

## Chapter 8 Comprehensive Interpretation

### 8.1 Grade-Tonnage Model

The grade-tonnage model for the carbonate hosted Pb-Zn deposits (D. L. Mosier and J. A. Briskey, 1985) is shown in Figure 95. According to Figure 139, ore deposits of this type with tonnage in excess of 2.2 million tons account for 90 %, those with tonnage in excess of 35 million tons account for 50 % and those with tonnage in excess of 540 million tons account for 10 % in number. Assuming that resources with similar tonnage and grade can be expected for this type of ore deposits under similar geological environment, it might be possible that half of ore deposits in the Republic of Tunisia as a whole would exceed 35 million tons in tonnage. The ore deposits that have been discovered to date are Bougrine (8000 kt, possible), Dal N'Hal (3800 kt, possible), Bou Khil (1200kt, possible), Koudiat Safra (230 kt, possible), El Akhouat (55 kt, possible) and Koudiat Soda (230 kt, possible). None of these reaches the order of tens of million tons, with the maximum being 8 million tons of Bougrine. This implies that ore deposits of such order remain undiscovered or that exploration of known deposits to depth is insufficient.

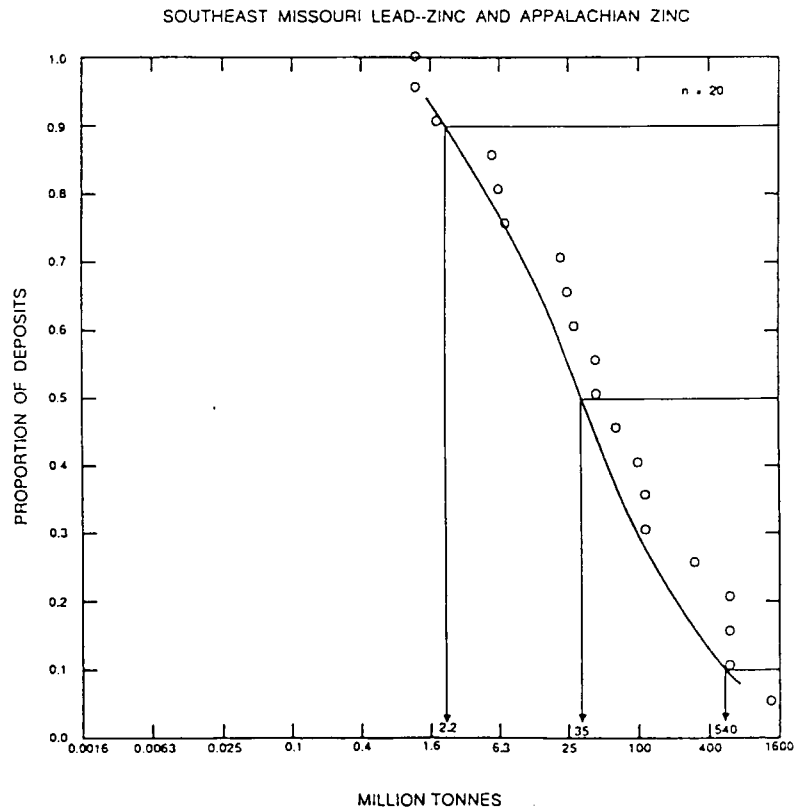


Figure 95 Correlation model between ore grade and ore quantity

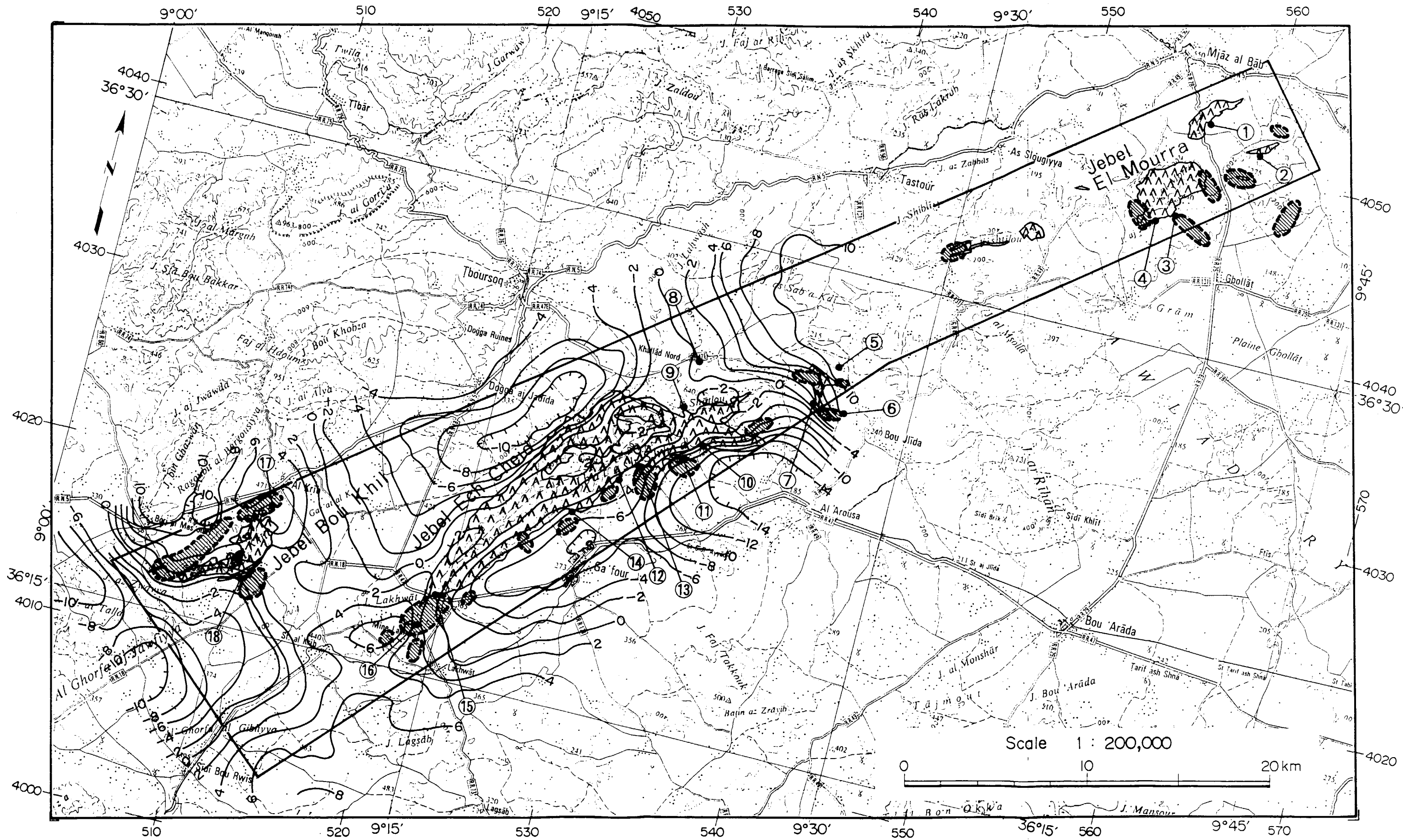
## 8.2 Regional Gravity and Geology-Mineralization

Figure 96 is the composite plan incorporating Triassic diapir distribution, mineral occurrences, Pb-Zn geochemical anomalies and the Bouguer Gravity Anomaly (Correction Density = 2.33 g/cm<sup>3</sup>) Map by Jean Claude, G (1999). According to the Bouguer Anomaly Map, the regional gravity in the Project Area as a whole is high in the central-northeastern and the southwestern parts, and low in the central southwestern part, indicating the general trend of the Bouguer anomaly in the NW-SE direction. This trend of NW-SE direction conflicts with that of the structural trend in the NE-SW direction that represents the most prevailing structures in this region affected by the Alpine diastrophism.

The sedimentary basin in the region started subsiding in Cretaceous, which resulted in deposition of thick sedimentary sequences of Cretaceous to Eocene. In the early half of Cretaceous, block movement of the basement prevailed and triggered diapirism towards middle Cretaceous. The block movement, together with the diapirism, caused repetition of uplift and subsidence of the sedimentary basin, which resulted in deposition of conglomerate interbedded with the Cretaceous sedimentary sequences. As the Alpine diastrophism emerged in late Cretaceous, the sedimentary basin became progressively shallower towards early Tertiary. The Tertiary sedimentary sequences of Oligocene and afterwards, mostly of terrestrial nature, were extensively developed, overlying the Cretaceous and Eocene sequences.

The Alpine diastrophism, with its peak stage in Oligocene, brought about intense deformation of rocks in the region by folding, faulting and thrusting during the period of Neogene. These structures were developed under the prevailing stress field during the diastrophism, represented by NE-SW trending thrust faults particularly well demonstrated in the 'Nappe' zone and by NW-SE trending grabens and horsts commonly observed in the general area. It is quite conceivable that the basement is subsided in the zones of graben and is uplifted in the zones of horst. The regional gravity lows and highs, as above mentioned, may correspond respectively to subsided and uplifted zones of the basement.

Comparing Figure 96 to the geological map at a scale of 1 to 50,000, the Cretaceous system distributes centering regional gravity highs. Therefore, the Bouguer gravity distribution possibly indicates the depth of Cretaceous base. More in detail, minor gravity highs are observed in association with the Jebel Ech Cheid diapir and are aligned in the NE-SW direction. It is observed in the field that thin Neogene sequences distribute abutting on the diapir in places. Therefore, these gravity highs can be correlated to the Neogene sequences, reflecting the shallow base of the Neogene sequences.







-  Pb-Zn Geochemical Anomaly Zone
-  Triassic
-  Regional Bouguer Anomaly  
(Density : 2.33 g/cm<sup>3</sup>) (mgal)
-  Mineral Occurrence

Figure 96 Summarized map of the existing data

Assuming that the Bouguer gravity distribution is related to the depths of the Cretaceous and Neogene bases, its characteristics with respect to the geology are summarized as follows:

- Neogene terrain: gravity highs and lows are correlated respectively to thin and thick Neogene sequences.
- Cretaceous terrain: gravity highs are correlated to thick sequences of the Cretaceous system, while lows indicate either thin sequences of the Cretaceous system or Triassic diapirs.
- Triassic terrain: gravity highs indicate diapirs without roots such as 'transition' or 'umbrella' zones, while lows suggest diapir centers or those continuing to depth.

A number of Pb-Zn mineral occurrences of the Mississippi Valley or the carbonate hosted type are located in this region, mostly in the steep gradient zones of the Bouguer gravity distribution. This implies that circulation of hydrothermal fluids, which brought about the mineralization, were controlled by the structure of sedimentary basin at that time. Besides, Pb-Zn geochemical anomalies distribute in the vicinity of diapir bodies.

### 8.3 Mineralization Model

As sediments were accumulated in the Cretaceous basin, diapirism was initiated due to difference in density between the underlying Triassic system including evaporites and the consolidated sediments at the bottom of the Cretaceous system. With increasing consolidation of sediments at depth, squeezed intra-strata water, which dissolved metallic elements and hydrocarbons, started migrating laterally and upwards.

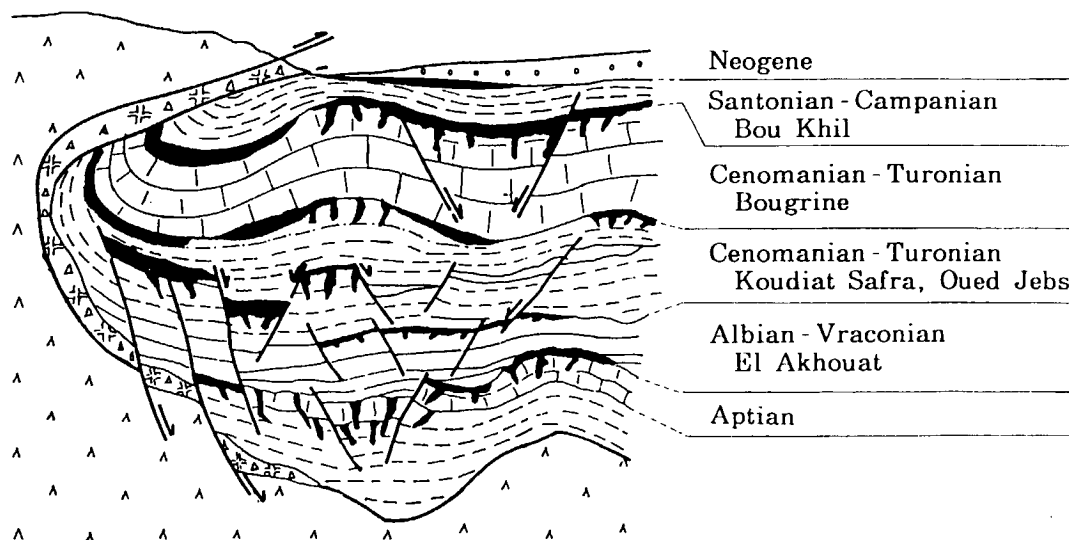


Figure 97 Mineralization Model(Hammami.M,1999)

Highly saline water squeezed out of the Triassic rock salt, gypsum and other evaporites migrated through permeable channels formed by fracturing of rocks particularly in the vicinity of the contact between the ascending Triassic diapirs and the intruded Cretaceous system. The saline water, mixing with metalliferous solution squeezed out of the Cretaceous sediments, further migrated upwards through faults and fractures and, if physico-chemical conditions were appropriate, precipitated minerals on the tops or limbs of diapirs where structural spaces, such as fractured zones or permeable strata, were available. The mixed solutions were able to migrate further away from diapirs, if permeable channels were available, and to precipitate minerals at any locations, if physico-chemical conditions allowed. Metallic elements, such as lead, zinc, barium and so forth, are believed to have been dissolved out mostly of the Cretaceous sediments, although the Triassic evaporites may have supplied some amounts of them. Meanwhile, strontium migrated in solutions through channels in the Triassic system and was concentrated under Triassic cap rocks (Figure 97).

## Chapter 9 Conclusion

### 9.1 Conclusion

The Mineral Exploration Project for the Krib-Mejez el Bab Area in the Republic of Tunisia was carried out in the 3 year period from 1999 to 2000 of the Japanese fiscal term. The project comprised the satellite image analysis for the entire Krib-Mejez el Bab Area, the air-photo analysis, geological investigations, geophysical prospecting and drilling investigations for the Bou Khil, El Akhouat-Argoub Adama, Bazina Kebira and Oued Jebes Prospects, and the geophysical prospecting and drilling investigation for the Siliana Prospect. The outcomes from the above exploration works are summarized below.

#### (1) Satellite Image Analysis

##### (a) Landsat TM Image Analysis

The best band combination to reflect the geology, geological structures and lithology of the Project Area was determined to be RGB=7/4/1 as the result of the examination of various band combinations. Therefore, the false color image with the band combination, RGB=7/4/1 was employed for the photo-geologic interpretation. The result of the photo-geologic interpretation indicated excellent agreement with the geology, geological structures and lithology interpreted based on the existing data.

##### (b) JERS-1 SAR Image Analysis

Lineaments are well developed in the terrain of the Triassic, Cretaceous and Tertiary Systems. NE-SW trending lineaments are most predominated in the Project Area, with subordinate development of NW-SE and E-W trending lineaments. NW-SE trending lineaments are characteristically well developed in the Bou Khil, El Akhouat-Argoub Adama, Bazina Kebira and Oued Jebes Prospects, where known mineral showings are located.

#### (2) Air-photo Analysis

Lineament development and lithology distribution were interpreted for each selected prospect on monochromatic air-photos (1 to 25,000 scale) obtained in Tunisia.

##### (a) Bou Khil Prospect

NE-SW, NW-SE and E-W trending lineaments, which are mostly implied as faults, are well observed in the terrain of the Triassic, Cretaceous and Tertiary Systems. Among these lineaments, the NE-SW trending ones are most predominated. In addition, lineaments that possibly indicate beddings, are commonly developed in the Triassic, Cretaceous and Tertiary terrain. They trend in the NE-SW to E-W directions

in the Triassic terrain, in the NE-SW to ENE-WSW directions in the Cretaceous terrain and in the NE-SW to E-W directions in the Tertiary terrain.

(b) El Akhouat-Argoub Adama Prospect

N-S, NW-SE, NE-SW and WNW-ESE trending lineaments, which are mostly implied as faults, are observed in the terrain of the Cretaceous and Tertiary Systems. In addition, lineaments that possibly indicate beddings, are commonly developed in the Triassic, Cretaceous and Tertiary terrain. They trend in the NE-SW to ENE-WNW directions in the Triassic terrain, in the N-S, NNE-SSW and NE-SW directions in the Cretaceous terrain and nearly in the N-S direction in the Tertiary terrain.

(c) Bazina Kebira Prospect

NE-SW, N-S and NW-SE trending lineaments, which are mostly implied as faults, are well observed in the terrain of the Triassic and Tertiary Systems. Among these lineaments, the NE-SW trending ones are most predominated. In addition, lineaments that possibly indicate beddings, are developed in the NE-SW to ENE-WSW directions in the Triassic terrain, which coincide with elongation of formations.

(d) Oued Jebes Prospect

NE-SW, NW-SE and E-W trending lineaments, which are mostly implied as faults, are well observed in the terrain of the Triassic, Cretaceous and Tertiary Systems. Among these lineaments, those trending in the NE-SW and NW-SE directions bound limits of the major formations. In addition, a number of ENE-WSW trending lineaments, possibly indicating beddings, are developed in the Tertiary terrain.

(3) Geological Investigation

(a) Bou Khil Prospect

The geology comprises the Triassic, Cretaceous, Tertiary and Quaternary Systems. The Triassic System forms diapirs consisting of gypsum, dolomite, limestone, argillite and sandstone. The Cretaceous System comprises limestone and alternation of marl-limestone. Transition zones, consisting of brecciated, dolomitized carbonate rocks, are developed at the contacts with the Triassic diapirs. The Tertiary System comprises marl, sandstone, argillite and conglomerate. The Quaternary System comprises alluvial deposits and soils. The Bou Khil deposits, which produced some 400,000 tons of ores with the average combined grade of 10% Pb+Zn, are formed in the Cretaceous System. Celestite(Sr) deposits, such as Chantier 2 and Saint-Pierre, are located in the transition zones elongating in the NE-SW direction.

(b) El Akhouat-Argoub Adama

The geology comprises the Triassic, Cretaceous, Tertiary and Quaternary Systems. The Triassic System forms diapirs consisting of gypsum, dolomite, limestone, argillite

and sandstone. The Cretaceous System comprises limestone and marl. Transition zones, consisting of brecciated, dolomitized carbonate rocks, are developed at the contacts with the Triassic diapirs. The Tertiary System comprises limestone, sandstone, argillite and conglomerate, while the Quaternary System consists of alluvial deposits and soils. The El Akhouat-Argoub Adama deposits, which produced some 55,000 tons of ores, are formed in the Cretaceous System.

(c) Bazina Kebira Prospect

The geology comprises the Triassic, Cretaceous, Tertiary and Quaternary Systems. The Triassic System forms diapirs consisting of gypsum, dolomite, limestone, argillite and sandstone. The Cretaceous System comprises limestone and marl. Transition zones, consisting of brecciated, dolomitized carbonate rocks, are developed at the contacts with the Triassic diapirs. The Tertiary System comprises limestone, sandstone, argillite and conglomerate, while the Quaternary System consists of talus, colluvial and alluvial deposits. Mineral occurrences, such as Koudiat Soda, Koudiat Safra and H'Zamel Assoued, are located in this prospect.

(d) Oued Jebes Prospect

The geology comprises the Triassic, Cretaceous, Tertiary and Quaternary Systems. The Triassic System forms diapirs consisting of gypsum, dolomite, limestone, argillite and sandstone. The Cretaceous System comprises limestone, marl and argillite. Transition zones, consisting of brecciated, dolomitized carbonate rocks, are developed at the contacts with the Triassic diapirs. The Tertiary System comprises argillic limestone, marl, sandstone and argillite, while the Quaternary System consists of talus, colluvial and alluvial deposits. Mineral occurrences, such as Oued Jebes, Kef Lasfra and Dar Chebka, are located in this prospect.

(4) Geophysical Prospecting

The geophysical prospecting, using the gravity and IP methods in combination, was conducted for the mineral occurrences in the El Akhouat-Argoub Adama, Bazina Kebira, Siriana and Oued Jebes Prospects. The magnetometric method was also applied in the geophysical prospecting for the El Akhouat-Argoub Adama.

No distinct alteration zone is generally associated with the Pb-Zn mineralization of the Mississippi Valley Type that is the main target of the current exploration project. Therefore, application of geophysical techniques has been long considered impractical or ineffective to explore this type of mineralization. In the current project, however, it is found that chargeability anomalies are often associated with known mineral occurrences where prospected using the IP method. Specifically, the drill hole, MJTK-L2, encountered significant mineralized zones to the proximity of the old mine



site in the southern El Akhouat-Argoub Adama Prospect, where the strongest chargeability anomaly had been identified in the course of the current geophysical prospecting. The drilling exploration located a number of mineralized zones with various intensities and extents in association with other chargeability anomalies as well. The laboratory test for rock samples from drill cores and outcrops indicated high chargeability only in mineralized samples. Therefore, it is considered that chargeability is related to mineralization and can be one of the direct indications of mineralization.

Since the formations in the general area indicate very low resistivity in their electrical nature, electrical responses are extremely weak, close to the detection limit of the prospecting instrument, even with the intense transmitting current exceeding several amperes. Noises from power lines and residential areas are so strong that it is extremely difficult to conduct any methods of electrical prospecting. Even under such circumstances, the IP measurement has produced outstanding chargeability anomalies in association with mineral occurrences, and its performance is considered reliable.

The special resistivity pattern shows fair agreement with the distribution of formations. The unconformity contact between the Triassic and Cretaceous Systems, which is the most important key for the exploration, is well demonstrated either in plan or cross-section by a resistivity discontinuity where high resistivity turns into low resistivity within a short distance. A zigzag pattern of a resistivity discontinuity shown in plan regulates locations of mineralized zones where faults crosscut the Triassic-Cretaceous contacts.

The Project Area as a whole, the Tertiary and Quaternary terrain in particular, indicates low resistivity. Besides, low resistivity in the order of  $1 \Omega m$  are often associated with chargeability anomalies suggesting possible mineralized zones at depth. The holes that were drilled for such chargeability anomalies with low resistivity associations in the Bou Khil, Bazina Kebira and Siriana Prospects, encountered high pressure groundwater in sandstone, which made it impossible to continue drilling any further. The groundwater sample that was collected from the hole drilled in the Siriana Prospect indicated electrical conductivity about 3 times higher than sea water, which might suggest ancient hydrothermal solutions in composition. However, such groundwater with high salinity and high pressure will be hazardous for drilling and underground mining operations.

The regional gravity survey that is being carried out by Tunisia National Office of Mine as a part of the National Programme for Preparation of Land Base Maps locates the known mineral occurrences in the Project Area within the regional gravity highs or their peripheral zones. This appears to contradict the fact that the mineral occurrences are associated with Triassic diapirs of low density. It is possibly interpreted that low-

density diapirs rose along fractured zones on the crests of domes or anticlines showing regional gravity highs, which were formed in the compressive field during the Alpine Orogeny.

Numerous fractures are interpreted in association with mineral occurrences, based on the detailed gravity distribution obtained in the current gravity prospecting. Particularly, the residual gravity, the difference from the regional gravity trend, is effective to identify such fractures. Geological structures regulating mineralized zones can be effectively interpreted by combining the residual gravity anomalies and the resistivity distributions. Diapirs are expressed as low residual gravity anomalies in general, except for high-density dolomite terrain, which indicates them to be low-resistivity bodies.

It was extremely difficult to interpret the geological structures based on the magnetic distribution plans prepared according to the magnetometric survey conducted in the El Akhouat-Argoub Adama. This may be because the magnetic features of the Project Area, located in a mid-latitude region, are very much complex in comparison with the gravity features. Interpretation of distribution of the Triassic System, limited in its extents, is very difficult based on only the cross-section analysis of the residual gravity due to its rather insensitive nature. However, the elongated distribution of the Triassic System was outlined by the cross-section analysis of the residual gravity taking account of the magnetic distribution.

Summarizing the results of the geophysical prospecting as above explained, it will be concluded that the geophysical prospecting adopting the gravity and IP methods in combination is effective to locate mineralized zones in the Project Area. The hole that was drilled to the chargeability anomaly at depth in the El Akhouat-Argoub Adama, successfully proved the mineralization in association with the anomaly. Therefore, an appropriate electrode interval for the IP method will be about 100 m for new concealed ore deposits.

#### (5) Drilling Investigation

A total of 11 holes were drilled in the 3-Year Period Exploration Project, namely 2 holes, MJTK-B1 and B2 in the Bou Khil Prospect, 5 holes, MJTK-L1, -L2, -L3, -L4 and -L5 in the El Akhouat-Argoub Adama Prospect, 2 holes, MJTK-C1 and -C2 in the Bazina Kebira Prospect, 1 hole, MJTK-A1 in the Siriana Prospect and 1 hole, MJTK-O1 in the Oued Jebes Prospect.

##### (a) Bou Khil Prospect

The hole MJTK-B1 that aimed at verification of the IP anomaly and exploration of the extension of the known deposit intersected the celestite mineralization with the

width of 18m and the average grade of 17.19 %  $\text{SrSO}_4$ . The grade of marketable celestite should be 88 %  $\text{SrSO}_4$  or higher. Therefore, exploitation of the celestite mineralization is regarded as economically inviable.

The hole MJTK-B2 that aimed at verification of the IP anomaly failed to intersect any mineralization. Pb-Zn mineralization in the Tertiary system had been expected since the IP anomaly was associated with Tertiary formations. The cause of the IP anomaly is, however, proved to be pyrite in sandstone.

(b) El Akhouat-Argoub Adama Prospect

The hole MJTK-L1 aimed at verification of the IP anomaly and exploration of possible mineralization in the Cretaceous formations distributing around a diapir. This hole intersected only weak Pb-Zn mineralization. It is interpreted that the mineralization is weak because the Cretaceous formations distributing around a diapir belong to Aptian and are different from those hosting the major ore deposits in their stratigraphic positions. The cause of the IP anomaly is proved to be abundant pyrite contained in the formations comprising Aptian marl.

The hole MJTK-L2 was drilled to verify the new mineralization located in the course of the 1st Year Campaign. This hole intersected three mineralized zones with the widths of 16.0m (the average grade of 4.27 % Pb+Zn), of 11.8m (the average grade of 6.30 % Pb+Zn) and of 32.0m (the average grade of 4.14 % Pb+Zn) in the host rocks of Cretaceous carbonates in the interval between 225.50 and 382.90m. In addition, these mineralized zones include three 1m-sections of carbonate-hosted ores indicating 0.7 % Pb and 20.0 % Zn from 237.50 to 238.50m, 1.92 % Pb and 36.0 % Zn from 275.60 to 276.60m, and 3.45 % Pb and 16.0 % Zn from 379.90 to 380.90m. It is the most essential subject for the current exploration program to explore the continuities and the extensions of these mineralized zones.

The hole MJTK-L3 was drilled to explore mineralization in the Cretaceous system and to verify the IP anomaly detected by the 1st Year IP survey and the subsurface diapir interpreted from the result of the gravity survey. This hole intersected pyrite-calcite veinlets/networks carrying minor sphalerite and galena as well as celestite-calcite or pyrite-calcite veinlets/networks accompanying minor sphalerite in association with brecciated zones. However, no mineralization has been intersected with any significant concentration. The cause of the IP anomaly can be correlated to black compact dolomite accompanying a significant amount of pyrite within a diapir body. This diapir, in its position, corresponds to the interpreted subsurface diapir according to the result of the gravity survey.

The hole MJTK-L4 was drilled to explore the southwestern extension of the

mineralization intersected by the hole MJTK-L2. This hole intersected mineralization that consists of pyrite-calcite veinlets/networks carrying minor galena and sphalerite. However, the mineralization indicates no significant concentrations in either lead or zinc. The cause of the IP anomaly can be attributed to marl accompanying abundant pyrite.

The hole MJTK-L5 was drilled to explore the northern extension of the new mineralization intersected by MJTK-L2, however, terminated at the depth of 242.10m due to a cave encountered. Therefore, this hole verified neither the northern extension of the mineralization nor the cause of the chargeability anomaly. However, calcite-(pyrite)-sphalerite veinlets/networks are intersected at around the depth of 137m, with the average grade of 0.74% Zn for an interval of 2.0m).

(c) Bazina Kebira Prospect

The hole MJTK-C1 was drilled to identify nature of the H'Zamel Assoued mineralization and to verify the chargeability anomaly. The H'Zamel Assoued mineralization occurs in association with Aptian carbonate rocks of the Cretaceous System. This hole, however, encountered weak Zn mineralization (averaged at 0.29% Zn for 4.0m section) in carbonate rocks of Albian instead of those of Aptian. The chargeability anomaly is proved to be caused by pyrite associated with the mineralization.

The hole MJTK-C2 was drilled to explore the down-dip extension of the Koudiat Soda ore deposit and to verify the chargeability anomaly. However, the hole failed to intersect any mineralization other than pyritization associated with Tertiary formations. Therefore, it cannot be expected that the Koudiat Soda ore deposit would extend to the down-dip. Although the hole failed to prove Pb and/or Zn mineralization, it is significant that the geological structure of the ore deposit was well demonstrated in the hole. The cause of the chargeability anomaly may be attributed to pyrite in black, compact shale within the diapir.

(d) Siliana Prospect

The hole MJTK-A1 was drilled to explore possible unknown mineralization by verifying the chargeability anomaly. The hole was unable to make advance beyond the depth of 198.80m due to steam blowout, which made it impossible to verify the chargeability anomaly. However, minor Pb and Zn mineralization was encountered at the depths from 112.90 to 119.30m, from 135.00 to 140.00m, from 174.50 to 179.50m and from 190.65 to 197.70m, with the maximum grades of Pb and Zn at 0.33% for 1m section and at 0.64% for 1m section respectively. Therefore, it is confirmed that Pb-Zn mineralization exists between the Mahjoubia and the Siriana showings.

#### (e) Oued Jebes Prospect

The hole MJTK-O1 was drilled to explore to the west of the Dar Chebka showing and to verify the chargeability anomaly. The mineralization was encountered in the interval between 82.50 and 88.70m, and comprised calcite-(pyrite) veinlets carrying minor galena. In addition, minor galena filling fractures was observed in the interval between 272.80 and 276.30m. Other than these mineralized intervals, no notable mineralization was intersected by this hole. It is implied that the cause of the chargeability anomaly was pyrite disseminated in argillaceous limestone.

### 9.2 Recommendation

The 3-Year Exploration Project, from 1999 to 2001 in the fiscal term, was carried out for the 5 selected prospects, namely Bou Khil, El Akhouat-Argoub Adama, Bazina Kebira, Siriana and Oued Jebes, in the Krib-Mejez El Bab Region of the Republic of Tunisia, having employed various prospecting techniques.

The geological investigation and the geophysical prospecting combining the plural number of techniques (gravity and IP methods) were conducted in the 3-Year Period Exploration. Subsurface structures were interpreted by combining the geology and the geological structures based on the geological investigation with the gravity basement and resistivity structures based on the geophysical prospecting. According to this interpretation, it was assumed, as a working hypothesis, that the mineralization would be indicated by high chargeability anomalies superimposing gravity basements with high to moderate resistivity. The drilling exploration, for the targets selected on the basis of this hypothesis, resulted in locating 3 new zones of mineralization, with the thicknesses of 16.0m, 11.8m and 32.0m indicating the average combined grades of Pb+Zn at 4.27%, 6.30% and 4.14% respectively in association with Cretaceous carbonate rocks in the El Akhouat-Argoub Adama Prospect. In addition, mineral indications were also found in other 4 prospects.

The discovery of the new mineralization zones proved that the geological investigation and the geophysical prospecting combining the plural number of techniques were effective to locate possible mineralization concealed in the subsurface in the Project Area. This prospecting approach are being established theoretically and practically for future application to the exploration of the similar type of mineralization concealed in the subsurface in the general area.

It is desirable to apply the gravity and IP methods in combination along the same measuring lines for the exploration of the Mississippi Valley or the Carbonate-hosted type of Pb-Zn mineralization in the Project Area or elsewhere having similar geological backgrounds. Application of a magnetometric method may be effective, where the

exposure of the Triassic System is limited such as in the El Akhouat-Argoub Adama Prospect. The result of the IP survey can be interpreted for itself, while the interpretation of the gravity result requires assessment both from the regional and residual gravity points of view. The magnetic survey will provide supplemental data for the interpretation of the gravity result. After the geophysical prospecting with the measuring line-spacing of 500m as employed in the current project is completed, follow-up work with narrower spacing, say 100 to 200m, may be necessary depending on sizes of targeted mineralized zones.

The potential of the Project Area for the mineralization is proved to be significant, as the result of locating the mineralization in all the target prospects. Since emphasis was more or less placed on the regional aspects in the current exploration project, some of geophysical anomalies and mineral indications remain untested by drilling. Accordingly, there will be still chances for locating new mineralization in the Project Area. For example, no drilling exploration is conducted on the Bou Mous and Rag el Bagrat showings in the Oued Jebes Prospect, even though chargeability anomalies have been identified in association.

Further, it will be one of effective exploration strategies to conduct follow-up investigations for the new mineralization zones in the El Akhouat-Argoub Adama Prospect, in order to verify their shapes, sizes and extents for establishing future exploration guides.

# REFERENCES

## 文 献

- 物理探査学会(1999) 第5章 電気探査, 物理探査ハンドブック, p.239-296.
- (1999) 第8章 重力探査, 物理探査ハンドブック, p.433-468.
- 千葉昭彦・熊田政弘(1994) 花崗岩及び凝灰岩試料の比抵抗測定—間隙水の比抵抗が岩石比抵抗に及ぼす影響について—. 物理探査, Vol.47, p.161-172.
- Chikhaoui, M., Hatira, N., Khalfaoui, A. et Hamouda, A. (1993) Etude geologique et geochemique du prospect de L'oued Jebes, secteur de Mejez El Bab resultants et proposition de sondages: Association ONM-MG Centre Zitoua, Le Kef.
- Coggon, J.H. (1971) Electromagnetic and electrical modeling by the finite element method. Geophysics, Vol.36, No.1, p.132-155.
- Cooperation ONM-BRGM(1982-1985) Projet zone des domes, Inventaire gitologique, Feuille au 1/50.000 Gafour: Office National Des Mines, Bureau de Recherches Geologiques et Minieres.
- (1982-1985) Projet zone des domes, Inventaire gitologique, Feuille au 1/50.000 Medjez El Bab: Office National Des Mines, Bureau de Recherches Geologiques et Minieres.
- (1982-1985) Projet zone des domes, Inventaire gitologique, Feuille au 1/50.000 Teboursouk: Office National Des Mines, Bureau de Recherches Geologiques et Minieres.
- Cox, D.P. and Singer, D.A., eds. (1986) Mineral deposit model. U.S. Geol.Surv.Bull., 1693, 379p.
- Dali, F. (1995) Notice explicative de la carte géologique de la Tunisie à 1/50.000, Gafour, Feuille n° 40: Republique Tunisienne Ministere de L'industrie, Office National des Mines, Direction de la Géologie.
- Dey, A. and Morison, H.F. (1979) Resistivity modeling for arbitrarily shaped two-dimensional structures. Geophysical Prospecting, Vol.27, p.106-136.
- Fakraoui, M., Ghanmi, M. et Hatira, N. (1998) Notice explicative de la carte géologique de la Tunisie à 1/50.000, Nebeur, Feuille n° 39: Republique Tunisienne, Ministere de L'industrie, Office National des Mines, Service Géologique de Tunisie.
- Hammami, M. (1993) Mise au point sur les travaux tactiques realises sur le flanc est du Jebel Ech Cheid: Office National des Mines, Direction de la Recherche Miniere, Division Inventaire.
- (1993) Travaux de recherche effectues sur le flanc est du Jebel El Akhouat: Office National Des Mines, Direction de la Recherche Miniere, Division Inventaire.
- (1996) Donnees geologiques, gitologiques, geochemiques de l'alignement J. Ech Cheid-J. El Mourra(Teboursouk-Mejez El Bab). Volume 3:D-Donnees gitologiques: Office National Des Mines, Division Inventaires, Projet: Recherche D'anomalies.
- Hatira N., Perthuisot V. and Rouvier H. (1990) Les minéraux à Cu, Sb, Ag, Hg des mineraux à Pb-Zn de Sakiet Koucha(diapir de Sakiet Sidi Youssef, Tunisie Septentrionale). Mineral Depos, Vol.25, p.112-117.
- Jean-Claude, G. (1999) Expertise des leves gravimetriques CG-01 et CG-02. (Zone des Domes Tunisie): Office National des Mines de Tunisie.
- 加藤元彦(1987) 2次元フィルタの理論と重力・磁力分布の解析. ラテイス社, 262p.



- Pelton, W.H., Rijo, L. and Swift, C.M. (1978) Inversion of two-dimensional resistivity and induced-polarization data. *Geophysics*, Vol. 43, No. 4, p. 788-803.
- Perthuisot, V. (1979) Carte géologique de la Tunisie, Echelle:1/50.000, Feuille n° 33 Teboursouk, Notice explicative: République Tunisienne, Ministère de L'industrie des Mines et de L'énergie, Direction des Mines et de la Géologie, Sous Direction de la Géologie.
- Perthuisot V., Bouzenoune A., Hatira N., Henry B., Laatar E., Mansouri A., Rouvier H., Smati A. et Thibieroz J. (1999) Les diapirs du Maghreb orient: part des déformations alpines et des structures initiales crétacées et tertiaires dans les formes actuelles. *Bull. Soc. géol. France*, t. 170, no 1, p. 57-65.
- Republique Tunisienne, Ministère de L'économie Nationale, Office National des Mines, Département de la Géologie, Service Géologique National (1985) Carte Géologique de la Tunisie, Echelle 1:500.000
- Rouvier, H., Perthuisot, V. and Mansouri, A. (1985) Pb-Zn deposits and salt-bearing diapirs in southern Europe and north Africa. *Economic Geology*, vol. 80, p. 666-687.
- Sasaki, Y. (1992) Resolution of resistivity tomography inferred from numerical simulation. *Geophysical Prospecting*, Vol. 27, p. 106-136.
- (財) 資源・環境観測解析センター(1996) 新編リモートセンシング用語辞典
- (財) 資源観測解析センター(1989) 資源探査のためのリモートセンシング実用シリーズ別冊用語辞典
- (1992) 資源探査のためのリモートセンシング実用シリーズ5 合成開口レーダー (SAR)
- Stranik, Z., Biely, A. et Salaj, J. (1994) Notice explicative de la carte géologique de la Tunisie à 1/50.000, Oued Zarga, Feuille n° 26: République Tunisienne, Ministère de L'industrie, Office National Des Mines, Direction de la Géologie.
- Zonge Engineering(1994) GDP-32 Instruction Manual 5-5.28.

# APPENDIXES

# GEOLOGIC LOG

Hole : MJTK-B1  
 Machine Model : RASKA30  
 Elevation : 557.31m  
 Drilled Length : 216.80m

Site Name : Bou Khil  
 Period : 2000. 11. 11~2001. 1. 9  
 Inclination : 70°  
 Direction : 158°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)			
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr(%)	Ba					
			Limestone light grayish white, compact, finely calcite matrix, weathered and oxidized, limonite is found in the fissures.															50.0
		5																86.7
		6.00 6.40	6.00~6.40m yellowish brown mudstone.															100.0
			Limestone yellowish brown, weathered, oxidized, brecciated, brown mud matrix, contains a small amount of celestite.															73.3
		10																83.3
		13.70	Mudstone yellowish brown, weathered, oxidized.															83.3
		15																80.0
		20																23.3
		21.50	Mudstone greenish gray, pyrite disseminated.															100.0
		23.70	Brecciated zone gray~dark gray, partially brecciated, dolomite-pyrite matrix, 23.70~23.80m, 28.20~28.50m celestite-pyrite-(sphalerite) vein~veinlets.															100.0
		25																100.0
		28.80	Limestone greenish gray, finely calcite cement, pyrite disseminated.															100.0
		30																100.0
		32.00	Mudstone, greenish gray.															100.0
		33.00	Brecciated zone gray~dark gray, dolomite-pyrite matrix, brecciaes are composed of limestone and calcareous mudstone (brecciaes are as much as 2-3cm in diameter), with calcite-celestite vein.															100.0
		35																93.3
		36.00																93.3
		40	33.00~36.00m contains a small amount of celestite.															93.3
		42.60	42.60~44.30m contains a small amount of celestite.															100.0
		44.30																100.0
		45																100.0
		46.60	Mudstone, pale gray.															100.0
		47.50	Mineralized zone gray~dark gray, brecciated, dolomite-pyrite matrix, contains a minor amount celestite and a small amount of sphalerite, pyrite and sphalerite are scattered, 53.50m celestite-calcite-sphalerite-pyrite veinlets.	38.52	25.36	55.34	4.23	829.3	<2.0	2.50	6.70	4.8	148.9				47.50	
		50		26.96	<5.0	39.25	2.91	512.7	<2.0	1.10	5.30	13.5	229.5				48.50	
				19.47	38.69	51.81	4.82	380.4	<2.0	1.00	1.50	20.2	34.55				49.50	100.0
				23.01	9.87	91.07	3.38	779.8	<2.0	1.60	5.40	12.7	16.70				50.50	
				40.95	271.8	15.38	4.01	231.2	<2.0	1.00	1.50	25.6	58.69				51.50	
				49.45	28.70	67.29	4.34	145.1	<2.0	0.80	0.30	3.5	163.6				52.50	100.0
				17.27	195.0	11.96	2.37	665.4	<2.0	2.10	3.60	23.3	13.20				53.50	
				27.66	6.07	30.33	2.91	410.8	<2.0	1.70	2.50	17.4	95.58				54.50	
				14.36	<5.0	23.32	1.44	26.3	<2.0	0.20	0.10	28.2	135.5				55.50	100.0
				55.16	<5.0	9.34	2.85	177.6	<2.0	0.80	1.20	18.4	125.6				56.50	
				39.47	78.48	16.72	2.28	290.1	<2.0	1.20	1.50	18.2	127.4				57.50	
		58.00	Mudstone, pale green, partially brecciated.														58.00	100.0
		59.50		48.97	8.49	24.54	3.82	490.8	<2.0	1.40	2.00	19.2	95.19				59.50	

Appendix 1 Columnar section of the drill hole, MJTK - B1

# GEOLOGIC LOG

Hole : MJTK-B1  
 Machine Model : RASKA30  
 Elevation : 557.31m  
 Drilled Length : 216.80m

Site Name : Bou Khil  
 Period : 2000. 11. 11~2001. 1. 9  
 Inclination : 70°  
 Direction : 158°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr(%)	Ba		
60			Mineralized zone	48.97	8.49	24.54	3.92	490.8	<2.0	1.40	2.00	19.2	95.19	60.50	100.0
			light gray~gray, brecciated, dolomite-pyrite in breccia matrix, contains a minor amount of celestite and massive pyrite.	58.27	127.6	7.80	6.57	349.5	<2.0	0.60	1.40	21.6	0.95	61.50	100.0
				49.15	221.6	16.15	7.47	305.4	2.47	0.70	1.00	25.4	0.33	62.50	100.0
				51.95	102.5	15.34	4.54	122.5	<2.0	0.30	0.18	21.8	61.19	63.50	100.0
				42.42	<5.0	14.66	2.47	324.6	<2.0	1.40	1.80	17.5	155.1	64.50	100.0
65		65.20	Mudstone	29.76	531.9	9.30	2.48	415.9	<2.0	1.70	2.47	16.5	130.9	65.50	93.3
			greenish gray, pyrite disseminated, contains calcareous sandstone breccia.											67.80	93.3
		67.80	Mineralized zone	41.55	85.77	8.83	1.68	1672.7	<2.0	5.90	14.70	8.4	4.64	67.80	93.3
			light gray~gray, brecciated, dolomite-pyrite in breccia matrix, contains a minor amount of celestite.	68.08	107.1	25.38	3.56	849.9	<2.0	3.60	5.70	1.3	338.6	68.80	100.0
				38.18	368.3	11.65	2.96	523.2	<2.0	2.80	4.80	8.5	11.9	69.80	100.0
				60.80	0.18%	17.03	4.43	415.1	<2.0	1.70	2.50	9.2	52.8	70.80	100.0
			72.30~72.50m drusy celestite-(calcite) vein with petrole materials.	55.73	254.0	23.08	3.43	843.6	<2.0	2.80	4.40	13.9	11.6	71.80	100.0
				99.50	72.87	26.14	5.43	1308.7	<2.0	4.00	6.90	5.3	2.39	72.80	100.0
		73.80	Marl, dark gray, brecciated.											73.80	100.0
75		75.00	Mudstone												100.0
			pale green~pale gray, calcareous, partially brecciated.												100.0
		79.70	Brecciated zone												100.0
			dark gray~gray, contains a small amount of celestite and sphalerite.												100.0
		82.50	Limestone, gray, compact, mostly crushed.												86.7
		83.90	Brecciated zone												100.0
			dark gray~gray, brecciaes are composed of dolomitic marl, calcite-celestite vein.												100.0
		86.50	Limestone												73.3
			light gray, finely crystalline, with pyrite striation and drusy calcite crystal, limonite is found in the fissures.												73.3
90		90.70	Brecciated zone												73.3
			dark gray~gray, brecciaes are composed of carbonate rocks, celestite matrix.												73.3
		94.00	Mudstone, pale green, calcareous.												100.0
95		95.00	Marl, dark gray, dolomitic, celestite matrix.												100.0
		96.00	Limestone, pale gray, finely crystalline.												100.0
		97.40	Marl												100.0
			gray~dark gray, dolomitic, friable and crumbly, interbedded with thin bedded mudstone and limestone, partially brecciated, pyrite disseminated.												100.0
100		103.10	Conglomerate												100.0
			gray, brecciaes are composed mainly of carbonate rocks and fossiliferous sandstone (brecciaes are as much as 1-20cm in diameter), 108.50m with drusy calcite veinlets.												100.0
		109.40	Marl, dark gray.												100.0
110		110.20	Conglomerate												100.0
			gray~brownish gray, with drusy calcite veinlets.												100.0
		112.70	Sandstone												100.0
			light greenish white, coarse-grained, sub-rounded quartz pebble, fossiliferous.												100.0
115		116.40	Marl												100.0
			dark gray~greenish gray, arenaceous, interbedded with thin bedded limestone.												100.0
120		119.70													100.0

Appendix 1 Columnar section of the drill hole, MJTK - B1

# GEOLOGIC LOG

Hole : MJTK-B1  
 Machine Model : RASKA30  
 Elevation : 557.31m  
 Drilled Length : 216.80m

Site Name : Bou Khil  
 Period : 2000. 11. 11~2001. 1. 9  
 Inclination : 70°  
 Direction : 158°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
120			Limestone													100.0
		121.80	dark gray~dark brown, compct.													100.0
			Marl													100.0
		125	dark greenish gray~dark gray, arenaceous, extremely friable and crumbly.													78.6
		126.00m	interbedded with compact limestone.													
		129.50	Sandstone													80.0
		131.80	dark gray, fine-grained, calcareous.													93.3
			Mudstone													93.3
		135.40	dark gray~gray, very pasty.													93.3
		137.95	Sandstone													100.0
			grayish white, fine to medium-grained, sub-angular~sub-rounded quartz pebble.													100.0
		140	Marl													100.0
			dark gray~black, arenaceous.													100.0
		142.50	Sandstone													86.7
		145	dark gray~black, fine-grained, sub-angular quartz pebble, calcareous, glauconite bearing.													86.7
		147.10	Marl, dark gray, arenaceous.													93.3
		148.00	Sandstone													100.0
		150.00	grayish white, glauconite bearing.													100.0
			Marl													93.3
			dark gray, arenaceous, friable and crumbly.													100.0
		153.20	Conglomerate													83.3
		155	gray, breccias are composed mainly of glauconite sandstone and siltstone.													83.3
		156.30	Sandstone													100.0
			grayish white, fine-grained, calcareous, glauconite bearing.													76.7
		159.30	Sand, light gray, unconsolidated.													50.0
		160.30	Mudstone													3.3
			dark gray~gray, very soft and pasty.													0.0
		162.20	Sandstone, light grayish white, calcareous.													14.3
		163.20	Mudstone													
			dark gray~gray, very soft and pasty.													
		165.20	Sandstone													
			reddish brown, fine to medium-grained, sub-rounded quartz pebble, oxidized, loosely consolidated.													
		170														
		174.30	Non core													
		178.30	Sandstone													
			gray, fine-grained, glauconite bearing.													
180																

Appendix 1 Columnar section of the drill hole, MJTK - B1

# GEOLOGIC LOG

Hole : MJTK-B1  
 Machine Model : RASKA30  
 Elevation : 557.31m  
 Drilled Length : 216.80m

Site Name : Bou Khil  
 Period : 2000. 11. 11~2001. 1. 9  
 Inclination : 70°  
 Direction : 158°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba	
180		180	Sandstone dark greenish gray, fine-grained, sub-angular quartz pebble, glauconite bearing, loosely consolidated.											14.3		
														30.0		
185														43.3		
														36.7		
190														53.3		
				193.00	Mudstone black, loosely consolidated.											26.7
195															40.0	
				196.80	Sand grayish white~light brownish white, unconsolidated, sub-rounded quartz pebble.											33.3
200															33.3	
															26.7	
205													23.3			
													16.7			
210													25.0			
		216.80														
220																
225																
230																
235																
240																

Appendix 1 Columnar section of the drill hole, MJTK - B1

# GEOLOGIC LOG

Hole : MJTK-B2  
 Machine Model : RASKA30  
 Elevation : 454.81m  
 Drilled Length : 142.10m

Site Name : Bou Khil  
 Period : 2001. 1. 14~1. 29  
 Inclination : 90°  
 Direction : -

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
			Overburden														
		9.00	Sandstone yellowish brown, coarse-grained, sub-rounded quartz pebble, weathered.													20.0	20.0
		12.00	Sand yellowish brown, fine to medium-grained, loosely consolidated, sub-rounded quartz pebble.													0.0	0.0
		15.00														0.0	0.0
		20.00														0.0	0.0
		25.00														0.0	0.0
		30.00														0.0	0.0
		35.00														0.0	0.0
		37.00														0.0	0.0
		37.00	Mud grayish black~black, loosely consolidated.													20.0	20.0
		40.10	Sandstone reddish brown, fine to medium-grained, oxidized, contains breccia.													20.0	20.0
		43.10	Conglomerate reddish brown, oxidized, loosely consolidated, brown mud matrix, brecciaes are as much as 0.5-2.0cm in diameter and composed mainly of calcareous sandstone and limestone.													10.0	10.0
		45.00														30.0	30.0
		50.00														60.0	60.0
		55.00														90.0	90.0
		60.00														100.0	100.0
																86.7	86.7

Appendix 2 Columnar section of the drill hole, MJTK - B2

# GEOLOGIC LOG

Hole : MJTK-B2  
 Machine Model : RASKA30  
 Elevation : 454.81m  
 Drilled Length : 142.10m

Site Name : Bou Khil  
 Period : 2001. 1. 14~1. 29  
 Inclination : 90°  
 Direction : -

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
80		61.10	Conglomerate													86.7
		62.70	Sandstone yellowish brown, medium-grained.													93.3
65		67.20	Conglomerate light yellowish brown, brown mud matrix, brecciaes are as much as 3~4cm in diameter and composed mainly of Tertiary carbonate rocks, garnet crystal bearing.													56.7
		70.00	Sandstone yellowish brown, coarse-grained, sub-rounded quartz pebble, contains breccia.													33.3
70		70.00	Conglomerate reddish brown, oxidized, loosely consolidated, brown mud matrix, brecciaes are as much as 2~3cm in diameter and are composed mainly of Tertiary carbonate rocks.													40.0
75																100.0
80																53.3
85																53.3
90																100.0
95																80.0
100																36.7
105																100.0
110		106.70	Sandstone yellowish brown, fine~medium-grained, calcareous, sub-rounded~sub-angular quartz pebble, strongly pyritized.													43.3
115		109.70	Mudstone yellowish gray~brown, weathered, oxidized, loosely consolidated, contain brecciaes (brecciaes are composed of grayish white limestone and are as much as 2-10cm in diameter).													100.0
		117.70	Mudstone blackish gray, loosely consolidated.													36.7
120																20.0
																100.0


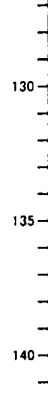
Appendix 2 Columnar section of the drill hole, MJTK - B2



# GEOLOGIC LOG

Hole : MJTK-B2  
 Machine Model : RASKA30  
 Elevation : 454.81m  
 Drilled Length : 142.10m

Site Name : Bou Khil  
 Period : 2001. 1. 14~1. 29  
 Inclination : 90°  
 Direction : -

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba	
120		127.10	Mudstone blackish gray, loosely consolidated, very pasty, contain brecciaes of carbonate rocks.											100.0		
													80.0			
125													36.7			
					142.10	Sand yellowish brown, unconsolidated, medium-grained, sub-rounded quartz pebble.										6.7
130															16.7	
135															20.0	
															16.7	
140										20.0						
142.10																
145																
150																
155																
160																
165																
170																
175																
180																

Appendix 2 Columnar section of the drill hole, MJTK - B2

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
			Overburden													33.3
																60.0
		5														36.7
																53.3
		10														37.0
																90.0
		15														43.3
																46.7
		20														53.3
		21.70	Gypsum-Mudstone complex													53.3
			grayish white~gray (partially reddish brown).													
		25.10	Mudstone													86.7
			blackish gray, calcareous, with gypsum.													
		27.70	Gypsum-Mudstone complex													83.3
		28.90	Mudstone													93.3
			blackish gray, calcareous, contains gypsum crystal.													
		31.70	Gypsum-Mudstone-Carbonate rocks complex													56.7
			grayish white, brecciated.													
		33.70	Mudstone													100.0
			reddish brown~gray, calcareous.													
		36.05	Dolomite													33.3
			black~grayish white, finely crystalline, organic material matrix, with gypsum.													
		39.95	Mudstone													90.0
			blackish gray, with grayish white dolomite brecciaes (brecciaes are as much as 2~5cm in diameter).													
			51.70~52.80m with gypsum.													83.3
		52.80	Gypsum, white, massive.													86.7
		53.50	Mudstone, gray, calcareous.													86.7
		54.80	Mudstone-Gypsum-Dolomite complex													86.7
			reddish brown, contains gray dolomite breccia, with gypsum veinlets.													
		57.80	Mudstone													86.7
			reddish brown, with gypsum vein.													
		80														

Appendix 3 Columnar section of the drill hole, MJTK-L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
60	△ △	60.70	Mudstone, reddish brown, calcareous.											86.7	100.0
	△ △		Gypsum-Carbonate rocks-Mudstone complex grayish white, contains dolomite and mudstone breccia, with gypsum vein.											83.3	
65	△ △	63.50	Mudstone-Gypsum-Dolomite complex grayish white (partially reddish brown), brecciated, composed mainly of calcareous mudstone, gypsum veinlets and brecciated dolomite.											100.0	
	△ △													100.0	
70	△ △	71.70	Mudstone reddish brown, with gypsum veinlets.											96.7	
	△ △	73.70	Gypsum, grayish white, massive.											100.0	
75	△ △	74.70	Dolomite, grayish black, with gypsum.											93.3	
	△ △	76.00	Mudstone reddish brown, with gypsum veinlets.											93.3	
	△ △	78.70	78.70~79.00m massive gypsum.												
80	△ △	80.20	Dolomite, grayish white, finely crystalline.											83.3	
	△ △	83.40	Gypsum, grayish white, massive.											100.0	
85	△ △	85.00	Mudstone reddish brown, with gypsum veinlets.											96.7	
	△ △	85.00~86.15m	with grayish white dolomite breccias											93.3	
90	△ △	94.70	Mudstone-Gypsum-Dolomite complex blackish gray~reddish brown, brecciated, composed mainly of calcareous mudstone, gypsum veinlets and brecciated dolomite.											100.0	
	△ △	99.30	Limestone gray, brecciated, breccia consists of Cretaceous carbonate rocks, calcite and gypsum cement.	81.54	0.15%	0.98	0.31	159.1	<2.0	5.25	16.00	2972.0	61.1	102.60	100.0
100	△ △	103.60	Dolomite black, finely crystalline, contains abundant of hydrozincite.	23.05	308.20	8.02	1.18	175.3	<2.0	4.35	10.60	2798.7	112.0	103.60	100.0
105	△ △	106.30	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black), brecciated, composed mainly of calcareous mudstone, gypsum veinlets, brecciated dolomite and limestone.	<10	76.09	3.71	0.55	100.1	<2.0	2.50	10.00	2479.2	100.2	104.60	100.0
	△ △	114.10	Dolomite grayish black, brecciated, with gypsum.											105.60	100.0
110	△ △	116.60	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	
115	△ △													100.0	
120	△ △													100.0	

Appendix 3 Columnar section of the drill hole, MJTK-L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
120	^ ^		Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	
	^ ^													100.0	
	^	123.10	Mudstone reddish brown, with gypsum veinlets.											100.0	
125	^ ^													100.0	
	^ ^	125.60	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	
	^ ^													100.0	
	^ ^	128.10	Dolomite gray, brecciated, with gypsum.											96.7	
130	^ ^													100.0	
	^ ^	130.10	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black), brecciated, composed mainly of calcareous mudstone, gypsum veinlets, brecciated dolomite and limestone.											100.0	
	^ ^													100.0	
135	^ ^													100.0	
	^ ^		135.80~136.30m massive gypsum.											100.0	
	^ ^	137.40	Marl (Aptien age) grayish black, calcareous, homogeneous, lime mud matrix, sparry calcite cement, contains brown limestone breccia, vitrinite and peloid bearing, with carbonate network. a small amount of pyrite is almost invariably present.											96.7	
140	— —													93.3	
	— —													80.0	
	— —													100.0	
145	— —													100.0	
	— —		137.40~142.70m mostly crushed,											100.0	
	— —		151.10~151.79m micropyrrite rich,											100.0	
	— —		156.50m carbonate network dominant.											100.0	
150	— —													100.0	
	— —													100.0	
	— —													100.0	
155	— —													100.0	
	— —													100.0	
	— —													100.0	
160	— —													100.0	
	— —													100.0	
	— —													100.0	
165	— —													100.0	
	— —													100.0	
	— —													100.0	
170	— —		169.10~172.10m carbonate network dominant.											100.0	
	— —													96.7	
	— —													96.7	
175	— —													100.0	
	— —													100.0	
180	— —													100.0	

Appendix 3 Columnar section of the drill hole, MJTK-L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75'  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
180			Marl (Aptien age) grayish black, homogeneous, calcareous, lime mud matrix, sparry calcite cement, fossiliferous (gasteropodes bearing), contains brown limestone breccia, vitrinite and peloid bearing, with carbonate network, a small amount of pyrite is almost invariably present.											100.0	100.0
			180.00~181.00m carbonate network dominant.											100.0	100.0
			193.60~195.10m carcite veinlets with a trace amount of galena and sphalerite.											100.0	100.0
185														100.0	100.0
190														100.0	100.0
195														100.0	100.0
200														100.0	100.0
205														100.0	100.0
210		207.70	Marl (Aptien age) grayish black, calcareous, contains limestone nodule and framboidal pyrite, with carbonate network, crack dominant.											100.0	100.0
			209.00m contains brown limestone.											100.0	100.0
			214.10~216.10m calcareous marl.											96.7	100.0
215			217.20~217.50m carbonate network dominant.											100.0	100.0
220			220.10m calcite-(galena) network, 218.40m contains organic materials.											100.0	100.0
225														100.0	93.3
230														100.0	100.0
235		233.20	Marl (Aptien age) grayish black, argillaceous, contains limestone breccia and framboidal pyrite, with carbonate network, crack dominant.											100.0	100.0
			233.90m contains brown limestone breccia with calcite-(galena) veinlets.											100.0	100.0
240															

Appendix 3 Columnar section of the drill hole, MJTK-L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
240			Marl (Aptien age) grayish black, argillaceous, contains limestone nodule and framboidal pyrite, with carbonate network, crack dominant.											100.0	100.0
			240.10~244.60m mostly crushed.											100.0	100.0
245														100.0	100.0
250														100.0	100.0
255														100.0	100.0
			259.30~260.00m mostly crushed.											73.3	73.3
260		260.00	Marl (Aptien age) grayish black, calcareous, lime mud matrix, sparry calcite cement, with carbonate network.											60.0	60.0
			262.30~262.50m calcite-hydrozincsite veinlets.											93.3	93.3
			266.00~266.50m sheared zone.											100.0	100.0
270			271.40~273.20m carbonate network dominant.											100.0	100.0
275														100.0	100.0
			278.00											73.3	73.3
280			Marl (Aptien age) grayish black, argillaceous, fossiliferous, contains limestone breccia and framboidal pyrite.											100.0	100.0
			278.00~279.80m sheared zone.											100.0	100.0
285														100.0	100.0
			287.00											100.0	100.0
290			Marl (Aptien age) grayish black, calcareous, lime mud matrix, sparry calcite cement, contains black woody material, framboidal pyrite is locally found, with carbonate veinlets (width 1mm).											100.0	100.0
														100.0	100.0
295														100.0	100.0
														100.0	100.0
300														100.0	100.0

Appendix 3 Columnar section of the drill hole, MJTK - L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
300	II -	300.00	Marl (Aptien age) grayish black, calcareous, lime mud matrix, sparry calcite cement, contains vitrinite and framboidal pyrite, with carbonate veinlets.														100.0
	- II			100.0													
	II -			100.0													
	- II			100.0													
305	II -			100.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
310	II -	318.80	Marl (Aptien age) grayish black~gray, dolomitic, alternating of argillaceous marl and thin bedded limestone, contains vitrinite fragment and framboidal pyrite, partilly brecciated, cruck dominant, 323.30m calcite-(galena) veinlets, 324.70m calcite-(sphalerite) veinlets, 327.80~328.20m calcite-pyrite-(sphalerite) veinlets, 336.00m calcite-pyrite-(galena) veinlets, 338.50m calcite-pyrite-(galena) veinlets, 338.60m a trace amount of galena is found in the fissures.														96.7
	- II			100.0													
320	II -			100.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
325	II -			90.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
330	II -	349.80	Marl (Aptien age) grayish black~gray, dolomitic, contains vitrinite and peloid (pyrite coating), a minor amount of framboidal pyrite is almost invariably present. 356.30~364.10m sheared.														100.0
	- II			100.0													
	II -			100.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
340	II -			100.0													
	- II			100.0													
	II -			100.0													
	- II			100.0													
345	II -	350.00															100.0
	- II			100.0													
	II -			100.0													
	- II			100.0													
350	II -	355.00															100.0
	- II			100.0													
	II -			100.0													
	- II			100.0													
355	II -	360.00															90.0
	- II			90.0													

Appendix 3 Columnar section of the drill hole, MJTK - L1

# GEOLOGIC LOG

Hole : MJTK-L1  
 Machine Model : RASKA30  
 Elevation : 429.12m  
 Drilled Length : 400.10m

Site Name : El Akhouat  
 Period : 2000. 9. 27~10. 17  
 Inclination : 75°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
360	—		Marl (Aptien age)													90.0
	—		grayish black~gray, dolomitic, contains vitrinite and peloid (pyrite coating), with minor amounts of pyrite.													96.7
365	^	364.10	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish white), composed mainly of calcareous mudstone, gypsum veinlets, limestone, dolomite and marl.													100.0
	^															100.0
370	^	368.60	Carbonate rocks-Gypsum complex gray, calcite and gypsum cement, contains Cretaceous marl and limestone breccia.													100.0
	^															100.0
375	^	373.10	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish white), brecciated (breccias are composed mainly of calcareous mudstone, gypsum veinlets, limestone and dolomite.													100.0
	^															96.7
380	^		379.70~380.50m massive limestone, 380.50~381.10m marl, calcite cement.													100.0
	^															100.0
385	^		384.00~384.90m dolomitized limestone, 384.90~385.50m marl, calcite cement.													100.0
	^															100.0
	^		374.20~374.30m contains hydrozincite, 375.20~375.50m contain marl breccias.													100.0
390	^															100.0
	^															100.0
	^	392.90	Dolomite-Limestone-Mudstone complex gray~grayish white, gypsum cement, brecciated (breccias are composed mainly of Cretaceous limestone and dolomite.													100.0
395	^															100.0
	^															100.0
400	^	400.10														

Appendix 3 Columnar section of the drill hole, MJTK-L1



# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000. 10. 21~11. 4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
		0.80	Overburden													
			Limestone (Coniacian age) brownish light gray~yellowish light brown, compact, finely calcite matrix, weekly oxidized, pyrite are scattered, with calcite-(pyrite) veinlets. limonite is found in the fissures.													69.4
5																93.3
		5.50m, 15.50m	drusy calcite vein (width 5cm).													100.0
10																93.3
																100.0
15																100.0
		17.70	Dolomite (Turonian age) grayish brown~yellowish brown, compact, finely dolomite matrix, weekly oxidized, contains organic materials, with calcite-(pyrite) veinlets. limonite is found in the fissures.													100.0
20																100.0
		24.60m	drusy calcite vein (width 5cm).													60.0
25		26.00~30.60m	wholly crushed.													46.7
30																100.0
		32.60	Dolomite (Turonian age) gray~grayish brown, finely dolomite matrix, with calcite-pyrite veinlets. limonite is found in the fissures.													100.0
35																100.0
		32.60~35.30m	brecciated, fossiliferous.													96.7
38.00			Dolomite (Turonian age) brownish gray, compact, finely dolomite matrix, with calcite network.													100.0
40		40.00m	calcite vein (width 7cm).													100.0
43.00		43.60	Calcite-limonite-hematite vein													100.0
45			Dolomite (Turonian age) brownish gray~light brownish gray, compact, fossiliferous, finely dolomite matrix, partially brecciated, with calcite veinlets~network.													100.0
50		45.40~47.80m	with calcite-pyrite-(galena) veinlets.													100.0
51.40			Calcite-limonite-hematite-(sphalerite) vein													100.0
53.10			Dolomite (Turonian age) gray~grayish brown, finely crystalline, finely dolomite cement, with calcite veinlets~network; weakly oxidized.													100.0
55		53.10~53.70m, 57.80~60.40m	brecciated, pyrite are scattered, contains a trace amount of galena.													100.0
60																100.0

Appendix 4 Columnar section of the drill hole, MJTK-L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000.10.21~11.4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba	
60		60.40	Dolomite (Turonian age) gray~light yellowish brown, finely dolomite matrix, with calcite veinlets, limonite is found in the fissures.												100.0	100.0
65		65.00	Dolomite (Turonian age) light yellowish brown~grayish white, weakly oxidized, finely dolomite matrix, contains Mn-oxide material, limonite is found in the fissures.												100.0	90.0
70		66.20~66.90m	with calcite-pyrite network,												100.0	
		69.80m	drusy calcite vein (width 5cm),												100.0	
		75.00~75.20m	contains a trace amount of galena, calcite-hematite vein.												100.0	
75		76.60	Dolomite (Turonian age) light yellowish brown~gray, compact, lime mud matrix.												100.0	
80		81.30	Dolomite (Turonian age) light brown~light gray, pyrite are scattered, with calcite vein,												100.0	90.0
85		84.00	Dolomite (Turonian age) grayish black~grayish brown, organic, lamina is recognized, interbedded with light brown limestone, a minor amount of pyrite is locally found,												100.0	90.0
		85.40~86.00m	with calcite-(pyrite) veinlets (width 1~2cm),												100.0	
		89.00	85.40~86.00m light brown limestone part,												100.0	
		90.70	89.00~90.70m light brown limestone part,												100.0	
		94.20	89.70m												100.0	
		94.70	drusy calcite-hematite vein (width 15cm),												100.0	
95		94.20~94.70m	light brown limestone part, with calcite-(pyrite) veinlets,												100.0	
100		100.90~101.00m	with calcite-(galena) network,												100.0	
		101.00m	calcite-galena-(sphalerite) vein (width 10cm),												100.0	
		104.70m	calcite-pyrite vein (width 5cm),												100.0	
105															100.0	
110															100.0	
			114.90~115.00m mostly crushed, limonite is found in the fissures,												100.0	
115		116.80~117.00m	calcite-pyrite-galena vein (width 20cm),												100.0	
		117.00													100.0	
120																

Appendix 4 Columnar section of the drill hole, MJTK - L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000. 10. 21~11. 4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba					
120			Dolomite (Turonian age) dark gray~dark brown, lamina is recognized, organic, lime mud matrix, with calcite vein~veinlets, a minor amount of pyrite is locally found.															100.0
125		121.60~123.00m with calcite-(pyrite) vein~network.																93.3
130																		100.0
135			132.70~132.90m calcite vein (width 20cm). 133.60~133.75m calcite vein (width 15cm). 138.10~138.60m with calcite network. 139.10m drusy calcite veinlets (width 2cm) with petorole nodule.															100.0
140			140.00m calcite-(pyrite) veinlets (width 3cm). 140.20m drusy calcite veinlets (width 2cm). 142.80m calcite veinlets (width 3cm). 142.90m calcite veinlets (width 3cm).															100.0
145																		100.0
150																		100.0
155			155.60m calcite vein (width 10cm).															100.0
160																		100.0
165			163.80~164.00m with calcite veinlets. 167.10~168.10m brecciated, calcite-pyrite matrix.															90.0
170			169.40	Dolomite (Turonian age) grayish white~gray, altanating of grayish white compact dolomite and brownish gray lamina dolomite.														100.0
175			173.50	Sandstone (Turonian age) grayish white~gray, fine-grained, calcareous, with coarse-grained calcite pebble, interbedded with thin beded dolomitic black marl, with calcite-pyrite veinlets~network, pyrite are scattered.														100.0
180																		100.0

Appendix 4 Columnar section of the drill hole, MJTK-L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000. 10. 21~11. 4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)									
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba											
180		180	Sandstone (Turonian age) grayish white~light brownish white, calcareous, fine to medium-grained, interbedded with thin bedded dolomitic marl, pyrite are scattered, with calcite-(pyrite) network.																			100.0	100.0	
185		179.50~180.60m calcite-(pyrite) veinlets.																					100.0	100.0
190		181.80~181.90m calcite-pyrite vein(width 10cm).																					100.0	100.0
195		184.80~184.95m calcite-pyrite-sphalerite vein(width 15cm).																					100.0	100.0
200		189.60~189.80m calcite-pyrite-(galena) vein(width 20cm).																					100.0	100.0
205		201.50m calcite-galena veinlets(width 1cm), 204.70~205.10m with calcite-(pyrite) veinlets(width 1cm).																					100.0	100.0
210		208.00m drusy calcite veinlets(width 2cm), 212.00m calcite vein, 212.50m calcite vein.																					100.0	100.0
215		213.50	Limestone (Turonian age) gray~dark gray, finely crystalline, organic, dolomitized, weakly mineralized, 213.80m calcite-pyrite-(galena)-(sphalerite) veinlets (width 3cm), 216.80~217.00m with calcite-pyrite-(galena) network, 217.60~218.00m, 218.90~219.30m calcite-pyrite-(galena) veinlets(width 1-3cm), 219.70~223.00m with calcite veinlets~network.																				100.0	100.0
220		223.00	Mineralized zone limestone-hosted, brownish dark gray, dolomitized, lime mud-organic material matrix. 223.00~225.50m with calcite-(pyrite)-(sphalerite) network, 225.50~226.50m calcite-pyrite-sphalerite-galena veinlets and network, 226.50~227.10m calcite-pyrite-sphalerite-galena matrix, 227.30~231.65m calcite-pyrite-sphalerite-galena veinlets and network, 232.50~235.00m calcite-sphalerite-(pyrite)-(galena) veinlets~network, 235.00~235.20m calcite-(pyrite)-(sphalerite) veinlets, 236.05~237.45m calcite-sphalerite-pyrite-(galena) vein, 237.45~238.40m massive pyrite and sphalerite ore.	186.9	2.00	6.26	1.41	1318.9	83.58	6.09	24.20	395.1	11.15	222.50										
225				566.5	1.82	8.93	1.59	1203.5	73.82	8.00	20.70	435.8	13.58	223.50	100.0									
				330.5	2.45	12.18	2.03	1441.4	101.41	8.00	18.70	441.1	30.20	224.50										
				691.2	2.35	13.95	2.43	1164.9	88.53	11.93	24.92	828.1	60.47	225.50										
				1772.1	4.62	7.02	2.55	1318.4	189.9	6.79	35.70	518.4	64.47	226.50	100.0									
				1.53%	3.52	1.40	2.05	1277.7	138.3	3.31	44.10	127.5	7.19	227.50										
				1053.1	3.07	7.05	1.59	1583.9	124.0	13.51	35.00	328.0	25.91	228.50										
			2451.3	2.82	6.43	0.94	1191.6	124.5	12.43	31.22	269.8	37.48	229.50	100.0										
			3252.9	3.70	11.61	2.73	1160.8	99.13	9.04	31.60	452.0	151.8	230.50											
			103.7	1.54	13.55	0.93	764.6	56.94	14.42	28.00	463.2	31.88	231.50											
			115.8	3.30	7.38	0.98	912.1	161.88	8.30	21.60	319.4	30.45	232.50	100.0										
			303.6	2.30	14.32	1.22	1049.7	41.97	7.30	21.10	570.3	53.39	233.50											
			137.6	1.40	7.55	1.11	1054.6	29.19	8.30	21.20	493.6	13.32	234.50											
			209.0	1.70	11.52	2.09	1010.6	16.47	7.00	20.50	633.1	14.51	235.50	100.0										
			1321.7	8.42	9.11	5.14	677.8	57.17	1.32	35.42	511.3	26.28	236.50											
			6988.0	20.00	61.79	21.00	373.0	132.8	0.08	11.62	69.1	113.3	237.50											
			120.3	0.68	8.82	1.22	644.8	9.92	0.33	44.10	1257.5	25.22	238.50	100.0										
240		238.60	Sandstone (Turonian age)																			239.50		

Appendix 4 Columnar section of the drill hole, MJTK - L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000.10.21~11.4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)				
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba						
240	[Sandstone pattern]	240	Sandstone (Turonian age) brownish white~light grayish brown, fine to medium-grained, calcareous, interbedded thin bedded dolomitic black marl. with calcite-(pyrite) veinlets, pyrite are scattered.  242.00~243.00m calcite-pyrite matrix, 243.40~243.50m calcite cavity sediment, 245.20~246.60m pyrite-calcite veinlets,  250.50m pyrite-calcite veinlets, 252.20m pyrite-calcite veinlets, 254.60m calcite-pyrite-galena brecciae.  258.80~258.90m calcite-(galena)-(sphalerite) network, 262.70m sphalerite-calcite-pyrite veinlets (width 3cm).														100.0	100.0	
245		100.0																100.0	
250		100.0																100.0	
255		100.0																100.0	
260		100.0																100.0	
261.70				261.70	Dolomite (Turonian age) brownish gray~gray, finely crystalline, lamina is recognized, with calcite-pyrite -(galena) veinlets and sphalerite-calcite -pyrite veinlets (width 3cm).													100.0	
265		265.80		100.0															100.0
266.80		[Mineralized zone pattern]		266.80	Mineralized zone limestone-hosted, brownish gray~gray, lime mud-organic material matrix, 265.80~266.80m, 270.30~270.60m calcite-pyrite-sphalerite-galena network, 266.80~267.80m with calcite-sphalerite- pyrite veinlets (width 1cm±)~network, 271.40~271.70m massive pyrite, 272.60~275.40m with calcite-sphalerite- pyrite veinlets (width 0.5-1.0cm), 275.40~277.10m sphalerite-galena massive ore, 277.20~277.60m calcite-pyrite-sphalerite vein.	776.7	0.81	11.03	2.27	824.5	12.08	6.70	22.70	489.9	74.70	265.80	100.0		
267.80				516.5		9.46	22.79	2.75	744.1	103.1	5.33	32.20	346.1	111.0	266.80				
268.80				518.8		0.79	13.35	3.35	672.4	15.48	0.91	38.50	825.7	393.6	267.80				
269.80	874.9		0.69	11.68		4.67	798.0	10.90	3.81	37.10	693.7	328.3	268.80	100.0					
270.80	5314.9		1.21	16.64		8.55	560.6	32.03	0.41	34.62	582.9	394.3	269.80						
271.80	3064.3		1.03	19.82		5.49	765.7	34.03	1.40	39.20	432.9	71.91	270.80						
272.60	1061.5		0.58	12.51		1.39	822.4	15.77	13.70	31.08	685.7	338.8	271.80	100.0					
273.60	677.7		1.79	16.67		1.30	889.9	43.22	11.61	33.04	628.6	85.68	272.60						
274.60	1871.2		3.47	28.68		3.09	965.0	43.14	7.21	33.60	805.5	182.1	273.60						
275	5089.4		3.59	43.85		5.53	822.7	61.40	6.47	31.22	503.1	113.8	274.60	96.7					
276.60	1.92%	36.00	281.5	7.50	292.1	506.8	0.66	11.20	83.07	7.91	275.60								
277.60	2622.0	11.30	50.87	6.60	532.8	156.7	0.16	33.46	524.0	46.70	276.60								
278.60	144.4	0.59	14.09	1.64	346.6	3.92	0.25	39.90	991.5	58.65	277.60	100.0							
280	[Sandstone pattern]	280	Sandstone (Turonian age) light gray~brownish white, calcareous, fine-grained, alternating of compact sandstone and dolomitic black marl, with calcite-(pyrite) veinlets~network, marl. pyrite are scattered.  280.20m, 280.90m calcite-pyrite-sphalerite-(galena) veinlets, 286.70m calcite-(pyrite)-(sphalerite) vein(width 7cm), 288.40~286.80m, 289.00~290.60m interbedded with thin bedded black marl.												278.60	100.0			
285		100.0															100.0		
286.70m		100.0															100.0		
289.00~290.60m		100.0															100.0		
291.60				291.60	Mineralized zone limestone-hosted, light brown, partially dolomitized, pyrite are scattered, 291.60~293.60m calcite-(pyrite)-(sphalerite) veinlets~vein, 294.10~296.70m calcite-pyrite-sphalerite-(galena) matrix, 296.90~299.85m calcite vein with massive pyrite.	1812.0	1.50	18.00	1.05	612.0	14.00	0.17	27.14	954.0	225.0	291.60			
292.60	2049.3	0.89	16.32	3.46		560.2	20.45	0.10	20.90	801.2	109.7	292.60	100.0						
293.60	805.22	0.60	7.86	1.54		529.5	16.34	0.10	24.10	615.3	107.8	293.60							
294.60	186.59	1.28	8.90	1.50		712.8	23.51	0.10	33.00	423.6	270.4	294.60							
295.60	1690.4	0.59	12.74	2.62		579.9	13.93	0.10	30.30	799.1	322.8	295.60	100.0						
296.60		296.60													296.60	100.0			
300		300																	

Appendix 4 Columnar section of the drill hole, MJTK - L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000.10.21~11.4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
		300	Mineralized zone limestone-hosted, light brown, partially dolomitized, pyrite are scattered. 299.85~304.00m calcite-sphalerite-pyrite-(galena) vein.	132.00	0.54	9.24	1.36	505.6	5.29	0.20	31.30	903.6	227.5	300.60	100.0	
		301.60		131.21	0.51	10.24	1.32	496.0	5.11	0.20	30.30	877.3	216.7	301.60		
		302.60		327.53	0.31	7.84	1.69	592.7	6.32	0.30	31.80	494.2	130.0	302.60		
		303.60		418.05	1.65	19.37	3.06	542.2	10.17	0.90	26.40	732.8	53.01	303.60		
		304.60	Dolomite (Turonian age) brownish gray~gray, lime mud matrix, lamina is recognized, with calcite-pyrite-(sphalerite) veinlets~network. 306.20~306.30m fault  314.20~315.30m brecciated, calcite-pyrite cement.  322.60m calcite-pyrite vein (width 10cm).											304.60	100.0	
		306.20													306.20	100.0
		306.30													306.30	100.0
		310													310	100.0
		315													315	100.0
		320													320	100.0
		325													325	100.0
		330													330	100.0
		335													335	100.0
		334.80		Dolomite (Turonian age) brownish gray, weakly mineralized, organic, lime mud matrix, with calcite-pyrite-(sphalerite)-(galena) network, contains calcite-sphalerite breccia, with pyrite striation. 335.10~337.60m brecciated, with calcite breccia. 337.60~339.30m calcite-galena-(sphalerite) veinlets.	1.89%	0.87	30.02	3.07	1709.2	27.92	0.25	30.52	933.7	76.66	337.60	100.0
		338.60			4969.2	1.49	15.00	1.92	955.2	27.87	0.25	34.44	1348.2	67.13	338.60	
		339.60			751.4	0.55	24.11	2.55	709.8	12.88	0.25	32.90	992.1	225.9	339.60	
		340														340
		345													345	100.0
		346.30	Mineralized zone limestone-hosted, dark brownish gray, dolomitized, brecciated, finely crystalline, lime mud-organic material matrix. 346.40~357.30m brecciated, sphalerite-pyrite matrix. 357.30~360.30m calcite-sphalerite network~veinlets and sphalerite-galena-pyrite matrix.	433.4	0.39	17.99	1.98	538.9	8.13	0.83	30.80	1150.6	162.2	346.30	100.0	
		347.30		401.4	1.44	23.33	3.83	502.9	11.07	0.25	23.94	1631.9	72.94	347.30		
		348.30		3628.0	4.56	18.34	16.00	431.2	37.51	0.16	21.28	1181.0	35.96	348.30		
		349.30		1944.3	8.95	15.59	9.40	348.6	58.03	0.25	17.92	989.7	55.22	349.30		
		350		1537.6	4.01	6.16	4.30	845.6	47.21	0.16	40.60	840.2	30.20	350		
		351.30		2994.3	0.67	12.88	2.41	855.4	6.71	0.33	36.40	833.3	163.8	351.30		
		352.30		1291.6	2.21	16.95	3.18	677.2	50.11	0.74	26.04	1396.6	211.5	352.30		
		353.30		2735.1	0.63	22.51	3.18	372.6	9.09	0.74	21.98	1920.9	167.0	353.30		
		354.30		1.74%	1.08	16.80	7.12	429.9	52.13	0.83	20.36	1573.7	69.61	354.30		
		355		1882.1	0.70	15.71	2.30	600.7	4.41	0.74	33.60	1771.9	165.9	355		
		355.30		1026.5	1.20	12.39	2.43	697.6	14.32	0.41	39.90	1291.2	111.3	355.30		
		356.30		2752.5	2.91	23.70	4.36	417.0	41.02	0.75	22.12	1867.9	238.0	356.30		
		357.30		662.5	1.13	17.08	4.03	535.2	17.01	3.80	17.08	1635.2	104.5	357.30		
		358.30	6637.1	5.94	26.26	7.39	251.1	62.10	0.82	10.92	1637.8	72.98	358.30			
		359.30	2818.7	3.37	26.28	3.91	310.5	36.96	0.41	12.32	1678.2	108.6	359.30			

Appendix 4 Columnar section of the drill hole, MJTK-L2

# GEOLOGIC LOG

Hole : MJTK-L2  
 Machine Model : RASKA30  
 Elevation : 519.01m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2000. 10. 21~11. 4  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba		
360	[Cross-hatched pattern]	360.00	Mineralized zone	775.1	1.22	24.43	2.96	248.7	12.69	0.33	10.92	2025.5	81.34	360.30	100.0
			limestone-hosted, brownish gray,	6130.8	3.65	28.35	6.37	196.8	40.32	0.41	7.80	1523.9	77.07	361.30	
			dolomitized, organic material matrix,	945.8	1.61	26.95	4.09	388.5	20.22	0.25	14.84	1318.8	244.7	362.30	
			with sphalerite-calcite-pyrite-galena vein-	1190.2	1.72	35.18	4.61	206.3	27.89	0.16	12.32	1695.0	173.3	363.30	
			lets,	1216.5	1.42	60.77	4.08	221.4	26.89	0.33	10.08	2673.0	117.6	364.30	
365			361.20~361.40m, 365.30~367.20m	7677.6	2.30	76.15	3.22	328.4	32.15	0.20	7.20	3388.3	69.8	365.30	
			brecciated, sphalerite-galena-pyrite matrix,	2342.1	4.30	45.83	2.67	1204	51.53	0.10	19.90	978.2	111.9	366.30	
			364.50~365.00m	1.92(%)	1.02	28.84	2.65	963.3	70.51	0.20	17.00	1124.0	49.0	367.30	
			calcite-sphalerite-pyrite vein,	1.69(%)	1.06	39.71	2.78	747.6	86.35	0.20	14.00	934.2	41.9	368.30	
														369.30	
370	[Horizontal dashed pattern]	370.80	Cavity										370.80	13.3	
			Dolomite (Turonian age)											370.80	93.3
			light brownish gray, finely calcite												
			matrix, lamina is recognized, with												
			calcite-pyrite veinlets,	3798.3	0.73	48.36	4.40	523.7	12.58	0.16	12.88	1267.4	46.67	373.90	100.0
375	[Cross-hatched pattern]	375.05	Mineralized zone	2.45%	8.23	40.62	2.36	840.3	236.7	1.24	26.32	638.4	94.51	374.90	100.0
			limestone-hosted, brownish gray~brown,	3.45%	8.78	41.84	2.49	704.9	382.9	0.58	24.78	816.9	71.64	375.90	
			dolomitized, partially brecciated,	2.89%	1.74	21.70	2.90	1007.9	48.22	0.41	31.36	832.5	81.90	376.90	
				1.65%	0.24	16.06	1.51	829.6	14.19	0.16	34.30	1042.9	141.2	377.90	
			375.10~377.10m, 382.00m	3701.6	0.92	28.47	2.91	588.9	17.65	0.08	21.00	969.2	173.9	378.90	
			sphalerite-galena-pyrite matrix,	3.45%	16.00	68.99	5.22	1003	208.6	0.16	25.34	355.1	45.20	379.90	
			377.10~378.50m	3.46%	8.86	64.41	2.39	848.2	229.9	0.16	24.08	346.4	59.31	380.90	
			calcite-galena-pyrite-(sphalerite) veinlets,	694.1	1.15	28.05	2.96	899.8	23.43	0.08	35.42	1565.1	323.9	381.90	
			379.90~381.40m											382.90	
			sphalerite-galena massive ore,												
380	[Cross-hatched pattern]	383.60	Cavity												
385	[Blank]	400.00													
400															

Appendix 4 Columnar section of the drill hole, MJTK - L2

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000. 12. 30~2001. 1. 30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
		0.60	Overburden													
			Limestone													93.3
			light brownish white, compact, homogeneous, finely calcite matrix, weathered and weakly oxidized, limonite and pyrite are scattered, with pyrite striation and a small amount of calcite veinlets, limonite is found in the fissures.													78.6
			4.60~4.80m coarsely calcite cement.													100.0
																93.3
																93.3
																86.7
																100.0
																100.0
																100.0
																96.7
																86.7
			30.60~32.80m crushed.													96.7
																93.3
																93.3
																100.0
																100.0
																93.3
																96.7
																100.0
																100.0
																93.3
																96.7
																100.0
																93.3
																100.0

Appendix 5 Columnar section of the drill hole, MJTK-L3



# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000.12.30~2001.1.30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
80			Limestone												100.0
			grayish white, finely calcite matrix, homogeneous, partially interbedded with thin bedded black marl, with calcite-(pyrite) veinlets, limonite is found in the fissures.												100.0
65			61.00~61.20m black marl, 61.30~61.90m black marl.												80.0
															96.7
70															96.7
															90.0
75															93.3
			80.80~80.90m calcite-(pyrite) vein.												96.7
80		81.10	Limestone												96.7
			whitish gray, compact, finely calcite matrix, homogeneous, alternating of limestone and thin bedded black marl, with calcite network~veinlets.												100.0
85			83.30m calcite-(pyrite) vein (width 2cm), 88.80~88.90m with calcite-(pyrite) veinlets (width 3cm).												90.0
90		91.00	Marl												100.0
			gray~blackish gray, lime mud matrix, partially interbedded with dark gray mudstone, with calcite veinlets~network.												100.0
95			91.00~91.80m crushed, 94.70~95.20m crushed, 95.20~96.40m with calcite veinlets.												100.0
			98.80~99.30m with calcite veinlets~network.												96.7
100			102.00~102.10m with calcite-(pyrite) veinlets.												100.0
															100.0
105															100.0
			113.60~113.80m with calcite veinlets.												96.7
110															100.0
			116.20m calcite veinlets (width 5cm), 117.20m calcite-(pyrite) veinlets (width 5cm), 118.20~118.50m with drusy calcite vein.												100.0
115															100.0
															100.0
120															100.0

Appendix 5 Columnar section of the drill hole, MJTK-L3

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000. 12. 30~2001. 1. 30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
120			Marl dark gray~black, lime mud matrix, partially interbedded with mudstone, with calcite-(pyrite) veinlets~network.														100.0
125			123.00~128.00m dark gray mudstone. 126.40m calcite veinlets (width 2cm). 128.00m calcite veinlets (width 3cm). 129.60~129.80m with calcite-(pyrite) vein.														100.0
130			132.70m calcite veinlets (width 2cm). 133.10~133.50m with calcite-(pyrite) veinlets. 134.30~135.90m dark gray mudstone.														100.0
135																	100.0
140			141.35~141.50m with calcite-(pyrite) network.														100.0
145			145.20~145.50m dark gray mudstone. 147.00~147.20m with calcite veinlets. 147.80~151.40m mostly crushed. 150.80m calcite-(pyrite) vein (width 7cm). 153.30~153.70m with calcite network.														100.0
150																	100.0
154.00			Marl dark gray, lime mud matrix, fossiliferous, alternating of black marl and gray limestone, with calcite network~veinlets.														100.0
155																	100.0
160			164.20m ammonite bearing. 165.80~168.80m mostly crushed.														100.0
165																	80.0
170																	53.3
171.90			Limestone light brownish white, compact, finely calcite matrix, lamina is recognized, with pyrite striation and calcite veinlets~network. 174.90~175.10m sphalerite network. 178.40~180.80m calcite-(pyrite) veinlets with a trace amount of galena.														46.7
175																	13.3
180																	66.7

Appendix 5 Columnar section of the drill hole, MJTK - L3

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000. 12. 30~2001. 1. 30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
180	[Limestone Columnar Section]	180	Limestone											66.7	
			light brownish white~light brownish gray, compact, finely calcite matrix, partially interbedded with thin bedded black marl, lamina is recognized, with pyrite striation and calcite veinlets~network, pyrite are scattered.												100.0
185			181.20~181.40m	with calcite network~veinlets.											90.0
			182.70m	calcite-pyrite veinlets (width 3cm).											76.7
190			187.80~190.40m, 192.80~193.80m	mostly crushed, calcite-pyrite network.											93.3
			192.70m	calcite-(pyrite) veinlets (width 5mm) with a trace amount of galena.											100.0
195			198.40~201.60m	calcite-pyrite vein~network with a trace amount of sphalerite and galena.											86.7
			202.00~203.40m	with calcite-(pyrite) veinlets.											100.0
200			204.00												90.0
		[Brecciated zone Columnar Section]	205	Brecciated zone											73.3
			dark gray~blackish gray, black mud and pyrite matrix, breccias are composed mainly of Cretaceous and Triassic carbonate rocks (breccias are as much as 2-20cm in diameter).												73.3
210			209.60m	limestone breccia with calcite-pyrite-(sphalerite) veinlets.											76.7
			212.30~214.20m	contains brownish gray limestone breccia with small amounts of celestite.											100.0
215			216.70												100.0
	[Gypsum-Carbonate rocks complex Columnar Section]	220	Gypsum-Carbonate rocks complex											100.0	
			whitish gray~gray, gypsum-calcite matrix, brecciated (breccias are composed mainly of Cretaceous limestone and Triassic carbonate rocks), dolomitized.												100.0
225			218.10~220.00m	mussive gypsum.											100.0
	[Gypsum-Mudstone-Carbonate rocks complex Columnar Section]	226.50	Gypsum-Mudstone-Carbonate rocks complex											63.3	
			purplish~purplish gray, brecciated (breccias are composed mainly of Triassic limestone, dolomite and calcareous mudstone), with gypsum vein.												86.7
230		233.30												80.0	
	[Mudstone-Gypsum-Carbonate rocks complex Columnar Section]	235	Mudstone-Gypsum-Carbonate rocks complex											86.7	
			grayish white~pale greenish white, brecciated (breccias are composed mainly of Triassic limestone, dolomite and calcareous mudstone), with gypsum vein.												100.0
240															

Appendix 5 Columnar section of the drill hole, MJTK - L3

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000. 12. 30~2001. 1. 30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba					
240	^ ^	260.80	Mudstone-Gypsum-Carbonate rocks complex light greenish white, brecciated (brecciaes are composed mainly of calcareous sandstone, mudstone, limestone and dolomite, with gypsum vein~veinlets.													100.0		
^ ^																		100.0
^ ^																		100.0
245	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
250	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
255	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
260	^ ^	271.80	Dolomite-Gypsum-Mudstone complex gray~blackish gray, strongly dolomitized and pyritized, brecciated (brecciaes are composed mainly of dolomite, calcareous sandstone and mudstone, with gypsum vein~veinlets, contains hydrozincite. 267.40~268.40m contains pyrite crystal.													93.3		
^ ^																		100.0
^ ^																		100.0
265	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
270	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
275	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
280	^ ^	298.90	Mudstone-Gypsum-Carbonate rocks complex pale green~gray, brecciated (brecciaes are composed mainly of mudstone, dolomite and calcareous sandstone, with gypsum vein~veinlets, contains hydrozincite. 291.80~292.80m wholly crushed, 294.80~296.20m massive gypsum.													100.0		
^ ^																		100.0
^ ^																		100.0
285	^ ^																	100.0
^ ^																		100.0
^ ^																		100.0
290	^ ^																	100.0
^ ^																		53.3
^ ^																		100.0
295	^ ^																	100.0
^ ^																		100.0
300	^ ^				Mudstone-Carbonate rocks-Gypsum complex													100.0

Appendix 5 Columnar section of the drill hole, MJTK-L3

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000. 12. 30~2001. 1. 30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)			
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba	
300	^		Mudstone-Carbonate rocks-Gypsum complex dark gray, gypsum cement, brecciated (brecciaes are composed mainly of dolomite and limestone).												100.0	
	^															83.3
	^															
	^															
305	^															73.3
	^															
	^															
	^															
	^	307.80		Gypsum-Mudstone-Carbonate rocks complex dark gray~gray, brecciated (brecciaes are composed mainly of dolomite, mudstone, calcareous sandstone and Cretaceous limestone), dolomite matrix and gypsum cement.												96.7
	^															
310	^															100.0
	^															
	^															100.0
	^															
315	^															100.0
	^															
	^															100.0
	^															
320	^														100.0	
	^															
	^														100.0	
	^															
325	^														100.0	
	^															
	^														100.0	
	^															
330	^														100.0	
	^															
	^														100.0	
	^															
	^	334.20	Brecciated zone dark gray~gray, brecciaes are composed mainly of marl and limestone (with calcite-pyrite veinlets~network), marl matrix.												100.0	
335	△															
	△															76.7
	△															
	△															83.8
340	△															
	△														100.0	
	△	341.40	Limestone gray~brownish gray, finely calcite matrix, partially interbedded thin bedded black marl, with calcite-pyrite veinlets~network.  341.50~341.70m with calcite-pyrite-sphalerite veinlets. 342.40~342.80m with calcite-pyrite-sphalerite veinlets. 348.70m calcite vein (width 5cm). 351.70m calcite-massive pyrite vein (width 50cm).  355.90~356.50m with calcite-pyrite vein. 358.80~359.00m with calcite veinlets. 360.30~360.80m with calcite vein.												66.7	
345	□															100.0
	□															100.0
	□															100.0
350	□															100.0
	□															46.7
	□															
	□															100.0
355	□															100.0
	□															100.0
360	□														100.0	

Appendix 5 Columnar section of the drill hole, MJTK - L3

# GEOLOGIC LOG

Hole : MJTK-L3  
 Machine Model : RASKA30  
 Elevation : 419.25m  
 Drilled Length : 374.50m

Site Name : El Akhouat  
 Period : 2000.12.30~2001.1.30  
 Inclination : 70°  
 Direction : 298°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
360			Limestone													100.0	
			gray~brownish gray, finely calcite matrix, partially interbedded thin bedded black marl, with calcite-pyrite veinlets~network.														100.0
365			361.20~363.40m sheared zone, 366.80~367.00m contains massive pyrite.														53.3
																	43.3
370																	66.7
																	61.1
		372.80	Mudstone-Carbonate rocks complex													100.0	
		374.50															
375																	

Appendix 5 Columnar section of the drill hole, MJTK-L3

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
			Limestone gray, compact, finely calcite matrix, weathered, with calcite-pyrite veinlets. limonite is found in the fissures.											66.7	
														38.9	
														53.3	
														53.3	
														76.7	
		11.00	Limestone yellowish brown, weathered, alternating of limestone and marl, with calcite-hematite veinlets~network and pyrite striation, limonite is found in the fissures.											80.0	
														80.0	
														66.7	
														66.7	
														66.7	
														96.7	
		27.90	Limestone light gray~gray, argillaceous, alternating of limestone and marl, crack dominant, limonite is found in the fissures.											86.7	
														66.7	
														23.3	
		39.00	Limestone brownish gray~gray, finely calcite matrix, with calcite veinlets~network and pyrite striation, limonite is found in the fissures.											83.3	
														83.3	
			46.30m calcite vein (width 2-3cm). 46.70m calcite vein (width 5cm) with a trace amount of galena.											100.0	
		48.80	Limestone light brownish gray~light gray, finely calcite matrix.											90.0	
		51.40	Brecciated zone brecciaes are composed mainly of limestone, calcite and limonite, with oxidized vein.											70.0	
		55.80	Limestone brownish gray~gray, finely calcite matrix, with calcite veinlets~network and pyrite striation.											46.7	
														96.7	

Appendix 6 Columnar section of the drill hole, MJTK - L4

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
60			Limestone brownish gray~gray, finely calcite matrix, with calcite veinlets~network. limonite is found in the fissures.												100.0
65			62.20m calcite vein (width 10cm). 67.10m calcite veinlets (width 3cm). 68.00m calcite veinlets (width 2cm).												90.0
70			71.80~72.00m with calcite-(pyrite) vein.												100.0
71.80			Limestone light gray~light brownish gray, alternating of limestone and very thin bedded black marl, with calcite veinlets~network and pyrite striation.												100.0
75			74.30~74.90m calcite network with a trace amount of galena. 77.50~82.70m calcite veinlets~network dominant.												100.0
80			91.50m calcite vein (width 20cm). 92.90m calcite vein (width 3cm) with a trace amount of sphalerite.												100.0
85			95.30~95.70m calcite veinlets with a trace amount of galena. 96.70~97.80m calcite veinlets dominant. 98.90~99.30m calcite vein (width 20cm).												93.3
90															80.0
95															100.0
99.30			Limestone brownish gray~gray, alternating of limestone and very thin bedded marl, with calcite veinlets and pyrite striation.												100.0
100			106.70m calcite vein. 106.90m calcite vein with a trace amount of galena.												100.0
105			109.20~110.00m calcite-(barite)-(galena) matrix. 113.00~113.30m brecciated, calcite-(barite) matrix with a small amount of galena.	2338.2	371.9	8.63	1.09	1599	2.63	0.30	31.0	1268.8	>20000	109.10	93.3
110			113.80m calcite-(galena) network.	6732.9	553.1	21.9	1.72	1217	<2.0	0.86	22.8	1397.7	>20000	110.10	
115			114.40m calcite-(galena) veinlets (width 1cm). 115.60m calcite-(galena) veinlets (width 1cm). 117.30m calcite veinlets with a trace amount of galena. 119.30m calcite vein. 119.50m calcite vein with a trace amount of galena.	379.27	216.3	22.8	0.72	2222	<2.0	0.20	20.0	2175.7	>20000	111.10	100.0
120				704.09	511.7	5.61	0.69	1183	<2.0	0.22	19.2	1797.1	>20000	112.10	
				1713.5	1657	8.42	0.91	1853	5.14	0.29	27.5	1917.0	>20000	113.10	100.0
														113.70	

Appendix 6 Columnar section of the drill hole, MJTK - L4



# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
120			Limestone brownish gray~gray, argillaceous, with calcite veinlets and pyrite striation, 121.90m calcite vein with a trace amount of galena and sphalerite.														100.0
125			122.90~124.20m calcite-(pyrite) vein with a trace amount of galena and sphalerite. 126.80~127.30m calcite-pyrite veinlets with a small amount of sphalerite and galena.														100.0
130			128.10~128.30m calcite veinlets with a trace amount of sphalerite.														100.0
132.20			Marl dark gray, calcareous, lime mud matrix, with calcite veinlets~network, 137.70~138.90m calcite vein with a trace amount of sphalerite.														86.7
135																	100.0
138.80			Limestone light brownish gray~brownish gray, finely calcite matrix, with calcite veinlets ~network and pyrite striation.														100.0
140																	100.0
143.30			Marl dark gray, calcareous, lime mud matrix, with calcite veinlets~network, 152.30~152.70m with calcite vein~veinlets, 154.50~154.70m calcite vein~veinlets with a trace amount of galena.														100.0
145																	100.0
150																	100.0
155																	100.0
160			159.20~160.40m brecciated, oxidized, wholly crushed, calcite-pyrite matrix, 160.40~164.90m calcite-(pyrite) vein~network with a trace amount of galena, 167.60m calcite-(pyrite) vein(width 3cm) with a trace amount of galena.														73.3
165																	86.7
170																	93.3
172.80			Limestone brownish gray, argillaceous, interbedded with black thin bedded mudstone, with barite-calcite-(pyrite)-(galena) veinlets~network, 174.00m calcite-pyrite vein with a trace amount of galena.														100.0
175																	100.0
180				446.3	2549.5	15.6	1.37	1339	8.40	0.56	30.0	891.6	>20000				90.0
				1131.1	2776.2	15.0	1.53	907.6	6.50	1.00	29.0	780.8	>20000				173.20
				734.9	1059.0	15.0	1.07	1213	2.95	0.81	39.5	1089.8	>20000				174.20
				1349.4	1285.0	4.94	2.19	2703	3.83	1.28	39.0	785.6	>20000				175.20
				455.2	1006.2	9.76	0.98	792.1	<2.0	0.69	35.0	718.4	>20000				176.20
				174.5	1790.5	11.8	0.94	960.8	<2.0	0.67	32.0	1013.7	>20000				177.20
				2105.4	3061.1	10.0	0.27	2378	4.15	2.15	31.0	590.2	>20000				178.20
																	179.20

Appendix 6 Columnar section of the drill hole, MJTK - L4

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba		
180		180.20	Limestone	662.1	2201.4	12.3	0.12	1246	2.85	0.64	33.0	745.6	>20000	180.20	86.7
		181.20	brownish gray, argillaceous.	1562.5	2501.0	13.6	4.85	3213	<2.0	2.70	28.9	995.3	>20000	181.20	
		182.20	Marl	9373.6	1184.0	20.0	3.59	2167	2.76	1.97	9.2	423.7	>20000	182.20	73.3
		183.20	dark gray, partially brecciated, barite-calcite-galena-spharelite matrix, mostly crushed.	6838.9	1634.0	11.1	4.64	2698	<2.0	2.05	8.6	590.1	>20000	183.20	
185		184.20		1.40%	1380.9	26.1	3.85	2053	6.72	1.60	8.4	612.4	>20000	184.20	
		185.20		1.40%	1381.5	66.8	6.25	3480	2.06	1.65	13.7	806.5	>20000	185.20	
		186.70	Limestone	5807.0	1949.0	19.5	0.39	2966	<2.0	3.50	18.0	1125.0	>20000	186.70	100.0
		187.20	brownish gray, argillaceous, altanating of limestone and marl, with calcite veinlets~network and pyrite striation,	736.0	1549.1	22.9	1.34	1182	2.70	1.00	37.0	1182.5	>20000	187.20	
190		191.90	Marl											188.20	100.0
		195.40	Limestone												100.0
		205.20	Brecciated zone												100.0
		207.80	Marl												96.7
210														96.7	
	215													96.7	
	220													90.0	
	225													86.7	
	230													96.7	
	235													100.0	
	240													100.0	

Appendix 6 Columnar section of the drill hole, MJTK - L4

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
240			Marl dark gray, lime mud matrix, with calcite veinlets~vein, pyrite is found in the fissures.											100.0	
245														100.0	
		246.00	Marl brownish gray~dark gray, homogeneous, calcareous, with calcite-pyrite veinlets~vein,											100.0	
250														93.3	
			250.60~251.50m calcite-pyrite vein~veinlets,											100.0	
255														100.0	
260														100.0	
														100.0	
265														100.0	
														100.0	
270														100.0	
														100.0	
275			275.3m calcite veinlets, 276.5m calcite veinlets,											100.0	
														100.0	
280														100.0	
														100.0	
285			288.10~288.70m calcite-(pyrite) network~veinlets, 291.30~291.70m calcite-(pyrite)-(chalcopyrite) veinlets,											100.0	
290														100.0	
		292.30	Marl dark gray, lime mud matrix, calcareous, with calcite veinlets, pyrite is found in the fissures.											76.7	
295														83.3	
														96.7	
300															

Appendix 6 Columnar section of the drill hole, MJTK - L4

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
300			Marl dark gray, lime mud matrix, calcareous, with calcite veinlets, pyrite is found in the fissures.													90.0	
		305														100.0	
																100.0	
		310														100.0	
																100.0	
		315	315.00m calcite vein (width 3cm), 315.30m calcite veinlets, 315.60m calcite veinlets,  318.30m calcite vein (width 3cm),													100.0	
		320	321.30m calcite vein, 326.20m calcite vein (width 5cm),													100.0	
		325														96.7	
																100.0	
		330	330.50~331.90m with calcite network~veinlets,													100.0	
		335														100.0	
		336.40	Marl dark gray, lime mud matrix, calcareous, with calcite veinlets.													100.0	
		340	336.40~337.40m calcite-(sphalerite) veinlets with a trace amount of galena, 339.30~340.50m with calcite-(sphalerite) veinlets, 341.90~342.00m with calcite network~veinlets, 344.20~347.10m brecciated, with a trace amount of galena, 347.50~348.30m with calcite veinlets, 352.40m calcite vein (width 2cm),													100.0	
		345														100.0	
																100.0	
		350	352.40m calcite vein (width 2cm),													100.0	
																91.7	
		355	357.00m calcite veinlets,													93.3	
																100.0	
		360															

Appendix 6 Columnar section of the drill hole, MJTK-L4

# GEOLOGIC LOG

Hole : MJTK-L4  
 Machine Model : RASKA30  
 Elevation : 487.53m  
 Drilled Length : 400.00m

Site Name : El Akhouat  
 Period : 2001. 2. 5~2. 27  
 Inclination : 60°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
360			Marl dark gray, lime mud matrix, calcareous. 365.60m calcite-pyrite vein (width 10cm).													100.0
365			369.50m calcite network. 370.10m calcite-(pyrite) veinlets.													100.0
370		370.40	Marl dark gray, lime mud matrix, with calcite veinlets. 373.80m calcite-(pyrite) veinlets.													90.0
375			380.50~380.70m with calcite veinlets. 381.30m calcite veinlets (width 1cm), 384.10~384.30m with calcite veinlets. 386.10~386.40m with calcite veinlets. 386.70~386.90m with calcite veinlets.													93.3
380																80.0
385																100.0
390																86.7
395			393.30m calcite veinlets. 393.70~398.50m with calcite veinlets.													96.7
400		400.00	397.90~398.50m mostly crushed. 399.10~400.00m mostly crushed.													84.0
																76.7
																100.0
																100.0
																100.0

Appendix 6 Columnar section of the drill hole, MJTK-L4

# GEOLOGIC LOG

Hole : MJTK-L5  
 Machine Model : RASKA30  
 Elevation : 585.38m  
 Drilled Length : 245.10m

Site Name : El Akhouat  
 Period : 2000. 12. 5~12. 19  
 Inclination : 65°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
			Limestone light brownish white, massive, weathered, oxidized, with calcite veinlets. limonite and hematite are found in the fissures.													43.3	
		5														73.3	
		10														100.0	
		15														100.0	
		16.30	16.30~16.50m fault clay.													100.0	
		16.50	Limestone grayish white~light gray, massive, weakly weathered, with calcite network. limonite is found in the fissures.													100.0	
		20														100.0	
		20.40	20.40~21.90m wholly crushed.													100.0	
		25														100.0	
		29.50	29.50~29.70m fault clay.													100.0	
		29.70	Limestone light yellowish white (partially gray), massive, weakly weathered, consists mostly limestone but contains some intercalated marl. limonite is found in the fissures.													100.0	
		35														100.0	
		40														100.0	
		43.10	43.10~44.30m gray marl.													100.0	
		44.30	44.50m calcite veinlets (width 5cm).													100.0	
		45														100.0	
		48.10	48.10~48.70m gray marl.													100.0	
		48.70	49.40m calcite veinlets (width 1cm).													100.0	
		50														100.0	
		53.20	53.20~54.10m gray marl.													100.0	
		54.20	54.40m calcite veinlets (width 1cm).													100.0	
		55														100.0	
		54.80	54.90~55.50m gray marl.													100.0	
		55.50														100.0	
		60														100.0	

Appendix 7 Columnar section of the drill hole, MJTK-L5

# GEOLOGIC LOG

Hole : MJTK-L5  
 Machine Model : RASKA30  
 Elevation : 585.38m  
 Drilled Length : 245.10m

Site Name : El Akhouat  
 Period : 2000. 12. 5~12. 19  
 Inclination : 65°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
60			Limestone light grayish white~light yellow. massive. weakly weathered.														100.0
65		63.20~63.75m	limonite is found in the fissures.														100.0
		68.90m	calcite veinlets (width 3mm).														100.0
		69.10m	calcite veinlets (width 5mm).														100.0
70																	100.0
		73.85															100.0
75			Limestone light whitish gray~gray. massive, partially oxidized, has lamina structure, interbedded with thin bedded marl, with calcite veinlets, limonite is found in the fissures.														100.0
80																	100.0
		78.15~78.50m	oxidized.														86.7
		81.10m	calcite veinlets (width 3mm).														90.0
		82.25m	calcite veinlets (width 4mm).														100.0
		85.00~86.35m	oxidized.														100.0
		87.35m	calcite-(pyrite) vein (width 3cm).														100.0
90																	100.0
		88.30~88.75m	calcite-pyrite veinlets (width 1-3mm).														100.0
		89.00m	calcite veinlets (width 7mm).														100.0
		90.45m	calcite veinlets (width 1mm).														100.0
		96.10m	calcite veinlets (width 2-5mm).														100.0
		98.70~99.10m	oxidized.														100.0
		99.40~99.90m	oxidized.														100.0
		102.20~102.70m	has lamina structure.														100.0
100		102.70															100.0
			Limestone light whitish gray~gray. massive, partially oxidized, interbedded with thin bedded marl, limonite is found in the fissures.														100.0
																	100.0
		103.50~103.80m	oxidized.														100.0
		104.90~105.30m	oxidized.														100.0
		112.00~113.25m	has lamina structure.														100.0
110																	100.0
		116.00															100.0
			Limestone dark gray. has lamina structure. contain pyrite nodules.														100.0
120																	100.0

Appendix 7 Columnar section of the drill hole, MJTK-L5

# GEOLOGIC LOG

Hole : MJTK-L5  
 Machine Model : RASKA30  
 Elevation : 585.38m  
 Drilled Length : 245.10m

Site Name : El Akhouat  
 Period : 2000. 12. 5~12. 19  
 Inclination : 65°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)			
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba					
		120	Limestone dark gray, has lamina structure.													100.0		
		123.65	Limestone light brownish white, weakly weathered, limonite is found in the fissures.													100.0		
		125	Limestone light gray~light yellowish gray, massive, limonite is found in the fissures.													100.0		
		130	124.60m calcite veinlets (width 3-10mm), 130.65m calcite-pyrite-(sphalerite) network, 131.00~131.60m calcite-(sphalerite)-limonite matrix, 131.70m calcite-pyrite veinlets (width 2mm).													100.0		
		132.70	Limestone light gray, massive, interbedded with very thin bedded marl, a minor amount of pyrite is almost invariably present, limonite is found in the fissures.													100.0		
		135		96.3	280.6	10.1	0.82	352	9.23	0.22	53.2	1112	128			136.00	100.0	
				121	2700	10.0	0.82	352	21.5	0.31	48.7	1356	106			137.00		
			133.00~133.50m calcite-(sphalerite)-(pyrite) network.	1226	1.2%	9.8	1.14	415	24.8	0.48	46.2	1349	209			138.00		
		140	134.70m calcite-sphalerite-pyrite veinlets (width 5mm), 134.90~135.10m calcite-(pyrite)-hematite veinlets (width 1cm), 135.90~136.30m calcite network, 136.45~136.90m calcite-pyrite-(sphalerite) network.	154	<5.0	10.2	7.40	2679	5.42	0.64	1.04	204	425			139.00	90.0	
		145	137.25~137.45m calcite-sphalerite network with a trace amount of galena, 137.60~137.80m calcite-(pyrite) network, 137.80~138.00m calcite-sphalerite network, 138.10~138.70m calcite-(sphalerite)-(pyrite) network, 140.65~140.75m calcite-(sphalerite) veinlets (width 2-3mm), 142.10m, 142.60m, 143.25m, 143.40m calcite-(pyrite) veinlets (width 3mm), 144.90~145.40m oxidized.													140.00		
		145.00																
		145.40																
		150	147.20~147.35m calcite-(sphalerite) network, 148.45~148.55m calcite veinlets with trace amounts of sphalerite, 149.90m, 152.00m calcite veinlets (width 2-3mm), 156.15~156.50m drusy calcite veinlets with trace amounts of sphalerite (width 1-3mm), 158.25~158.70m calcite-(pyrite) network, 159.10m calcite vein (width 1.5cm), 159.30~159.50m calcite network, 163.00m calcite veinlets with trace amounts of galena (width 3mm), 165.35m calcite veinlets (width 5mm), 168.10~170.25m calcite veinlets~network, 172.70~173.35m drusy calcite-(pyrite) network.														100.0	
		155																
		160																
		165																
		170																
		173.35	Limestone light gray (partially gray), massive, has lamina structure, with pyrite striations.													100.0		
		175																
		180																

Appendix 7 Columnar section of the drill hole, MJTK - L5



# GEOLOGIC LOG

Hole : MJTK-L5  
 Machine Model : RASKA30  
 Elevation : 585.38m  
 Drilled Length : 245.10m

Site Name : El Akhouat  
 Period : 2000. 12. 5~12. 19  
 Inclination : 65°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
180			Limestone light gray (partially gray), massive, finely crystalline, has lamina structure.													100.0	
		183.05m	calcite-sphalerite veinlets (width 1-3mm).													100.0	
185		183.90m	calcite-(sphalerite) veinlets (width 1-3mm).													100.0	
		184.70~184.80m	calcite-(pyrite) veinlets (width 1mm).													100.0	
190		185.10m	calcite-(sphalerite) veinlets (width 1-3mm).													100.0	
		188.10~188.15m	calcite-pyrite veinlets.													100.0	
		188.55m, 189.00m, 190.55~191.00m	calcite veinlets (width 1-3mm).													100.0	
195		191.30m	calcite-pyrite veinlets (width 1mm).													100.0	
		191.80m	calcite veinlets (width 2mm).													100.0	
		192.90m	calcite-pyrite veinlets (width 1mm).													100.0	
		193.90m	calcite veinlets (width 1mm).													100.0	
200		194.85m	calcite veinlets (width 7mm).													100.0	
		195.15m, 195.40m, 196.05m	calcite veinlets (width 2-5mm).													100.0	
		200.85~201.40m	oxidized vein.													100.0	
205		203.70~204.10m	calcite veinlets with trace amounts of sphalerite.													100.0	
		206.55~206.80m	calcite veinlets (width 2mm).													100.0	
210		207.90m	oxidized vein.													100.0	
		208.45m, 209.20m, 210.20m	calcite veinlets (width 1-2mm).													100.0	
215		217.10	Limestone light gray (partially gray), massive, has lamina structure, with calcite veinlets.													100.0	
		217.15m	calcite-(sphalerite) veinlets (width 1mm).													100.0	
220		223.60m	calcite-(sphalerite) veinlets (width 1mm).													100.0	
		226.00m	calcite-pyrite-(sphalerite) veinlets (width 1cm).													100.0	
230		231.70m	calcite veinlets (width 5mm).													100.0	
		232.60m	drusy calcite veinlets (width 1mm).													100.0	
		233.25	Limestone light gray, massive, has lamina structure, with calcite veinlets.													95.2	
235		233.25~233.40m	calcite-(sphalerite) veinlets.													30.0	
		234.75~235.00m	calcite-pyrite veinlets.													30.0	
		235.00~235.50m	calcite veinlets.													30.0	
		234.40~234.80m, 236.35~236.45m	calcite veinlets (width 2mm).													3.3	
240																	

Appendix 7 Columnar section of the drill hole, MJTK-L5

# GEOLOGIC LOG

Hole : MJTK-L5  
 Machine Model : RASKA30  
 Elevation : 585.38m  
 Drilled Length : 245.10m

Site Name : El Akhouat  
 Period : 2000. 12. 5~12. 19  
 Inclination : 65°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
240			Limestone													
		242.10	light gray (partially gray), massive.													3.3
			Non core (cavity)													0.0
245		245.10														
250																
255																
260																
265																
270																
275																
280																
285																
290																
295																
300																

Appendix 7 Columnar section of the drill hole, MJTK - L5

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)																																																																																																																																	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba																																																																																																																																			
	^ o		Colluvial deposits yellowish brown, weathered. consists of Trias gravel, sand and clay, calcite cement.															o		50.0		o		83.3	5	o		66.7		o		83.3		o		83.3	10	o		40.0		o		33.3		o		43.3		o		63.3		o		63.3	25	o	24.00	Alternating beds of limestone and mudstone limestone : yellowish brown~light gray, argillaceous, oxidized, with calcite veinlets, a small amount of pyrite is almost invariably present. limonite is found in the fissures. mudstone : brown, oxidized, wholly crushed.														o		93.3	30	o		100.0		o		93.3		o		90.0		o		100.0	40	o	40.50	Sandstone light gray~yellowish brown, fine-grained, calcareous, partially oxidized, with calcite veinlets (width 1-2mm). contains organic materials, limonite is found in the fissures.														o		100.0		o		100.0	45	o		100.0		o		90.0		o		96.7	60	o														
	o			50.0																																																																																																																																												
	o			83.3																																																																																																																																												
5	o			66.7																																																																																																																																												
	o			83.3																																																																																																																																												
	o			83.3																																																																																																																																												
10	o			40.0																																																																																																																																												
	o			33.3																																																																																																																																												
	o			43.3																																																																																																																																												
	o			63.3																																																																																																																																												
	o			63.3																																																																																																																																												
25	o	24.00		Alternating beds of limestone and mudstone limestone : yellowish brown~light gray, argillaceous, oxidized, with calcite veinlets, a small amount of pyrite is almost invariably present. limonite is found in the fissures. mudstone : brown, oxidized, wholly crushed.														o		93.3	30	o		100.0		o		93.3		o		90.0		o		100.0	40	o	40.50	Sandstone light gray~yellowish brown, fine-grained, calcareous, partially oxidized, with calcite veinlets (width 1-2mm). contains organic materials, limonite is found in the fissures.														o		100.0		o		100.0	45	o		100.0		o		90.0		o		96.7	60	o																																																																						
	o		93.3																																																																																																																																													
30	o		100.0																																																																																																																																													
	o		93.3																																																																																																																																													
	o		90.0																																																																																																																																													
	o		100.0																																																																																																																																													
40	o	40.50	Sandstone light gray~yellowish brown, fine-grained, calcareous, partially oxidized, with calcite veinlets (width 1-2mm). contains organic materials, limonite is found in the fissures.														o		100.0		o		100.0	45	o		100.0		o		90.0		o		96.7	60	o																																																																																																											
	o			100.0																																																																																																																																												
	o			100.0																																																																																																																																												
45	o			100.0																																																																																																																																												
	o			90.0																																																																																																																																												
	o			96.7																																																																																																																																												
60	o																																																																																																																																															

Appendix 8 Columnar section of the drill hole, MJTK - C1

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)			
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba	
80			Sandstone light gray~yellowish brown, fine-grained, calcareous, partially oxidized, contains pyrite nodules and micas, with calcite veinlets (width 1-2mm), limonite is found in the fissures.												100.0	
65															100.0	
		66.50	Limestone gray~reddish brown, argillaceous, has lamina structure, partially oxidized (hematitized and limonitized).												90.0	
70															83.3	
		72.00	Non core												0.0	
		73.00	Sandstone yellowish brown, fine-grained, angular~subangular calcite granulars, has lamina structure, interbedded with thin bedded argillaceous limestone.												100.0	
75															93.3	
			75.00~75.50m argillaceous limestone, partially oxidized.												33.3	
80			Limestone brownish yellow~gray, massive, finely crystalline, arenaceous, calcite cement.												45.0	
		83.10													100.0	
		84.50	Limestone light grayish white, massive, fossiliferaous, partially brecciated.												100.0	
85																
		87.00	Limestone light brownish yellow, massive, fossiliferaous, brecciated, oxidized lime mud matrix.	589	320	<0.5	0.78	1706	<1.0	0.20	46.5	821.1	352	87.00		
				488	280	<0.5	0.69	1632	<1.0	0.20	50.1	860.2	70.5	88.00	90.0	
				507	920	<0.5	2.54	1641	<1.0	0.17	46.8	582.9	95.9	89.00		
90															90.00	
		90.90	Limestone gray, massive, interbedded with thin bedded mudstone, with pyrite nodules, striations and calcite veinlets (width 2-10mm), limonite is found in the fissures.												96.7	
95															83.3	
			94.00~94.70m brownish yellow mudstone, 95.90~96.80m brownish yellow mudstone, 100.40~101.30m sheared zone.												80.0	
100															93.3	
		101.30	Limestone gray, massive, contains arenaceous limestone part, with calcite veinlets (width 2-5mm), limonite is found in the fissures.												96.7	
105															96.7	
			110.40~112.30m crack dominant.												100.0	
110															100.0	
			116.50~119.40m crack dominant.												90.0	
115															63.3	
120																

Appendix 8 Columnar section of the drill hole, MJTK - C1

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
120			Limestone gray, massive, contains arenaceous limestone part. with drusy calcite veinlets~network (width 2-5mm). limonite is found in the fissures.														
125			123.20m calcite veinlets (width 1.5cm). 125.90~126.70m arenaceous part. 128.10~128.50m arenaceous part.														
130		130.70	Non core (cavity)														0.0
		132.00	Sandstone light yellowish brown, fine-grained, oxidized.														100.0
135		133.50	Limestone grayish white, fossiliferous, brecciated, partly oxidized, lime mud and limonite-hematite matrix, pyrite disseminated.	319	40.4	<0.5	0.71	2103	<1.0	0.23	50.4	690.6	67.8				134.50
				217	140.9	<0.5	0.82	1073	13.9	0.26	43.7	915.0	93.2				135.50
				195	160.7	<0.5	0.75	847	8.43	0.28	47.3	1029	37.5				136.50
				280	420.6	<0.5	1.28	1318	<1.0	0.21	50.1	817.0	56.4				137.50
140		140.40	Alternating beds of marl and limestone marl: dark gray, massive, calcareous, partially crushed. limestone: light grayish white, massive, arenaceous, thin bedded.														138.50
145			140.40~150.30m a minor amount of pyrite is almost invariably present.														100.0
150																	100.0
155			156.00~156.30m wholly crushed. 156.50~159.00m cruck dominant.														90.0
160																	83.3
165			162.80~164.20m sheared. 164.80~165.00m fault clay.														100.0
170																	100.0
175																	100.0
180			179.50~180.90m sheared.														100.0

Appendix 8 Columnar section of the drill hole, MJTK - C1

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
180			Alternating beds of marl and limestone marl : dark gray, massive, calcareous, limestone : light grayish white, massive, arenaceous, thin bedded,  179.50~180.90m sheared, 182.70~183.30m fault clay.													100.0	
185				100.0													
190		189.70		100.0													
195				100.0													
200			Alternating beds of marl and limestone has lamina structure, marl : dark gray, argillaceous, hematite is found in the fissures, limestone : light grayish white, massive, finely crystalline, arenaceous, with druzey calcite vein~veinlets (width 2-15mm),  212.30~213.30m sheared,  220.00~220.10m sheared, 223.70~224.00m wholly crushed, 224.60~225.10m crack dominant.												100.0		
205				100.0													
210				100.0													
215				100.0													
220				100.0													
225		225.40		100.0													
230				83.3													
235				100.0													
240		236.30		90.0													
				100.0													

Appendix 8 Columnar section of the drill hole, MJTK-C1

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
240			Alternating of limestone and sandstone														
			limestone: dark gray. massive.														100.0
			sandstone: light grayish white. calcareous														100.0
			fine-grained. angular calcite granulars.														
			galena and pyrite disseminated.														
245		246.40	Sandstone	154	200	24.1	1.18	249	<1.0	0.11	0.33	52.7	182			245.90	
			light gray. fine-grained. subangular	287	120	<0.5	1.91	697	<1.0	0.11	0.47	50.5	77.6			246.90	100.0
			calcite granulars.	196	121	<0.5	2.40	1099	<1.0	0.12	0.72	40.7	42.3			247.90	
		249.40	Conglomerate	307	40	<0.5	1.41	797	<1.0	0.07	4.48	69.5	44.7			248.90	
			light brownish white. breccia are composed of limestone and marl.	401	121	<0.5	1.11	824	<1.0	0.06	16.2	217.9	<1.0			249.90	100.0
		251.00	Marl													250.90	
			dark gray.														100.0
			with pyrite nodules.														
			254.60~255.80m sheared.														100.0
			258.40~259.40m sheared.														
			259.60~260.00m sheared.														100.0
260		263.50	Alternating of marl and limestone														86.7
			marl: dark gray. friable and crumbly.														
			limestone: light grayish white. massive.														70.0
			finely crystalline. arenaceous.														
			with drusy calcite veinlets.														100.0
			269.20m														
			drusy calcite-(sphalerite) vein (width 1cm).														100.0
			270.50m														
			drusy calcite-(sphalerite) vein (width 2cm).														100.0
			274.70m														
			drusy calcite-(sphalerite) vein (width 5cm).														100.0
275		275.30	Marl														
			dark gray.														100.0
			with limestone block.														
			280.00m calcite-sphalerite network.														100.0
280		280.30	Limestone	379	1201	<0.5	1.39	1106	<1.0	0.30	51.8	411.5	153			280.70	
			light grayish white. massive.	657	1901	<0.5	1.73	1131	<1.0	0.28	50.4	430.9	<1.0			281.70	
			brecciated. lime mud matrix.	253	2500	<0.5	1.28	795	<1.0	0.26	51.8	497.8	<1.0			282.70	90.0
			281.50m calcite-sphalerite-pyrite matrix.	389	6000	7.80	1.40	612	13.5	0.27	47.9	545.3	38.0			283.70	
			281.90m calcite-sphalerite-pyrite matrix.													284.70	
285		285.70	Limestone														100.0
			grayish white. brecciated.														
			286.20~286.50m														80.0
			with calcite-sphalerite-pyrite breccia.														
290		287.30	Alternating of marl and limestone (Mal>>Ls)														
			marl: dark gray.														100.0
			with calcite veinlets.														
			limestone: light grayish white. massive.														100.0
			partially brecciated.														
			with drusy calcite veinlets.														
295		299.00	Limestone														100.0
			light grayish white. massive. brecciated.														
300																	

Appendix 8 Columnar section of the drill hole, MJTK - C1

# GEOLOGIC LOG

Hole : MJTK-C1  
 Machine Model : RASKA30  
 Elevation : 486.99m  
 Drilled Length : 311.20m

Site Name : Bazina Kebira  
 Period : 2000. 10. 11~10. 31  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
300			Limestone light grayish white, massive, partially brecciated.													100.0
		301.70m	with calcite-sphalerite-pyrite breccia.													100.0
305		304.70m	calcite veinlets with trace amounts of sphalerite.													50.0
		307.20	Limestone light grayish white, brecciated, pyrite rich lime mud matrix, wholly crushed.													13.3
310		311.20														0.0
315																
320																
325																
330																
335																
340																
345																
350																
355																
360																

Appendix 8 Columnar section of the drill hole, MJTK - C1



# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000.11.5~11.28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
			Overburden													36.7	
		4.70														70.0	
		6.50	Mudstone-Gypsum-Carbonate Rocks Complex light gray~gray, composed mainly of of calcareous mudstone, gypsum and brecciated limestone.													86.7	
			Mudstone-Gypsum Complex light gray~pale greenish gray, with calcite network.													93.3	
			8.60m gypsum vein (width 3cm).													86.7	
			9.00~9.20m massive gypsum.														
			11.10~11.30m massive gypsum.														
		15.80														100.0	
			Mudstone-Gypsum-Carbonate Rocks Complex pale greenish white~reddish brown, composed mainly of brecciated mudstone gypsum, limestone and dolomite.													100.0	
																100.0	
																100.0	
		23.50														86.7	
			Gypsum white, massive, partially brecciated (especially upper part).													100.0	
																93.3	
																100.0	
																100.0	
																100.0	
																100.0	
																100.0	
																100.0	
																100.0	
		42.30														100.0	
			Mudstone-Gypsum-Carbonate Rocks Complex light grayish white~reddish brown, composed mainly of calcareous mudstone gypsum, dolomite and limestone.													86.7	
		46.60														93.3	
		47.70	Marl black, loosely consolidated, very pasty.													90.0	
			46.60~47.70m interbedded with fine sandstone (loosely consolidated).													86.7	
		53.10														100.0	
			Sandstone yellowish brown, weathered, fine-grained angular~subangular calcite granular, oxidized.													100.0	
		58.50														100.0	
			Marl black, loosely consolidated, very pasty.													100.0	
		59.80														100.0	

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000. 11. 5~11. 28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
60			Sandstone yellowish brown, weathered, fine-grained subangular calcite granular, calcareous, limonite is found in the fissures.											100.0	
64.00			Marl dark gray, friable and crumbly, with calcite veinlets.											100.0	
65			Sandstone yellowish brown, weathered, fine-grained subangular calcite granular, oxidized, with calcite veinlets (width 1-2mm), limonite is found in the fissures.											83.3	
66.00			73.00~74.00m interbedded with marl.											68.20	
70				121	60.8	7.09	1.35	457	6.8	0.48	1.68	5708	687	69.20	93.3
				75.2	200	6.51	1.32	877	26.4	0.10	0.82	5446	587	70.20	
				54.4	140	5.63	1.16	659	16.4	0.09	0.72	2095	449	71.20	
				45.3	160	4.95	1.30	963	2.3	0.08	0.53	5693	620	72.20	
73.00				232	200	7.08	1.13	459	27.7	0.22	0.95	7737	645	73.20	93.3
74.00				106	152	6.25	1.25	683	15.9	0.20	0.94	5336	597	74.20	
75			Sandstone light grayish white, fine-grained, calcareous, partially brecciated, contains organic materials, cruck dominant.											93.3	
80			78.70~79.00m fault clay, 79.40~79.50m fault clay, 80.50~80.60m fault clay, 87.60~87.70m fault clay, 88.00~88.20m fault clay.											100.0	
85			88.20~88.50m strongly oxidized, 88.80~89.40m limonite is found in the fissures.											90.0	
90			Sandstone light grayish white, fine-grained, calcareous, angular~subangular calcite granular, calcite cement, has lamina structure.											100.0	
95			Marl black, loosely consolidated, very pasty, interbedded with calcareous sandstone, contain brecciaes of mussive limestone.											100.0	
95.20			101.80~102.60m fine-grained sandstone, 104.40~104.60m mussive limestone breccia.											90.0	
100														96.7	
105														90.0	
107.50			Fault Clay											86.7	
109.20			Sandstone light gray~grayish white, fine-grained, subangular calcite granular, contains glauconite, pyrite disseminated, interbedded with thin beded marl.											86.7	
110														96.7	
115														100.0	
115.80			Marl dark gray~black, friable and crumbly, sheared, contain brecciaes of limestone.											100.0	
120														100.0	

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000. 11. 5~11. 28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
120			Marl dark gray~black, friable and crumbly, sheared, contain breccias of limestone.													100.0	
125			120.20m barite vein (width 3cm), 121.80m calcite vein (width 2cm).													100.0	
126.10			Gypsum-Carbonate Rocks Complex light grayish white, composed mainly of gypsum, dolomite and lime mud.													100.0	
130																100.0	
135																100.0	
140			140.70~151.00m fault breccia.													76.7	
145			159.20~159.60m contains hydrozincite.													100.0	
150																100.0	
155																100.0	
160																100.0	
162.00			Gypsum-Carbonate Rocks Complex light grayish white, composed mainly of gypsum, dolomite and lime mud, contain breccias of calcareous mudstone													83.3	
165																100.0	
170																100.0	
175																100.0	
180																100.0	

Appendix 9 Columnar section of the drill hole, MJTK-C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000. 11. 5~11. 28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)				
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba						
180	^	180-192.00	Gypsum-Carbonate Rocks Complex light grayish white, composed mainly of gypsum, dolomite and lime mud, contain brecciaes of calcareous mud- stone, with gypsum vein.													100.0	100.0		
185	^																	100.0	100.0
190	^																	100.0	100.0
192.00	^																	66.7	100.0
				192.00	Fault clay														
				192.60	Gypsum-Carbonate Rocks Complex light grayish white, composed mainly of gypsum, dolomite and lime mud, contain brecciaes of calcareous mud- stone.														100.0
195	^																		100.0
200	^																		100.0
205	^																		100.0
210	^																		100.0
		211.50	Mudstone reddish brown, calcareous.														100.0		
		213.80	Mudstone-Gypsum-Dolomite Complex dark greenish white~light greenish gray, composed mainly of mudstone, gypsum, dolomite and lime mud,														100.0		
215	^																100.0		
220	^																100.0		
225	^																100.0		
230	^																100.0		
		230.80	Mudstone-Carbonate Rocks Complex pale green, composed mainly of mudstone, dolomite and gypsum vein.														100.0		
235	^																100.0		
240	^																100.0		

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000. 11. 5~11. 28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
240	^	241.50	Mudstone-Carbonate Rocks Complex													100.0
	^	242.50	Mudstone reddish brown, calcareous.													100.0
245	^		Mudstone-Carbonate Rocks Complex pale green (partially reddish brown), composed mainly of mudstone and dolomite, with gypsum and calcite veinlets.													100.0
	^															100.0
	^															100.0
250	^															100.0
	^															100.0
	^															100.0
255	^															100.0
	^															100.0
	^															100.0
260	^															100.0
	^	261.70	Mudstone-Carbonate Rocks-Gypsum Complex pale green, composed mainly of mudstone, dolomite and gypsum vein, with calcite network.													100.0
265	^															100.0
	^															100.0
	^	268.40	Mudstone-Carbonate Rocks Complex pale green, composed mainly of mudstone, dolomite and gypsum vein~veinlets, with calcite network, dolomite contain crystals of anhedral pyrite.													100.0
270	^															100.0
	^															100.0
	^															100.0
275	^															100.0
	^															100.0
	^															100.0
280	^															100.0
	^															100.0
	^	284.20	Mudstone-Gypsum-Carbonate Rocks Complex light greenish gray, composed mainly of mudstone, gypsum and dolomite, dolomite contains pyrite and with calcite veinlets.  284.20~285.30m massive gypsum. 289.00~290.10m massive gypsum. 292.20~293.00m massive gypsum.													100.0
285	^															100.0
	^															100.0
	^															100.0
290	^															100.0
	^															100.0
	^															100.0
295	^															100.0
	^	296.70	Mudstone-Carbonate Rocks Complex pale green.													100.0
	^															100.0
300	^															100.0

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kεbira  
 Period : 2000.11.5~11.28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)				
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba						
300	^	310.30	Mudstone-Carbonate Rocks Complex pale green. composed mainly of mudstone and dolomite, with Fe-rich calcite veinlets~network.													100.0	100.0		
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^																100.0	100.0	
	^	316.60	Mudstone-Carbonate Rocks Complex grayish white (partially reddish brown), composed mainly of mudstone and dolomite.													100.0	100.0		
	^	321.70		Gypsum-Dolomite Complex grayish white. composed mainly of gypsum and dolomite, contain brecciaes of calcareous mudstone.													100.0	100.0	
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^														100.0	100.0			
	^	341.50	Gypsum-Mudstone-Carbonate Rocks Complex grayish white. composed mainly of gypsum, mudstone and dolomite, contain brecciaes of Cretaceous marl and limestone.													100.0	100.0		
	^	348.20		Mudstone-Carbonate Rocks-Gypsum Complex grayish white (partially reddish brown), composed mainly of mudstone, dolomite, and Cretaceous marl and limestone.													90.0	100.0	
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^																	100.0	100.0
	^														100.0	100.0			
	^	359.30	Fault clay													93.3	100.0		
360																			

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-C2  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 386.10m

Site Name : Bazina Kebira  
 Period : 2000. 11. 5~11. 28  
 Inclination : 65°  
 Direction : 122°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)	
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba			
360		360.40	Fault clay													
			Marl dark gray~black, loosely consolidated, pasty, contain brecciaes of limestone, with calcite veinlets.													100.0
365		364.10	Fault clay													83.3
		365.80	Marl dark gray, friable and crumbly.													73.3
370																53.3
																66.7
375																53.3
																66.7
380																63.3
																100.0
385		386.10														
390																

Appendix 9 Columnar section of the drill hole, MJTK - C2

# GEOLOGIC LOG

Hole : MJTK-A1  
 Machine Model : RASKA30  
 Elevation : 181.09m  
 Drilled Length : 198.80m

Site Name : Siliana  
 Period : 2001. 9. 6~10. 10  
 Inclination : 70°  
 Direction : 35. 5°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
			Marl light brownish gray, weakly weathered. limonite and hematite are found in the fissures.													96.7	
		5														90.0	
		7.10	Marl dark gray, calcareous. contain pyrite nodules.  16.10m calcite veinlets (width 5mm).													100.0	
		10														100.0	
		15														90.0	
		20														80.0	
		21.80	Marl gray, argillaceous, has lamina structures, contains calcareous part, with pyrite nodules and calcite veinlets~network.													100.0	
		25.40														100.0	
		27.00														100.0	
		27.80														100.0	
		29.70														93.3	
		30.40														86.7	
		31.00														70.0	
		31.80														87.0	
		32.80														85.7	
		33.70														86.7	
		34.80														63.3	
		35.60														75.0	
		36.20	Marl gray, argillaceous, has lamina structure, contains pyrite nodules, with small amounts of calcite veinlets~ network (width 1mm±).													61.1	
		40.80														83.3	
		41.30														100.0	
		47.20														100.0	
		47.50	Marl gray, friable and crumbly, fossiliferous, contains pyrite nodules.														
		50.70															
		50.80															
		51.00															
		54.40															
		60															

Appendix 10 Columnar section of the drill hole, MJTK - A1



# GEOLOGIC LOG

Hole : MJTK-A1  
 Machine Model : RASKA30  
 Elevation : 181.09m  
 Drilled Length : 198.80m

Site Name : Siliiana  
 Period : 2001. 9. 6~10. 10  
 Inclination : 70°  
 Direction : 35. 5°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
60			Marl gray, calcareous, extremely friable and crumbly, with pyrite nodules.																														100.0																	100.0	65																70.0																	93.3																	100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00	
																100.0																	100.0	65																70.0																	93.3																	100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																		
																100.0	65																70.0																	93.3																	100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																			
65																70.0																	93.3																	100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																				
																93.3																	100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																					
																100.0				75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																						
			75.80m calcite-sphalerite veinlets~network,													100.0																	93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																							
																93.3				80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																								
			80.60~80.80m calcite-sphalerite veinlets~network,													100.0																	100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																									
																100.0				84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																										
			84.00~86.00m calcite-(sphalerite) veinlets~network,													100.0				87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																											
			87.40~88.40m calcite-(sphalerite) veinlets (width 1-5mm),													100.0				89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																												
			89.10m calcite-(sphalerite) veinlets (width 7mm),													100.0																	100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																													
																100.0				91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																														
			91.40~91.60m calcite-sphalerite veinlets (width 2mm),													100.0																	100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																															
																100.0																	100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																
																100.0				93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																	
			93.20 Alternating of limestone and marl (Ls>Mal) limestone : grayish white, finely crystalline, has lamina structure, with pyrite striation and calcite veinlets. marl : gray, argillaceous, pyrite rich.													76.5				93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																		
			93.50~93.90m calcite-sphalerite network, 95.10m calcite-(sphalerite) veinlets (width 2mm±),													76.9				99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																			
			99.30 100.00 Limestone grayish white, finely crystalline, contains minor amounts of pyrite striation and nodule, with calcite veinlets. 104.20m calcite-sphalerite veinlets.													90.0																	75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																				
																75.0				105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																					
			105.00 Alternating of limestone and marl (Ls>>Mal) limestone : grayish white, finely crystalline, with calcite veinlets~network, marl : gray, argillaceous, very thin beded.													100.0																	83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																						
																83.3				112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																							
			112.90m sphalerite veinlets with pyrite and galena, 114.50m barite-galena-sphalerite vein (width 3cm), 114.60m sphalerite-calcite veinlets (width 1mm),	253	<5.0	6.47	1.92	901	8.12	0.32	8.26	203.9	154	112.00	100.0					1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																								
				1839	60.6	<0.5	4.24	1154	<1.0	0.47	2.04	130.0	301	113.00						2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																								
				2855	60.0	<0.5	3.70	1608	<1.0	0.35	6.33	1111	445	114.00	100.0				115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																								
			115.70 Alternating of marl and limestone (Mal>>Ls) 113.00~114.10m barite-galena vein with a small amount of sphalerite, 116.10~116.50m calcite-(sphalerite)-(galena) network, 119.00~119.30m calcite-pyrite-(sphalerite)- (galena) network,	94.3	80.6	<0.5	4.25	1675	<1.0	0.46	4.36	225.6	582	115.00						604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				604	<5.0	<0.5	5.30	2844	<1.0	0.77	2.04	168.9	824	116.00	100.0					<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				<10	<5.0	<0.5	9.40	3739	2.15	0.77	0.90	1337	84.1	117.00						1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				1116	40.0	34	4.16	1130	4.10	0.48	0.81	212.3	268	118.00						57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
				57.8	40.2	1.5	4.37	1513	<1.0	0.52	2.04	179.2	270	119.00	100.0															120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
														120.00																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Appendix 10 Columnar section of the drill hole, MJTK - A1

# GEOLOGIC LOG

Hole : MJTK-A1  
 Machine Model : RASKA30  
 Elevation : 181.09m  
 Drilled Length : 198.80m

Site Name : Siliana  
 Period : 2001. 9. 6~10. 10  
 Inclination : 70°  
 Direction : 35. 5°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
		120	Alternating of marl and limestone (Mal>>Ls) with calcite-(sphalerite) veinlets~network.														100.0
		123.80	121.40~121.60m fault breccia.														73.3
		125	Limestone light grayish white, mussy, finely crystalline, with drusy calcite veinlets.														73.3
		125.80	Marl dark gray, with calcite network.														100.0
		130	Limestone light grayish white, mussy, finely crystalline, with calcite veinlets~network.														90.0
		131.60	133.00m sphalerite-(calcite) veinlets~network.														100.0
		134.00	Marl dark gray, calcareous, with calcite-(sphalerite) veinlets~network.	96.5	<5.0	45.8	6.30	2070	<1.0	0.84	1.65	649.0	657			135.00	100.0
		135		<10.0	<5.0	53.4	8.30	3534	<1.0	0.97	1.93	195.7	313			136.00	
		138.30	Limestone light grayish white, mussy, has pyrite striation and nodules, with calcite veinlets (width 2-5mm).	10.7	40.0	28.3	4.25	1048	<1.0	0.76	1.74	359.1	1088			137.00	100.0
		140	Marl dark gray, friable and crumbly, with calcite veinlets~network.	<10.0	40.0	11.6	3.72	771	3.59	0.94	2.99	314.1	1806			138.00	
		140.40	142.60~142.90m calcite-sphalerite veinlets (width 2-10mm).	12.0	40.0	23.0	3.16	474	1.96	0.58	1.26	254.2	1140			139.00	96.7
		145	145.10m sphalerite-calcite veinlets (width 2-5mm).														100.0
		145	145.60m fault clay.														100.0
		145	146.20m fault clay.														100.0
		150	146.60~147.00m sphalerite-calcite veinlets~network.														100.0
		150	148.70~149.00m sphalerite-calcite network.														100.0
		155	Alternating of marl and limestone (Mal>>Ls) marl : gray, argillaceous, limestone : light grayish white, mussy.														100.0
		155.30	156.10~156.40m calcite-sphalerite veinlets (width 2-4mm).														93.3
		155.30	156.90~157.00m sphalerite-(calcite) veinlets (width 5mm).														100.0
		155.30	158.00~158.80m calcite-sphalerite veinlets.														100.0
		159.70	Marl dark gray, with calcite veinlets.														100.0
		163.40	162.10~162.40m calcite-sphalerite veinlets (width 3-5mm).														100.0
		165	Limestone grayish white, recrystallized, brecciated, lime mud matrix.														100.0
		165	163.60m calcite-(sphalerite) vein (width 3cm).														100.0
		165	165.10~165.60m calcite-sphalerite veinlets~network.														100.0
		165	167.10~167.30m calcite-sphalerite matrix.														100.0
		165	168.60~169.30m calcite-(sphalerite) veinlets (width 2-5mm).														100.0
		165	170.80m calcite-(sphalerite) vein (width 2cm).														100.0
		165	172.30m calcite-sphalerite vein (width 1cm).														100.0
		165	174.50~175.30m calcite-sphalerite-galena veinlets~network.														100.0
		175	Alternating of marl and limestone (Mal>>Ls) with calcite veinlets~network.	473	40.0	<0.5	8.05	3410	<1.0	1.37	24.4	1055	<1.0			174.50	
		175.30	175.20~176.20m calcite-sphalerite-(galena) network.	<10.0	40.0	<0.5	6.30	2496	<1.0	0.68	1.12	1223	45.3			175.50	100.0
		175.30	179.00~179.40m calcite-sphalerite veinlets~network.	54.3	80.1	38.5	3.33	854	12.5	0.53	1.03	282.7	514			176.50	
		175.30		32.6	200	32.6	4.27	749	<1.0	0.66	3.11	287.8	1053			177.50	
		175.30		55.1	6400	210	7.78	1381	24.4	0.84	3.19	310.0	1422			178.50	93.3
		180														179.50	

Appendix 10 Columnar section of the drill hole, MJTK - A1

# GEOLOGIC LOG

Hole : MJTK-A1  
 Machine Model : RASKA30  
 Elevation : 181.09m  
 Drilled Length : 198.80m

Site Name : Siliana  
 Period : 2001. 9. 6~10. 10  
 Inclination : 70°  
 Direction : 35. 5°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
180		181.30	Alternating of marl and limestone (Mal>>Ls)													180	93.3
		183.50	Marl dark gray, with calcite network, 182.40m calcite-sphalerite-galena veinlets.													184.60	100.0
185		188.20	Alternating of marl and limestone (Mal>>Ls) with calcite-galena veinlets (width 2-5mm). marl : gray, with calcite-sphalerite veinlets. limestone : gray white, finely crystalline, has lamina structure, with pyrite striation. 186.80~186.90m fault clay.	402	80.8	18.2	2.45	730	8.24	0.35	3.27	405.1	1015			185.60	100.0
				3305	60.4	176	4.62	1556	<1.0	0.65	2.35	357.1	1149			186.60	
190			Marl dark gray, with calcite-galena veinlets~ network (width 1-2mm).  190.40~191.40m sphalerite-calcite network, 194.40~195.40m sphalerite-calcite network, 197.70~198.20m fault clay.	133	60.3	30.2	3.85	851	<1.0	0.55	0.84	201.5	400			190.65	100.0
				430	3800	36.9	2.14	716	<1.0	0.37	36.1	1092	275			191.65	
				312	68.1	70.3	5.10	1574	4.98	0.66	1.42	209.5	538			192.65	
				1440	60.5	17.9	3.28	761	8.61	0.39	1.40	384.9	1254			193.65	92.0
195				1512	620	23.1	3.56	835	13.0	0.46	2.07	325.8	600			194.65	
				314	100	33.3	3.23	819	10.7	0.48	2.24	460.6	754			195.65	
			Limestone light grayish white, finely crystalline, with barite-(sphalerite)-(galena) vein.	1687	80.3	24.0	8.80	3387	<1.0	0.95	2.18	378.5	821			196.65	100.0
		197.70 198.20 198.80														197.65	100.0
200																	
205																	
210																	
215																	
220																	
225																	
230																	
235																	
240																	

Appendix 10 Columnar section of the drill hole, MJTK - A1

# GEOLOGIC LOG

Hole : MJTK-O1  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000.12.25~2002.1.16  
 Inclination : 80°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
		0.70	Overburden												85.0
			Marl yellowish brown~brown, weathered. limonite is found in the fissures.												70.0
		5													50.0
		7.20	5.50~7.20m oxidized.												
			Marl black, with calcite vein~veinlets, limonite is found in the fissures.												70.0
		10													100.0
		15													100.0
			14.30m fault breccia, 17.50~18.00m sheared.												63.3
		18.00	Limestone												
			grayish white~gray, argillaceous, has lamina structure, with calcite veinlets~network, limonite is found in the fissures.												100.0
		20													100.0
		25	18.80m calcite vein~veinlets with a small amount of galena.												100.0
			23.00~23.85m calcite vein~veinlets (width 1cm).												100.0
		30	25.70~26.25m calcite vein~veinlets (width 2-20mm).												100.0
			31.80~32.00m calcite-(sphalerite) vein (width 2cm).												100.0
		35													
			32.40m calcite vein (width 8mm), 32.55m calcite vein (width 2cm), 33.60m calcite vein (width 7mm), 34.30~34.50m calcite veinlets (width 2mm), 40.25m calcite veinlets (width 5mm).												100.0
		40													93.3
		40.30	Sheared zone contains breccia of marl with calcite vein~network (petrole bearing).												76.7
		43.15	Marl												
			black, crumbly, wholly crushed.												73.3
		45.40	Sheared zone												
		46.25	Marl												
			black~dark gray, friable and crumbly, with calcite network.												70.0
		50													
			53.00~53.70m sheared.												100.0
		55													
			55.30~55.50m calcite-(sphalerite) veinlets~network, 56.85~57.05m calcite vein~veinlets, 57.35~57.55m calcite-(sphalerite) network.												100.0
		60													100.0

Appendix 11 Columnar section of the drill hole, MJTK - 01

# GEOLOGIC LOG

Hole : MJTK-01  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000.12.25~2002.1.16  
 Inclination : 75°  
 Direction : 130°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
60			Marl black~dark gray, friable and crumbly, with calcite veinlets~network.											100.0	
			60.00~60.10m fault breccia.											100.0	
65			60.25m calcite vein (width 3cm).											100.0	
			67.95~68.15m sheared.											100.0	
			72.50~72.60m sheared.											100.0	
			72.65~72.70m											100.0	
70			brecciated marl with a trace amount of sphalerite.											100.0	
		72.70	Alternating of sandstone and limestone											100.0	
			sandstone : gray, medium-grained, sub-angular~angular pebbles, calcite cement, with calcite-pyrite veinlets.											100.0	
75			limestone : brownish white, mussive, with calcite-pyrite veinlets.											100.0	
			79.35~79.45m calcite-(pyrite) vein with trace amounts of sphalerite (width 1.5cm).											100.0	
80		80.25	Conglomerate											100.0	
			dark gray, contains glauconite.											100.0	
		81.45	Limestone											82.45	
			brownish white~pale brown, mussive, with calcite veinlets~network.	1293	1747	15.1	2.57	260	4.88	2.05	36.7	2074	380	83.45	
			82.50m, 82.90~83.50m, 84.50m	224	1795	10.2	2.86	252	21.6	2.45	39.7	1889	316	84.45	100.0
85			calcite-pyrite veinlets with trace amounts of galena and sphalerite (width 8mm).	1274	2501	15.2	3.00	285	8.80	2.58	30.4	2286	530	85.45	
			85.50m pyrite-calcite veinlets (width 8mm).	163	2376	12.7	1.72	179	16.6	0.40	37.0	1408	91.5	86.45	
			85.50m pyrite-calcite veinlets (width 8mm).	183	3653	23.4	1.72	183	25.7	1.03	34.7	1994	161	87.45	100.0
			86.45m calcite-sphalerite veinlets with petrole materials (width 3-5mm).	158	2419	12.3	1.57	159	14.5	1.26	32.9	2098	528	88.45	
90			87.00~87.80m drusy calcite-sphalerite-(pyrite)-(galena) veinlets (width 2-7mm).											100.0	
			88.40m, 88.70m, calcite veinlets with trace amounts of galena (width 2mm).											100.0	
			89.00m drusy calcite veinlets with trace amounts of galena (width 2mm).											100.0	
95			89.95~90.20m, 90.75~90.90m calcite-(pyrite) veinlets with trace amounts of galena (width 2mm).											100.0	
			91.10~91.35m calcite-(pyrite) network, 91.45m pyrite-calcite veinlets (width 6mm).											63.3	
100			92.00m, 92.60~92.90m, 93.30m calcite-(pyrite) veinlets with trace amounts of galena (width 2mm).											63.3	
			93.85~94.00m calcite-pyrite network, 96.30~97.00m calcite-pyrite veinlets~network.											100.0	
105			97.10~101.80m wholly crushed, 101.60~101.80m calcite and galena are found in the fissures.											100.0	
		105.75	Limestone											100.0	
			brownish gray~brown, mussive, has lamina structure, a minor amount of pyrite is almost invariably present,											100.0	
110			103.90~104.00m calcite veinlets with trace amount of pyrite and galena.											100.0	
			104.60m calcite-(pyrite) veinlets (width 3mm).											100.0	
			104.85~105.00m calcite network,											100.0	
			105.70~105.80m drusy calcite veinlets,											100.0	
			107.20~107.40m calcite-pyrite network,											100.0	
115			108.30~108.40m, 110.20~110.45m calcite-pyrite vein~veinlets (width 3-10mm).											100.0	
			111.20m drusy calcite-pyrite veinlets,											100.0	
		117.35	115.55m calcite-(pyrite) veinlets (width 2mm).											100.0	
		117.55	116.80m calcite-(pyrite) veinlets (width 2mm).											100.0	
		118.30	117.35~117.55m fault breccia.											100.0	
		118.65	118.30~118.65m fault breccia.											100.0	
120															

Appendix 11 Columnar section of the drill hole, MJTK - 01

# GEOLOGIC LOG

Hole : MJTK-O1  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000. 12. 25~2002. 1. 16  
 Inclination : 80°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
120			Limestone gray~brownish gray, massive. argillaceous, has lamina structure. with calcite network, a small amount of pyrite is almost invariably present.														100.0
			120.00m calcite veinlets (width 3mm).														100.0
			121.00~121.30m calcite network.														100.0
125			125.40m calcite veinlets (width 2-8mm).														100.0
			129.20m calcite vein (width 1cm).														100.0
			129.45m calcite vein (width 2-3cm).														100.0
130			131.00~131.20m calcite-pyrite vein (width 1.5cm).														100.0
			131.25~132.20m drusy calcite vein with calcite crystal (width 1-3cm).														100.0
			132.50~132.80m calcite network.														100.0
135			133.20~134.00m calcite vein~veinlets (width 1-9mm).														96.7
			137.60~137.80m pyrite-calcite veinlets with trace amounts of galena and sphalerite.														100.0
			138.55m calcite veinlets (width 2mm).														100.0
140			139.00~139.60m calcite veinlets (width 1-2mm).														100.0
			139.65~140.00m calcite-pyrite vein (width 1cm).														100.0
			142.15~142.45m calcite vein~veinlets (width 2-10mm).														100.0
145			143.00m drusy calcite vein (width 2cm).														100.0
			143.40~143.55m calcite vein (width 1cm).														100.0
			145.30~148.15m brecciated zone with calcite -pyrite veinlets~network.														50.0
		148.15	Marl														76.7
150		149.80	dark brown, loosely consolidated, pasty.														76.7
			Limestone brownish gray~dark gray, massive, has lamina structure, with calcite veinlets, a small amount of pyrite is almost invariably present.														93.3
155			151.10~151.45m calcite veinlets (width 1mm).														100.0
			153.20~153.45m, 153.80m calcite-pyrite veinlets (width 1-2mm).														100.0
			145.50m calcite-(pyrite) veinlets (width 5mm).														100.0
160			154.90~155.00m calcite veinlets (width 2mm).														100.0
			155.65~156.00m massive pyrite-calcite veinlets (width 5mm).														100.0
			156.55~156.80m calcite-pyrite veinlets (width 2-5mm).														100.0
165			157.85m calcite-pyrite veinlets (width 3mm).														93.3
			160.80m calcite veinlets (width 5mm).														96.7
			168.60m calcite-(pyrite) veinlets (width 1cm).														96.7
			167.75~168.40m calcite-(pyrite) network.														100.0
170			168.70~169.45m wholly crushed, with drusy green calcite veinlets.														100.0
			169.50~169.60m calcite network.														100.0
			170.45~170.55m calcite-(pyrite) network with trace amounts of galena and sphalerite.														100.0
			170.60~170.80m calcite veinlets (width 1mm).														100.0
			170.90~171.00m calcite-pyrite veinlets (width 2mm).														100.0
175			171.10m calcite veinlets (width 2mm).														100.0
			172.00~172.05m drusy calcite veinlets (width 3mm).														100.0
			177.90~180.05m calcite network.														100.0
			179.80m calcite veinlets (width 1cm).														100.0
180			179.90~180.10m calcite veinlets~network.														100.0

Appendix 11 Columnar section of the drill hole, MJTK - 01

# GEOLOGIC LOG

Hole : MJTK-01  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000. 12. 25~2002. 1. 16  
 Inclination : 80°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
180			Limestone gray, mussive, has lamina structure, with pyrite striations and calcite veinlets.													100.0	100.0
			180.20m calcite vein (width 1cm).													100.0	
185			182.60m, 183.70m, 184.80m calcite veinlets (width 1-2mm).													100.0	
			186.40m calcite vein (width 1.5cm).													100.0	
			187.60~187.70m calcite veinlets (width 2-7mm).													100.0	
190			189.60m drusy calcite veinlets (width 5mm).													100.0	
			191.00m calcite veinlets (width 3mm).													100.0	
			192.60~193.10m calcite-galena vein (width 2-4cm).													100.0	
			193.25~193.35m drusy calcite veinlets.													100.0	
195			194.70~194.90m calcite network.													100.0	
			196.80~196.90m drusy calcite network.													100.0	
			197.10~197.70m calcite veinlets (width 2-5mm).													100.0	
			197.90~198.10m calcite veinlets (width 2-5mm).													100.0	
			198.15~198.60m calcite veinlets (width 2-5mm).													100.0	
199.00			Limestone dark gray, mussive, sheared, with drusy calcite vein~veinlets.													100.0	
200																100.0	
201.15			Limestone light gray, mussive, weakly brecciated, crack dominant.													100.0	
205			201.90m drusy calcite-(pyrite) vein with trace amounts of galena (width 2-3mm).													100.0	
			202.40~202.50m calcite network with trace amounts of galena.													100.0	
			202.60~203.40m calcite-(pyrite) veinlets~network with trace amounts of galena.													100.0	
210			205.60~206.00m calcite network with trace amounts of galena and pyrite.													100.0	
			206.30~206.50m drusy calcite-(pyrite) veinlet with small amounts of galena.													100.0	
			208.40~208.80m calcite-pyrite veinlets with trace amounts of galena (width 1-3mm).													100.0	
213.30			209.85~210.10m calcite-pyrite network with trace amounts of galena.													100.0	
215			211.25~211.60m calcite-(pyrite) veinlets (width 1-3mm).													100.0	
			Limestone light gray~gray, mussive, interbedded with thin bedded black marl, has lamina structure.													100.0	
220			217.20~217.60m calcite veinlets (width 1-3mm).													100.0	
			220.80~220.90m calcite veinlets with trace amounts of galena.													100.0	
225																100.0	
226.30			Limestone light gray~gray, mussive, weakly brecciated, calcite-pyrite matrix.													100.0	
230			227.05~227.15m drusy calcite-pyrite vein (width 10cm).													93.3	
			230.90~231.20m contains framboidal pyrite.													100.0	
232.60			Limestone light grayish white, mussive, contains framboidal pyrite.													100.0	
235			235.85m calcite veinlets (width 5mm).													100.0	
			236.65m calcite vein (width 3cm).													100.0	
			237.00~237.40m calcite veinlets (width 3-5mm).													100.0	
240			238.60~239.90m calcite network.													100.0	

Appendix 11 Columnar section of the drill hole, MJTK - 01

# GEOLOGIC LOG

Hole : MJTK-O1  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000.12.25~2002.1.16  
 Inclination : 80°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
240			Limestone light grayish white~gray, massive, with calcite veinlets and pyrite striation, contains framboidal pyrite.											100.0	
														100.0	
245														100.0	
		250.35m	drusy calcite veinlets with trace amount of pyrite (width 2-3mm).											96.7	
250		251.85	Limestone light grayish white~gray, massive, weekly brecciated, with calcite veinlets and pyrite striation.											100.0	
		252.80~253.15m	calcite veinlets(width 1-3mm).											100.0	
255		254.20~254.35m	calcite-marcacite veinlets (width 1-10mm).											100.0	
		254.40~254.80m	calcite veinlets(width 1-7mm).											100.0	
258.40			Limestone light grayish white~gray, massive, weakly brecciated, crack dominant, interbedded with thin bedded black marl, a small amount of pyrite is almost invariably present.											100.0	
260		258.50~259.10m	calcite veinlets with trace amounts of of galena (width 1-5mm).											100.0	
		260.45~260.80m	calcite network.											100.0	
265		261.60m	galena is found in the fissures.											100.0	
		262.20m	calcite-galena veinlets.											100.0	
270		262.90~263.30m	calcite veinlets.											100.0	
		270.35m	drusy calcite veinlets (width 5mm).											100.0	
		274.20m	calcite vein (width 2cm).											100.0	
274.20			Limestone brown, massive.	1.2%	593	36.7	1.72	165	2.47	0.20	45.4	1272	212	275.60	100.0
		272.80~272.90m	calcite veinlets with small amounts of galena (width 1mm).											276.60	100.0
275		276.00~276.30m	calcite veinlets with trace amounts of galena (width 2-5mm).											100.0	
		276.85~277.00m	calcite-marcacite veinlets (width 2-3mm).											100.0	
277.15			Limestone grayish white, massive, with calcite-pyrite veinlets, a small amount of pyrite is almost invariably present.											100.0	
		277.20m	calcite-(pyrite) veinlets (width 2mm).											100.0	
280		279.00~279.30m	calcite-pyrite veinlets (width 2-7mm).											100.0	
		281.45m, 281.80m	calcite-marcacite veinlets (width 2-4mm).											100.0	
285		284.35m, 285.40m, 285.55m, 285.65m	calcite-pyrite veinlets (width 3mm).											100.0	
		287.90~288.05m	calcite vein with a trace amounts of galena (width 7mm).											100.0	
290		288.30~288.60m	calcite veinlets(width 1-3mm).											100.0	
		288.80m	drusy calcite veinlets (width 5mm).											100.0	
295		288.90~289.30m	calcite veinlets (width 1mm).											100.0	
		289.85m	calcite veinlets with trace amount of galena (width 7mm).											100.0	
		293.45~293.65m	calcite-(pyrite) veinlets (width 1-4mm).											100.0	
300															

Appendix 11 Columnar section of the drill hole, MJTK - 01



# GEOLOGIC LOG

Hole : MJTK-O1  
 Machine Model : RASKA30  
 Elevation : 540.17m  
 Drilled Length : 352.60m

Site Name : Oued Jebes  
 Period : 2000.12.25~2002.1.16  
 Inclination : 80°  
 Direction : 118°

Scale	Column	Depth (m)	Description	Grade (ppm)										Depth (m)	Core Rec. (%)		
				Pb	Zn	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)	Sr	Ba				
300			Limestone grayish white, massive, with calcite veinlets, a small amount of pyrite is almost invariably present.														100.0
305		305.00	Limestone dark gray, argillaceous, with calcite veinlets~network, contains framboidal pyrite.														100.0
310			305.10m calcite-(pyrite) veinlets (width 1.5cm). 308.20~308.40m calcite veinlets~network. 308.60~308.90m calcite-pyrite veinlets (width 1-2cm), 310.10~310.40m calcite veinlets~network, 311.25~311.75m calcite veinlets with trace amount of sphalerite.														100.0
315			313.00m drusy calcite veinlets (width 2mm), 316.10~316.20m calcite network, 316.80~317.50m drusy calcite veinlets (width 2mm); 317.70~318.35m calcite veinlets~network, 319.30~319.60m calcite-(pyrite) network with trace amounts of sphalerite, 320.10~321.10m calcite-pyrite vein~veinlets (width 1-2cm), 321.60~322.00m calcite veinlets(width 1-5mm).														100.0
320			322.40~322.70m calcite-(pyrite) veinlets (width 1-5mm), 323.65m calcite-pyrite vein (width 5cm), 326.70~327.30m calcite network, 327.40~327.55m calcite-(pyrite) veinlets (width 1-5mm), 327.70~327.90m calcite network, 329.00~329.10m calcite veinlets~network, 329.40~329.50m calcite veinlets (width 1-4mm), 330.50~330.70m calcite-(pyrite) veinlets~network, 331.20~331.55m calcite veinlets(width 3-7mm), 331.60~331.70m calcite vein (width 3cm), 331.90~332.15m calcite vein (width 2-3cm), 333.00~333.15m calcite-(pyrite) veinlets (width 1-8mm), 334.35~334.50m calcite veinlets(width 2-5mm), 334.80~335.10m calcite veinlets(width 1-2mm), 335.30~335.50m calcite veinlets(width 1-5mm), 336.30~336.50m calcite veinlets(width 1-3mm), 337.80~346.30m calcite vein~veinlets.														100.0
325			347.60m calcite vein with trace amounts of galena and sphalerite, 348.30m calcite vein (width 1.5cm), 350.00m calcite vein (width 1cm), 351.50m calcite breccia with trace amount of sphalerite, 351.65m calcite vein (width 1.5cm), 352.20~352.50m calcite veinlets(width 1-8mm).														96.7
330																	90.0
335																	100.0
340																	
345																	
350		352.60															
355																	
360																	

Appendix 11 Columnar section of the drill hole, MJTK - 01