 660,60	65 029,00	563 040,10	11,88	4,78	0,16	9,52	3,26	3,51
SECONDARY VEIN	------	93 642,30	102 481,50	196 123,80	10,54	3,71	0,05	8,12	3,23	3,00
VEIN NUMBER 2	80 443,60	92 116,40	50 083,20	222 643,20	14,19	9,02	0,11	2,28	3,41	2,26
VEIN NUMBER 3	------	34 867,14	44 458,50	79 325,90	7,32	6,94	0,39	25,43	3,27	1,49
ULTIMATE TOTAL	409 794,10	437 070,90	301 510,50	1 148 375,50	11,53	5,36	0,14	9,06	3,28	----

Potential Reserves for Inler Plateau Mineralization
Minable Reserves for Inler Plateau Mineralization.

4.14: The reserve calculations for the İnler Plateau Mineralization show that there are 2,163,531 tons of reserve which contain 7.63 % Zn, 13.15 % Pb, 0.11 % Cu and 9.45 ppm Ag. The reserve groups and vein reserves are given in the following table.

V. 2. Suggestions:

The suggestions for the continuation of the veins, turning the reserve groups to "A" category and increasing the ore potential for the Dereköy Pb-Zn mineralizations economic potential are illustrated in the results of the investigation. These suggestions are compiled in six subtitles and discussed below. These subtitles are: geological work; drill hole investigations; gallery investigations; geophysical studies; topographic studies; and studies for mining projects.

The veins continuation towards deeper depths and the characteristics from the mineralization point of view may be determined by the geophysical studies. These studies are relatively cheaper to conduct than drill hole and gallery studies. The geophysical investigations and the planning of the drill holes through the guidance of the geophysical investigation data are preferred because of the savings in cost for mining projects.

In this area, the mineralizations give their economical values between the 1850 and 1750 m. elevations. The investigations conducted by gallery instead of expensive drill holes will lower the final mining costs.

It is feasible to drill short wells for the 1850 m. elevation investigation.

The investigation cost will be lowered if the 1750 m. elevation investigation is conducted by underground drill holes.

suggested that these investigations must be coordinated through every stage of the study.

E). Topographical Studies:

1). It will be necessary for the geological and mining investigations to construct a 1:1,000 scale, or if necessary 1:500 scale geological map of the 36,000 m. square of the study area which is located in the eastern section of the İnler Plateau.

2). It is suggested that for the necessity of the geophysical investigations that there be a topographical investigation of the 3900 m. profile at certain locations in the Inler Plateau.

F). Studies for Mining Projects:

It will be necessary to direct the prospecting investigations to support the mining projects besides the İnler Plateau Mineralization mining project where the economical characteristics are shown by the studies.

It will be safer for quality purposes to obtain samples by underground drill holes for the reserve calculations.

A). Geological Studies:

1). The investigated areas 1:5,000 scale and the 1:1,000 scale detailed geological maps were completed for the İnler Plateau. The 1:500 scale gallery geological maps were also drawn. It is necessary to follow the changes in the veins for the year 1993 and later years by illustrating the galleries 1:500 scale geological maps.

2). It will be useful to conduct the geological studies for the continuation of the veins towards the east of the Uzunoluk Tepe Fault.

B). Drill Hole Studies:

1). Mortaş Vein:

It is necessary to drill holes towards the 1800 and 1750 m. elevations to determine the continuation and economical qualities of the vein further east of the X:67800-Y:38700 coordinate points. One of the drill holes should reach the Kuzey Vein so that the preliminary data may be obtained concerning the 170 m. are where no data has been previously collected.

2). Kuzey Vein:

All of the drill holes which cut the vein are cutting the vein in the same elevation. For this reason, to determine the "A" category reserve it is necessary to plan 8 drill holes with 50 m. distances between each other between the Y:38650-Y:39000 coordinate points. The order of the drill holes should be determined as a result of the obtained data.

It will be more economical to determine the veins continuation and quality at the 1800 m. elevation by rekup, which will open the main gallery at the 1805 m. elevation instead of using drill holes.

To the east of X:67775-Y:39000 coordinate points for the 1750 m. elevation and lower elevations, the veins continuation for the deeper elevations; the continuation to the east; and the economical characteristics from the mineralization point of view, may be determined by drill holes. It will lower the cost of the mining investigation if the drill holes are planned using the guidance of the geophysical investigation data to determine the continuation of the vein to the east and to the deeper elevations.

3). Main Vein:

The Main Vein, Main Vein I, and Main Vein II relationships may not be determined because of the lack of data. It is suggested that the gallery investigation should be conducted to determine their relationship to one another (See Gallery Investigations).

It will be helpful to drill holes towards the 1850 and 1750 m. elevations to determine the continuation of the vein further east of the Y:39000 coordinate point and its economical qualities.

It is necessary to drill holes at the Y:38950 coordinate point at the 1850 and 1750 m. elevations; at the Y:38900 coordinate point at the 1850-1750 m. elevations; at the Y:38950 coordinate point at the 1850 m. elevation; and at the Y:39000 coordinate point at the 1850 m. elevation to raise the ore quality to the "A" category reserve.

4). Secondary Vein:

To determine the economical quality of this vein and to increase the reserve to category "A", it is necessary to drill holes at the Y:38850, Y:38900, Y:38950, Y:39000 coordinate points to the 1850 and 1750 m. elevations.

The drill holes will show the continuation and economical dimensions from the mineralization point of view by drilling holes towards the 1850, 1800, and 1750 m. elevations further east of the Y:39000 coordinate point under the guidance of the general suggestions.

5). No. 2 Vein:

The continuation of the vein and the economical qualities were not determined further east of the Y:38900 coordinate point because of insufficient data. It is necessary to drill holes at the 1850 and 1750 m. elevations at the Y:38950 coordinate point to determine the continuation and economical qualities of the vein in the above mentioned area. It will be necessary to continue the investigations further east through the guidance of the data obtained from these drill holes.

6). No. 3 Vein:

There is limited drill and gallery data for this vein. The "A" category reserve of the vein, its continuation further east of the Y:38800 coordinate points and economical quality from the mineralization point of view was not determined because of the lack of data. To determine the unknowns, it is necessary to plan drill holes at Y:38800; Y:38850; Y:38900; Y:38950 and Y:39000 coordinate points towards the 1850-1750 m. elevations under the guidance of the information obtained from the 1800 m. gallery rökups.

7). Maden Tepe Mineralization:

It will be helpful to drill holes in different slopes towards the south to determine the continuation of the north 100° directional silica containing zone, which surfaced in the southern section of the Inler Plateau, in the tuff containing sequences and the economical characteristics from the mineralization point of view.

8). Balkovan Dere Mineralization:

To determine the continuation in depth and the quality of the east-west directional ore containing and silica containing zones of the Balkovan Dere Mineralization area, it is necessary to drill holes in a northern direction. These drill holes will determine the possible potential.

C). Gallery Studies:

1). To open the galleries in the economic ore containing veins according to the mining project and the control of other veins from these galleries by rökups will give the ore potential in the optional conditions.

2). The Sarı Vein and Kuzey Vein characteristics at the 1805 m. elevation may be determined by extending the 27 m. long rökup for 50-60 m. in the same direction, which was opened at the 65th m. in the north of the gallery which follows the Main Vein.

3). At the 1805 m. elevation gallery, from the X:67612-Y:38860 coordinate points to the north, a 10-15 m. long gallery may determine the Main Vein and Main Vein I relation and the characteristics of the vein.

4). The 1805 m. elevation gallery, from the X:67600-Y:38892 coordinate points to the east by a 20-30 m. gallery the Main Vein II may be reached. The eastern direction of the continuation of this gallery helps to determine the characteristics of the Main Vein II in this elevation.

5). At the 1805 m. elevation gallery from the X:67584-Y:38900 coordinate points towards the gallery opened in the east in the Secondary Vein, may determine the characteristics of the vein at the 1805 m. elevation.

6). At the 1805 m. elevation open a gallery that will follow the No. 2 Vein, will determine the continuation of the vein towards the east and determine the characteristics from the Y:38900 coordinate point to the further east mineralization point of view.

7). Around 25-30 m. rökups at every 50 m. length at the gallery towards the south following the No. 2 gallery may cut the No. 3 Vein and determine the characteristics at the 1805 m. elevation.

D). Geophysical Studies:

The geophysical studies should not depend on only one method of investigation. The electrical methods should differentiate the mineralizations containing sulfur, however, scattered pyrite in the side rock may give misleading results in the calculations. The ore containing veins, which may be several km. long and reach several 10 m., may be differentiated by seismic methods. It is possible to investigate by the shallow seismic method the mineralization in the rhyolactic and rhydacitic tuffs, which may be under the andesitic agglomeras. The İnler Plateau Mineralization continuation towards the east and further in depth will be very expensive if done by drill holes.

For this purpose between X:6720-Y:39100; X:68100-Y:39100; X:67200-Y:38800; X:68100-Y:38800; X:67200-Y:38600, and X:68100-Y:38600 coordinate points towards the north-south direction three seismic profiles are suggested. Between the X:67600-Y:38400; X:67600-Y:39000; X:67250-Y:38400 and X:67250-Y:39000 coordinate points towards the east-west direction two seismic profiles are suggested for a total of five seismic profiles to be conducted.

In these profiles the obtained frequency and geophone distance selections may be helpful at the first 200 m. depth in the east and in other areas 400-500 m. depths.

The obtained results may be more feasible in the evaluation of the seismic data if IP and/or the electromagnetic investigation of the previously mentioned profiles is conducted at later stages of the investigations.

The structure of the mineralization and its continuation towards the deeper elevations may be cleansed by the suggested geophysical investigations on the Balkovan Dere on a smaller scale.

It may be an unavoidable to coordinate the geophysical investigations with the geological investigations to determine the feasible results for the ore potential of this area. It is

Table 1.: KUZEY VEIN RESERVE CALCULATIONS.

Table 1.1.: KUZEY VEIN POTENTIAL RESERVE CALCULATIONS.

Table 1.1.1.: Kuzey Vein Potential Reserve Parameters.

BOREHOLE AND GALLERY DATAS	THİCKNESS (TRUE) (m)	TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
4 / 1	3,26	7,19	2,72	0,27	13,89	3,14
5 / 1	1,27	4,09	1,56	0,06	6,61	3,08
6 / 1	1,27	5,87	2,62	0,03	7,00	3,13
7 / 1	2,39	5,37	1,22	0,02	6,72	3,02
8 / 0	1,13	17,28	2,18	0,08	19,80	3,27
9 / 1	2,07	5,00	0,82	0,06	5,58	3,08
9 / 2	0,31	6,03	2,72	0,24	15,39	3,13
10 / 1	0,98	2,40	0,54	0,03	8,00	3,04

Table 1.1.2.: Kuzey Vein Profile Areas (Potential).

"B" category based areas.

	N (m)	M (m)	VOLUMES (NXM)=m^2	TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_4	3,36	50	168,00	7,19	2,72	0,268	13,89	3,14
S_5	1,27	50	63,50	4,09	1,56	0,063	6,61	3,08
S_6	1,27	50	63,50	5,87	2,62	0,029	7,00	3,13
S_7	2,39	50	119,50	5,37	1,22	0,020	6,72	3,09
S_8	1,13	50	56,50	17,28	2,18	0,079	19,80	3,27
S_9	1,19	48	57,12	5,13	1,07	0,083	6,86	3,09
S_{10}	0,98	50	49,00	2,40	0,54	0,030	8,00	3,04
C CATEGORY BASED AREAS								
S_4Down	3,36	25/2	42,00	7,19	2,72	0,268	13,89	3,14
S_4Up	3,36	25/2	42,00	7,19	2,72	0,268	13,89	3,14
S_5Down	1,27	25/2	15,87	4,09	1,56	0,063	6,61	3,08
S_5Up	1,27	25/2	15,87	4,09	1,56	0,063	6,61	3,08
S_6Down	1,27	25/2	15,87	5,87	2,62	0,029	7,00	3,13
S_6Up	1,27	25/2	15,87	5,87	2,62	0,029	7,00	3,13
S_7Down	2,39	25/2	29,90	5,37	1,22	0,020	6,72	3,09
S_7Up	2,39	25/2	29,90	5,37	1,22	0,020	6,72	3,09
S_8Down	1,13	25/2	14,10	17,28	2,18	0,079	19,80	3,27
S_8Up	1,13	25/2	14,10	17,28	2,18	0,079	19,80	3,27
S_9Down	0,13	25/2	3,90	6,03	2,72	0,240	15,39	3,13
S_9Up	2,07	25/2	25,90	5,00	0,82	0,059	5,58	3,08
S_{10}Down	0,98	25/2	12,30	2,40	0,54	0,030	8,00	3,04
S_{10}Up	0,98	25/2	12,30	2,40	0,54	0,030	8,00	3,04
S_8East	$S_8B + S_8C$		70,60	17,28	2,18	0,079	19,80	3,27
S_9West	$S_9B + S_9CUp$		82,31	5,13	1,00	0,076	6,52	3,11
S_4West	3,36	50	168,00	7,19	2,72	0,270	13,89	3,14
S_{10}East	0,98	50	49,00	2,40	0,54	0,030	8,00	3,04
S_{10}West	$S_{10}B+S_{10}CUp$		61,30	2,40	0,54	0,030	8,00	3,04

Tablo.1.1.3. North Vein Potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
4-5	50	5579,80	6,34	2,40	0,21	11,89	3,12	17408,9	B
5-6	50	3175,00	4,98	2,09	0,046	6,81	3,11	9874,3	B
6-7	50	4501,80	5,54	1,71	0,023	6,82	3,10	13955,7	B
7-8	50	4302,80	9,19	1,53	0,039	10,92	3,15	13553,9	B
*8 EAST	25	1412,50	17,28	2,18	0,079	19,80	3,27	4618,9	B
9	50	2856,00	5,13	1,07	0,083	6,86	3,09	8825,0	B
10	50	2450,00	2,4	0,54	0,03	8,00	3,04	7448,0	B
T O T A L	B		6,66	1,72	0,083	6,86	3,12	75684,7	B
4-5 Down	50	1384,90	6,34	2,40	0,21	11,89	3,12	4352,2	C
4-5 Up	50	1394,90	6,34	2,40	0,21	11,89	3,12	4352,2	C
5-6 Down	50	793,75	4,98	2,09	0,046	6,81	3,11	2486,6	C
5-6 Up	50	793,75	4,98	2,09	0,046	6,81	3,11	2486,6	C
6-7 Down	50	1125,46	5,54	1,71	0,023	6,82	3,10	3488,9	C
6-7 Up	50	1125,46	5,54	1,71	0,023	6,82	3,10	3488,9	C
7-8 Down	50	1075,70	9,19	1,53	0,039	10,92	3,15	3388,5	C
7-8 Up	50	1075,70	9,19	1,53	0,039	10,92	3,15	3388,5	C
**8-0 Down	25	352,50	17,28	2,18	0,079	19,80	3,18	1120,9	C
**8-0 Up	25	352,50	17,28	2,18	0,079	19,80	3,18	1120,9	C
8-9	25	1780,67	10,74	1,54	0,077	12,65	3,18	5662,5	C
9-10	18	1287,85	3,96	0,80	0,056	7,15	3,08	3966,6	C

* "B" category based volume and reserves formed east of the 8-8' profile.

** "C" category based volume and reserves formed between the 8-8' and 9-9' profiles.

SECTION	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORİES
* 9-9'Up	50	1295	5,00	0,82	0,059	5,58	3,08	3988,6	C
**10-10'Down	50	615	2,40	0,54	0,03	8,00	3,04	1869,6	C
**10-10'Up	50	615	2,40	0,54	0,03	8,00	3,04	1869,6	C
***4-4'West	25/2	2100	7,19	2,72	0,27	13,89	3,14	6594,0	C
****10-10'East	25/2	612,5	2,40	0,54	0,03	8,00	3,04	1862,0	C
TOTAL C			6,79	1,70	0,099	10,13	3,12	55451,2	C

Table 1.1.4.: Kuzey Vein Potential Reserves.

	AERAGE TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
TOTAL B	6,66	1,72	0,08	9,63	3,12	75 684,7	B
TOTAL C	6,79	1,70	0,10	10,13	3,12	55 451,2	C
ULTIMATE TOTAL	6,71	1,71	0,09	9,84	3,12	131 135,9	(B+C)

* "C" category volume and reserve formed in the upper elevations of the drill holes.

** "C" category volume and reserve formed in the upper and lower elevations of the drill holes.

*** "C" category volume and reserve formed east of the 4-4' profile.

**** "C" category volume and reserve formed east of the 10-10' profile.

Table 1.2.: KUZEY VEIN MINABLE RESERVE CALCULATIONS.

Table 1.2.1.: Kuzey Vein Minable Reserve Parameters.

BOREHOLE AND GALLERY DATAS	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
4 / 1	2,55	6,92	2,54	0,33	12,73	3,14
5 / 1	1,27	4,09	1,56	0,06	6,61	3,08
6 / 1	1,00	6,10	2,60	0,02	5,00	3,13
7 / 1	0,92	5,70	1,08	0,04	4,69	3,09
8 / 0	0,66	26,50	3,10	0,09	30,00	3,41
9 / 1	1,51	6,32	0,96	0,03	5,00	3,10
9 / 2	0,31	6,03	2,72	0,24	15,39	3,13

Table 1.2.2. North Vein Profile Areas (Mineable).

B Category mineable areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_4	2,55	50	127,50	6,92	2,54	0,33	12,73	3,14
S_5	1,27	50	63,50	4,09	1,56	0,06	6,61	3,08
S_6	1,00	50	50,00	6,10	2,60	0,02	5,00	3,13
S_7	0,92	50	46,00	5,70	1,08	0,04	4,69	3,09
S_8	0,66	50	33,00	26,50	3,10	0,09	30,00	3,41
*S_{8East}	0,66	50	33,00	26,50	3,10	0,09	30,00	3,41
S_9	0,91	48	43,68	6,27	1,26	0,10	6,77	3,11
C Category based areas								
S_4Down	2,55	25/2	31,87	6,92	2,54	0,33	12,73	3,14
S_4Up	2,55	25/2	31,87	6,92	2,54	0,33	12,73	3,08
S_5Down	1,27	25/2	15,87	4,09	1,56	0,06	6,61	3,08
S_5Up	1,27	25/2	15,87	4,09	1,56	0,06	6,61	3,08
S_6Down	1,00	25/2	12,50	6,10	2,60	0,02	5,00	3,13
S_6Up	1,00	25/2	12,50	6,10	2,60	0,02	5,00	3,13
S_7Down	0,92	25/2	11,50	5,70	1,08	0,04	4,69	3,09
S_7Up	0,92	25/2	11,50	5,70	1,08	0,04	4,69	3,09
S_8Down	0,66	25/2	8,25	26,50	3,10	0,09	30,00	3,41
S_8Up	0,66	25/2	8,25	26,50	3,10	0,09	30,00	3,41
** S_8East	S_8B+S_8CUp		41,25	26,50	3,10	0,09	30,00	3,41
S_9Up	1,51	25/2	18,87	6,32	0,96	0,03	5,00	3,10
*** S_9west	S_9B+S_9CUp		61,87	6,27	1,26	0,10	6,77	3,11
S_9East	0,91	48	43,68	6,27	1,26	0,10	6,77	3,11

(*) "B" category reserve based areas formed east of the 8-8' profile
(**) "C" category reserve based areas formed east of the 8-8' profile
(***) "C" category reserve based areas formed west of the 9-9' profile
The "C" category reserve is not given under the 9-9' profile because there is no economical reserve expected.

Tablo 1.2.3. North Vein Mineable Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
4-5	50	4 682,98	5,98	2,21	0,24	10,69	3,12	14 610,9	B
5-6	50	2 830,79	4,98	2,02	0,05	5,90	3,10	8 775,4	B
6-7	50	2 399,31	5,90	1,87	0,03	4,85	3,11	7 461,8	B
7-8	50	1 966,03	14,39	1,92	0,06	15,26	3,22	6 330,6	B
8-8 East	25	875,00	26,50	3,10	0,09	30,00	3,41	2 813,3	B
9-9'	50	2 184,00	6,27	1,26	0,09	6,77	3,11	6 792,2	B
TOTAL B			8,19	2,00	0,12	10,07	3,14	47 784,2	B
4-4 West	25/2	1 593,75	6,92	2,54	0,33	12,73	3,14	5 004,4	C
4-5 Down	50	1 170,75	5,98	2,21	0,21	10,69	3,12	3 652,7	C
4-5 Up	50	1 170,75	5,98	2,21	0,21	10,69	3,12	3 652,7	C
5-6 Down	50	707,70	4,98	2,02	0,05	5,90	3,10	2 193,9	C
5-6 Up	50	707,70	4,98	2,02	0,05	5,90	3,10	2 193,9	C
6-7 Down	50	599,83	5,90	1,87	0,03	4,85	3,11	1 865,5	C
6-7 Up	50	599,83	5,90	1,87	0,03	4,85	3,11	1 865,5	C
7-8 Down	50	491,51	14,39	1,92	0,06	15,26	3,22	1 582,7	C
7-8 Up	50	491,51	14,39	1,92	0,06	15,26	3,22	1 582,7	C
8-9	22,65	3 480,08	14,36	2,00	0,09	16,06	3,23	11 240,6	C
9-9 Up	50	943,75	6,32	0,96	0,03	5,00	3,10	1 120,0	C
9-9 East	25/2	546,00	6,27	1,26	0,09	6,77	3,11	1 698,1	C
TOTAL C			8,08	1,98	0,13	11,17	3,16	39 458,3	C

Tablo 1.2.4. North Vein Mineable Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORİES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	8,19	2,00	0,12	10,07	3,14	47 784,2	B
TOTAL C	9,08	1,98	0,13	11,17	3,16	39 458,3	C
ULTIMATE TOTAL	8,59	1,99	0,12	10,57	3,15	87 242,5	(B+C)

Table 2: MAIN VEIN RESERVE CALCULATIONS.

Table 2.1.: MAIN VEIN POTENTIAL RESERVE CALCULATIONS.

2.1.1.: Main Vein Potential Reserve Parameters.

BOREHOLE AND GALLERY DATA	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
4 / 1	2,78	5,07	1,03	0,35	6,06	3,08
89 / 1	5,90	14,73	5,22	0,23	0,10	3,27
Gallery 1805	1,00	0,70	0,70	0,01	0,10	3,03
88 / 2	6,22	5,15	1,48	0,13	3,56	3,10
5 / 0	1,72	0,70	0,30	0,04	9,00	3,01
5 / 1	6,87	22,20	7,93	0,21	38,16	3,50
Gallery 1805	9,00	11,71	2,66	0,01	0,10	3,20
Gallery 1845	10,00	12,66	4,73	0,01	0,10	3,26
6 / 1	2,91	6,53	2,71	0,23	7,01	3,14
Gallery 1805	8,66	7,72	2,07	0,01	0,10	3,14
Gallery 1845	9,00	10,66	2,75	0,01	0,10	3,14
89 / 5	2,20	1,91	0,73	0,03	0,10	3,04
7 / 1	5,41	7,03	3,09	0,17	12,36	3,18
Gallery 1805	19,00	10,48	3,74	0,01	0,10	3,21
Gallery 1850	0,50	10,80	2,84	0,01	0,10	3,19
90 / 1A	4,20	0,20	0,10	0,03	0,10	3,01
8 / 0	0,22	34,00	5,60	0,33	50,00	3,59
8 / 1	20,48	3,40	1,42	0,07	12,78	3,07
9 / 1(*)	1,94	7,36	2,20	0,63	12,86	3,13

* This area has been calculated as a "C" class even though the area between the 8-8' profile and 9-9' profile areas were determined as a disseminated mineralization by the gallery data.

Table 2.1.2. Main Vein Profile Areas (potential)

A category based areas

	k_1m	k_2m	a_1m	a_2m	AREAS (m^2)	AVERAGE TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d ton/m^3
	N=$_k1+k_2/2$		M=$a_1+a_2/2$							
* 4/1-89/1	2,78	5,90	29,0	19,5	105,26	15,20	11,64	3,89	0,27	3,21
	4,34		24,25							
89/1 Gallery1805	5,9	1,0	25,0	45,0	120,75	12,70	4,56	0,20	0,10	3,24
	3,45		35,0							
Gallery1805 88/2	1,0	6,22	32,0	18,0	90,00	4,53	1,37	0,11	3,08	3,09
	3,6		25,0							
** S_4					317,33	10,02	3,32	0,20	1,58	3,19
5 / 0 , 5 / 1	1,72	6,87	64,0	67,0	281,65	17,89	6,40	0,17	32,32	3,40
	4,30		65,5							
5 / 1 Gallery1805	6,87	9,0	64,0	52,0	460,23	16,25	4,94	0,097	16,58	3,33
	7,94		58,0							
Gallery1805 ve 1845	9,0	10,0	39,0	39,5	372,88	12,21	3,75	0,01	0,10	3,23
	9,5		39,25							
S_5					1 114,73	15,31	4,91	0,082	15,04	3,31

* "A" category based areas calculated between the 4/1 and 89/1 drill holes.

** "A" category based on the 4-4' profile calculations.

	k_1m	k_2m	a_1m	a_2m	AREAS (m^2)	AVERAGE TENORS				DENSITY d ton/m^3
	$N={}_k1+k_2/2$		$M=a_1+a_2/2$			Zn %	Pb %	Cu %	Ag ppm	
6 / 1 Gallery1805	2,91	8,66	64,5	47,0	322,79	7,42	2,23	0,07	1,84	3,14
	5,79		55,75							
Gallery1805 and Gallery1845	8,66	9,0	45,0	47,0	384,11	9,22	2,35	0,01	0,10	3,17
	8,83		43,5							
Gallery1845 89/5	9,0	2,2	41,5	60,0	284,20	8,94	2,36	0,01	0,10	3,16
	5,6		50,75							
S_6					991,10	8,55	2,32	0,03	0,67	3,16
7 - 1 Gallery1805	5,41	19,0	46,5	34,0	491,45	9,72	3,59	0,05	2,82	3,20
	12,21		40,25							
Gallery1805 and Gallery1845	19,0	0,50	32,0		312,0	10,49	3,71	0,01	0,10	3,21
	9,75									
Gallery1805 90 - 1A	0,50	4,2	70,0		164,5	1,33	0,39	0,03	0,10	3,03
	2,35									
S_7					967,95	8,54	3,08	0,03	1,48	3,17

	k_1	k_2	a_1	a_2	AREAS N x M (m^2)	AVERAGE TENORS				DENSITY d ton/m^3
	$N=k_1+k_2/2$		$M=a_1+a_2/2$			Zn %	Pb %	Cu %	Ag ppm	
8 / 0	0,22	20,48	121	125	1 275,05	3,73	1,44	0,08	13,18	3,08
8 / 1	10,35		123							
B Category based areas										
S_8					1 275,05	3,73	1,44	0,08	13,18	3,08
S_4 Down	2,78		25		69,50	5,07	1,03	0,35	6,06	3,08
S_4 Up	6,22		25		155,50	5,15	1,48	0,13	3,56	3,10
S_5 Down	1,72		25		43,00	0,70	0,30	0,04	9,00	3,01
S_5 Up	10,0		25		250,00	12,66	4,73	0,01	0,10	3,26
S_6 Down	2,91		25		72,75	6,53	2,71	0,23	7,01	3,14
S_6 Up	2,2		25		55,00	1,91	0,73	0,03	0,10	3,04
S_7 Down	5,41		25		135,25	7,03	3,09	0,17	12,36	3,18
S_7 Up	4,2		25		105,00	0,20	0,10	0,03	0,10	3,01
S_8 Down	0,22		25		5,50	34,00	5,60	0,33	50,00	3,59
S_8 Up	20,48		25		512,00	3,40	1,42	0,07	12,78	3,07
*S_4 West					317,33	10,02	3,32	0,20	1,58	3,19

* "B" category reserve based on the area west of the 4-4' profile.
The 4-4' profile total area is included.

C Category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				YOĞUNLUK d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_4 Dw	2,78	25/2	34,75	5,07	1,03	0,35	6,06	3,08
S_4 Up	6,22	25/2	77,75	5,15	1,48	0,13	3,56	3,10
S_5 Dw	1,72	25/2	22,50	0,70	0,30	0,04	9,00	3,01
S_5 Up	10,00	25/2	125,00	12,66	4,73	0,01	0,10	3,26
S_6 Dw	2,91	25/2	36,38	6,53	2,71	0,23	7,01	3,14
S_6 Up	2,20	25/2	27,50	1,91	0,73	0,03	0,10	3,04
S_7 Dw	5,41	25/2	67,63	7,03	3,09	0,17	12,36	3,18
S_7 Up	4,20	25/2	52,50	0,20	0,10	0,03	0,10	3,01
S_8 Dw	0,22	25/2	2,75	34,00	5,60	0,33	50,00	3,59
S_8 Up	20,48	25	512,00	3,40	1,42	0,07	12,78	3,07
S_8East	10,35	123	1 275,05	3,73	1,44	0,08	13,18	3,08
S_9West	1,94	50	97,00	2,36	2,20	0,63	12,86	3,13

Table 2.1.3. Main Vein Potential Calculation Table

	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{1/2}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORİES
			Zn %	Pb %	Cu %	Ag ppm			
4-5	50	33 780,30	14,14	4,56	0,11	12,07	3,28	110 799,4	A
5-6	50	52 615,42	12,13	3,69	0,06	8,28	3,24	170 474,0	A
6-7	50	48 975,11	8,55	2,69	0,03	1,07	3,16	154 761,4	A
7-8	50	55 898,97	5,80	2,15	0,06	8,13	3,12	174 404,8	A
TOTAL A CATEGORIES			9,78	3,15	0,06	7,10	3,19	610 439,5	A
4-5 Down	50	2 786,12	3,40	0,75	0,23	7,18	3,05	8 497,7	B
4-5 Upt	50	10 044,46	9,78	3,48	0,06	1,43	3,19	32 041,6	B
5-6 Down	50	2 861,35	4,36	1,81	0,16	7,75	3,09	8 841,6	B
5-6 Up	50	7 037,67	10,72	4,01	0,01	0,10	3,22	22 661,3	B
6-7 Down	50	5 119,89	6,85	2,96	0,19	10,49	3,17	16 130,1	B
6-7 Up	50	3 933,22	0,79	0,32	0,03	0,10	3,02	11 878,3	B
7-8 Down	50	2 800,40	8,08	3,19	0,18	13,83	3,19	8 933,3	B
7-8 Up	50	14 147,70	2,86	1,19	0,07	10,62	3,06	43 292,0	B
* 4-4 West	50	3 966,63	10,02	3,32	0,20	1,58	3,19	12 653,5	B
** 8-8 East	--	------	----	---	---	----	----	-----	---
TOTAL B CATEGORIES			6,47	2,41	0,11	9,06	3,13	165 029,6	B

* It is accepted as lensed out to the east-west.

** It was determined by the gallery data that at the 8-8' profile area, this area has disseminated mineralization characteristics. For this reason, this area has been calculated as "C" category.

	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
4-5 Down	50	1 393,06	3,40	0,75	0,23	7,18	3,05	4 248,8	C
4-5 Up	50	5 022,23	9,78	3,48	0,06	1,43	3,19	16 020,9	C
5-6 Down	50	1 430,68	4,36	1,81	0,16	7,75	3,09	4 420,8	C
5-6 Up	50	3 518,84	10,72	4,01	0,01	0,10	3,22	11 330,7	C
6-7 Down	50	2 559,95	6,85	2,96	0,19	10,49	3,17	8 115,0	C
6-7 Up	50	1 966,61	0,79	0,32	0,03	0,10	3,02	5 939,2	C
7-8 Down	50	1 400,20	8,08	3,19	0,18	13,83	3,19	4 466,6	C
7-8 Up	50	7 073,85	2,86	1,19	0,07	10,62	3,06	21 646,0	C
8-8 East	25/2	15 938,13	3,73	1,44	0,08	13,18	3,08	49 089,4	C
8-9	40	22 983,08	3,63	1,49	0,12	13,15	3,08	70 787,9	C
TOTAL C			5,21	1,98	0,09	10,72	3,11	12 5277,4	C

Tablo 2.1.4. Main Vein Potantial Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	9,78	3,15	0,06	7,10	3,19	610 439,5	A
TOTAL B	6,47	2,41	0,11	9,06	3,13	165 029,6	B
TOTAL C	5,21	1,98	0,09	10,72	3,11	196 065,3	C
ULIMATE TOTAL	8,54	2,85	0,08	8,34	3,17	97 1534,4	(A+B+C)

Table 2.2. MAIN VEIN MINEABLE RESERVE CALCULATIONS

Table 2.2.1. Main Vein Mineable Reserve Parameters

BOREHOLE AND GALLERY DATA	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
4 / 1	1,80	5,59	0,80	0,38	5,13	3,07
89 / 1	6,27	13,92	4,60	0,22	0,10	3,27
88 / 2	1,80	12,80	4,20	0,24	15,00	3,26
5 / 1	9,09	16,63	5,97	0,16	28,65	3,44
Gallery 1805	9,00	11,71	2,66	0,01	0,10	3,20
Gallery 1845	10,00	12,66	4,73	0,01	0,10	3,26
6 / 1	2,91	6,53	2,71	0,23	7,01	3,14
Gallery 1805	8,66	7,02	2,07	0,01	0,10	3,14
Gallery 1845	9,00	10,66	2,75	0,01	0,10	3,19
89 / 5	1,00	4,20	2,00	0,09	0,10	3,09
7 / 1	1,60	17,26	8,61	0,21	22,30	3,47
Gallery 1805	19,00	10,48	3,74	0,01	0,10	3,21
Gallery 1845*	0,50	10,80	2,84	0,01	0,10	3,19
8 / 0	0,22	34,00	5,60	0,33	50,00	3,59
8 / 1	2,08	10,35	5,30	0,31	39,77	3,27

* The zone thickness was not discovered because of the lack of a "T" in this area. For this reason the analyzed length was considered as a vein thickness by Çinkur A.Ş.

Tablo 2.2.2. Main Vein Profile Areas (Mineable)

A Category based areas

SECTIONS	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
4/1-89/1	4,04	37,5	151,30	12,06	3,75	0,26	1,22	3,23
89/1-88/2	4,04	59,0	238,10	13,67	4,51	0,22	2,38	3,27
S_4			389,40	13,04	4,21	0,24	2,54	3,25
5/1-1805	9,05	57,0	515,60	14,18	4,32	0,08	14,45	3,32
1805-1745	9,50	40,0	380,00	12,21	3,75	0,01	0,10	3,23
S_5			895,60	13,24	4,08	0,05	8,36	3,28
6/1-1805	5,79	57,5	332,60	6,90	2,23	0,07	1,84	3,14
1805-1845	8,83	40,0	353,20	8,88	2,42	0,01	0,10	3,17
1845-89/5	5,00	55,0	275,00	10,01	2,68	0,01	0,10	3,18
S_6			960,80	8,52	2,43	0,03	0,70	3,16
7/1-1805	10,30	40,5	417,15	11,01	4,12	0,03	1,82	3,23
1805-1845	9,75	32,0	312,00	10,49	3,72	0,01	0,10	3,21
S_7			729,15	10,79	3,95	0,02	1,08	3,22
8/0-8/1	1,15	124	142,60	12,61	5,33	0,31	40,75	3,30
S_8			142,60	12,61	5,33	0,31	40,75	3,30

B Category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_4 4-4'B			389,40	13,04	4,21	0,21	2,54	3,25
S_4 Down	1,80	25	45,00	5,59	0,80	0,38	5,13	3,07
S_4 Up	1,80	25	45,00	12,80	4,20	0,24	15,00	3,26
S_5 Down	9,09	25	227,25	16,63	5,97	0,16	28,65	3,44
S_5 Up	10,00	25	250,00	12,66	4,73	0,01	0,10	3,26
S_6 Down	2,91	25	72,75	6,53	2,71	0,23	7,01	3,14
S_6 Up	1,00	25	25,00	4,20	2,00	0,09	0,10	3,09
S_7 Down	1,60	25	40,00	17,26	8,61	0,21	22,30	3,47
S_7 Up	0,50	25	12,50	10,80	2,84	0,01	0,10	3,27
S_8 Down	0,22	25	5,50	34,00	5,60	0,33	50,00	3,59
S_8 Up	2,08	25	52,00	10,35	5,30	0,31	40,75	3,30
S_8 8-8'D	1,15	124	142,60	12,61	5,33	0,31	40,75	3,30
C Category Based Areas								
S_4 Down	1,80	25/2	22,50	5,59	0,80	0,38	5,13	3,07
S_4 Up	1,80	25/2	22,50	12,80	4,20	0,24	15,00	3,26
S_5 Down	9,09	25/2	113,63	16,63	5,97	0,16	28,65	3,44
S_5 Up	10,00	25/2	125,00	12,66	4,73	0,01	0,10	3,26
S_6 Down	2,91	25/2	36,38	6,53	2,71	0,23	7,01	3,14
S_6 Up	1,00	25/2	12,50	4,20	2,00	0,09	0,10	3,09
S_7 Down	1,60	25/2	20,00	17,26	8,61	0,21	22,30	3,47
S_7 Up	0,50	25/2	6,25	10,80	2,84	0,01	0,10	3,27
S_8 Down	0,22	25/2	2,75	34,00	5,60	0,33	50,00	3,59
S_8 Up	2,08	25/2	26,00	10,35	5,30	0,31	39,77	3,27
S_8 East	1,15	124	142,60	12,61	5,33	0,31	40,75	3,30

Table 2.2.3. Main Vein Mineable Reserve Calculation Table

	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORLS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
4-5	50	31 259,10	13,25	4,12	0,11	6,64	3,27	102 217,3	A
5-6	50	46 400,50	10,89	6,33	0,04	4,47	3,22	149 409,6	A
6-7	50	4 211,80	9,50	3,09	0,03	0,86	3,19	13 435,6	A
7-8	50	19 903,40	11,09	4,18	0,07	7,57	3,23	64 288,0	A
TOTAL A CATEGORIES			11,60	5,09	0,07	5,60	3,24	329 350,5	A
4-4 West	25	9 735,00	13,04	4,21	0,21	2,54	3,25	31 638,8	B
4-5 Down	50	6 222,90	14,81	5,12	0,20	24,76	3,38	21 033,4	B
4-5 Up	50	6 684,40	12,68	4,65	0,05	2,37	3,26	21 791,1	B
5-6 Down	50	7 143,00	14,18	5,18	0,18	23,40	3,38	24 143,3	B
5-6 Up	50	5 900,90	11,89	4,48	0,02	0,10	3,24	19 119,0	B
6-7 Down	50	2 778,20	10,34	4,80	0,22	12,43	3,26	9 056,9	B
6-7 Up	50	919,60	6,40	2,28	0,06	0,10	3,15	2 896,7	B
7-8 Down	50	1 005,50	19,28	8,24	0,22	25,65	3,48	3 499,1	B
7-8 Up	50	1 499,90	10,44	4,82	0,25	32,08	3,27	4 904,8	B
TOTAL B CATEGORIES			12,83	4,74	0,23	14,21	3,29	138 083,1	B
4-5 Down	50	3 111,45	14,81	5,12	0,20	24,76	3,38	10 516,7	C
4-5 Up	50	3 342,20	12,68	4,65	0,05	2,37	3,26	10 895,6	C
5-6 Down	50	3 571,50	14,18	5,18	0,18	23,40	3,38	12 071,7	C

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{1/2}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
5-6 Up	50	2 950,45	11,89	4,48	0,02	0,10	3,24	9 559,5	C
6-7 Down	50	1 389,10	10,34	4,80	0,22	12,43	3,26	4 528,5	C
6-7 Up	50	459,80	6,40	2,28	0,06	0,10	3,15	1 448,4	C
7-8 Down	50	502,75	19,28	8,24	0,22	25,65	3,48	1 749,6	C
7-8 Up	50	749,95	10,44	4,82	0,25	32,08	3,27	2 452,3	C
8-8'East	25/2	1 782,50	12,61	5,33	0,31	40,75	3,30	5 582,3	C
TOTAL CATEGORY C			11,83	4,90	0,32	19,88	3,27	25 620,6	C

Table 2.2.4. Main Vein Mineable Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	11,60	5,09	0,06	5,60	3,24	329 350,5	A
TOTAL B	12,83	4,74	0,23	14,21	3,29	138 083,1	B
TOTAL C	11,83	4,90	0,32	19,88	3,27	25 620,6	C
ULTIMATE TOTAL	11,96	4,98	0,15	10,05	3,26	439 054,2	(A+B+C)

Table 3. MAIN VEIN I RESERVE CALCULATIONS

Table 3.1. MAIN VEIN I POTENTIAL RESERVE CALCULATIONS

Table 3.1.1. Mein Vein I Potential Reserve Parameters

BOREHOLE NO	TRUE THICKNES S (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
8 / 0	1,38	3,90	2,15	0,11	8,15	3,09
9 / 1	3,39	13,75	3,98	0,16	14,96	3,27
9 / 2	0,14	12,20	2,80	0,33	5,00	3,24
10 / 1	2,62	3,28	1,56	0,12	10,15	3,08
10 / 2	0,46	1,90	0,30	0,02	5,00	3,03

Table 3.1.2. Main Vein I Profile Areas (Potential)

"A" category based areas

<table>
<tr><th rowspan="2"></th><th rowspan="2" colspan="2">N
(m)</th><th rowspan="2" colspan="2">M
(m)</th><th rowspan="2">AREAS
(NXM)=m²</th><th colspan="4">A V E R A G E
T E N O R S</th><th rowspan="2">DENSITY
d
ton/m³</th></tr>
<tr><th>Zn %</th><th>Pb %</th><th>Cu %</th><th>Ag ppm</th></tr>
<tr><td>S_9</td><td colspan="2">3,39</td><td colspan="2">25</td><td>84,75</td><td>13,75</td><td>3,98</td><td>0,16</td><td>14,96</td><td>3,27</td></tr>
<tr><td>S_9</td><td colspan="2">0,14</td><td colspan="2">25</td><td>3,50</td><td>12,20</td><td>2,80</td><td>0,33</td><td>5,00</td><td>3,24</td></tr>
<tr><td>S_{10}</td><td colspan="2">2,62</td><td colspan="2">25</td><td>62,50</td><td>3,28</td><td>1,56</td><td>0,12</td><td>10,15</td><td>3,24</td></tr>
<tr><td>S_{10}</td><td colspan="2">0,46</td><td colspan="2">25</td><td>11,50</td><td>1,90</td><td>0,30</td><td>0,02</td><td>5,00</td><td>3,03</td></tr>
<tr><td colspan="11">"B" Category based areas</td></tr>
<tr><td>S_8</td><td colspan="2">1,38</td><td colspan="2">50</td><td>69,00</td><td>3,90</td><td>2,15</td><td>0,11</td><td>8,15</td><td>3,09</td></tr>
<tr><td>S_9</td><td colspan="2">1,38</td><td colspan="2">25</td><td>84,75</td><td>13,75</td><td>3,98</td><td>0,16</td><td>14,96</td><td>3,27</td></tr>
<tr><td rowspan="2">S_9</td><td>3,39</td><td>0,14</td><td>34,5</td><td>28</td><td rowspan="2">55,31</td><td rowspan="2">13,69</td><td rowspan="2">3,93</td><td rowspan="2">0,17</td><td rowspan="2">14,56</td><td rowspan="2">3,27</td></tr>
<tr><td colspan="2">1,77</td><td colspan="2">31,25</td></tr>
<tr><td>S_9</td><td colspan="2">0,14</td><td colspan="2">25</td><td>3,50</td><td>12,20</td><td>2,80</td><td>0,33</td><td>5,00</td><td>3,24</td></tr>
<tr><td>S_{10}</td><td colspan="2">2,62</td><td colspan="2">25</td><td>62,50</td><td>3,28</td><td>1,56</td><td>0,12</td><td>10,15</td><td>3,08</td></tr>
<tr><td rowspan="2">S_{10}</td><td>2,62</td><td>0,46</td><td>50</td><td>53</td><td rowspan="2">79,31</td><td rowspan="2">3,53</td><td rowspan="2">1,37</td><td rowspan="2">0,11</td><td rowspan="2">9,38</td><td rowspan="2">3,07</td></tr>
<tr><td colspan="2">1,54</td><td colspan="2">51,5</td></tr>
<tr><td>S_{10}</td><td colspan="2">0,46</td><td colspan="2">25</td><td>11,50</td><td>1,90</td><td>0,30</td><td>0,02</td><td>5,00</td><td>3,03</td></tr>
</table>

"C" Category based areas

	N (m)	M (m)	VOLUMES (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_8 Down	1,38	25/2	17,25	3,90	2,15	0,11	8,15	3,09
S_8 Up	1,38	25/2	17,25	3,90	2,15	0,11	8,15	3,09
S_8 West	1,38	50	69,00	3,90	2,15	0,11	8,15	3,09
S_8EastUp	1,38	25/2	17,25	3,90	2,15	0,11	8,15	3,09
S_8 East	1,38	50	69,00	3,90	2,15	0,11	8,15	3,09
S_8EastDown	1,38	25/2	17,25	3,90	2,15	0,11	8,15	3,09
*S_8EastT.	----	----	103,50	3,90	2,15	0,11	8,15	3,09
S_9 West	3,39	50	169,50	13,75	3,98	0,16	14,96	3,27
**S_9West	1,77	31,25	55,31	13,69	3,93	0,17	14,56	3,27
S_9 West	0,14	50	7,00	12,20	2,80	0,33	5,00	3,24
*S_9West Total	----	----	231,81	13,69	3,93	0,17	14,56	3,27
*** S_9 West	3,39	25	84,75	13,75	3,98	0,26	14,96	3,27
*** S_9 West	1,77	31,25	55,31	13,69	3,93	0,17	14,56	3,27
*** S_9 West	0,14	25	3,50	12,20	2,80	0,33	5,00	3,24
S_9 Up	3,39	25/2	42,38	13,75	3,98	0,26	14,96	3,27
S_9 Down	0,14	25/2	1,75	12,20	2,80	0,33	5,00	3,24
S_{10} Down	2,62	25/2	32,75	3,28	1,56	0,12	10,15	3,08
S_{10} Up	0,46	25/2	5,75	1,90	0,30	0,02	5,00	3,03
**** S_{10} East	0,46	25	11,50	1,90	0,30	0,02	5,00	3,03
**** S_{10} East	1,54	51,5	79,31	3,07	1,37	0,11	9,38	3,07
**** S_{10} East	2,62	25	62,50	3,28	1,56	0,12	10,15	3,08
S_{10} East	0,46	50	23,00	1,90	0,30	0,21	5,00	3,03
S_{10} East	1,54	51,5	79,31	3,07	1,37	0,11	9,38	3,07
S_{10} East	2,62	50	131,00	3,28	1,56	0,11	10,15	3,07
**** S_{10}EastT	----	----	233,31	3,07	1,37	0,11	9,38	3,07

(*) "C" category based reserve areas formed between the 8-8' and 9-9' profile areas
(**) After the areas are eliminated from the influence of the 9/1 and 9/2 drill holes, the area between these drill holes was based on the "C" category reserve which formed west of the No. 9 drill hole
(***) "C" category based reserve area formed west of the No. 9 drill hole data
(****) "C" category based areas formed east of the No. 10 drill hole data (see appendix 14.2)

Tableo 3.1.3. Main Vein I Potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
9-10	50	2 124,48	12,33	3,54	0,14	13,77	3,24	6 883,3	A
9-10	50	1 346,50	3,75	1,63	0,13	9,88	3,09	4 160,7	A
TOTAL A			9,09	2,82	0,14	12,30	3,18	11 044,0	A
8-8'	50	3 450,00	3,90	2,15	0,11	8,15	3,09	10 660,5	B
9-10	50	2 124,48	12,33	3,54	0,14	13,77	3,24	6 883,3	B
9-10	50	3 816,26	7,70	2,42	0,13	11,51	3,15	12 021,2	B
9-10	50	1 346,50	3,75	1,63	0,13	9,88	3,09	4 160,7	B
*9-9'West	25	2 118,75	13,75	3,98	0,16	14,96	3,27	6 928,3	B
9-9'West	25	87,50	12,20	2,80	0,33	5,00	3,24	283,5	B
10-10'East	25	287,50	1,90	0,30	0,02	5,00	3,03	871,1	B
10-10'East	25	1 562,50	3,28	1,56	0,12	10,15	3,08	4 812,5	B
TOTAL B			7,52	2,56	0,13	11,14	3,16	46 621,1	B
8-8'Down	50	862,50	3,90	2,15	0,11	8,15	3,09	2 665,1	C
8-8'Up	50	962,50	3,90	2,15	0,11	8,15	3,09	2 665,1	C
8-8'West	25/2	862,50	3,90	2,15	0,11	8,15	3,09	2 665,1	C
8-9	36	5 882,45	10,66	3,38	0,15	12,58	3,21	18 882,7	C
9-9'WestUp	25	2 118,75	13,75	3,98	0,16	14,96	3,27	6 928,3	C
9-9'West	25	1 382,75	13,69	3,93	0,17	14,56	3,27	4 521,6	C
9-9'West	25	87,50	12,20	2,80	0,33	5,00	3,24	283,5	C
9-10 Up	50	1 062,34	12,33	3,54	0,14	13,77	3,24	3 441,9	C

(*) In the 9-9' profile the "A" category was taken as a base and a 25 m. long volume was formed. The average quality and density were based in this area (see appendix 14.2)

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
9-9'-10-10'Down	50	701,18	3,73	1,62	0,13	9,89	3,09	2 166,6	C
10-10'SectionD	25	287,50	1,90	0,30	0,02	5,00	3,03	871,1	C
10-10'SectionD	25	1 982,75	3,07	1,37	0,11	9,38	3,07	6 087,0	C
10-10'SectionD	25	1 562,50	3,28	1,56	0,12	10,15	3,08	4 812,5	C
*10-10'SectionD	25/2	2 916,37	3,07	1,37	0,11	9,38	3,07	8 953,3	C
TOTAL C			7,52	2,56	0,13	11,34	3,16	64 943,8	C

(*) It is accepted that it is lensed at the 25 m. long distance. For this reason half of the formed volume was taken

Table 3.1.4. Main Vein I Potential Reserve

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	9,09	2,82	0,14	12,30	3,18	11 044,0	A
TOTAL B	7,52	2,56	0,13	11,14	3,16	46 621,1	B
TOTAL C	7,52	2,56	0,13	11,14	3,16	64 943,8	C
ULTIMATE TOTAL	7,66	2,58	0,13	11,24	3,16	122 608,9	(A+B+C)

Table 3.2. MAIN VEIN I MINABLE RESERVE CALCULATIONS

Table 3.2.1. Main Vein I Minable Reserve Parameters

BORE HOLE NO	TRUE THICKNES (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
8 / 0	0,87	5,60	3,10	0,16	10,00	3,13
9 / 1	2,52	16,72	4,35	0,17	14,35	3,32
10 / 1	1,09	5,01	2,23	0,07	13,34	3,11

Table 3.2.2. Main Vein I Profile Areas

"B" Category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_8	0,87	50	43,50	5,60	3,10	0,16	10,00	3,13
S_9	2,52	50	126,00	16,72	4,35	0,17	14,35	3,32
S_{10}	1,09	50	54,50	5,01	2,23	0,07	13,34	3,11
"C" Category based areas								
S_8 West	0,87	50	43,50	5,60	3,10	0,16	10,00	3,13
S_8 Down	0,87	25/2	10,88	5,60	3,10	0,16	10,00	3,13
S_8 Up	0,87	25/2	10,88	5,60	3,10	0,16	10,00	3,13
S_8 East	0,87	50	43,50	5,60	3,10	0,16	10,00	3,13
S_9 West	2,52	50	126,00	16,72	4,35	0,17	14,35	3,32
S_9 Down	2,52	25/2	31,50	16,72	4,35	0,17	14,35	3,32
S_9 Up	2,52	25/2	31,50	16,72	4,35	0,17	14,35	3,32
S_{10}Down	1,09	25/2	13,63	5,01	2,23	0,07	13,34	3,11
S_{10} Up	1,09	25/2	13,63	5,01	2,23	0,07	13,34	3,11
S_{10}East	1,09	50	54,50	5,01	2,23	0,07	13,34	3,11

Table 3.2.3. Main Vein I Minable Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
8-8'	50	2 175,00	5,60	3,10	0,16	10,00	3,13	6 807,8	B
9-10	57	5 003,98	13,80	3,71	0,14	14,50	3,27	16 363,0	B
TOTAL B			11,39	3,53	0,15	12,86	3,23	23 170,8	B
8-8'West	25/2	543,75	5,60	3,10	0,16	10,00	3,13	1 701,9	C
8-8' Down	50	543,75	5,60	3,10	0,16	10,00	3,13	1 701,9	C
8-8' Up	50	543,75	5,60	3,10	0,16	10,00	3,13	1 701,9	C
8-9	59	4 789,497	13,87	4,03	0,17	13,23	3,27	15 661,7	C
9-10 Down	57	1 250,995	13,80	3,71	0,14	14,05	3,27	4 090,8	C
9-10 Up	57	1 250,995	13,80	3,71	0,14	14,05	3,27	4 090,8	C
10-10East	25/2	681,25	5,01	2,23	0,07	13,34	3,11	2 118,7	C
TOTAL C			11,89	3,67	0,15	12,92	3,24	31 067,7	C

Table 3.2.4 Main Vein I Minable Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	11,39	3,59	0,15	12,86	3,23	23 170,8	B
TOTAL C	11,89	3,67	0,15	12,92	3,24	31 067,7	C
ULTIMATE TOTAL	11,68	3,61	0,15	12,89	3,24	54 238,5	(B+C)

Table 4. MAIN VEIN 2 RESERVE CALCULATIONS

Table 4.1. MAIN VEIN 2 POTENTIAL RESERVE CALCULATIONS

Table 4.1.1. Main Vein 2 Potential Reserve Parameters

BORE HOLE NO	TRUE THICKNESS (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
9 / 1	1,94	7,36	2,20	0,63	12,86	3,13
10 / 1	1,46	12,69	4,82	1,35	29,60	3,27
10 / 2	9,30	1,79	0,57	0,03	10,05	3,03

Table 4.1.2. Main Vein 2 Profile Areas (Potential)

"B" Category based areas

	N (m)	M (m)	AREAS (NXM)m^2	AVERAGE TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d ton/m^3
9/1	1,94	50	97,00	7,36	2,20	0,63	12,86	3,13
S_9			97,00	7,36	2,20	0,63	12,86	3,13
(*) 10/1-10/2	1,46 / 9,3 5,38	109 / 119 114	613,32	3,27	1,15	0,21	12,70	3,06
S_{10}			613,32	3,27	1,15	0,21	12,70	3,06
"C" Category based areas								
S_9 West	1,94	50	97,00	7,36	2,20	0,63	12,86	3,13
S_9 Down	1,94	25/2	24,25	7,36	2,20	0,63	12,86	3,13
S_9 Up	1,94	25/2	24,25	7,36	2,20	0,63	12,86	3,13
S_{10} Down	1,46	25/2	18,25	12,69	4,82	1,35	29,60	3,27
S_{10} Up	9,30	25/2	116,25	1,79	0,37	0,03	10,05	3,03
S_{10} East	5,35	25/2	613,32	3,27	1,15	0,21	12,70	3,06

(*) The average distance between the 10/1 and 10/2 drill hole data is 114 m. The 114 m. area is considered "B" category because of the lack of the 9/1 drill hole data in this area

Table 4.1.3. Main Vein 2 Potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
9-10	40	12 723,07	3,83	1,29	0,27	12,72	3,07	39 059,8	B
TOTAL CATEGORY B			3,83	1,29	0,27	12,70	3,07	39 059,8	B
9-9'West	25/2	1 212,50	7,36	2,20	0,63	12,86	3,13	3 795,1	C
9-10 Down	40	847,16	9,65	3,33	0,94	20,05	3,19	2 702,5	C
9-10 Up	40	2 581,26	2,75	0,85	0,14	10,54	3,05	7 872,8	C
10-10'East	25/2	7 666,50	3,27	1,15	0,21	12,70	3,06	23 459,5	C
TOTAL C			3,66	1,34	0,30	12,79	3,07	37 829,9	C

Table 4.1.4. Main Vein 2 Potential Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	3,83	1,29	0,27	12,70	3,07	35 059,8	B
TOTAL C	3,66	1,34	0,30	12,79	3,07	37 829,9	C
ULTIMATE TOTAL	3,74	1,31	0,28	12,74	3,07	74 889,7	(B+C)

Table 4.2. MAIN VEIN 2 MINABLE RESERVE CALCULATIONS

Table 4.2.1. Main Vein 2 Minable Reserve Parameters

BORE HOLE NO	TRUE THICKNESS (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
9 / 1	1,06	5,97	2,26	0,63	8,41	3,12
10 / 1	1,25	13,40	5,35	1,79	33,22	3,29

Table 4.2.2. Main Vein 2 Profile Areas (Minable)

"B" Category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_9	1,06	50	53,00	5,97	2,26	0,63	8,41	3,12
S_{10}	1,25	50	62,50	13,40	5,38	1,79	33,22	3,29
"C" Category based areas								
S_9 West	1,06	50	53,00	5,97	2,26	0,63	8,41	3,12
S_9 Down	1,06	25/2	13,25	5,97	2,26	0,63	8,41	3,12
S_9 Up	1,06	25/2	13,25	5,97	2,26	0,63	8,41	3,12
S_{10} Down	1,25	25/2	15,63	13,40	5,38	1,79	33,22	3,29
S_{10} Up	1,25	25/2	15,63	13,40	5,38	1,79	33,22	3,29
S_{10} East	1,25	50	62,50	13,40	5,38	1,79	33,22	3,29

Table 4.2.3. Main Vein 2 Minable Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
9-10	40	2 307,39	9,99	3,95	1,26	21,84	3,21	7 406,7	B
TOTAL B			9,99	3,95	1,26	21,84	3,21	7 406,7	B
9-9'West	25/2	662,50	5,97	2,26	0,63	8,41	3,12	2 067,0	C
9-10 Down	40	576,84	9,99	3,95	1,26	21,84	3,21	1 851,7	C
9-10 Up	40	576,84	9,99	3,95	1,26	21,84	3,21	1 851,7	C
10-10'East	25/2	781,25	13,40	5,38	1,79	33,22	3,29	2 570,3	C
TOTAL C			10,04	3,97	1,27	22,02	3,21	8 340,7	C

Table 4.2.4. Main Vein 2 Minable Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	9,99	3,95	1,26	21,84	3,21	7 406,7	B
TOTAL C	10,04	3,97	1,27	22,02	3,21	8 340,7	C
ULTIMATE TOTAL	10,02	3,96	1,26	21,94	3,21	15 747,4	(B+C)

Table 5. SECONDARY VEIN RESERVE CALCULATION

Table 5.1. SECONDARY VEIN POTENTIAL RESERVE CALCULATIONS

Table 5.1.1. Secondary Vein Potential Reserve Parameters

BOREHOLE AND GALLERY DATA	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
89 / 5	7,02	2,47	0,68	0,06	0,10	3,05
90 / 1A	9,95	2,61	2,32	0,03	0,10	3,09
7 / 1	1,37	2,00	1,20	0,06	6,00	3,03
8 / 1	1,15	13,74	5,42	0,21	20,15	3,30
8 / 2	3,73	1,20	0,72	0,04	31,00	3,03
Gallery1805 9-9' profile	4,00	12,00	5,00	0,01	0,10	3,26
10 / 2	3,37	10,20	2,26	0,13	15,87	3,17

Table 5.1.2. Secondary Vein Profile Areas (Potential)

A Category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS Zn %	Pb %	Cu %	Ag ppm	DENSITY d ton/m^3
S_7	9,95	25	248,75	2,61	2,32	0,03	0,10	3,09
S_7	1,37	25	34,25	2,00	1,20	0,06	6,00	3,03
S_8	3,73	25	93,25	1,20	0,72	0,04	31,00	3,03
S_8	1,15	25	28,75	13,74	5,42	0,21	20,15	3,30
B Category based areas								
S_6	7,02	50	351,00	2,47	0,68	0,06	0,10	3,05
S_7	9,95	50	497,50	2,61	2,32	0,03	0,10	3,09
S_7	1,37	25	3,25	2,00	1,20	0,06	6,00	3,03
S_7	9,95	25	248,75	2,61	2,32	0,03	0,10	3,09
S_7	9,95 | 1,37 5,56	25	139,00	2,54	2,18	0,04	0,81	3,08
S_7	5,56	25	139,00	2,54	2,18	0,04	0,81	3,08
S_7	1,37	25	34,25	2,00	1,20	0,06	6,00	3,03
S_8	3,73	25	93,25	1,20	0,72	0,04	31,00	3,03
S_8	1,15 | 3,73 2,44	25	61,00	4,15	1,83	0,08	28,44	3,09

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_8	2,44	25	61,00	4,15	1,83	0,08	28,44	3,09
S_8	1,15	25	28,75	13,74	5,42	0,21	20,15	3,30
S_8	3,73	25	93,25	1,20	0,72	0,04	31,00	3,03
S_8	1,15	50	57,50	13,74	5,42	0,21	20,15	3,30
S_9	4,00	50	200,00	12,00	5,00	0,01	0,10	3,26
S_{10}	3,37	50	168,50	10,20	2,26	0,13	15,87	3,17
C Category based areas								
S_6 Down	7,02	25/2	87,75	2,47	0,68	0,06	0,10	3,05
S_6 Up	7,02	25/2	87,75	2,47	0,68	0,06	0,10	3,05
S_6 West	7,02	50	351,00	2,47	0,68	0,06	0,10	3,05
S_7 Down	1,37	25	34,25	2,00	1,20	0,06	6,00	3,03
S_7 Down	1,37	25/2	17,13	2,00	1,20	0,06	6,00	3,03
S_7	5,56	75	417,00	2,54	2,18	0,04	0,81	3,08
S_7 Up	9,95	25/2	124,38	2,61	2,32	0,04	0,10	3,09
S_7	5,56	28	155,68	2,54	2,18	0,04	0,81	3,08
S_8 Down	1,15	25/2	14,38	13,74	5,42	0,21	20,15	3,30
S_8	2,44	29,5	71,98	4,15	1,83	0,08	28,44	3,09
S_8 Up	3,73	25/2	46,63	1,20	0,72	0,04	31,00	3,03
S_8 Down	1,15	25/2	14,38	13,74	5,42	0,21	20,15	3,30
S_8	2,44	79,5	193,98	4,15	1,83	0,08	28,44	3,09
S_8 Up	3,73	25	93,25	1,20	0,72	0,04	31,00	3,03
S_8 Up	3,73	25/2	46,63	1,20	0,72	0,04	31,00	3,03
S_9 Down	4,00	25/2	50,00	12,00	5,00	0,01	0,10	3,26
S_9 Up	4,00	25/2	50,00	12,00	5,00	0,01	0,10	3,26
S_9 East	4,00	50	200,00	12,00	5,00	0,01	0,10	3,26
S_{10} Down	3,37	25/2	42,13	10,20	2,26	0,13	15,87	3,17
S_{10} Up	3,37	25/2	42,13	10,20	2,26	0,13	15,87	3,17
S_{10} West	3,37	50	168,50	10,20	2,26	0,13	15,87	3,17
S_{10} East	3,37	50	168,50	10,20	2,26	0,13	15,87	3,17

Table 5.1.3. Secondary Vein Potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
7-8	50	8 232,37	2,23	1,88	0,05	8,52	3,07	25 291,8	A
7-8	50	5 558,63	7,36	3,12	0,12	12,46	3,15	17 509,7	A
TOTAL A			4,33	2,39	0,08	10,13	3,10	42 801,5	A
6-7	50	21 106,31	2,55	1,64	0,04	0,10	3,07	64 796,4	B
6-7	50/2	81,25	2,00	1,20	0,06	6,00	3,03	246,2	B
7-8	50	8 232,37	2,23	1,88	0,05	8,52	3,07	25 291,8	B
7-8	50	4 868,02	3,03	2,07	0,05	9,13	3,08	14 993,5	B
7-8	50	4 868,02	3,03	2,07	0,05	9,13	3,08	14 993,5	B
7-8	50	5 558,63	7,36	3,12	0,12	12,46	3,15	17 509,7	B
8-9	50/2	2 331,25	1,20	0,72	0,04	31,00	3,03	7 063,7	B
8-9	50	6 078,97	12,39	5,09	0,06	4,58	3,27	19 878,2	B
10-10	50	8 425,00	10,20	2,26	0,13	15,87	3,17	26 707,3	B
TOTAL B			5,06	2,28	0,07	7,57	3,11	191 480,2	B
*6-7 Down	50/2	1 284,38	2,00	1,20	0,06	6,00	3,03	3 891,7	C
6-7	50	11 600,66	2,53	1,92	0,04	0,67	3,07	35 614,0	C
6-7 Up	50	5 276,57	2,55	1,64	0,05	0,10	3,07	16 199,1	C
6-6'West	50/2	8 775,00	2,47	0,68	0,06	0,10	3,07	26 763,8	C
7-8 Down	50	786,50	7,36	3,12	0,12	12,46	3,15	2 477,5	C
7-8	50	5 558,62	3,05	2,07	0,05	9,55	3,08	17 120,6	C
7-8 Up	50	4 119,18	2,23	1,88	0,05	8,52	3,07	12 645,9	C

(*) The based on this volume in the area :S_7 $(7\text{-}1)_{Alt}$ + S_7 (7-1) = 34,25 + 17,125 = 51,375

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
8-9 Down	50	1 519,74	12,39	5,09	0,06	4,58	3,27	4 969,6	C
8-9	50	5 707,73	5,78	2,48	0,07	22,63	3,12	17 808,1	C
*8-9	50/2	3 496,88	1,20	0,72	0,04	31,00	3,03	10 595,5	C
9-10	75	9 201,26	11,18	3,75	0,06	7,31	3,22	29 628,1	C
10-10' Down	50	2 106,25	10,20	2,26	0,13	15,87	3,17	6 676,8	C
10-10' Up	50	2 106,25	10,20	2,26	0,13	15,87	3,17	6 676,8	C
10-10' East	50	2 106,25	10,20	2,26	0,13	15,87	3,17	6 676,8	C
TOTAL C			5,14	2,11	0,06	8,30	3,11	197 744,1	C

(*) The base of this volume in area :S_8 (8/2) + S_8 (8/2) = 93,25 + 46,625 = 139,875 m^2

Table 5.1.4. Secondary Vein Potential Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	4,33	2,39	0,08	10,13	3,1	42 801,5	A
TOTAL B	5,06	2,28	0,07	7,57	3,11	191 480,2	B
TOTAL C	5,14	2,11	0,06	8,30	3,11	197 744,1	C
ULIMATE TOTAL	5,02	2,21	0,07	7,97	3,11	432 025,8	(A+B+C)

Table 5.2. SECONDARY VEIN MINEABLE RESERVE CALCULATION

Table 5.2.1. Secondary Vein Mineable Reserve Parameters

BOREHOLE AND GALLERY DATA	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
89 / 5	2,73	4,60	0,30	0,03	0,10	3,06
90 / 1A	3,47	7,12	4,61	0,04	0,10	3,23
8 / 1	1,74	7,76	3,33	0,12	12,03	3,18
Gallery 1805	4,00	12,00	5,00	0,01	0,10	3,26
10 / 2	3,20	14,43	3,21	0,07	20,47	3,26

Tablo 5.2.2. Secondary Vein Profile Areas (Mineable)

B Category based Areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVERAGE TENORS				DENSITY d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_6	2,73	50	136,50	4,60	0,30	0,03	0,10	3,06
S_7	3,47	50	173,50	7,12	4,61	0,04	0,10	3,23
S_8	1,74	50	87,00	7,76	3,33	0,12	12,03	3,18
S_9	4,00	50	200,00	12,00	5,00	0,01	0,10	3,26
S_{10}	3,20	50	160,00	14,43	3,21	0,07	20,47	3,26
C Category based Areas								
S_6 Down	2,73	25/2	34,10	4,60	0,30	0,03	0,10	3,06
S_6 Up	2,73	25/2	34,10	4,60	0,30	0,03	0,10	3,06
S_7 Down	3,47	25/2	43,40	7,12	4,61	0,04	0,10	3,23
S_7 Up	3,47	25/2	43,40	7,12	4,61	0,04	0,10	3,23
S_8 Down	1,74	25/2	21,75	7,76	3,33	0,12	12,03	3,18
S_8 Up	1,74	25/2	21,75	7,76	3,33	0,12	12,03	3,18
S_9 Down	4,00	25/2	50,00	12,00	5,00	0,01	0,10	3,26
S_9 Up	4,00	25/2	50,00	12,00	5,00	0,01	0,10	3,26
S_9 East	4,00	50	200,00	12,00	5,00	0,01	0,10	3,26
S_{10}West	3,20	50	160,00	14,43	3,21	0,07	20,47	3,26
S_{10} Down	3,20	25/2	40,00	14,43	3,21	0,07	20,47	3,26
S_{10} Up	3,20	25/2	40,00	14,43	3,21	0,07	20,47	3,26
S_{10}West	3,20	50	160,00	14,43	3,21	0,08	20,47	3,26
S_6 West	2,73	50	136,50	4,60	0,30	0,03	0,10	3,06

Table 5.2.3. Secondary Vein Mineable Reserve Calculations Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
6-7	50	7 731,50	6,01	2,71	0,03	0,10	3,16	24 431,6	B
7-8	50	6 389,30	7,33	4,18	0,07	4,08	3,21	20 509,7	B
8-9	50	6 981,80	10,72	4,93	0,04	3,72	3,24	22 621,0	B
10-10	50	8 000,00	14,43	3,21	0,07	20,47	3,26	26 080,0	B
TOTAL B			9,78	3,71	0,05	7,52	3,22	93 642,3	B
6-7 Down	50	1 932,88	6,01	2,71	0,03	0,10	3,16	6 107,9	C
6-7 Up	50	1 932,88	6,01	2,71	0,03	0,10	3,16	6 170,9	C
7-8 Down	50	1 597,33	7,33	4,18	0,07	4,08	3,21	5 127,4	C
7-8 Up	50	1 597,33	7,33	4,18	0,07	4,08	3,21	5 127,4	C
8-9 Down	50	1 745,45	10,72	4,93	0,04	3,72	3,24	5 655,3	C
8-9 Up	50	1 745,45	10,72	4,93	0,04	3,72	3,24	5 655,3	C
9-10	75	13 472,14	13,08	4,20	0,04	9,15	3,26	43 919,2	C
10-10 Down	50	2 000,00	14,43	3,21	0,07	20,47	3,26	6 520,0	C
10-10 Up	50	2 000,00	14,43	3,21	0,07	20,47	3,26	6 520,0	C
10-10East	25/2	2 000,00	14,43	3,21	0,07	20,47	3,26	6 520,0	C
6-6 West	25/2	1 706,25	4,60	0,30	0,03	0,10	3,06	5 221,1	C
TOTAL C			11,23	3,71	0,05	8,66	3,23	102 481,5	C

Table 5.2.4. Secondary Vein Mineable Reserves

	AVERAGE TENORS				DENSITY d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	9,78	3,71	0,05	7,52	3,22	93 642,3	B
TOTAL C	11,23	3,71	0,05	8,66	3,23	102 481,5	C
ULTIMATE TOTAL	10,54	3,71	0,05	8,12	3,23	196 123,8	(B+C)

Table 6. VEIN NO 2 RESERVE CALCULATIONS

Table 6.1. VEIN NO 2 POTENTIAL RESERVE CALCULATIONS

Table 6.1.1. Vein No 2 Potential Reserve Parameters

BOREHOLE AND GALLERY DATA	Thickness (True) (m)	AVERAGE TENORS				DENSITY d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
Gallery 1805	1,41	13,87	7,04	0,01	0,10	3,33
90 / 1A	1,39	8,35	4,32	0,36	0,10	3,20
Gallery 1805	1,80	24,40	7,80	0,01	0,10	3,50
Gallery 1805	3,00	12,30	28,80	0,01	0,10	3,97
8 - 1	9,49	4,23	2,10	0,44	17,24	3,09
8 - 0	0,84	2,60	0,56	0,30	6,00	3,04
Gallery 1805	4,00	13,00	3,00	0,01	0,10	3,22

Table 6.1.2. Vein No 2 Profile Areas (Potential)

A Category Based Areas

	k_1	k_2	a_1	a_2	AREAS $(NXM)=m^2$	AVERAGE TENORS				DENSITY d ton/m^3
	$N=k_1+k_2/2$		$M=a_1+a_2/2$			Zn %	Pb %	Cu %	Ag ppm	
S_5	1,41		50		70,50	13,87	7,04	0,01	0,10	3,33
S_6	1,39		50		69,50	8,35	4,32	0,36	0,10	3,20
S_7	1,80		50		90,00	24,40	7,80	0,01	0,10	3,50
S_8	9,49	3,0	53	65	368,45	6,17	8,51	0,37	13,13	3,30
	6,25		59,0							
S_9	4,00		50		200,00	13,00	3,00	0,01	0,10	3,22
B Category based areas										
S_5 Up	1,41		25		35,25	13,87	7,04	0,01	0,10	3,33
S_5Dw	1,41		25		35,25	13,87	7,04	0,01	0,10	3,33
S_6 Up	1,39		25		34,75	8,35	4,32	0,36	0,10	3,20
S_6Dw	1,39		25		34,75	8,35	4,32	0,36	0,10	3,20
S_7 Up	1,80		25		45,00	24,40	7,80	0,01	0,10	3,50
S_7Dw	1,80		25		45,00	24,40	7,80	0,01	0,10	3,50
S_8 Up	3,00		25		75,00	12,30	28,80	0,01	0,10	3,97
S_8Dw	9,49		25		237,25	4,23	2,10	0,44	17,24	3,09
S_8	0,84		50		42,00	2,60	0,56	0,30	6,00	3,04
S_9 Up	4,00		25		100,00	13,00	3,00	0,01	0,10	3,22
S_9Dw	4,00		25		100,00	13,00	3,00	0,01	0,10	3,22

<table>
<tr><th rowspan="2"></th><th>k_1</th><th>k_2</th><th>a_1</th><th>a_2</th><th rowspan="2">AREAS (NXM)=m^2</th><th colspan="4">A V E R A G E T E N O R S</th><th rowspan="2">DENSITY d ton/m^3</th></tr>
<tr><th colspan="2">$N=k_1+k_2/2$</th><th colspan="2">$M=a_1+a_2/2$</th><th>Zn %</th><th>Pb %</th><th>Cu %</th><th>Agppm</th></tr>
<tr><td>S_9 East</td><td colspan="2">4,0</td><td colspan="2">50</td><td>200,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
<tr><td colspan="11">C Category based areas</td></tr>
<tr><td>S_5 Up</td><td colspan="2">1,41</td><td colspan="2">25/2</td><td>17,63</td><td>13,87</td><td>7,04</td><td>0,01</td><td>0,10</td><td>3,33</td></tr>
<tr><td>S_{5Dw}</td><td colspan="2">1,41</td><td colspan="2">25/2</td><td>17,63</td><td>13,87</td><td>7,04</td><td>0,01</td><td>0,10</td><td>3,33</td></tr>
<tr><td>S_6 Up</td><td colspan="2">1,39</td><td colspan="2">25/2</td><td>17,38</td><td>8,35</td><td>4,32</td><td>0,36</td><td>0,10</td><td>3,20</td></tr>
<tr><td>S_6Dw</td><td colspan="2">1,39</td><td colspan="2">25/2</td><td>17,38</td><td>8,35</td><td>4,32</td><td>0,36</td><td>0,10</td><td>3,20</td></tr>
<tr><td>S_7 Up</td><td colspan="2">1,80</td><td colspan="2">25/2</td><td>22,50</td><td>24,40</td><td>7,80</td><td>0,01</td><td>0,10</td><td>3,50</td></tr>
<tr><td>S_7Dw</td><td colspan="2">1,80</td><td colspan="2">25/2</td><td>22,50</td><td>24,40</td><td>7,80</td><td>0,01</td><td>0,10</td><td>3,50</td></tr>
<tr><td>S_8 Up</td><td colspan="2">3,00</td><td colspan="2">25/2</td><td>37,50</td><td>12,30</td><td>28,80</td><td>0,01</td><td>0,10</td><td>3,97</td></tr>
<tr><td rowspan="2">S_8</td><td>9,49</td><td>0,84</td><td>73</td><td>66</td><td rowspan="2">359,30</td><td rowspan="2">4,10</td><td rowspan="2">1,97</td><td rowspan="2">0,43</td><td rowspan="2">16,33</td><td rowspan="2">3,09</td></tr>
<tr><td colspan="2">5,17</td><td colspan="2">69,5</td></tr>
<tr><td>S_8Dw</td><td colspan="2">0,84</td><td colspan="2">25/2</td><td>10,50</td><td>2,60</td><td>0,56</td><td>0,30</td><td>6,00</td><td>3,04</td></tr>
<tr><td>S_9 Up</td><td colspan="2">4,00</td><td colspan="2">25/2</td><td>50,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
<tr><td>S_9Dw</td><td colspan="2">4,00</td><td colspan="2">25/2</td><td>50,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
<tr><td>S_9 East</td><td colspan="2">4,00</td><td colspan="2">50</td><td>200,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
<tr><td>*S_{9Up}</td><td colspan="2">4,00</td><td colspan="2">25/2</td><td>50,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
<tr><td>*S_9 Dw</td><td colspan="2">4,00</td><td colspan="2">25/2</td><td>50,00</td><td>13,00</td><td>3,00</td><td>0,01</td><td>0,10</td><td>3,22</td></tr>
</table>

(*) "C" Category based areas over the B volume formed east of the 9-9' profile alanlar.

Table 6.1.3. Vein no 2 vein potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
5	43	3 031,50	13,87	7,04	0,01	0,10	3,33	10 094,9	A
6-7	32	2 544,94	17,40	6,28	0,16	0,10	3,37	8 576,4	A
7-8	50	10 675,94	9,74	8,37	0,27	10,55	3,34	35 657,6	A
8-9	61,5	12 718,28	8,57	6,57	0,24	8,55	3,27	41 588,8	A
T O T A L A			10,35	7,26	0,22	7,65	3,31	95 917,7	A
5-5' Up	43	1 515,75	13,87	7,04	0,01	0,10	3,33	5 047,5	B
5-5' Down	43	1 515,75	13,87	7,04	0,01	0,10	3,33	5 047,5	B
6-7 Up	32	1 272,47	17,40	6,28	0,16	0,10	3,37	4 288,2	B
6-7 Down	32	12 72,47	17,40	6,28	0,16	0,10	3,37	4 288,2	B
7-8 Up	50	2 968,25	16,84	20,93	0,01	0,10	3,79	11 249,7	B
7-8 down	50	6 426,27	7,45	2,26	0,37	14,51	3,15	20 242,8	B
7-8	50/2	1 050,00	2,60	0,56	0,30	6,00	3,04	3 192,0	B
8-9 Up	61,5	5 362,90	12,70	14,06	0,01	0,10	3,54	18 984,6	B
8-9 Down	61,5	10 071,22	6,83	2,37	0,31	12,16	3,13	31 522,9	B
8-9	50/2	1 050,00	2,60	0,56	0,30	6,00	3,04	3 192,0	B
9-9'East	25	5 000,00	13,00	3,00	0,01	0,10	3,22	16 100,0	B
T O T A L B			10,65	6,49	0,17	5,86	3,30	123 155,4	B
5 Up	43	757,88	13,87	7,04	0,01	0,10	3,33	2 523,8	C
5 Down	43	757,88	13,87	7,04	0,01	0,10	3,33	2 523,8	C
6-7 Up	32	636,23	17,40	6,28	0,16	0,10	3,37	2 144,1	C

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
6-7 Down	32	636,23	14,40	6,28	0,16	0,10	3,37	2 144,1	C
7-8 Up	50	1 484,12	16,84	20,93	0,01	0,10	3,79	5 624,8	C
7-8 Down	50	7 854,37	5,30	2,31	0,41	15,37	3,11	24 427,1	C
7-8 Down	50/2	262,50	2,60	0,56	0,30	6,00	3,04	798,0	C
8-9 Up	61,5	2 681,45	12,70	11,06	0,01	0,10	3,54	9 492,3	C
8-9 Down	61,5	11 138,34	5,19	2,10	0,38	14,35	3,11	34 609,9	C
8-9 Down	50/2	262,50	2,60	0,56	0,30	6,00	3,04	798,0	C
9-9'East	25/2	2 500,00	13,00	3,00	0,01	0,10	3,22	8 050,0	C
* 9-9' Up	50/2	1 250,00	13,00	3,00	0,01	0,10	3,22	4 025,0	C
* 9-9' Down	50/2	1 250,00	13,00	3,00	0,01	0,10	3,22	4 025,0	C
T O T A L C			8,54	4,49	0,24	8,57	3,16	103 329,9	C

(*)"C" category volumes over and under the "B" category formed east of the 9-9' profile

Table 6.1.4. No.2 Vein Potential Reserves

	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	10,35	7,26	0,22	7,65	3,31	95 917,7	A
TOTAL B	10,65	6,49	0,17	5,86	3,30	123 155,4	B
TOTAL C	8,54	4,49	0,24	8,57	3,16	103 329,9	C
ULTIMATE TOTAL	9,88	6,08	0,21	7,26	3,26	322 403,0	(A+B+C)

Table 6.2: No. 2 VEIN MINEABLE RESERVE CALCULATIONS

Table 6.2.1: No. 2 Vein mineable reserve Parameters

BOREHOLES	Thickness (True) (m)	AVARAGE TENORS				DENSITIESd ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
Gallery 1805	1,41	12,87	7,04	0,01	0,10	3,33
* 90 / 1A	1,39	8,35	4,32	0,36	0,10	3,20
Gallery 1805	1,80	24,40	7,80	0,01	0,10	3,50
8 / 1	1,98	8,74	3,34	0,18	19,76	3,17
Gallery 1805	3,00	12,30	28,80	0,01	0,10	3,97
Gallery 1805	4,00	13,00	3,00	0,01	0,10	3,22

(*) In this area the gallery and 90/ 1A drill hole data collided with one another and for this reason the drill hole data was used to insure more reliable results

Table 6.2.2: No. 2 vein Profile Areas (mineable)

"A" category based areas

	N (m)	M (m)	AREAS (NXM)=m^2	AVARAGE TENORS				DENSITIES d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_5	1,41	50	70,50	13,87	7,04	0,01	0,10	3,33
S_6	1,39	50	69,50	8,35	4,32	0,36	0,10	3,20
S_7	1,80	50	90,00	24,40	7,80	0,01	0,10	3,50
S_8	2,49	58,5	145,70	10,88	18,68	0,08	7,92	3,65
S_9	4,00	50	200,00	13,00	3,00	0,01	0,10	3,22
B Category based areas								
S_5Dw	1,41	25	35,25	13,87	7,04	0,01	0,10	3,33
S_5 Up	1,41	25	35,25	13,87	7,04	0,01	0,10	3,33
S_6 Dw	1,39	25	34,80	8,35	4,32	0,36	0,10	3,20
S_6 Up	1,39	25	34,80	8,35	4,32	0,36	0,10	3,20
S_7 Dw	1,80	25	45,00	24,40	7,80	0,01	0,10	3,50
S_7 Up	1,80	25	45,00	24,40	7,80	0,01	0,10	3,50
S_8Dw	1,98	25	49,50	8,74	3,34	0,18	19,76	3,17
S_8 Up	3,00	25	75,00	12,30	28,80	0,01	0,10	3,97
S_9 Dw	4,00	25	100,00	13,00	3,00	0,01	0,10	3,22
S_9 Up	4,00	25	100,00	13,00	3,00	0,01	0,10	3,22
S_9 East	4,00	50	200,00	13,00	3,00	0,01	0,10	3,22
C Category Based Areas								
S_5 Dw	1,41	25/2	17,63	13,87	7,04	0,01	0,10	3,33
S_5 Up	1,41	25/2	17,63	13,87	7,04	0,01	0,10	3,33
S_6 Dw	1,39	25/2	17,40	8,35	4,32	0,36	0,10	3,20
S_6 Up	1,39	25/2	17,40	8,35	4,32	0,36	0,10	3,20
S_7 Dw	1,80	25/2	22,50	24,40	7,80	0,01	0,10	3,50
S_7 Up	1,80	25/2	22,50	24,40	7,80	0,01	0,10	3,50

	N (m)	M (m)	AREAS (NXM)= m^2	AVARAGE TENORS				DENSITIES d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_8 Dw	1,98	25/2	24,75	8,74	3,34	0,18	19,76	3,17
S_8 Up	3,00	25/2	37,50	12,30	28,80	0,01	0,10	3,97
S_9 Dw	4,00	25/2	50,00	13,00	3,00	0,01	0,10	3,22
S_9 Up	4,00	25/2	50,00	13,00	3,00	0,01	0,10	3,22
S_9 East	4,00	50	200,00	13,00	3,00	0,01	0,10	3,22
*S_9Dw	4,00	25	100,00	13,00	3,00	0,01	0,10	3,22
S_9 Up	4,00	25	100,00	13,00	3,00	0,01	0,10	3,22

(*) "C" Category based areas over the "B" category volume found east of the 9-9' profile

Table 6.2.3: No. 2 Vein Mineable Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
5-5'	43	3 031,50	13,87	7,04	0,01	0,10	3,33	10 094,90	A
6-7	50	3 976,50	17,40	6,28	0,16	0,10	3,37	13 400,80	A
7-8	50	5 836,90	16,04	14,52	0,05	4,93	3,59	20 954,50	A
8-9	61,5	10 586,30	12,11	9,61	0,04	3,40	3,40	35 993,40	A
TOTAL A			14,24	10,01	0,06	2,83	3,44	80 443,60	A
5-5' Dw	43	1 515,75	13,87	7,04	0,01	0,10	3,33	5 047,50	B
5-5' Up	43	1 515,75	13,87	7,04	0,01	0,10	3,33	5 047,50	B
6-7 Dw	50	1 988,25	17,40	6,28	0,16	0,10	3,37	6 700,40	B
6-7 Up	50	1 988,25	17,40	6,28	0,16	0,10	3,37	9 700,40	B
7-8 Dw	50	2 361,60	16,19	5,46	0,10	10,40	3,33	7 864,10	B
7-8 Up	50	2 968,20	16,84	20,93	0,01	0,10	3,79	11 249,50	B
8-9 Dw	61,5	4 507,10	11,59	3,11	0,66	6,61	3,20	14 422,70	B
8-9 Up	61,5	5 362,90	12,70	14,06	0,01	0,10	3,54	18 984,60	B
9-9'East	25	5 000,00	13,00	3,00	0,01	0,10	3,22	16 100,00	B
TOTAL B			14,19	8,62	0,14	2,03	3,40	92 116,40	B
5-5' Dw	43	757,88	13,87	7,04	0,01	0,10	3,33	2 523,70	C
5-5' Up	43	757,88	13,87	7,04	0,01	0,10	3,33	2 523,70	C
6-7 Dw	50	994,13	17,40	6,28	0,16	0,10	3,37	3 350,20	C
6-7 Up	50	994,13	17,40	6,28	0,16	0,10	3,37	3 350,20	C
7-8 Dw	50	1 180,80	16,19	5,46	0,10	10,40	3,33	3 932,10	C

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORIES
			Zn %	Pb %	Cu %	Ag ppm			
7-8 Up	50	1 484,10	16,84	20,93	0,01	0,10	3,79	5 624,70	C
8-9 Dw	61,5	2 253,55	11,59	3,11	0,66	6,61	3,20	7 211,40	C
8-9 Up	61,5	2 681,42	12,70	14,06	0,01	0,10	3,54	9 492,20	C
* 9-9'East	25/2	1 250,00	13,00	3,00	0,01	0,10	3,22	4 025,00	C
9-9'Up	25/2	1 250,00	13,00	3,00	0,01	0,10	3,22	4 025,00	C
9-9'Dw	25/2	1 250,00	13,00	3,00	0,01	0,10	3,22	4 025,00	C
TOTAL C			14,09	8,16	0,13	1,85	3,38	50 083,20	C

(*) "C" category volumes under and over the "B" category volume formed east of the 9-9' profile area

Table 6.2.4: No. 2 Vein mineable Reserves

	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVEES (Vxd) (ton)	CATEGORİES
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL A	14,24	10,01	0,06	2,83	3,44	80 443,60	A
TOTAL B	14,19	8,62	0,14	2,03	3,40	92 116,40	B
TOTAL C	14,09	8,16	0,13	1,85	3,38	50 083,20	C
ULTIMATE TOTAL	14,19	9,02	0,11	2,28	3,41	222 643,20	(A+B+C)

Table 7: No. 3 VEIN RESERVE CALCULATION

Table 7.1: No. 3 VEIN POTENTIAL RESERVE CALCULATION

Table 7.1.1: No.3 Vein Potential Reserve Parameters

BOREHOLES	Thickness (True) (m)	AVARAGE TENORS				DENSITIES d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
89 / 5	3,41	11,48	9,50	0,23	0,10	3,43
7 / 1	1,70	2,15	5,19	0,81	72,25	3,15
7 / 2	1,70	2,19	2,82	0,06	18,19	3,09
8 / 2	1,51	9,91	2,26	0,10	16,39	3,18

Table 7.1.2. No. 3 Vein profile Areas (potential)

"B" Category based areas

	k_1	k_2	a_1	a_2	AREAS $(NXM)=m^2$	AVARAGE TENORS				DENSITIES d ton/m^3
	$N=k_1+k_2/2$		$M=a_1+a_2/2$			Zn %	Pb %	Cu %	Ag ppm	
S_6	3,41		50		170,50	11,48	9,50	0,23	0,10	3,43
S_7	1,70		50		85,00	2,15	5,19	0,81	72,25	3,15
S_7	1,70		50		85,00	2,19	2,82	0,06	18,19	3,09
S_8	1,51		50		75,50	9,91	2,66	0,10	16,39	3,18
C Category based areas										
S_6 Up	3,41		25/2		42,60	11,48	9,50	0,23	0,10	3,43
S_6 Dw	3,41		25/2		42,60	11,48	9,50	0,23	0,10	3,43
S_7 Up	1,70		25/2		21,25	2,19	2,82	0,06	18,19	3,09
S_7 (7-2) (7-1)	1,70	1,70	140	142	239,70	2,17	4,01	0,43	45,22	3,12
	1,70		141							
S_7 Dw	1,70		25/2		21,25	2,15	5,19	0,81	72,25	3,15
S_8 Up	1,51		25/2		18,88	9,91	2,66	0,10	16,39	3,18
S_8 Dw	1,51		25/2		18,88	9,91	2,66	0,10	16,39	3,18

Table 7.1.3: No. 3 Vein Potential Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORY
			Zn %	Pb %	Cu %	Ag ppm			
6-7	50	6 264,75	8,39	5,04	0,17	6,12	3,32	20 798,90	B
6-7	50/2	2 125,00	2,15	5,19	0,81	72,25	3,15	6 693,75	B
7-8	50	4 010,15	5,82	2,74	0,08	17,34	3,13	12 551,80	B
7-8	50/2	2 125,00	2,15	5,19	0,81	72,25	3,15	6 693,75	B
TOTAL B			5,91	4,46	0,33	28,07	3,22	46 738,20	B
6-7 Up	50	1 566,19	8,39	5,04	0,17	6,12	3,32	5 199,70	C
6-7 Dw	50	6 389,17	3,57	4,84	0,40	38,41	3,17	20 253,70	C
6-7 Dw	50/2	531,25	2,15	5,19	0,81	72,25	3,15	1 673,45	C
7-8 Up	50	1 002,53	5,82	2,74	0,08	17,34	3,13	3 137,90	C
7-8 Dw	50	5 430,63	2,73	3,91	0,41	43,12	3,12	16 943,57	C
7-8 Dw	50/2	531,25	2,15	5,19	0,81	72,25	3,15	1 673,45	C
8-8'East	25/2	943,75	9,91	2,66	0,10	16,39	3,18	3 001,10	C
6-6'West	25/2	2 131,25	11,48	9,50	0,23	0,10	3,43	7 310,19	C
TOTAL C			5,09	4,96	0,35	31,87	3,20	59 196,06	C

Table 7.1.4: No. 3 Vein Potential Reserve

	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORY
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	5,91	4,46	0,33	28,07	3,22	46 738,20	B
TOTAL C	5,09	4,96	0,35	31,87	3,20	59 196,10	C
ULTIMATE TOTAL	5,45	4,74	0,34	30,19	3,21	105 934,30	(B+C)

Tablo 7.2.: No. 3 VEIN MINEABLE RESERVE CALCULATION

Tablo 7.2.1: No. 3 Vein Mineable Reserve Parameters

BOREHOLES	Thickness (True) (m)	AVARAGE TENORS				DENSITIES d ton/m^3
		Zn %	Pb %	Cu %	Ag ppm	
89 / 5	2,18	17,09	14,44	0,35	0,10	3,65
7 / 1	0,85	4,40	9,28	1,27	71,00	3,26
7 / 2	1,70	2,19	2,82	0,06	18,19	3,09
8 / 2	1,24	12,00	3,00	0,09	18,00	3,21

Tablo 7.2.2: No. 3 Vein Profile Areas (Mineable)

B Category based areas

	N (m)	M (m)	AREAS (NXM)= m^2	AVARAGE TENORS				DENSITIES d ton/m^3
				Zn %	Pb %	Cu %	Ag ppm	
S_6	2,18	50	109,00	17,09	14,44	0,35	0,10	3,65
S_7	0,85	50	42,50	4,42	9,28	1,27	71,00	3,26
S_7	1,70	50	85,00	2,19	2,82	0,06	18,19	3,09
S_8	1,24	50	62,00	12,00	3,00	0,09	18,00	3,21
C Category based areas								
S_6 Dw	2,18	25/2	27,25	17,19	14,44	0,35	0,10	3,65
S_6 Up	2,18	25/2	27,25	17,09	14,44	0,35	0,10	3,65
S_7 Dw	0,85	25/2	10,63	4,40	9,28	1,27	71,00	3,26
S_7	1,30	141	183,30	2,93	4,97	0,46	35,79	3,15
S_7 Up	1,70	25/2	21,25	2,19	2,82	0,06	18,19	3,09
S_8 Dw	1,24	25/2	15,50	12,00	3,00	0,09	18,00	3,21
S_8 Up	1,24	25/2	15,50	12,00	3,00	0,09	18,00	3,21
S_6West	2,18	50	109,00	17,09	14,44	0,35	0,10	3,65
S_8East	1,24	50	62,00	12,00	3,00	0,09	18,00	3,21

Table 7.2.3: No. 3 Vein Mineable Reserve Calculation Table

SECTIONS	L (m)	VOLUMES $V=1/3xL[S_1+S_2+(S_1xS_2)^{½}]$	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORY
			Zn %	Pb %	Cu %	Ag ppm			
6-7	50	4 837,60	10,56	9,35	0,22	8,03	3,40	16 447,80	B
6-7	50/2	1 062,50	4,40	9,38	1,27	71,00	3,26	3 463,80	B
7-8	50	3 659,90	6,33	2,90	0,07	18,11	3,14	11 492,10	B
7-8	50/2	1 062,50	4,40	9,28	1,27	71,00	3,26	3 463,80	B
TOTAL B			7,94	7,21	0,38	23,86	3,29	34 867,40	B
6-7 Dw	50	4 687,07	4,76	6,19	0,45	31,70	3,21	15 045,50	C
6-7 Up	50	1 209,39	10,56	9,35	0,22	8,03	3,40	4 111,90	C
6-7 Dw	50/2	265,63	4,40	9,28	1,27	71,00	3,26	865,90	C
7-8 Dw	50/2	265,63	4,40	9,28	1,27	71,00	3,26	865,90	C
7-8 Dw	50	4 201,70	3,63	4,81	0,43	34,40	3,15	13 235,40	C
7-8 Up	50	914,98	6,33	2,90	0,07	18,11	3,14	2 873,00	C
6-6'West	25/2	1 362,50	17,19	14,44	0,35	0,10	3,65	4 793,10	C
8-8'East	25/2	775,00	12,00	3,00	0,09	18,00	3,21	2 487,80	C
TOTAL C			6,83	6,72	0,40	26,67	3,26	44 458,50	C

Table 7.2.4: No. 3 Vein Mineable Reserve

	AVARAGE TENORS				DENSITIES d (ton/m^3)	RESERVES (Vxd) (ton)	CATEGORY
	Zn %	Pb %	Cu %	Ag ppm			
TOTAL B	7,94	7,21	0,38	23,86	3,29	34 867,40	B
TOTAL C	6,83	6,72	0,40	26,67	3,26	44 458,50	C
ULTIMATE TOTAL	7,32	6,94	0,39	25,43	3,27	79 325,90	(B+C)

Table 8: POTANTIAL RESERVE OF İNLER PLATEAU MINERALIZATION

	RESERVES				t Zn %	t Pb %	t Cu %	t Ag ppm	d gr/ton	Kl_{avr} (m)
VEINS	CATEGORY A	CATEGORY B	CATEGORY C	TOTAL						
NORTH VEIN	------	75 684,70	55 451,20	131 135,90	6,66	1,72	0,83	9,63	3,12	1,60
MAIN VEIN	621 438,50	250 710,50	299 838,00	1 172 032,00	8,11	2,71	0,09	8,66	3,16	4,07
SECONDARY VEIN	42 801,50	191 480,20	197 744,10	432 025,80	5,02	2,21	0,07	7,97	3,11	4,37
VEIN NUMBER 2	95 917,70	123 155,40	103 329,90	322 403,00	9,88	6,08	0,21	7,76	3,26	3,13
VEIN NUMBER 3	------	46 738,20	59 196,10	105 934,30	5,45	4,74	0,34	30,19	3,21	2,08
ULTIMATE TOTAL	760 202,70	687 769,00	715 559,30	2 163 531,00	7,53	3,15	0,11	9,45	3,16	----

Table 9: MINEABLE RESERVE OF İNLER PLATEAU MINERALIZATION

	RESERVES				t Zn %	t Pb %	t Cu %	t Ag ppm	d gr/ton	Kl_{avr} (m)
VEINS	CATEGORY A	CATEGORY B	CATEGORY C	TOTAL						
NORTH VEIN	------	47 784,20	39 458,30	87 242,50	8,59	1,99	0,12	10,57	3,15	1,17
MAIN VEIN	329 350,50	168 660,60	65 029,00	563 040,10	11,88	4,78	0,16	9,52	3,26	3,51
SECONDARY VEIN	------	93 642,30	102 481,50	196 123,80	10,54	3,71	0,05	8,12	3,23	3,00
VEIN NUMBER 2	80 443,60	92 116,40	50 083,20	222 643,20	14,19	9,02	0,11	2,28	3,41	2,26
VEIN NUMBER 3	------	34 867,14	44 458,50	79 325,90	7,32	6,94	0,39	25,43	3,27	1,49
ULTIMATE TOTAL	409 794,10	437 070,90	301 510,50	1 148 375,50	11,53	5,36	0,14	9,06	3,28	----

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