

## 第2章 ボーリング調査

### 2.1 調査概要

本年度のボーリング調査はブキル地区において、MJTK-B1 及び MJTK-B2 の計 2 孔を、ラクワット-アルグブ-アダマ地区において、MJTK-L1, MJTK-L2, MJTK-L3 及び MJTK-L4 の計 4 孔を実施した。

各孔井の掘進実績を表 11 に示す。なお、ボーリング調査の当初計画では、ブキル地区計 2 孔、ラクワット-アルグブ-アダマ地区計 2 孔の合計 4 孔・総掘削長 1,600m を実施する予定であったが、ラクワット-アルグブ-アダマ地区において、計 2 孔・総掘削長 800m のボーリング調査が追加となり、合計 6 孔・総掘削長 2,400m を実施することとなった。しかし、ブキル地区の MJTK-B1 孔及び MJTK-B2 孔がジャーミング事故や未固結砂層などのために、当初予定深度まで掘削できず、それぞれ 216.80m 及び 142.10m で中止のやむなきに至ったため、また、ラクワット-アルグブ-アダマ地区の MJTK-L3 孔が基盤の三畳系に達し、374.50m で掘り止めとなったため、掘削実績は 6 孔・総掘削長 1,933.50m となった。

表11 掘進実績表

	MJTK-B1	MJTK-B2	MJTK-L1	MJTK-L2	MJTK-L3	MJTK-L4
Preparation Phase	7/11/2000	11/1/2001	21/9/2000	20/10/2000	25/12/2000	2/2/2001
Number of Days	4.5	3.0	6.0	2.5	5.5	3.5
Drilling (From)	11/11/2000	14/1/2001	27/9/2000	21/10/2000	30/12/2000	5/2/2001
(To)	9/1/2001	29/1/2001	17/10/2000	4/11/2000	30/1/2001	27/2/2001
Drilling Days	63.5	16.0	21.0	14.5	31.5	22.0
Mobilization Phase	10/1/2001	30/1/2001	18/10/2000	5/11/2000	31/1/2001	28/2/2001
Number of Days	1.0	1.0	2.0	2.0	2.0	2.0
Total of Days	69.0	20.0	29.0	19.0	39.0	27.5
Planned Depth	400.00m	400.00m	400.00m	400.00m	400.00m	400.00m
Drilled Depth	216.80m	142.10m	400.10m	400.00m	374.50m	400.00m
Overburden	1.50m	9.00m	21.70m	0.80m	0.60m	0.50m
Core Length	169.00m	58.90m	351.10m	375.50m	344.10m	372.10m
Recovery	78.4%	44.3%	92.8%	94.0%	86.1%	93.1%
HW Casing	—	60m	—	—	—	15m
HQ Casing	—	—	—	—	—	—
NW Casing	189m	126m	54m	33m	81m	60m
Meters/Day	3.41m	8.88m	19.05m	27.58m	11.88m	18.18m
Meters/Total Days	3.14m	7.10m	13.79m	21.05m	9.60m	14.54m

### 2.2 調査方法

#### 2.2.1 ボーリング調査工程

各ボーリング孔の掘進工程を表 12 に示す。表 12 に示したように、掘削作業は 1 台の試錐機で行ったが、ボーリング調査が追加となったため、12 月末から新たに 1 台を投入し、合計 2 台を稼働させてボーリング作業を行った。

表12 掘進工程表

	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
MJTK-B1			11/7		1/10		
MJTK-B2					1/11	1/30	
MJTK-L1	9/21	10/18					
MJTK-L2		10/20	11/5				
MJTK-L3				12/25		1/31	
MJTK-L4					2/2		2/28

### 2.2.2 ボーリング作業と人員構成

掘削作業はチュニジア共和国チュニスのボーリング業者2社に委託してワイヤーライン工法で実施された。当初計画の掘削作業を Sondages Services Travaux 社が、追加の掘削作業を Tunisien Mineral Services 社が行った。

ボーリング調査に使用した試錐機は2台で、各試錐機共に原則として1日2方20時間稼動体制で掘削作業が行われた。各方の人員構成は試錐技師1名、試錐助手2名の計3名である。その他、掘削作業に直接携わった人員のほかに、用水運搬1名の要員が配置された。

### 2.2.3 使用機器・機材と掘削用水の供給

使用機器一覧を表13に、ダイヤモンドビット使用状況、消耗品及びその数量を表14に示す。試錐機はイタリア製 RESKA30 を2台使用した。

掘削用水はブキル地区ではブキル鉱山旧坑口の湧水を利用し、ラクワット-アルグブ-アダマ地区ではラクワット選鉱所から供給された。しかし、ラクワット-アルグブ-アダマ地区における追加の掘削作業では、ラクワット選鉱所からの用水供給が閉ざされたため、掘削用水の確保には付近の井戸及び灌漑用溜池を利用した。

表13 使用機器一覧

Drilling Machines:	
-RESKA (2 set): model R30, made in Italy, with diesel engine (137HP).	
Water Supply Pump:	
-HATZ (1 set): made in Tunisia, with diesel engine,	
-NENZI (1 set): made in Tunisia, with diesel engine,	
Water Tank:	
-2 set (6m <sup>3</sup> ), iron,	
-2 set (3,000L), iron,	
Tractor:	
-Kubota (2 set): made in Japan,	

表14 ダイヤモンドビット使用状況、消耗品及びその数量

Specification	Unit	MJTK-B1	MJTK-B2	MJTK-L1	MJTK-L2	MJTK-L3	MJTK-L4
Diamond bit (HQ)	pcs.	2	1	1			
Diamond reamer (HW)	pcs.	2	1	1			
Diamond bit (NQ)	pcs.	2	1	1	1	2	2
Diamond reamer (NW)	pcs.	2	1	2	2	1	1
Dieseloil	l	1,420	700	920	900	2,920	5,000
Lubricant oil	l	140	60	60	80	110	75
Grease	kg	38	20	17	21	30	25
Cement	kg	1,150					
Bentonite	kg	900	1,800				

## 2.2.4 試料採取及びコアの保管

掘削区間ごとにコアチューブから取り出されたコアは、木製のコア箱に収納され、コア写真撮影、コア記載及び試料採取に供された。コア写真撮影、コア記載及び試料採取が完了したコアは30箱ごとにテュニスにあるONM所管の倉庫に運搬され、保管された。採取された試料はテュニスにあるONMの分析所に送られ、化学分析に供された。

## 2.3 調査結果

### 2.3.1 ブキル地区

ブキル地区の地質概略をボーリング位置と共に図137に示す。本地区は図137に示したように、ダイアピルを構成する三畳系、炭酸塩岩類(石灰岩、石灰岩マール互層)からなる白亜系、角礫化・ドロマイト化炭酸塩岩類からなる漸移帯(Transition zone)、堆積岩類(マール・砂岩・泥岩・礫岩)を主

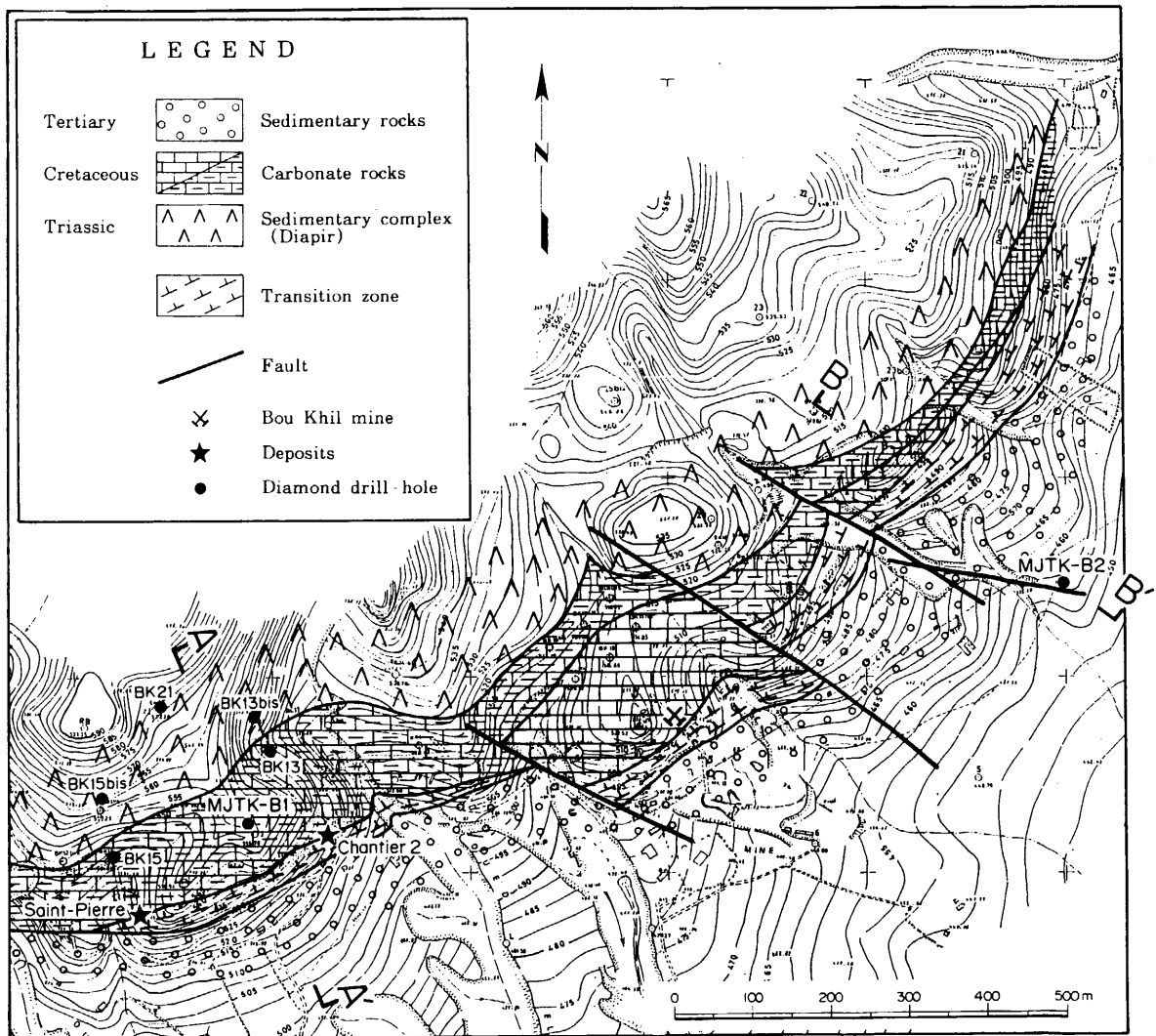


図 137 ボーリング位置図 (ブキル地区)

とした第三系(始新統, 漸新統~中新統)及び第四系からなる。白亜系には稼行実績(既採掘鉱量 40 万トン, 品位 Pb+Zn10%)のあるブキル鉱床が胚胎し, また, 北東-南西方向に発達する漸移帯中には, Chantier 2, Saint-Pierre などのセレスタイト(Sr)鉱床が発見されている。

本地区では, Chantier 2 鉱床探査及び IP 異常の確認を目的として, 図 137 に示した第 1 年次物理探査測線 B3(A-A')・B5(B-B')の 2 測線上で, MJTK-B1 及び MJTK-B2 の 2 孔のボーリングを実施した。各孔のボーリング柱状図を図 144~149 に示す。

(1) MJTK-B1 孔

本孔は第 1 年次調査によって抽出された分極率異常の確認及び Chantier 2 鉱床の南西方延長を探査することを目的として, 図 137 に示した物理探査 B3 測線上(A-A')で実施された。本孔のボーリング柱状図を図 144 に, ボーリング地質断面図を図 138 に示す。

第 1 年次に実施された電気探査の結果, B3 測線の漸移帯分布域で分極率異常が抽出された。B3 測線上に分布する漸移帯にはセレスタイト鉱化作用が伴われることから, セレスタイト鉱石を採取し室内試験に供した。室内試験の結果によれば, セレスタイト鉱石は 3.5mV/V 以下のかかなり低い分極率を示したため, 分極率異常とセレスタイト鉱化作用との関係について不明な部分があることから, 抽出された分極率異常の検討を目的として, 本孔のボーリングを実施した。

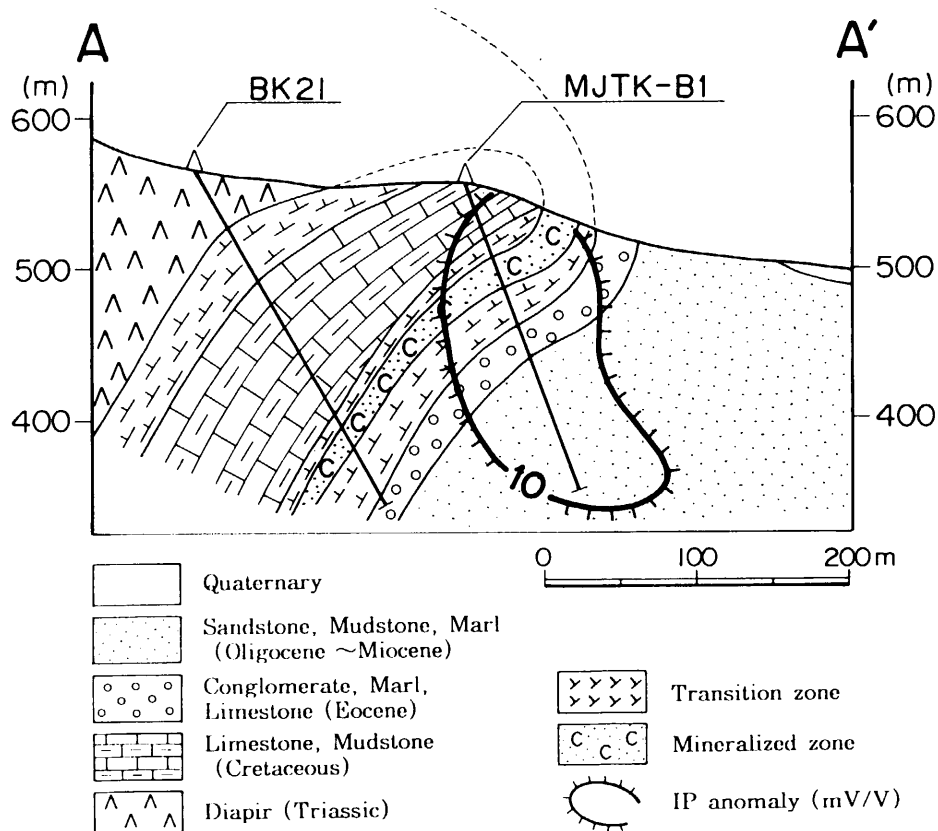


図 138 ボーリング地質断面図 (MJTK-B1 孔)

一方、Chantier 2 鉱床に対しては、これまでに5孔(総掘削長 970.85m)のボーリング探鉱が行われている(図 137・表 15)。これらの調査結果に基づき、推定鉱量 3 百万トン(平均品位 70% $\text{SrSO}_4$ )が報告されている(Mansouri・Sellami, 1990)。表 15 に示したように、Chantier 2 鉱床ではBK13bis 孔によって鉱体幅 22m(平均品位 72.64% $\text{SrSO}_4$ )のセレスタイト鉱化帯が確認されている。しかし、BK13bis-BK13 断面から南西方では、本鉱床のための探鉱ボーリングが少ない上に、BK13bis 孔及びBK21 孔が着鉱したにすぎないことから、BK13 孔南西方延長を探查することも目的としている。

表 15 ブキル地区 Chantier 2 鉱況一覽

孔名	着鉱区間 (m)	鉱体幅 (m)	品位 (%)		掘進長 (m)	方位 (°)	傾斜 (°)	標高 (m)
			Pb+Zn	$\text{SrSO}_4$				
BK13	87.00-96.00	9.0	8.3	-	169.50	160	-65	530.66
BK13bis	138.00-160.00	22.0	-	72.64	209.50	160	-65	538.44
BK15	66.55-71.55	5.0	18.7	-	127.20	170	-70	540.18
BK15bis	-	-	-	-	210.00	170	-70	559.23
BK21	194.00-207.00	13.0	-	38.01	254.65	160	-60	572.38

本孔の地質は深度 0.00-33.00m間の石灰岩泥岩互層(白亜系)、深度 103.10-121.80m間の礫岩・マール・石灰岩(始新統)及び深度 121.80-216.80m間の粘着質泥岩を伴う半固結～未固結砂岩(漸新統～中新統)からなり、深度 33.00-103.10m間に漸移帯が発達している(図 138・144)。

漸移帯は灰色～暗灰色のドロマイトを主体とし、角礫化、黄鉄鉱・白鉄鉱鉱化作用及びセレスタイト鉱化作用を伴う。鏡下では、ドロマイト(径 0.2mm 程度)、方解石(径 0.2mm 程度)、石英(径 0.8mm 程度)、珪灰石(径 1mm 程度)及び不透明鉱物からなる。

セレスタイト鉱化作用は深度 47.50-73.8m間に角礫状又は脈状にみられる。角礫状セレスタイトは微量の閃亜鉛鉱を伴い、角礫間を黒色、緻密質で多量の自形黄鉄鉱を含むドロマイトが埋めている。脈状セレスタイトは方解石-セレスタイト脈として産出する。主要鉱石鉱物はセレスタイト、黄鉄鉱、白鉄鉱及び閃亜鉛鉱である。セレスタイトは自形～半自形で径 0.05mm 程度である。黄鉄鉱は半自形、径 0.02mm 程度である。白鉄鉱は自形～半自形、径 0.05-0.2mm 程度でフランボイダル組織を示す。閃亜鉛鉱は半自形で径 0.05mm 程度である。セレスタイト濃集区間の鉱況を分析品位と共に表 16 に示す。

表 16 MJTK-B1 孔 鉱況一覽

孔名	着鉱区間 (m)	鉱体幅 (m)	鉱化型	品位 (%)
				$\text{SrSO}_4$
MJTK-B1	47.5-58.5	11.0	角礫状・脈状	16.89
	59.5-65.5	6.0	角礫状	20.33
	67.8-73.8	6.0	角礫状・脈状	7.80

本孔では図 138 に示したように、深度 40-120m間に分極率異常が見られる。この区間には漸移帯が発達しており、漸移帯中には黄鉄鉱-白鉄鉱鉱化作用が顕著に認められる。したがって、B3 測線の分極率異常は黄鉄鉱及び白鉄鉱を反映したものと考えられる。また、これまでの調査結果及び本孔の着鉱位置から判断して、Chantier 2 鉱床では、セレスタイト鉱化作用がBK13bis-BK13 断面から南西方向へ 75m延長していることが確認された。

(2) MJTK-B2 孔

本孔は第1年次調査によって抽出された分極率異常の確認を目的として、図137に示した物理探査B5測線上で実施された。本孔のボーリング柱状図を図145に、ボーリング地質断面図を図139に示す。

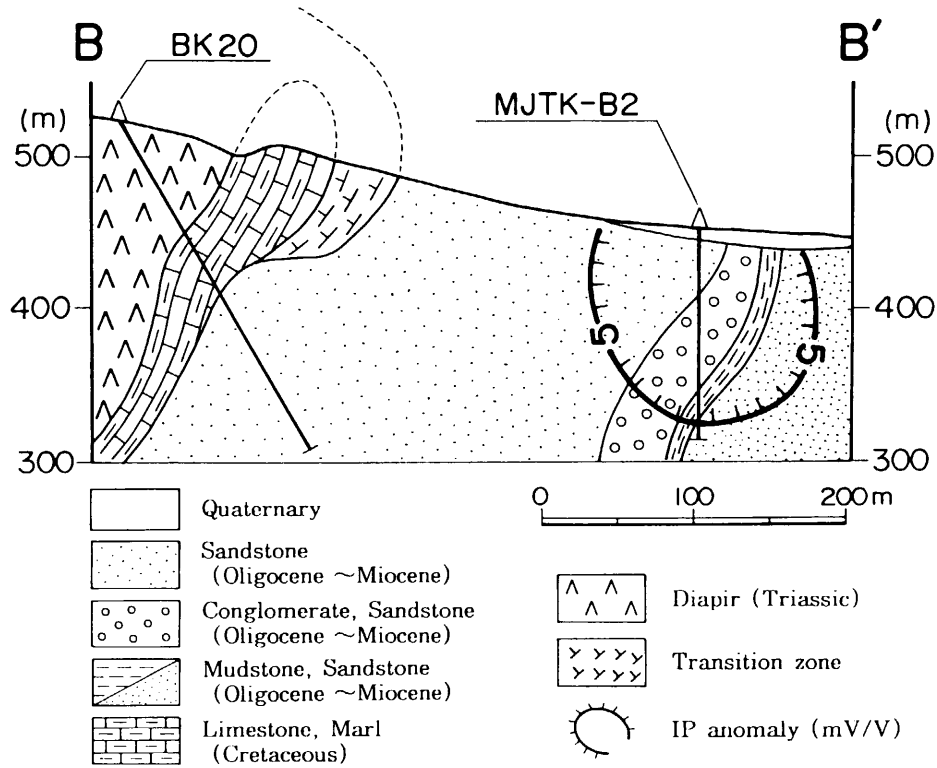


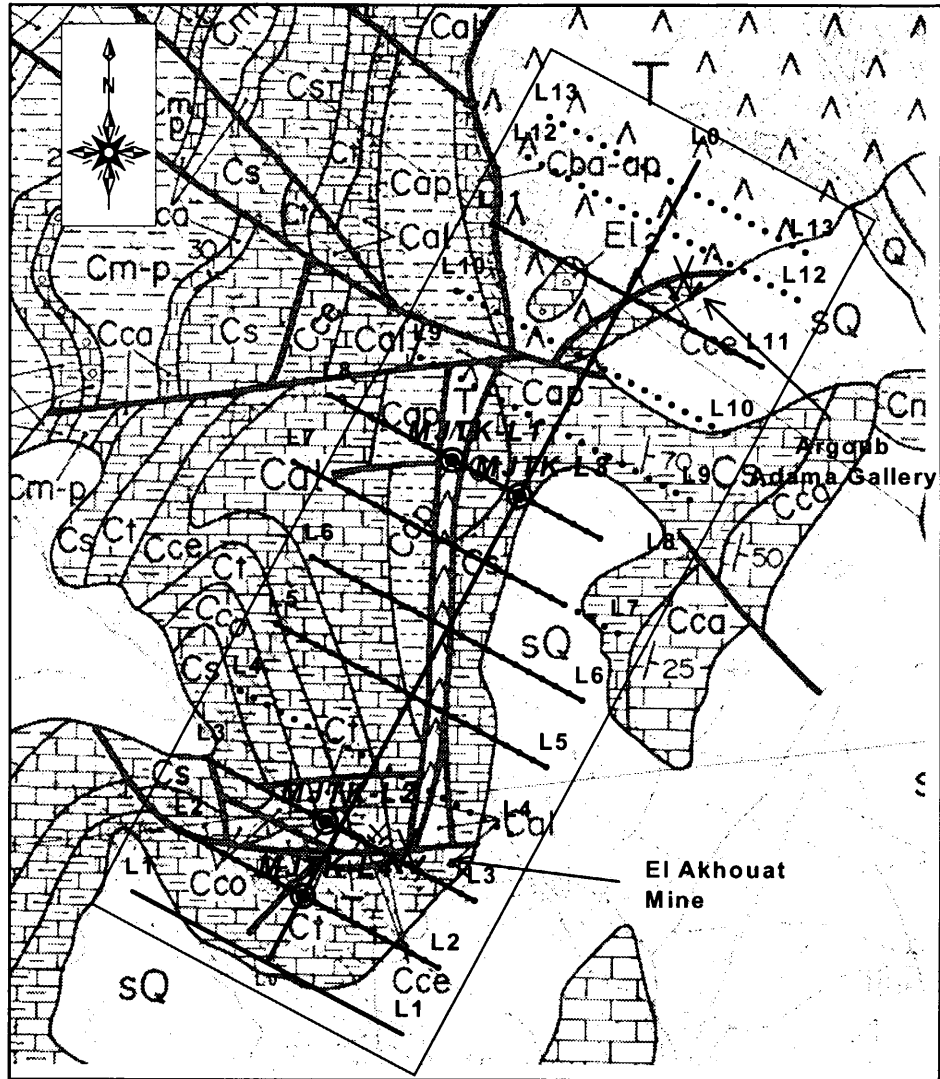
図139 ボーリング地質断面図 (MJTK-B2 孔)

本孔の地質は深度0.00-40.10m間の未固結～半固結砂岩、深度40.10-109.70m間の砂岩挟み礫岩及び深度109.70-142.10m間の粘着質泥岩を伴う未固結砂岩からなり(図139・145)、いずれも第三紀漸新世～中新世の堆積岩類によって構成される。

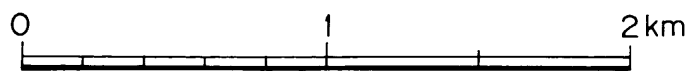
本孔は図139に示したように、深度70.00-110.00m間で分極率異常と交差する。この区間は石灰質砂岩を挟在する礫岩からなり、石灰質砂岩には強黄鉄鉱化作用が顕著に認められる。したがって、B5測線の分極率異常は石灰質砂岩に含まれる黄鉄鉱を反映したものと考えられる。

2.3.2 ラクワット-アルグブ-アダマ地区

ラクワット-アルグブ-アダマ地区の地質概略をボーリング位置と共に図140に示す。本地区は図140に示したように、ダイアピルを構成する三畳系、石灰岩及びマールからなる白亜系、石灰岩・砂岩・泥岩・礫岩を主とした第三系(始新統、漸新統～中新統)及び第四系からなる。白亜系には



Scale 1 : 25,000



LEGEND

Quaternary	Pleistocene	eQ	rubble	Cretaceous	Maastrichtian ~ Palaeocene	Cm-p	marl
	Pleistocene	sQ	soil		Campanian	Cca	limestone
	Pleistocene	Qc	calcareous conglomerate		Santonian	Cs	marl, limestone
	Pleistocene	Q	siltstone, conglomerate		Coniacian	Cco	marl, limestone
	Miocene ~ Pliocene	M-PIC	sandstone, conglomerate, marl, sand, clay		Turonian	Ct	limestone, marl
	Oligocene ~ Miocene	O-Mo	sandstone		Turonian	Ct2	marl
	Oligocene	O1	marl, sandstone, limestone		Turonian	Ct1	limestone
	Eocene	El-p	marl, limestone		Cenomanian	Cce	limestone, marl
	Eocene	El2	limestone, conglomerate		Albian	Cal	limestone, marl
					Aptian	Cap	marl, sandstone
Tertiary				Barremian ~ Aptian	Cba-ap	marl, quartzite, limestone	
				Triassic	T	gypsum, clay, sandstone, dolomite, limestone	
						Fault	
						Lineament	

図 140 ボーリング位置図 (ラクワット-アルグブ-アダマ地区)

稼行実績(既採掘推定鉱量 5.5 万トン)のあるラクワット鉱床を胚胎する。

本地区では、新鉱床探査及び分極率異常の確認を目的として、図 140 に示した第 1 年次物理探査測線 L2・L3・L8 の 3 測線上で、MJTK-L1, MJTK-L2, MJTK-L3 及び MJTK-L4 の 4 孔のボーリングを実施した。各孔のボーリング柱状図を図 144~149 に示す。

(1) MJTK-L1 孔

本孔はダイアピル周辺に分布する白亜系中の鉱化状況を確認すること及び第 1 年次調査によって抽出された分極率異常の確認を目的として、図 140 に示した物理探査 L8 測線上で実施された。本孔のボーリング柱状図を図 146 に、ボーリング地質断面図を図 141 に示す。

本孔の地質はダイアピルを構成する三畳系及び白亜系からなる。三畳系は深度 0.00-137.40m 及び深度 364.10-400.10m の区間にみられ、石膏、石灰岩、ドロマイト、泥質岩などによる堆積岩コンプレックスからなる。白亜系は深度 137.40-364.10m 間にみられ、主としてマールからなる。

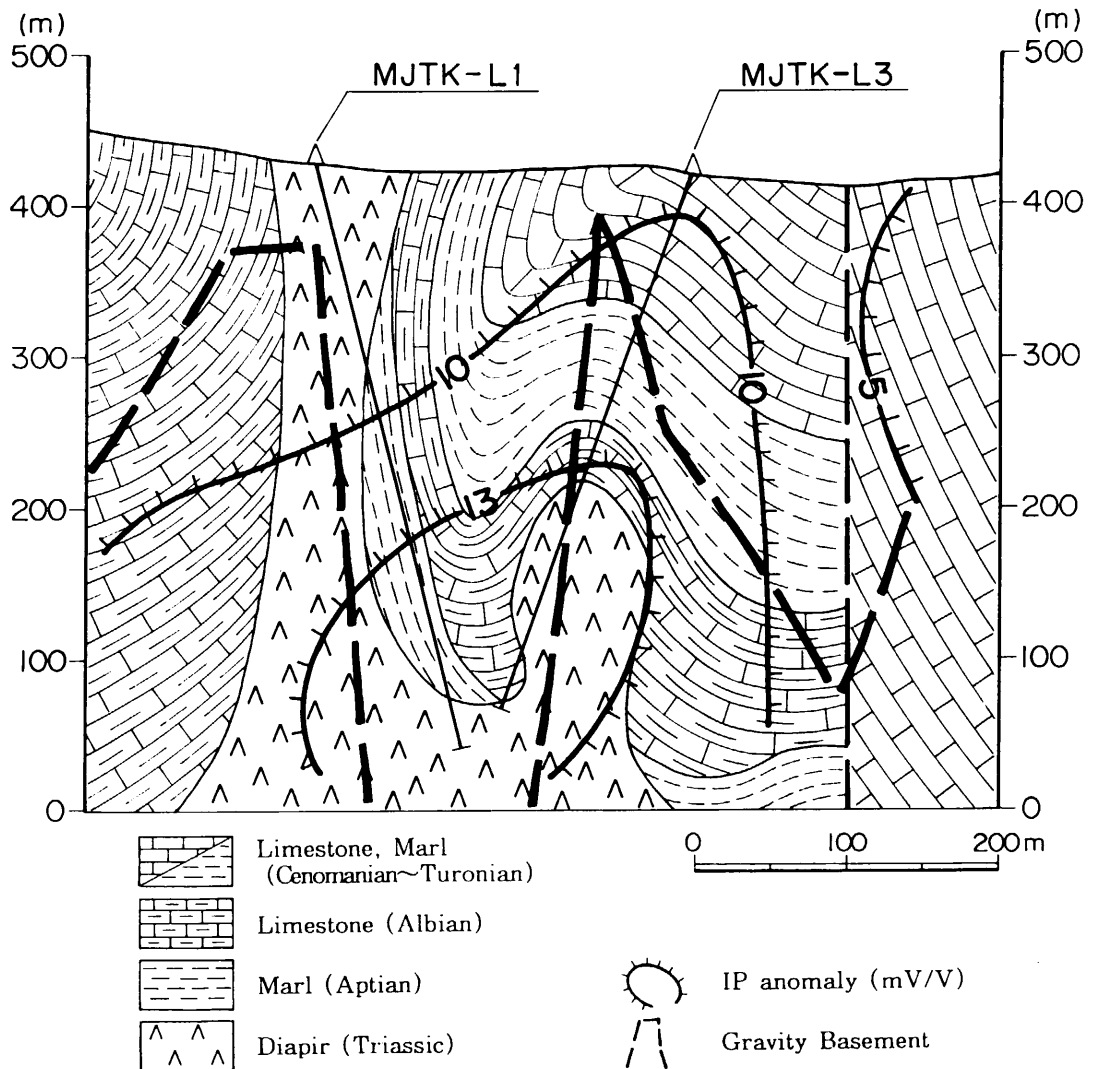


図 141 ボーリング地質断面図 (MJTK-L1・L3 孔)



本孔は深度 137.40-364.10m間にみられる白亜系の鉍化状況を確認するためのものであったが、微弱な鉛亜鉛鉍化作用をとらえたにとどまった。そのため、ボーリングコアから 10 試料を採取し、化石の洗い出しによる年代層序区分を行った。その結果、本孔の深度 137.40-364.10m間のマールは白亜系上部 Aptian 階～Albian 階基底部に相当し、本地区の鉍床胚胎層である白亜系 Albian 階・Cenomanian 階・Turonian 階とは異なることが確認された(表 17)。

表17 年代層序区分結果(MJTK-L1孔)

No.	採取深度(m)	岩石名	構成粒子の種類	堆積環境	年代層序区分
1	150.00	dolosparite	炭化植物片	潟	上部Aptian階～Albian階基底部
2	170.00	dolosparite	糞石	潟	Aptian階
3	180.00	dolosparite	巻貝, 炭化植物片	潟	上部Aptian階～Albian階基底部
4	200.00	dolosparite	糞石	潟	Aptian階
5	250.00	mudstone	フランボイダル黄鉄鉍	潟	上部Aptian階～Albian階基底部
6	280.00	mudstone	微小放散虫, フランボイダル黄鉄鉍	潟	上部Aptian階～Albian階基底部
7	300.00	dolosparite	炭化植物片, フランボイダル黄鉄鉍	潟	Aptian階
8	320.00	marl	炭化植物片, フランボイダル黄鉄鉍	潟	上部Aptian階～Albian階基底部
9	350.00	marl	糞石, フランボイダル黄鉄鉍	潟	Aptian階
10	360.00	marl	炭化植物片	潟	上部Aptian階～Albian階基底部

また、本孔では図 141 に示したように、深度 250m以深に分極率異常が見られる。深度 250m以深は主として黄鉄鉍化マールからなり、フランボイダル黄鉄鉍が顕著に認められる。したがって、L8 測線の分極率異常は黄鉄鉍を反映したものと考えられる。

#### (2) MJTK-L2 孔

本孔は第 1 年次調査によって抽出された新鉍化帯の確認を目的として、図 140 に示した物理探査 L3 測線上で実施された。本孔のボーリング柱状図を図 147 に、ボーリング地質断面図を図 142 に示す。

本孔の地質は深度 0.00-84.00m間のドロマイト、深度 84.00-173.50m間の葉理ドロマイト、深度 173.50-290.60m間の石灰質砂岩ドロマイト化石灰岩互層、深度 290.60-334.80m間のドロマイト化石灰岩及び深度 334.80-400.00m間の角礫化ドロマイト化石灰岩からなり、いずれも白亜紀 Cénomanien 期～Coniacian 期の炭酸塩岩類によって構成される。角礫化ドロマイト化石灰岩には、変成鉍物の珪灰石を生成している。本孔のコアから 9 試料を採取し、岩石薄片観察を行った。観察結果を表 18 に示す。

鉍化作用は深度 225.50-382.90m間にみられ、鉍石は縞状、網状～細脈状及び角礫状を示す。主要鉍石鉍物は閃亜鉛鉍、方鉛鉍及び白鉄鉍で、脈石鉍物は方解石及び石英である。閃亜鉛鉍は 0.01-0.5mm 程度、最大 7mm、他形～半自形結晶でコロフォーム組織、ポイキリチック組織(主晶)、球顆状構造などを示す。方鉛鉍は最大 7mm、0.01-0.5mm 程度 of 他形結晶である。白鉄鉍は 0.3mm 以下の自形結晶で、0.01-0.3mm のものが多く、ポイキリチック組織(客晶)、球顆状構造などを呈する(表 19)。

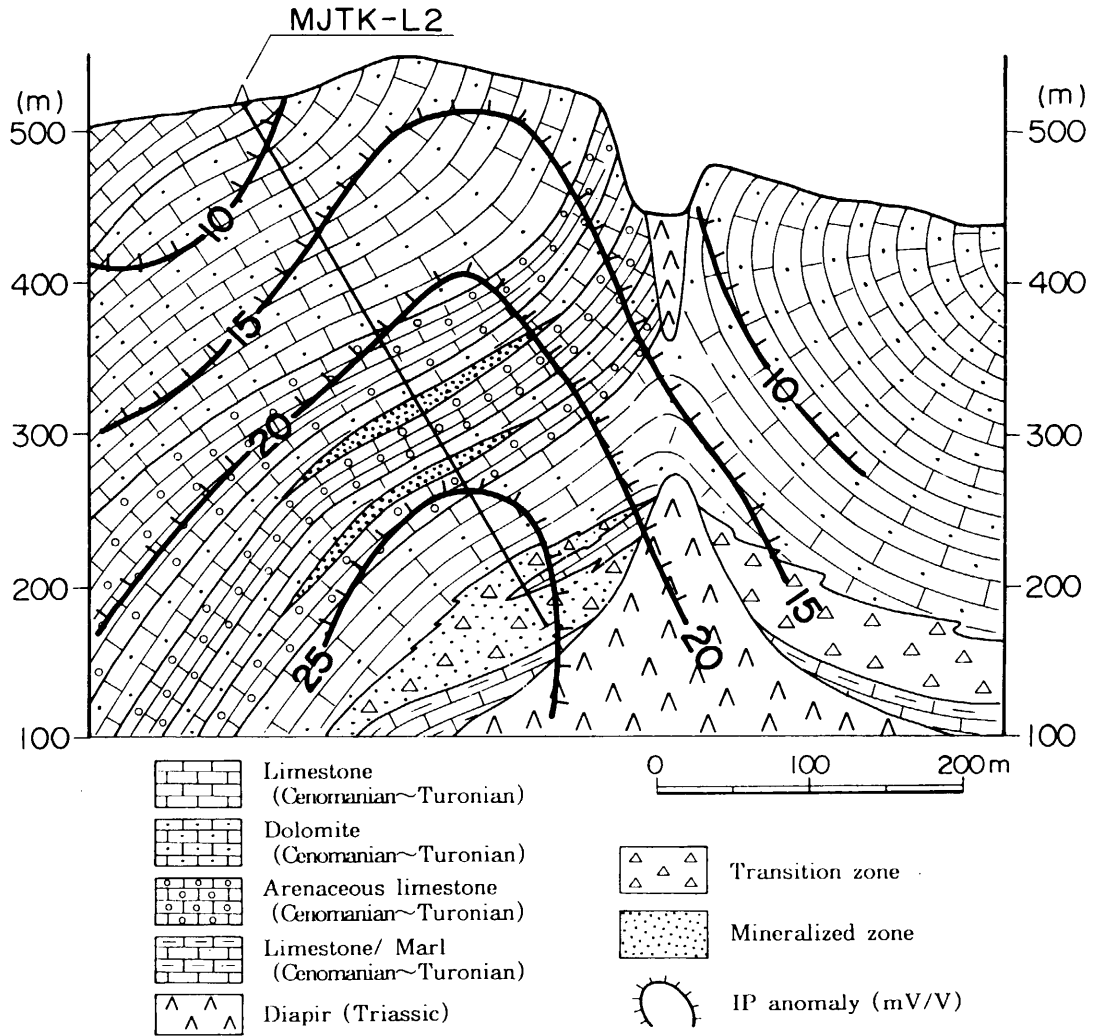


図 142 ボーリング地質断面図 (MJTK-L2 孔)

表18 岩石薄片観察結果 (MJTK-L2孔)

No.	Location (Depth) (m)	Rock Name	Minerals												
			Primary					Secondary and Alteration							
			Qz	Dol	Pl	Bio	Mus	Cal	Oq	Qz	Ch	Cal	Oq	Others	
1	19.30	Dolomite		◎				◎			+				layered structure
2	33.00	Dolomite		◎				○							layered structure
3	50.00	Dolomite		◎				○							
4	66.00	Dolomite		◎				○				△			
5	85.00	Dolomite		◎				○				○	△		
6	138.20	Dolomite		◎		?		○	+		?				
7	275.00	Limestone		△				◎				○	+		
8	280.70	Dolomite/Sandstone	○	◎	○	?	?	○	+		?	○			layered structure
9	356.40	Metamorphosed Dolomite	+	◎				◎	○			○			wollastonite

◎:abundant, ○:moderate, △:a few, +:rare,

Qz:quartz, Dol:dolomite, Pl:plagioclase, Bio:biotite, Mus:muscovite, Cal:calcite, Oq:opaque minerals,

表19 鉱石研磨片観察結果 (MJTK-L2孔)

No.	Depth (m)	Ore Type	Opaque Minerals					Texture
			Ga	Sph	Mar	Py	Others	
1	277.00	Veinlet		◎(anh-subh)	◎(euh)			Sph·Mar:spherulite
2	297.60	Banded	◎(anh)	○(anh-subh)	△(euh)	+(subh)		Py:framboidal
3	298.60	Network veins	+(anh)	◎(anh-subh)	○(euh)	+(subh)		
4	299.60	Brecciated	△(anh)	○(anh-subh)	◎(euh)			Sph·Mar:poikilitic
5	300.60	Brecciated	○(anh)	◎(anh-subh)	△(euh)			Sph:colloform
6	301.60	Banded		◎(anh-subh)	○(euh)	+(subh)	Goethite	Sph:colloform
7	380.60	Brecciated	○(anh)	○(anh-subh)	△(subh)	△(euh)		

◎:abundant(>50%), ○:moderate(50-20%), △:a few(20-5%), +:rare(<5%),

anh:anhedral, subh:subhedral, euh:euhedral, Sph:sphalerite, Mar:marcasite, Py:Pyrite,

本孔は全孔長 400.00mのうち、深度 225.50-382.90mの間に 3 層の鉱化帯を捕らえたほか、深度 237.50-238.50mの 1.0m間では、Pb0.7%、Zn20.0%、深度 275.60-276.60mの 1.0m間では、Pb1.92%、Zn36.0%及び深度 379.90-380.90mの 1.0m間では Pb3.45%、Zn16.0%の炭酸塩母岩型鉱石を捕捉した。MJTK-L2 孔の鉱況を分析品位と共に表 20 に示す。

表20 MJTK-L2孔鉱況一覧

孔名	着鉱区間 (m)	鉱体幅 (m)	鉱化型	品位 (%)		
				Pb	Zn	Pb+Zn
MJTK-L2	222.5-238.5	16.0	網状～細脈状	0.21	4.06	4.27
	265.8-277.6	11.8	網状～細脈状	0.40	6.00	6.30
	346.3-369.3	23.0	角礫状	0.45	2.48	2.93
	373.9-382.9	9.0	角礫状	2.02	5.18	7.20

本孔では図 144 に示したように、深度 160m以深に分極率異常が見られる。深度 225.50m以深には鉱化帯が分布する。鉱化帯中には黄鉄鉱-閃亜鉛鉱-方鉛鉱が顕著であることから、L3 測線の方極率異常は黄鉄鉱を含む鉱化帯を反映したものと考えられる。

### (3) MJTK-L3 孔

本孔はダイアピル周辺に分布する白亜系の鉱化状況を確認すること及び第 1 年次調査によって抽出された分極率異常の確認を目的として、図 140 に示した物理探査 L8 測線上で実施された。本孔のボーリング柱状図を図 148 に、ボーリング地質断面図を図 141 に示す。

ダイアピル周辺に分布する白亜系の鉱化状況を確認するためのボーリングとして、MJTK-L1 孔を実施した。しかし、MJTK-L1 孔に出現した白亜系は、上部 Aptian 階～Albian 階基底部に相当し、本地区の鉱床胚胎層とは異なる地層であることが確認された。そこで、地質構造の見直しを行い、MJTK-L1 孔を実施した物理探査 L8 測線上で、鉱床胚胎層の分布が推定される位置を選出し、本孔のボーリングを実施した。また、本孔は重力法断面解析の結果、物理探査 L8 測線上で推定されている潜頭ダイアピルの確認も目的としている。

本孔の地質はダイアピルを構成する三畳系及び白亜系からなり、角礫化帯が発達している。三畳系は深度 216.70-334.20m及び深度 372.80-374.50mの区間にみられ、石膏、石灰岩、ドロマイト、砂質岩、泥質岩などによる堆積岩コンプレックスからなる。白亜系は深度 0.00-204.00m及び深度 341.40-372.80mの区間にみられ、石灰岩及びマールからなる。角礫化帯は深度 204.00-216.70

m及び深度 334.20-341.40mに認められる。

鉍化作用は深度 178.40-180.80m及び深度 198.40-201.60m間に認められ、方解石-黄鉄鉍細脈及び微量の閃亜鉛鉍と方鉛鉍を伴う網状脈からなる。そのほか、角礫化帯中に、少量の閃亜鉛鉍を伴うセlestait-方解石脈、方解石-黄鉄鉍-(閃亜鉛鉍)細脈などが認められるが、まとまったセlestait鉍化作用は認められなかった。

本孔では図 141 に示したように、深度 240m以深に分極率異常が見られる。深度 240m以深は主としてダイアピルからなり、ダイアピル中には黄鉄鉍を伴う黒色緻密質ドロマイトが普遍的に認められる。特に、深度 260.80-271.80m間には、黒色緻密質ドロマイト中に自形黄鉄鉍が豊富に含まれる。これらのことから、L8 測線の分極率異常は黄鉄鉍を反映したものと考えられる。また、深度 216.70-334.20m間に認められたダイアピルは、物理探査重力法断面解析で推定された潜頭ダイアピルに一致する。

(4) MJTK-L4 孔

本孔は MJTK-L2 孔で確認された新鉍化帯の南西方延長を探索することを目的として、図 140 に示した物理探査 L2 測線上で実施された。本孔のボーリング柱状図を図 149 に、ボーリング地質断面図を図 143 に示す。

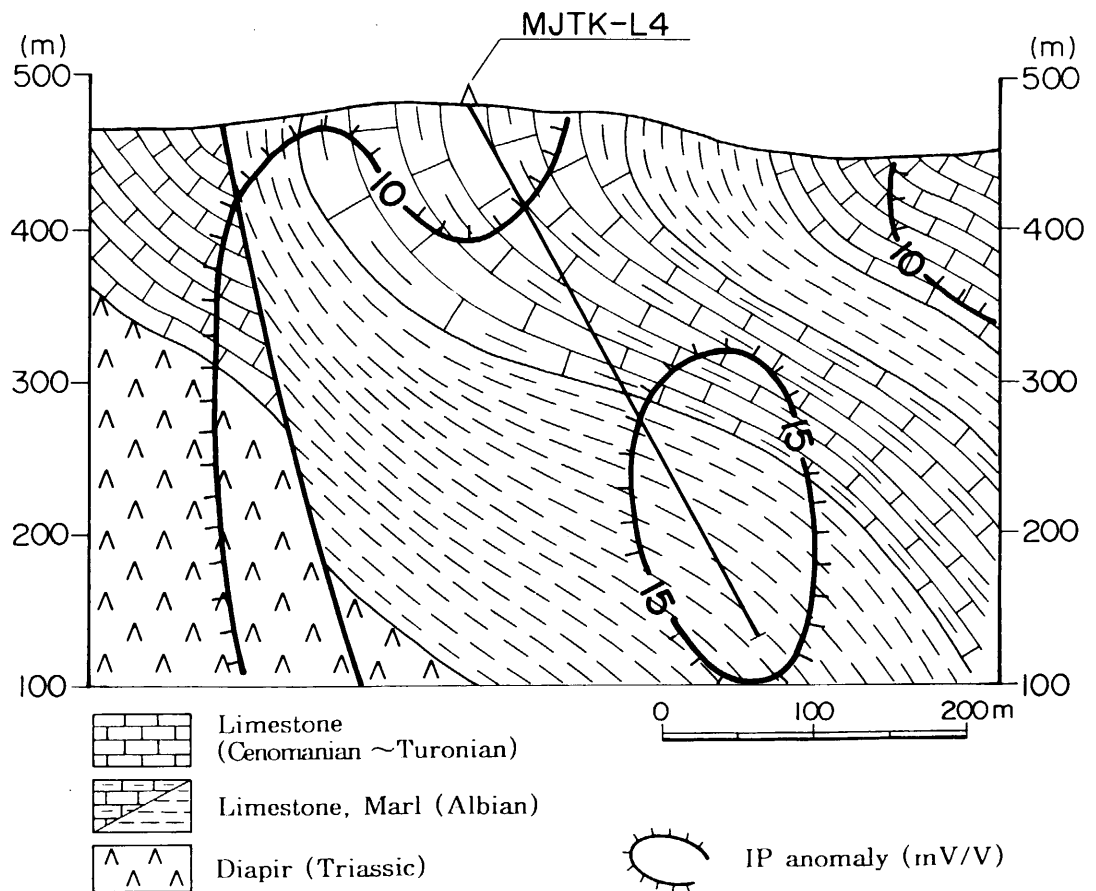


図 143 ボーリング地質断面図 (MJTK-L4 孔)

本孔の地質は深度 0.00-143.30m間の石灰岩，深度 143.30-207.80m間のマール石灰岩互層，深度 207.80-400.00m間のマールからなり，いずれも白亜紀 Albien 期～Turonien 期の炭酸塩岩類によって構成される。

鉍化作用は深度 109.10-113.70m間及び 173.20-188.20m間にみられ，方解石-黄鉄鉍細脈～網状脈に微量の閃亜鉛鉍と方鉛鉍を伴うが，まとまった鉍化部は認められなかった。

本孔では図 143 に示したように，深度 230m以深に分極率異常が見られる。深度 230m以深は主として黄鉄鉍化マールからなり，フランボイダル黄鉄鉍が顕著に認められる。したがって，L2 測線の分極率異常は黄鉄鉍鉍化部を反映したものと考えられる。

# 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	
															86.7	
		6.00	6.00~6.40m yellowish brown mudstone.												100.0	
		6.40	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	33.00~36.00m contains a small amount of celestite.												93.3	
		40													100.0	
		42.60	42.60~44.30m contains a small amount of celestite.												100.0	
		44.30													100.0	
		45													100.0	
		46.80	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		
				23.01	9.87	91.07	3.38	779.8	<2.0	1.60	5.40	12.7	16.70	50.50	100.0	
				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.											58.50	100.0	
		59.50		48.97	8.49	24.54	3.92	490.8	<2.0	1.40	2.00	19.2	95.19	59.50		

図144 ボーリング柱状図 (MJTK - B1 孔)

# 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	0.80	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	100.0
			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
			72.30~72.50m drusy celestite-(calcite) vein with petrole materials.	60.80	0.18%	17.03	4.43	415.1	<2.0	1.70	2.50	9.2	52.8	70.80	100.0
				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
85		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												100.0
			dark gray~gray, brecciaes are composed of carbonate rocks, celestite matrix.												100.0
		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

図144 ボーリング柱状図 (MJTK - B1 孔)

# 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
			dark greenish gray~dark gray. arenaceous. extremely friable and crumbly.														100.0
		126.00m	interbeded with compact limestone.														78.6
		129.50	Sandstone														80.0
			dark gray, fine-grained, calcareous.														93.3
		131.80	Mudstone														93.3
			dark gray~gray, very pasty.														93.3
		135.40	Sandstone														93.3
			grayish white, fine to medium-grained, sub-angular~sub-rounded quartz pebble.														100.0
		137.95	Marl														100.0
			dark gray~black, arenaceous.														100.0
		142.50	Sandstone														86.7
			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
			grayish white, glauconite bearing.														93.3
		150.00	Marl														100.0
			dark gray, arenaceous, friable and crumbly.														83.3
		153.20	Conglomerate														100.0
			gray, brecciaes are composed mainly of glauconite sandstone and siltstone.														100.0
		156.30	Sandstone														76.7
			grayish white, fine-grained, calcareous, glauconite bearing.														50.0
		159.30	Sand, light gray, unconsolidated.														3.3
		160.30	Mudstone														0.0
			dark gray~gray, very soft and pasty.														14.3
		162.20	Sandstone, light grayish white, calcareous.														
		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.														
		174.30	Non core														
		178.30	Sandstone														
			gray, fine-grained, glauconite bearing.														
		180															

図144 ボーリング柱状図 (MJTK - B1 孔)



# 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°

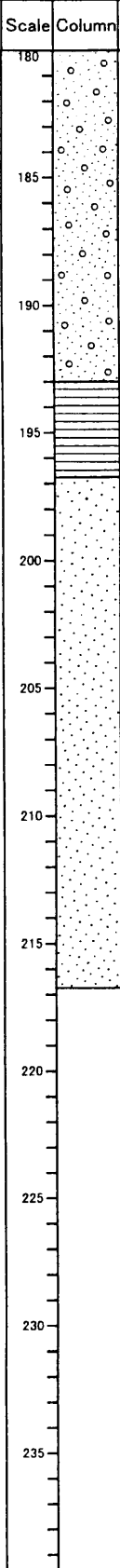
Scale	Column	Depth (m)	Description	Grade (ppm)								Depth (m)	Core Rec. (%)		
				Pb	Zn(%)	Cu	Fe(%)	Mn	Cd	Mg(%)	Ca(%)			Sr	Ba
180		180	Sandstone dark greenish gray, fine-grained, sub-angular quartz pebble, glauconite bearing, loosely consolidated.											14.3	
														30.0	
185														43.3	
														36.7	
190														53.3	
														26.7	
193.00					Mudstone black, loosely consolidated.										40.0
195															33.3
															33.3
196.80					Sand grayish white~light brownish white, unconsolidated, sub-rounded quartz pebble.										26.7
200												23.3			
												16.7			
205												25.0			
210															
215															
216.80															
220															
225															
230															
235															
240															

図144 ボーリング柱状図 (MJTK - B1 孔)

# 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													20.0
		12.00	Sand													0.0
			yellowish brown, coarse-grained, sub-rounded quartz pebble, weathered.													0.0
			yellowish brown, fine to medium-grained, loosely consolidated, sub-rounded quartz pebble.													0.0
																0.0
																0.0
																0.0
																0.0
																0.0
																0.0
																0.0
		37.00	Mud													30.0
			grayish black~black, loosely consolidated.													20.0
		40.10	Sandstone													20.0
		43.10	Conglomerate													10.0
			reddish brown, fine to medium-grained, oxidized, contains breccia.													30.0
			reddish brown, oxidized, loosely consolidated, brown mud matrix, breccias are as much as 0.5-2.0cm in diameter and composed mainly of calcareous sandstone and limestone.													60.0
																90.0
																100.0
		60														86.7

図145 ボーリング柱状図 (MJTK - B2 孔)

# 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
60		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

図145 ボーリング柱状図 (MJTK - B2 孔)

# 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 carbo- nate rocks.													100.0
															80.0	
																36.7
125																6.7
																16.7
																20.0
																16.7
130		142.10	Sand yellowish brown, unconsolidated, medium-grained, sub-rounded quartz pebble.												20.0	
135																
140																
145																
150																
155																
160																
165																
170																
175																
180																

図145 ボーリング柱状図 (MJTK - B2 孔)

# 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
																36.7
																53.3
																37.0
																90.0
																43.3
																46.7
		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.													
			36.70~37.10m gypsum-mudstone complex.													
		39.95	Mudstone													90.0
			blackish gray, with grayish white dolomite breccias (breccias are as much as 2~5cm in diameter).													
			51.70~52.80m with gypsum.													86.7
		52.80	Gypsum, white, massive.													83.3
		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.													

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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	86.7
	△ △		Gypsum-Carbonate rocks-Mudstone complex grayish white, contains dolomite and mudstone breccia, with gypsum vein.											100.0	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	96.7
	△ △ △	73.70	Gypsum, grayish white, massive.											100.0	100.0
75	△ △ △	74.70	Dolomite, grayish black, with gypsum.											93.3	93.3
	△ △ △	76.00	Mudstone reddish brown, with gypsum veinlets, 78.70~79.00m massive gypsum.											93.3	93.3
80	△ △ △	78.70	Dolomite, grayish white, finely crystalline.											93.3	93.3
	△ △ △	79.00	Mudstone reddish brown, with gypsum veinlets, 82.20~83.40m brecciated.											83.3	83.3
85	△ △ △	83.40	Gypsum, grayish white, massive.											100.0	100.0
	△ △ △	85.00	Mudstone reddish brown, with gypsum veinlets, 85.00~86.15m with grayish white dolomite breccias											96.7	96.7
90	△ △ △	86.15	Mudstone-Gypsum-Dolomite complex blackish gray~reddish brown, brecciated, composed mainly of calcareous mudstone, gypsum veinlets and brecciated dolomite.											100.0	100.0
95	△ △ △	94.70	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	102.60
100	△ △ △	99.30	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	103.60
105	△ △ △	103.60	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	104.60
	△ △ △	106.30	Dolomite grayish black, brecciated, with gypsum.											105.60	105.60
110	△ △ △	114.10	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	100.0
115	△ △ △	116.60	Dolomite grayish black, brecciated, with gypsum.											100.0	100.0
120	△ △ △	120.00	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	100.0

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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	△ △		Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black).											100.0	
	△ △	125.60												100.0	
	△ △	128.10	Dolomite gray, brecciated, with gypsum.											96.7	
130	△ △		Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish black), brecciated, composed mainly of calcareous mudstone, gypsum veinlets, brecciated dolomite and limestone.											100.0	
	△ △	130.10												100.0	
135	△ △		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	△ △		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	

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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
185			180.00~181.00m carbonate network dominant.											100.0	100.0
190			193.60~195.10m carcite veinlets with a trace amount of galena and sphalerite.											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. 209.00m contains brown limestone. 214.10~216.10m calcareous marl, 217.20~217.50m carbonate network dominant.											100.0	100.0
215														100.0	100.0
220			220.10m calcite-(galena) network, 218.40m contains organic materials.											96.7	100.0
225														100.0	100.0
230														93.3	100.0
235		233.20	Marl (Aptien age) grayish black, argillaceous, contains limestone breccia and framboidal pyrite, with carbonate network, crack dominant. 233.90m contains brown limestone breccia with calcite-(galena) veinlets.											100.0	100.0
240														100.0	100.0

図146 ボーリング柱状図 (MJTK-L1 孔)



# 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	
			240.10~244.60m mostly crushed.											100.0	
245														100.0	
														100.0	
250														100.0	
														100.0	
255														100.0	
														73.3	
			259.30~260.00m mostly crushed.											60.0	
260		260.00	Marl (Aptien age) grayish black, calcareous, lime mud matrix, sparry calcite cement, with carbonate network.											83.3	
			262.30~262.50m calcite-hydrozincsite veinlets.											93.3	
			266.00~266.50m sheared zone.											100.0	
270			271.40~273.20m carbonate network dominant.											100.0	
														100.0	
275														73.3	
		278.00	Marl (Aptien age) grayish black, argillaceous, fossiliferous, contains limestone breccia and framboidal pyrite.											100.0	
			278.00~279.80m sheared zone.											100.0	
285														100.0	
		287.00	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	
290														100.0	
														100.0	
295														100.0	
														100.0	
300														100.0	

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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 - 318.80	Marl (Aptien age) grayish black, calcareous, lime mud matrix, sparry calcite cement, contains vitrinite and framboidal pyrite, with carbonate veinlets.  301.30m carbonate-pyrite veinlets (width 5mm). 310.00m calcite-(galena) veinlets.														100.0
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			96.7													
	II			100.0													
320	II	318.80 - 349.80	Marl (Aptien age) grayish black~gray, dolomitic, alternating of argillaceous marl and thin bedded limestone, contains vitrinite fragment and framboidal pyrite, partly brecciated, crack 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.														100.0
	II			100.0													
	II			100.0													
	II			90.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
	II			100.0													
350	II	349.80 - 360	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			90.0													

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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		
380	— — — —	364.10	Marl (Aptien age) grayish black~gray, dolomitic, contains vitrinite and peloid (pyrite coating), with minor amounts of pyrite.												90.0		
																96.7	
365	^ ^			368.60	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish white), composed mainly of calcareous mudstone, gypsum veinlets, limestone, dolomite and marl.												100.0
370	^ ^	373.10	Carbonate rocks-Gypsum complex gray, calcite and gypsum cement, contains Cretaceous marl and limestone breccia.														100.0
375	^ ^			380.50	Mudstone-Gypsum-Carbonate rocks complex reddish brown (partially grayish white), brecciated (breccias are composed mainly of calcareous mudstone, gypsum veinlets, limestone and dolomite,  379.70~380.50m massive limestone, 380.50~381.10m marl, calcite cement,  384.00~384.90m dolomitized limestone, 384.90~385.50m marl, calcite cement, 374.20~374.30m contains hydrozincite, 375.20~375.50m contain marl breccias.												100.0
380	^ ^																100.0
																	100.0
385	^ ^																100.0
																	100.0
																	100.0
390	^ ^																100.0
																	100.0
																	100.0
																	100.0
395	^ ^	392.90	Dolomite-Limestone-Mudstone complex gray~grayish white, gypsum cement, brecciated (breccias are composed mainly of Cretaceous limestone and dolomite.														100.0
																100.0	
																100.0	
400	^ ^			400.10													100.0

図146 ボーリング柱状図 (MJTK-L1 孔)

# 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, weakly 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, weakly 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). 26.00~30.60m wholly crushed.												60.0
	25														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														100.0
			40.00m calcite vein (width 7cm).												100.0
	43.00		Calcite-limonite-hematite vein												100.0
	43.60		Dolomite (Turonian age) brownish gray~light brownish gray, compact, fossiliferous, finely dolomite matrix, partially brecciated, with calcite veinlets~network.												100.0
	45														100.0
			45.40~47.80m with calcite-pyrite-(galena) veinlets.												100.0
	50														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														100.0
			53.10~53.70m, 57.80~60.40m brecciated, pyrite are scattered, contains a trace amount of galena.												100.0
	60														100.0

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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
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
70		66.20~66.90m	with calcite-pyrite network.												100.0
		69.80m	drusy calcite vein (width 5cm).												100.0
75		75.00~75.20m	contains a trace amount of galena, calcite-hematite vein.												100.0
80		76.60	Dolomite (Turonian age) light yellowish brown~gray, compact, lime mud matrix.												100.0
85		81.30	Dolomite (Turonian age) light brown~light gray, pyrite are scattered, with calcite vein.												90.0
90		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, with calcite-(pyrite) veinlets (width 1~2cm).												90.0
		85.40~86.00m	light brown limestone part.												100.0
		89.00~90.70m	light brown limestone part.												100.0
		89.70m	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
115		114.90~115.00m	mostly crushed, limonite is found in the fissures.												100.0
		116.80~117.00m	calcite-pyrite-galena vein (width 20cm).												100.0
120															100.0

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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	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
		135	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
		140															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,														100.0
		169.40	Dolomite (Turonian age) grayish white~gray, altanating of grayish white compact dolomite and brownish gray lamina dolomite.														90.0
		170															100.0
		173.50	Sandstone (Turonian age) grayish white~gray, fine-grained, calcareous, with coarse-grained calcite pebble, interbedded with thin bedded dolomitic black marl, with calcite-pyrite veinlets~network, pyrite are scattered.														100.0
		175															100.0
		180															100.0

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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	[Sandstone pattern]	180.00	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.  179.50~180.60m calcite-(pyrite) veinlets. 181.80~181.90m calcite-pyrite vein(width 10cm). 184.80~184.95m calcite-pyrite-spheralite vein(width 15cm). 189.60~189.80m calcite-pyrite-(galena) vein(width 20cm).  201.50m calcite-galena veinlets(width 1cm). 204.70~205.10m with calcite-(pyrite) veinlets(width 1cm). 208.00m drusy calcite veinlets(width 2cm). 212.00m calcite vein. 212.50m calcite vein.														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		100.0																100.0	
215		100.0																100.0	
220		100.0																100.0	
223.00		[Limestone pattern]		223.00	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.													222.50	
225	223.50																	100.0	
225	224.50																	100.0	
225	225.50																	100.0	
225	226.50																	100.0	
225	227.50																	100.0	
225	228.50																	100.0	
225	229.50																	100.0	
225	230.50																	100.0	
225	231.50																	100.0	
230	[Mineralized zone pattern]	230.00	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					
230		223.50		566.5	1.82	8.93	1.59	1203.5	73.62	8.00	20.70	435.8	13.58	223.50					
230		224.50		330.5	2.45	12.18	2.03	1441.4	101.41	8.00	18.70	441.1	30.20	224.50					
230		225.50		691.2	2.35	13.95	2.43	1164.9	88.53	11.93	24.92	828.1	60.47	225.50					
230		226.50		1772.1	4.62	7.02	2.55	1318.4	189.9	6.79	35.70	518.4	64.47	226.50					
230		227.50		1.53%	3.52	1.40	2.05	1277.7	138.3	3.31	44.10	127.5	7.19	227.50					
230		228.50		1053.1	3.07	7.05	1.59	1583.9	124.0	13.51	35.00	328.0	25.91	228.50					
230		229.50		2451.3	2.82	6.43	0.94	1191.6	124.5	12.43	31.22	269.8	37.48	229.50					
230		230.50		3252.9	3.70	11.61	2.73	1160.8	99.13	9.04	31.60	452.0	151.8	230.50					
230		231.50		103.7	1.54	13.55	0.93	764.6	56.94	14.42	28.00	463.2	31.88	231.50					
235	[Sandstone pattern]	232.50	Sandstone (Turonian age)	115.8	3.30	7.38	0.98	912.1	161.88	8.30	21.60	319.4	30.45	232.50					
235		233.50		303.6	2.30	14.32	1.22	1049.7	41.97	7.30	21.10	570.3	53.39	233.50					
235		234.50		137.6	1.40	7.55	1.11	1054.6	29.19	8.30	21.20	493.6	13.32	234.50					
235		235.50		209.0	1.70	11.52	2.09	1010.6	16.47	7.00	20.50	633.1	14.51	235.50					
235		236.50		1321.7	8.42	9.11	5.14	677.8	57.17	1.32	35.42	511.3	26.28	236.50					
235		237.50		6988.0	20.00	61.79	21.00	373.0	132.8	0.08	11.62	69.1	113.3	237.50					
235		238.50		120.3	0.68	8.82	1.22	644.8	9.92	0.33	44.10	1257.5	25.22	238.50					
235		239.50													239.50				

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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	○	240.00~261.70	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		
245																											100.0
250																											100.0
255																											100.0
260																											100.0
265																											100.0
266.80																											100.0
267.80																											100.0
268.80																											100.0
269.80																											100.0
270.80	□	266.80~277.60	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			
266.80																									266.80		
267.80																										267.80	
268.80																										268.80	100.0
269.80																										269.80	
270.80																										270.80	
271.80																										271.80	100.0
272.60																										272.60	
273.60																										273.60	
274.60																										274.60	
275.60																							275.60	96.7			
276.60																							276.60				
277.60																							277.60	100.0			
278.80																							278.80				
280	○	277.60~291.60	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.																					100.0			
285																										100.0	
286.70																										100.0	
288.40																										100.0	
289.00																										100.0	
290.60																										100.0	
291.60																								100.0			
292.60	□	291.60~300.00	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				
293.60																									292.60	100.0	
294.60																									293.60		
295.60																									294.60		
296.60																									295.60	100.0	
299.85																									296.60	100.0	

図147 ボーリング柱状図 (MJTK-L2 孔)



# 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.												300.60	100.0
		301.60		132.00	0.54	9.24	1.36	505.6	5.29	0.20	31.30	903.6	227.5	301.60	100.0	
		302.60		131.21	0.51	10.24	1.32	496.0	5.11	0.20	30.30	877.3	216.7	302.60	100.0	
		303.60		327.53	0.31	7.84	1.69	592.7	6.32	0.30	31.80	494.2	130.0	303.60	100.0	
		304.60	418.05	1.65	19.37	3.06	542.2	10.17	0.90	26.40	732.8	53.01	304.60	100.0		
		305	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).												306.20	100.0
		306.20													306.30	100.0
		310														100.0
		315														100.0
		320														100.0
		325														100.0
		330														100.0
		335														100.0
		340														100.0
		345														100.0
		350														100.0
		355														100.0
		360	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.												337.60	100.0
		338.60		1.89%	0.87	30.02	3.07	1709.2	27.92	0.25	30.52	933.7	76.66	338.60	100.0	
		339.60		4969.2	1.49	15.00	1.92	955.2	27.87	0.25	34.44	1348.2	67.13	339.60	100.0	
		340.60		751.4	0.55	24.11	2.55	709.8	12.88	0.25	32.90	992.1	225.9	340.60	100.0	
		345.30														100.0
		346.30		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	100.0	
		348.30		3628.0	4.56	18.34	16.00	431.2	37.51	0.16	21.28	1181.0	35.96	348.30	100.0	
		349.30		1944.3	8.95	15.59	9.40	348.6	58.03	0.25	17.92	989.7	55.22	349.30	100.0	
		350.30		1537.6	4.01	6.16	4.30	845.6	47.21	0.16	40.60	840.2	30.20	350.30	100.0	
		351.30		2994.3	0.67	12.88	2.41	855.4	6.71	0.33	36.40	833.3	163.8	351.30	100.0	
		352.30		1291.6	2.21	16.95	3.18	677.2	50.11	0.74	26.04	1396.6	211.5	352.30	100.0	
		353.30	2735.1	0.63	22.51	3.18	372.6	9.09	0.74	21.98	1920.9	167.0	353.30	100.0		
		354.30	1.74%	1.08	16.80	7.12	429.9	52.13	0.83	20.36	1573.7	69.61	354.30	100.0		
		355.30	1882.1	0.70	15.71	2.30	600.7	4.41	0.74	33.60	1771.9	165.9	355.30	100.0		
		356.30	1026.5	1.20	12.39	2.43	697.6	14.32	0.41	39.90	1291.2	111.3	356.30	100.0		
		357.30	2752.5	2.91	23.70	4.36	417.0	41.02	0.75	22.12	1867.9	238.0	357.30	100.0		
		358.30	662.5	1.13	17.08	4.03	535.2	17.01	3.80	17.08	1635.2	104.5	358.30	100.0		
		359.30	6637.1	5.94	26.26	7.39	251.1	62.10	0.82	10.92	1637.8	72.98	359.30	100.0		
		360	2818.7	3.37	26.28	3.91	310.5	36.96	0.41	12.32	1678.2	108.6	360	100.0		

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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]	360.30 361.30 362.30 363.30 364.30 365.30 366.30 367.30 368.30 369.30	Mineralized zone	775.1	1.22	24.43	2.96	248.7	12.69	0.33	10.92	2025.5	81.34	100.0	
limestone-hosted, brownish gray, dolomitized, organic material matrix, with sphalerite-calcite-pyrite-galena veinlets.			6130.8	3.65	28.35	6.37	196.8	40.32	0.41	7.80	1523.9	77.07			
361.20~361.40m, 365.30~367.20m			945.8	1.61	26.95	4.09	388.5	20.22	0.25	14.84	1318.8	244.7			
brecciated, sphalerite-galena-pyrite matrix, calcite-sphalerite-pyrite vein.			1190.2	1.72	35.18	4.61	206.3	27.89	0.16	12.32	1695.0	173.3			
			1216.5	1.42	60.77	4.08	221.4	26.89	0.33	10.08	2673.0	117.6			
			7677.6	2.30	76.15	3.22	328.4	32.15	0.20	7.20	3388.3	69.8			
			2342.1	4.30	45.83	2.67	1204	51.53	0.10	19.90	978.2	111.9			
			1.92(%)	1.02	28.84	2.65	963.3	70.51	0.20	17.00	1124.0	49.0			
			1.69(%)	1.06	39.71	2.78	747.6	86.35	0.20	14.00	934.2	41.9			
370			[Dotted pattern]	369.30 370.80	Cavity										
Dolomite (Turonian age)													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	100.0	
375	[Cross-hatched pattern]	375.05 375.10 375.90 376.90 377.90 378.90 379.90 380.90 381.90 382.90	Mineralized zone	2.45%	8.23	40.62	2.36	840.3	236.7	1.24	26.32	638.4	94.51	100.0	
limestone-hosted, brownish gray~brown, dolomitized, partially brecciated.			3.45%	8.78	41.84	2.49	704.9	382.9	0.58	24.78	816.9	71.64			
375.10~377.10m, 382.00m			2.89%	1.74	21.70	2.90	1007.9	48.22	0.41	31.36	832.5	81.90			
sphalerite-galena-pyrite matrix, calcite-galena-pyrite-(sphalerite) veinlets, sphalerite-galena massive ore.			1.65%	0.24	16.06	1.51	829.6	14.19	0.16	34.30	1042.9	141.2			
			3701.6	0.92	28.47	2.91	588.9	17.65	0.08	21.00	969.2	173.9			
			3.45%	16.00	68.99	5.22	1003	208.6	0.16	25.34	355.1	45.20			
			3.46%	8.86	64.41	2.39	848.2	229.9	0.16	24.08	346.4	59.31			
			694.1	1.15	28.05	2.96	899.8	23.43	0.08	35.42	1565.1	323.9			
385		383.60	Cavity												
390															
395															
400		400.00													

図147 ボーリング柱状図 (MJTK-L2 孔)

# 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
		34.30	Limestone												93.3
			light brown~light brownish gray, compact, homogeneous, finely calcite matrix, weekly weathered, alternating of light brown limestone and thin bedded black marl, limonite is found in the fissures.												93.3
			34.30~34.90m crushed,												100.0
															100.0
															93.3
															96.7
															100.0
															100.0
		48.60	Limestone												96.7
			grayish white, finely calcite matrix, alternating of grayish white limestone and thin bedded black marl, with pyrite striation and calcite-limonite veinlets~network.												100.0
			50.50~50.80m												93.3
			limonite-hematite-calcite are found in the fissures.												93.3
			57.80~58.00m coarsely calcite cement.												100.0

図148 ボーリング柱状図 (MJTK-L3 孔)

# 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
60			Limestone 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
70															96.7
75															96.7
80			80.80~80.90m calcite-(pyrite) vein.												90.0
81.10			Limestone whitish gray, compact, finely calcite matrix, homogeneous, alternating of limestone and thin bedded black marl, with calcite network~veinlets.												93.3
85			83.30m calcite-(pyrite) vein (width 2cm), 88.80~88.90m with calcite-(pyrite) veinlets (width 3cm).												96.7
90															96.7
91.00			Marl gray~blackish gray, lime mud matrix, partially interbedded with dark gray mud- stone, 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
100			98.80~99.30m with calcite veinlets~network, 102.00~102.10m with calcite-(pyrite) veinlets.												100.0
105															96.7
110			113.60~113.80m with calcite veinlets.												100.0
115			116.20m calcite veinlets (width 5cm), 117.20m calcite-(pyrite) veinlets (width 5cm), 118.20~118.50m with drusy calcite vein.												100.0
120															100.0

図148 ボーリング柱状図 (MJTK-L3 孔)

# 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	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	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	100.0
135														100.0	100.0
140			141.35~141.50m with calcite-(pyrite) network.											100.0	100.0
145														100.0	100.0
150			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	100.0
154.00			Marl dark gray, lime mud matrix, fossiliferous, alternating of black marl and gray limestone, with calcite network~veinlets.											100.0	100.0
155														100.0	100.0
160														100.0	100.0
165			164.20m ammonite bearing, 165.80~168.80m mostly crushed.											100.0	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.											46.7	
175			174.90~175.10m sphalerite network, 178.40~180.80m calcite-(pyrite) veinlets with a trace amount of galena.											13.3	
180														66.7	

図148 ボーリング柱状図 (MJTK-L3 孔)

# 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 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.														66.7
			181.20~181.40m with calcite network~veinlets.														100.0
			182.70m calcite-pyrite veinlets (width 3cm).														100.0
			187.80~190.40m, 192.80~193.80m mostly crushed, calcite-pyrite network.														90.0
			192.70m calcite-(pyrite) veinlets (width 5mm) with a trace amount of galena.														76.7
			198.40~201.60m calcite-pyrite vein~network with a trace amount of sphalerite and galena.														93.3
			202.00~203.40m with calcite-(pyrite) veinlets.														100.0
		204.00	Brecciated zone 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).														86.7
			209.60m limestone breccia with calcite-pyrite-(sphalerite) veinlets.														100.0
			212.30~214.20m contains brownish gray limestone breccia with small amounts of celestite.														90.0
		216.70	Gypsum-Carbonate rocks complex whitish gray~gray, gypsum-calcite matrix, brecciated (breccias are composed mainly of Cretaceous limestone and Triassic carbonate rocks), dolomitized.														73.3
			218.10~220.00m massive gypsum.														73.3
		226.50	Gypsum-Mudstone-Carbonate rocks complex purplish~purplish gray, brecciated (breccias are composed mainly of Triassic limestone, dolomite and calcareous mudstone), with gypsum vein.														76.7
																	100.0
		233.30	Mudstone-Gypsum-Carbonate rocks complex grayish white~pale greenish white, brecciated (breccias are composed mainly of Triassic limestone, dolomite and calcareous mudstone), with gypsum vein.														100.0
																	63.3
																	86.7
																	80.0
																	86.7
																	100.0

図148 ボーリング柱状図 (MJTK-L3 孔)

# 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	^ ^	240.00~260.80	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	^ ^	260.80~271.80	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	^ ^	271.80~298.90	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

図148 ボーリング柱状図 (MJTK-L3 孔)

# 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	△	307.80	Mudstone-Carbonate rocks-Gypsum complex dark gray, gypsum cement, brecciated (brecciaes are composed mainly of dolomite and limestone).												100.0
	△			83.3											
	△			73.3											
305	△														
	△														
	△														
	△														
	△														
	△														
	△														
310	△	334.20	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
	△			100.0											
	△			100.0											
	△			100.0											
315	△														
	△														
	△														
	△														
	△														
	△														
320	△	341.40	Brecciated zone dark gray~gray, brecciaes are composed mainly of marl and limestone (with calcite-pyrite veinlets~network), marl matrix.												100.0
	△			76.7											
	△			83.8											
	△			66.7											
	△			100.0											
	△			100.0											
345	△														
	△														
	△														
	△														
350	△	360.80	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.												46.7
	△			100.0											
	△			100.0											
355	△														
	△			100.0											
360	△														100.0

図148 ボーリング柱状図 (MJTK - L3 孔)



# 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 gray~brownish gray, finely calcite matrix, partially interbedded thin bedded black marl, with calcite-pyrite veinlets~network.														100.0	
			361.20~363.40m sheared zone, 366.80~367.00m contains massive pyrite.															100.0
365																		53.3
																		43.3
370																		66.7
																		61.1
		372.80	Mudstone-Carbonate rocks complex														100.0	
		374.50																
375																		

図148 ポーリング柱状図 (MJTK-L3 孔)

# 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	
		5												53.3	
														53.3	
		10												76.7	
		11.00	Limestone yellowish brown, weathered, alternating of limestone and marl, with calcite-hema- tite veinlets~network and pyrite striation, limonite is found in the fissures.											80.0	
														80.0	
		15												66.7	
														66.7	
		20												66.7	
														96.7	
		25												66.7	
														66.7	
		27.90	Limestone light gray~gray, argillaceous, alternating of limestone and marl, crack dominant, limonite is found in the fissures.											86.7	
														66.7	
		30												23.3	
														83.3	
		35												83.3	
														100.0	
		39.00	Limestone brownish gray~gray, finely calcite matrix, with calcite veinlets~network and pyrite striation, limonite is found in the fiss- ures.											90.0	
														70.0	
		40												46.7	
														96.7	
		45	46.30m calcite vein (width 2-3cm). 46.70m calcite vein (width 5cm) with a trace amount of galena.												
		48.80	Limestone light brownish gray~light gray, finely calcite matrix.												
		51.40	Brecciated zone breccias are composed mainly of lime- stone, calcite and limonite, with oxidi- zied vein.												
		55													
		55.80	Limestone brownish gray~gray, finely calcite matrix, with calcite veinlets~network and pyrite striation.												
		60													

図149 ボーリング柱状図 (MJTK-L4 孔)

# 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.														
			62.20m calcite vein (width 10cm).														100.0
			67.10m calcite veinlets (width 3cm).														90.0
			68.00m calcite veinlets (width 2cm).														100.0
			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
			74.30~74.90m calcite network with a trace amount of galena.														100.0
			77.50~82.70m calcite veinlets~network dominant.														100.0
			91.50m calcite vein (width 20cm).														100.0
			92.90m calcite vein (width 3cm) with a trace amount of sphalerite.														100.0
			95.30~95.70m calcite veinlets with a trace amount of galena.														93.3
			96.70~97.80m calcite veinlets dominant.														80.0
			98.90~99.30m calcite vein (width 20cm).														100.0
		99.30	Limestone brownish gray~gray, alternating of limestone and very thin bedded marl, with calcite veinlets and pyrite striation.														100.0
			106.70m calcite vein.														100.0
			106.90m calcite vein with a trace amount of galena.														100.0
			109.20~110.00m calcite-(barite)-(galena) matrix.														109.10
			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				93.3
			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
			114.40m calcite-(galena) veinlets (width 1cm).	379.27	216.3	22.8	0.72	2222	<2.0	0.20	20.0	2175.7	>20000				111.10
			115.60m calcite-(galena) veinlets (width 1cm).	704.09	511.7	5.61	0.69	1183	<2.0	0.22	19.2	1797.1	>20000				112.10
			117.30m calcite veinlets with a trace amount of galena.	1713.5	1657	8.42	0.91	1853	5.14	0.29	27.5	1917.0	>20000				113.10
			119.30m calcite vein.														100.0
			119.50m calcite vein with a trace amount of galena.														100.0
																	113.70
120																	

図149 ボーリング柱状図 (MJTK-L4 孔)

# 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.													100.0
			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.													100.0
			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													86.7
			dark gray, calcareous, lime mud matrix, with calcite veinlets~network.													100.0
135			137.70~138.90m calcite vein with a trace amount of sphalerite.													100.0
		138.80	Limestone													100.0
140			light brownish gray~brownish gray, finely calcite matrix, with calcite veinlets ~network and pyrite striation.													100.0
		143.30	Marl													100.0
145			dark gray, calcareous, lime mud matrix, with calcite veinlets~network.													100.0
			152.30~152.70m with calcite vein~veinlets, 154.50~154.70m calcite vein~veinlets with a trace amount of galena.													100.0
150																100.0
			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
155																86.7
160																93.3
165																100.0
170																100.0
		172.80	Limestone													90.0
			brownish gray, argillaceous, interbedded with black thin bedded mudstone, with barite-calcite-(pyrite)-(galena) veinlets~network.	446.3	2549.5	15.6	1.37	1339	8.40	0.56	30.0	891.6	>20000			173.20
175				1131.1	2776.2	15.0	1.53	907.6	6.50	1.00	29.0	780.8	>20000			174.20
				734.9	1059.0	15.0	1.07	1213	2.95	0.81	39.5	1089.8	>20000			175.20
				1349.4	1285.0	4.94	2.19	2703	3.83	1.28	39.0	785.6	>20000			176.20
				455.2	1006.2	9.76	0.98	792.1	<2.0	0.69	35.0	718.4	>20000			177.20
			174.00m calcite-pyrite vein with a trace amount of galena.	174.5	1790.5	11.8	0.94	960.8	<2.0	0.67	32.0	1013.7	>20000			178.20
180				2105.4	3061.1	10.0	0.27	2378	4.15	2.15	31.0	590.2	>20000			179.20

図149 ボーリング柱状図 (MJTK - L4 孔)

# 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			Limestone											180.20	
			brownish gray, argillaceous.	662.1	2201.4	12.3	0.12	1246	2.85	0.64	33.0	745.6	>20000	181.20	86.7
		182.20		1562.5	2501.0	13.6	4.85	3213	<2.0	2.70	28.9	995.3	>20000	182.20	
			Marl	9373.6	1184.0	20.0	3.59	2167	2.76	1.97	9.2	423.7	>20000	183.20	73.3
			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	184.20	
185				1.40%	1380.9	26.1	3.85	2053	6.72	1.60	8.4	612.4	>20000	185.20	
		186.70		1.40%	1381.5	66.8	6.25	3480	2.06	1.65	13.7	806.5	>20000	186.20	
			Limestone	5807.0	1949.0	19.5	0.39	2966	<2.0	3.50	18.0	1125.0	>20000	187.20	100.0
			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	188.20	
190															100.0
		191.90	Marl												100.0
			dark gray, calcareous, lime mud matrix, with calcite veinlets.												100.0
195			Limestone												100.0
		195.40	brownish gray, argillaceous, altanating of limestone and marl, with calcite veinlets~network and pyrite striation.												100.0
200															100.0
			205.10m calcite vein(width 5cm) with a trace amount of galena.												100.0
205			Brecciated zone												100.0
		205.20	dark gray, calcite-pyrite matrix.												100.0
		207.80	Marl												96.7
210			dark gray, lime mud matrix, with calcite veinlets~vein.												96.7
			214.30~214.40m brecciated, calcite matrix, 219.30~219.00m mostly crushed.												96.7
215															96.7
															90.0
220															86.7
															96.7
225			227.30m calcite vein (width 10cm).												100.0
															100.0
230															100.0
			233.90~234.70m brecciated, 234.90~235.40m calcite-pyrite vein with a trace amount of galena.												100.0
235															100.0
															100.0
240															100.0

図149 ボーリング柱状図 (MJTK-L4 孔)

# 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
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
265														100.0
270														100.0
275			275.3m calcite veinlets, 276.5m calcite veinlets.											100.0
280														100.0
285														100.0
290			288.10~288.70m calcite-(pyrite) network~veinlets. 291.30~291.70m calcite-(pyrite)-(chalcopyrite) veinlets.											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
300														96.7

図149 ボーリング柱状図 (MJTK-L4 孔)

# 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
																100.0
																100.0
																100.0
																100.0
																100.0
																100.0
																100.0
																100.0
																100.0
																96.7
																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
																91.7
																93.3
																100.0
360																

図149 ボーリング柱状図 (MJTK-L4 孔)

# 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. 365.80m 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															96.7
400		400.00	393.30m calcite veinlets. 393.70~398.50m with calcite veinlets. 397.90~398.50m mostly crushed. 399.10~400.00m mostly crushed.												84.0
															76.7
															100.0
															100.0
															100.0

図149 ボーリング柱状図 (MJTK-L4 孔)



第 Ⅲ 部