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APPENDICES

Ap. II-1-1 Process Data of Drilling, (1) MJMH-1

(1) Working Period

		Total Days	Actual Days	Workers
Preparation	= Sep/17 - Sep/19	2	2	31
Drilling	= Sep/20 - Oct/11	22	22	353
Removal	= Oct/12 - Oct/16	5	5	75
Total	= Sep/17 - Oct/16	29	29	459

(2) Drilling Length

Planned Length = 400 m

Drilled Length = 400.40 m

(3) Core Recovery

0-100m = 55.0 %

100-200m = 100.0 %

200-300m = 100.0 %

300-400m = 100.0 %

Total = 88.7 %

(4) Bit Size

Tricone 8 1/2 " = 2.00 m

Tricone 6 " = 48.00 m

HQ = 18.25 m

NQ = 332.15 m

(5) Working Time

Drilling = 177 hs

Appurtenant = 263 hs

Repairing = 32 hs

Others = 8 hs

Subtotal = 480 hs

Preparation = 32 hs

Revoval = 48 hs

Total = 560 hs

(6) Efficiency

Total Length / Total Working Days = 13.81 m/d

Total Length / Net Drilling Days = 18.22 m/d

Total Workers / Total Length = 1.15 man/m

Drilling Workers / Total Length = 0.88 man/m

Ap. II-1-2 Process Data of Drilling, (2) MJMH-2

(1) Working Period

	Total Days	Actual Days	Workers
Preparation = Oct/5 - Oct/8	4	4	45
Drilling = Oct/9 - Nov/3	26	25	360
Removal = Nov/4 - Nov/4	1	1	15
Total = Oct/5 - Nov/4	31	30	420

(2) Drilling Length

Planned Length = 400 m

Drilled Length = 401.30 m

(3) Core Recovery

0-100m = 91.0 %

100-200m = 100.0 %

200-300m = 100.0 %

300-400m = 100.0 %

Total = 97.7 %

(4) Bit Size

Tricone 6 " = 9.00 m

HQ = 94.70 m

NQ = 297.60 m

(5) Working Time

Drilling = 140 hs

Appurtenant = 312 hs

Repairing = 32 hs

Others = 8 hs

Subtotal = 492 hs

Preparation = 40 hs

Revoval = 8 hs

Total = 540 hs

(6) Efficiency

Total Length / Total Working Days = 12.94 m/d

Total Length / Net Drilling Days = 16.05 m/d

Total Workers / Total Length = 1.05 man/m

Drilling Workers / Total Length = 0.90 man/m

Ap. II-1-3 Process Data of Drilling, (3) MJMH-3

(1) Working Period

	Total Days	Actual Days	Workers
Preparation = Oct/17 - Oct/21	5	5	75
Drilling = Oct/22 - Nov/9	19	18	270
Removal = Nov/10 - Nov/15	6	6	90
Total = Oct/17 - NOv/15	30	29	335

(2) Drilling Length

Planned Length = 400 m

Drilled Length = 400.80 m

(3) Core Recovery

0-100m = 91.0 %

100-200m = 100.0 %

200-300m = 100.0 %

300-400m = 100.0 %

Total = 97.7 %

(4) Bit Size

Tricone 4 3/4 " = 9.00 m

HQ = 99.30 m

NQ = 312.50 m

(5) Working Time

Drilling = 150 hs

Appurtenant = 282 hs

Repairing = 56 hs

Others = 16 hs

Subtotal = 504 hs

Preparation = 48 hs

Revoval = 64 hs

Total = 616 hs

(6) Efficiency

Total Length / Total Working Days = 13.36 m/d

Total Length / Net Drilling Days = 22.27 m/d

Total Workers / Total Length = 0.84 man/m

Drilling Workers / Total Length = 0.67 man/m

Ap. II-1-4 Process Data of Drilling, (4) MJMH-4

(1) Working Period

	Total Days	Actual Days	Workers
Preparation = Nov/5 - Nov/8	4	3	45
Drilling = Nov/9 - Dec/11	33	31	465
Removal = Dec/12 - Dec/15	4	4	60
Total = Nov/5 - Dec/15	41	38	570

(2) Drilling Length

Planned Length = 400 m

Drilled Length = 400.20 m

(3) Core Recovery

0-100m = 93.4 %

100-200m = 100.0 %

200-300m = 98.5 %

300-400m = 97.1 %

Total = 97.2 %

(4) Bit Size

Tricone 6 1/4 " = 6.50 m

HQ = 48.15 m

NQ = 345.55 m

(5) Working Time

Drilling = 147 hs

Appurtenant = 327 hs

Repairing = 96 hs

Others = 8 hs

Subtotal = 578 hs

Preparation = 48 hs

Revoval = 48 hs

Total = 674 hs

(6) Efficiency

Total Length / Total Working Days = 10.53 m/d

Total Length / Net Drilling Days = 12.90 m/d

Total Workers / Total Length = 1.43 man/m

Drilling Workers / Total Length = 1.16 man/m

Ap. Ⅱ－2 List of Used Equipments

Item	Model	Quantity	Specification
Drilling Machine	Longyear - 38	2	Capacity : NQ 575m, BQ 725m
Engine for Drill	F4L - 912	2	Diesel Engine
Pump	BR - 435	2	
Engine for Pump	Molvin F2L - 511	1	Diesel Engine : 14kw, 1,800 1/min
Engine for Pump	Molvin F2L - 912	1	Diesel Engine : 16.9kw, 1,800 1/min
Pump	Sykes - 487	2	
Engine for Pump	Mann - 31017	2	
Mud Mixer		2	50cm rad
Water Tank		2	2m × 3m × 1.4m
Water Tank		4	1.4m × 1.4m × 1m
Dump Truck	Bedford	2	5.5t
Jeep	RL	2	
Drill Rods	HQ - WL	150	3.00m/pc
	NQ - WL	150	3.00m/pc
Casing Pipes	HW	100	3.00m/pc
	NW	20	1.00m/pc

Ap. Ⅱ－3 List of Main Articles of Consumption

Item	Specification	Unit	Quantity				
			MJMH-1	MJMH-2	MJMH-3	MJMH-4	Total
Light Oil		ℓ	3,400	4,000	3,600	4,100	15,100
Bentonite		bag	75	10	10	20	115
CMC		bag	—	6	4	6	16
Metal crown		pc	3	1	1	1	6
Diamond bit	HQ	pc	1	3	2	3	9
	NQ	pc	6	4	4	8	22
Diamond reamer	HQ	pc	1	1	1	1	4
	NQ	pc	2	2	2	3	9
Core box		pc	50	65	65	65	245

Ap. Ⅱ－4　Drilling Meterage of Diamond Bits

(1)

DH No.	Kind of Bit	Bit No.	Drilling Meterage	Accumulative Met.
MJMH - 1	Tricon 8 1/2"		2.00	2.00
	Tricon 6"		22.00	24.00
	Tricon 6"		26.00	50.00
	HQ	901124	18.20	68.20
	NQ	904209	31.70	99.90
	NQ	578735	36.60	136.50
	NQ	904208	77.10	213.60
	NQ	903-21	58.00	271.60
	NQ	901-83	89.90	361.50
	NQ	907-20	38.90	400.40
MJMH - 2	Tricon 6 1/4"		9.00	9.00
	HQ	901124	47.00	56.00
	HQ	907-28	30.60	86.60
	HQ	907-23	17.10	103.70
	NQ	907-10	26.60	130.30
	NQ	907-07	98.30	222.60
	NQ	907-16	119.10	341.70
	NQ	907-06	59.60	401.30

(2)

DH No.	Kind of Bit	Bit No.	Drilling Meterage	Accumulative Met.
MJMH - 3	Tricon 4 3/4"		9.00	9.00
	HQ	907-33	58.50	67.50
	HQ	907-32	21.30	88.30
	NQ	907-10 ※	4.10	92.40
	NQ	907-03	56.70	149.10
	NQ	907-12	38.90	188.00
	NQ	737-84	119.00	307.00
	NQ	420-06	93.80	400.80
MJMH - 4	Tricon 6 1/4"		6.50	6.50
	HQ	904215	17.70	24.10
	HQ	905-30	11.40	35.50
	HQ	904-25	19.10	54.60
	NQ	907-21	36.80	91.40
	NQ	421-06	43.30	134.70
	NQ	904-19	32.30	167.00
	NQ	905-27	68.40	235.40
	NQ	104040	63.50	298.90
	NQ	905-25	38.50	337.40
	NQ	907-27	33.50	370.90
	NQ	737-85	29.30	400.20

※ Second use

Ap. Ⅱ-5 List of Analized Samples

DH No.	Sample No.	Sample Name	Type	Kind of Analysis			
				TS	PS	XR	OA
MJMH-1	1-128	Slate	-	T			
	1-246	Pb・Zn Ore	vlts	T	P	X	
	1-293	Siltstone	-	T			
	1-350	Pb・Zn Ore	vlts	T	P	X	A
MJMH-2	2-131	Alt (Phy・Silt)	-	T			
	2-233	Pb・Zn Ore	v	T			A
	2-247	Cu Ore	v	T	P	X	A
	2-366	Pb Ore	diss	T			A
	2-370	Cu・Zn Ore	diss	T			
	2-373	Pb・Zn Ore	v	T	P	X	A
MJMH-3	3-126	Cu・Po Ore	v	T	P		A
	3-225	Zn・Py Ore	vlts	T	P	X	A
	3-238	Siltstone	-	T		X	
	3-239	Phyllite	-	T		X	
	3-272	Alt (Phy・Silt)	-	T			
	3-308	Zn Ore	diss	T	P	X	A
	3-335	Cu・Zn Ore	v		P		
MJMH-4	4-056	Rhyolite	-	T		X	
	4-079	Rhyolite	-	T			
	4-104	Rhyolite	-	T			
	4-108	Rhyolite	-	T			
	4-160	Pb・Zn Ore	vlts		P	X	A
	4-196	Cu・Po Ore	v		P		A
		Total		20	10	10	10

TS : thin section
PS : polished section
XR : X-ray diffraction
OA : ore assay

Alt : alternation
Py : pyrite
Po : pyrrhotite

diss : dissemination
vlts : veinlets
v : vein

Ap. II-6 Assay Results of Drilling Core

(1)

No.	Sample No.	Depth (m)	Length (m)	Rock Type	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
1 -1	1 - 100	100 - 101	1.0	Sl	Tr	Tr	0.01	Tr
2	1 - 150	150 - 151	1.0	Sl	Tr	Tr	0.01	Tr
3	1 - 200	200 - 201	1.0	Sl	Tr	Tr	Tr	Tr
4	1 - 268	268 - 269	1.0	Sl	Tr	Tr	0.01	Tr
5	1 - 300	300 - 301	1.0	Sl	Tr	Tr	0.01	Tr
6	1 - 346	346.4 - 346.6	0.2		0.11	6.36	0.96	5
7	1 - 349	349.2 - 394.4	0.2		0.01	0.01	7.05	16
8	1 - 350	350.7 - 350.8	0.1		0.03	6.12	16.00	3
9	1 - 352	352.3 - 352.4	0.1		0.02	0.01	9.58	3
10	1 - 400	399 - 400	1.0	Sl	Tr	Tr	0.01	Tr
2 -1	2 - 132	132.1 - 132.6	0.5		0.05	0.02	0.02	2
2	2 - 134	134.6 - 135.5	0.9		0.03	Tr	0.07	t
3	2 - 219	219.3 - 220.1	0.8		0.16	0.04	0.13	1
4	2 - 225	225.7 - 226.3	0.6		0.01	0.02	0.24	Tr
5	2 - 232	232.0 - 233.3	1.3		0.01	2.31	1.86	8
6	2 - 234	233.3 - 234.7	1.4		0.04	0.10	0.42	1
7	2 - 246	246.8 - 247.8	1.0		1.07	0.02	0.17	9
8	2 - 250	250.7 - 250.9	0.2		0.07	0.09	0.06	4
9	2 - 293	293.4 - 295.0	1.6		0.05	0.33	1.59	4
10	2 - 330	330.0 - 331.5	1.5		0.12	0.06	0.20	3
11	2 - 332	331.5 - 333.0	1.5		0.05	0.03	0.02	2
12	2 - 334	333.0 - 334.5	1.5		0.03	0.06	0.66	2
13	2 - 366	365.9 - 366.7	0.8		Tr	0.14	0.04	1
14	2 - 372	371.5 - 372.1	0.6		0.07	0.04	0.47	1
15	2 - 373	372.1 - 373.1	1.0		0.02	0.91	1.92	23
3 -1	3 - 125	125.0 - 125.9	0.9		0.01	0.01	0.04	1
2	3 - 126	125.9 - 126.9	1.0		0.61	0.10	0.66	8
3	3 - 127	126.9 - 127.5	0.6		0.02	0.01	0.01	Tr
4	3 - 139	139.0 - 141.5	2.5		0.02	Tr	0.01	Tr
5	3 - 142	141.5 - 144.0	2.5		0.28	0.09	0.41	7
6	3 - 194	193.7 - 195.5	1.8		0.05	0.21	0.03	Tr
7	3 - 196	195.5 - 197.2	1.7		0.06	Tr	0.01	Tr
8	3 - 198	197.2 - 199.0	1.8		0.12	0.04	0.23	3
9	3 - 203	203.2 - 204.2	1.0		Tr	Tr	0.01	Tr
10	3 - 222	222.0 - 222.3	0.3		0.02	3.62	4.79	26
11	3 - 224	223.4 - 225.1	1.7		0.01	0.01	0.02	Tr
12	3 - 226	225.1 - 227.1	2.0		0.02	0.06	0.02	1
13	3 - 279	278.1 - 281.2	3.1		0.04	0.06	0.34	1
14	3 - 282	281.2 - 284.3	3.1		Tr	Tr	0.03	Tr
15	3 - 285	284.3 - 287.3	3.0		0.01	0.02	0.02	Tr
16	3 - 308	307.0 - 308.3	1.3		0.03	0.02	0.25	Tr
17	3 - 317	316.4 - 317.4	1.0		0.11	0.79	0.95	3
18	3 - 325	324.6 - 326.5	1.9		0.11	0.28	2.06	3
19	3 - 330	329.3 - 330.6	1.3		0.09	3.08	2.87	11
20	3 - 331	330.6 - 331.9	1.3		0.04	0.76	0.97	5
4 -1	4 - 034	34 - 35	1.0	Ry	Tr	0.01	0.03	Tr
2	4 - 056	56 - 57	1.0	Ry	Tr	0.01	0.02	Tr
3	4 - 074	74 - 75	1.0	Ry	Tr	Tr	0.01	Tr
4	4 - 158	158.0 - 159.8	1.8		0.01	0.02	0.05	Tr
5	4 - 160	159.8 - 160.4	0.6		0.01	1.14	1.34	5
6	4 - 171	171.5 - 171.7	0.2		0.19	0.48	2.57	16
7	4 - 194	193.2 - 194.4	1.2		0.02	0.02	0.03	1

(2)

No.	Sample No.	Depth (m)	Length (m)	Rock Type	Cu (%)	Pb (%)	Zn (%)	Ag (g/t)
8	4 - 195	194.4 - 195.6	1.2		0.03	0.03	0.18	1
9	4 - 196	195.6 - 196.4	0.8		Tr	Tr	0.05	Tr
10	4 - 197	196.4 - 197.4	1.0		0.17	0.08	0.13	3
11	4 - 225	225.0 - 226.2	1.2		0.02	0.14	0.14	1
12	4 - 230	230.3 - 230.8	0.5		0.18	0.09	0.01	1
13	4 - 232	231.8 - 232.3	0.5		0.06	0.01	0.01	Tr
14	4 - 234	234.0 - 234.6	0.6		0.04	Tr	Tr	1
15	4 - 304	304.6 - 304.7	0.1		0.92	0.04	0.28	3
16	4 - 344	344.4 - 345.2	0.8		0.01	Tr	0.01	Tr
17	4 - 362	362.5 - 362.9	0.4		0.03	0.91	2.64	11

Ap. II-7 Microscopic Observasion of Thin Sections

SAMPLE No.	ROCK TYPE	Qz	Pl	Mus	Ser	Bio	Chl	Cal	Sd	Carb	Zr	Sphe	Apa	Spha	Grap	Opaq
1-128	Siltstone	4	1	2		4	3				1				2	3
1-246	Cu-Pb-Zn veinlet	3	1	1	2	2	3	2						2	3	3
1-293	Siltstone	4	1	2		3	1	4			1	1			3	3
1-350	Cu-Pb-Zn veinlet	3	1	3	3	1	2	2						4	3	4
2-131	Alt of Phy & Silts	4		3	3		2		1	2	1			1	3	3
2-233	Carbonate veinlet	4	1	3	4		2	3					1		1	2
2-247	Cu-Zn veinlet	4			3	2	2		2	1		1		1	2	3
2-366	Cu-Pb ore	4	1	3			4		1	2				1	1	2
2-370	Cu-Zn ore	3					4		2	3	1					4
2-373	Cu-Zn veinlet	3					2	4	3							4
3-126	Iron sulfide ore	3			4		3		3			1				3
3-225	Iron sulfide veinlet	4	1	2	3	2	2	2	3					2	2	3
3-238	Phyllite	3			3		3		2	1					2	3
3-239	Phyllite	3	1		3		3		2						2	3
3-272	Alt of Slate & Phy	3		3	4		1			1					2	3
3-308	Cu-Pb-Zn Veinlet	3			3		2		3					2	3	4
4-056	Rhyoritic Rock	4	3	3	2		1		2	2						2
4-079	Phyllite	4			3		2		1	2	1					3
4-104	Rhyoritic Rock	4		4	3		2			3	1		1			2
4-108	Phyllite	3	1	3	3		3		2	1					2	2

4 : abundant 3 : common 2 : poor 1 : rare

-Abbreviations-

Alt : Alternation Phy : phyllite Silts : siltstone

Qz : Quartz Pl : Plagioclase Mus : Muscovite Ser : Sericite Bio : Biotite
Chl : Chlorite Cal : Calcite Sd : Siderite Carb : Carbonate Minerals
Zr : Zircon Sphe : Sphene Apa : Apatite Spha : Sphalerite Grap : Graphite
Opaq : Opaque Minerals

Sample No. : 1-128
Rock Name : Siltstone

This specimen is mainly composed of non-foliated minerals of quartz, biotite and chlorite, those are about 0.03mm in size.
Biotite and chlorite occur as euhedral to subhedral.
Muscovite(0.07mm to 0.3mm in diameter) is also observed.

Sample No. : 1-246
Rock Name : Cu-Pb-Zn veinlet

This specimen mainly consist of quartz (smaller than 0.01mm in size).Subordinate chlorite is observed in network-like texture.
Banded aggregate formed by chlorite involving a few relic particles of biotite are also observed. The aggregates accompany with opaque minerals, muscovite and sphalerite.

Sample No. : 1-293
Rock Name : Siltstone

This specimen is mainly composed of quartz,calcite and biotite,and shows weak compositional bandings owing to the differences of mineral contents ratio of biotite and graphite.
The layers that are rich in biotite and graphite (about 0.03mm in diameter) show weak foliation. On the other hand,the layers, poor in these minerals, mainly consist of quartz and calcite (about 0.08mm in diameter).And this layers show little foliation.

Sample No. : 1-350
Rock Name : Cu-Pb-Zn veinlet

This veinlet is mainly composed of opaque minerals and sphalerite. Opaque minerals are surrounded by sphalerite particles. Subordinate calcite and quartz are also associated with opaque minerals. The quartz grains show wavy extinction.

Sample No. : 2-131
Rock Name : Alternation of Phyllite & Siltstone

This specimen is composed of phyllite layers (less than 3mm in thickness) and siltstone layers (less than 6mm in thickness).
Rock forming minerals of the phyllite layer are fine-grained sericite and graphite. These minerals show considerably developed lepidoblastic texture. Spotted muscovite is partly observed.
The siltstone layer mainly consists of quartz (about 0.03mm in diameter) and subordinate muscovite.
This specimen is penetrated by veinlet (about 1mm in thickness) of quartz and siderite associated with opaque minerals.

Sample No. : 2-233
Rock Name : Carbonate veinlet

This veinlet is less than 1mm in thickness ,and consists of calcite and quartz which are about 0.15mm in size.
The country rock is phyllite which is mainly composed of quartz, muscovite and sericite (about 0.03mm in size). Muscovite and sericite show considerably developed lepidoblastic texture.

Sample No. : 2-247
Rock Name : Cu-Zn veinlet

This specimen is composed mainly of quartz and sericite.
Fine-grained (about 0.03mm in size) and comparatively coarse-grained (about 0.2mm in size) quartz particles are observed. Coarse-grained quartz formed lenticular aggregate accompanied with opaque minerals ,siderite and another kind of carbonate minerals.

Sample No. : 2-366
Rock Name : Cu-Pb ore

This specimen mainly consists of chlorite, quartz and muscovite ,which are about 0.03mm in size .Spotted chlorite, smaller than 0.07mm in size, is also observed.
Veinlet (less than 0.1mm in thickness) is observed in the specimen. This veinlet is mainly composed of carbonate minerals and quartz rarely associated with sphalerite and opaque minerals. Chlorite particles ,about 1mm in thickness, are partly present along the carbonate veinlet.

Sample No. : 2-370
Rock Name : Cu-Zn ore

This specimen is mostly composed of very fine-grained chlorite and opaque minerals which is smaller than 0.1mm in size. These minerals form considerable foliation.
Siderite and another kind of carbonate minerals are also observed. These carbonate minerals partly form veinlets. Siderite is commonly associated with opaqe minerals.

Sample No. : 2-373
Rock Name : Cu-Zn veinlet

This specimen is mainly composed of opaque minerals, siderite and calcite.
Siderite is observed marginal and interior parts of opaque minerals.
Calcite has clearly twin lamellae formed rhomb.
Chlorite is sporadically present as aggregate.

Sample No. : 3-126
Rock Name : Iron sulfide ore

This ore consists of opaque minerals and siderite,with subordinate chlorite and quartz.
The country rock is slate composed of very fine-grained, smaller than 0.01mm in size, mineral particles. These minerals are difficult to be determined by microscopic observation, but are inferred sericite(and/or kaoline) and quartz. This specimen shows considerably developed lepidoblastic texture.

Sample No. : 3-225
Rock Name : Iron sulfide veinlet

This specimen is penetrated by many veinlets. These veinlets consist of opaque minerals and siderite. Spalerite and calcite is also observed in this veinlets.
The country rock is phyllite which is mainly composed of muscovite, sericite and quartz. A lepidoblastic texture is formed by these minerals.

Sample No. : 3-238
Rock Name : Phyllite

This specimen is mainly composed of chlorite, sericite, and quartz. These minerals are also about 0.02mm in size and show considerably developed lepidoblastic texture.
Spotted chlorite (smaller than 0.06 in size) is present. Micro-quartz aggregate with chlorite, smaller than 0.3mm in size, is also detected.
this rock is penetrated by veinlets. One of These veinlets is composed of only siderite and the other veinlets are composed of carbonate minerals and quartz.

Sample No. : 3-239
Rock Name : Phyllite

This specimen is similar to Sample No.3-238 in mode of mineral assemblage and texture.
The specimen is composed mainly of chlorite, sericite and quartz. These minerals are about 0.02mm in size and show considerably developed lepidoblastic texture. Spotted chlorite (smaller than 0.06mm in size) is present. Micro-quartz aggregate with chlorite, smaller than 0.3mm in size, is also observed.
Siderite veinlets are detected in the specimen.

Sample No. : 3-272
Rock Name : Alternation of slate & phyllite

This specimen is composed of slate layer (about 5mm in thickness) and phyllite layer (less than 2mm in thickness).

Rock forming minerals of the slate layer are very fine-grained sericite and quartz. These minerals shows considerably developed lepidoblastic texture. Spotted opaque minerals with quartz are observed, and sericite particles surrounding the opaque minerals show pressure shadows.
The phyllite layer mainly consists of quartz (about 0.04mm in diameter) with subordinate amounts of muscovite. Chlorite layers formed by many grains are partially observed, but chlorite content is poor in totality.
This specimen is penetrated by veinlet (less than about 1mm in thickness) of quartz.

Sample No. : 3-308
Rock Name : Cu-Pb-Zn Veinlet

This veinlet is composed of opaque minerals, siderite and quartz. Siderite grains occur as euhedral to subhedral. Sphalerite is also observed.
The country rock is phyllite , mainly consisting of sericite, chlorite and quartz. These minerals is about 0.02mm in size and show a lepidoblastic texture.

Sample No. : 4-056
Rock Name : Rhyoritic rock

This specimen is severely altered, but porphyritic texture is remained.
Phenocrysts formed by plagioclase are observed. The plagioclase grains generally occur as twins and are partially replaced by calcite grains. Quartz phenocrysts recrystallize to micro-quartz aggregate .
The groundmass entirely recrystallize to micro-quartz, sericite and muscovite.
This specimen is penetrated by opaque minerals veinlets, and this opaque minerals partly associate with siderite.

Sample No. : 4-079
Rock Name : Phyllite

This specimen is mainly composed of quartz, sericite and muscovite, and shows weak compositional bandings owing to the differences mineral contents ratio of these minerals.
This specimen is penetrated by siderite veinlet and other kind of carbonate veinlet. Siderite is associated with opaque minerals.

Sample No. : 4-104
Rock Name : Rhyoritic rock

This specimen is inferred as a rhyoritic rock ,but severely altered and no original texture is observed.
This specimen is mainly composed of micro-quartz (smaller than

0.07mm in size),with subordinate amounts of sericite and muscovite (about 0.07mm in size).
Calcite is also observed, and partly formed veinlet.

Sample No. : 4-108
Rock Name : Phyllite

This specimen is mainly composed of quartz, sericite, muscovite and chlorite. These minerals are about 0.02mm in size and show considerably developed lepidoblastic texture.
This specimen is penetrated by veinlet, which are composed of quartz and subordinate siderite.

Ap. II-8 Microscopic Observasion of Polished Sections

SAMPLE No.	ROCK TYPE	Spha	Gn	Cp	Py	Mc	Po	He	Goe	Bo	Pn
1-246	Cu-Pb-Zn veinlet	2	3	1	3	2	2		1		
1-350	Cu-Pb-Zn veinlet	3	2		3					1	
2-247	Cu-Zn veinlet	2		3	3				1		
2-373	Cu-Zn veinlet	2		2	3		4				1
3-126	Iron sulfide ore	2	2	2	3	2	4		2		
3-225	Iron sulfide veinlet	2	2	3	3	2		2	2		
3-308	Cu-Pb-Zn Veinlet	2	2	3	2	2	4				
3-335	Cu veinlet	3	2	2	3	2	3				
4-160	Pb-Zn-Cu ore	4	3	2	3		2		1	2	
4-196	Cu ore	2		3	3	2	4				2

4 : abundant 3 : common 2 : poor 1 : rare

-Abbreviations-

Spha : sphalerite Gn : Galena Cp : Chalcopyrite Py : Pyrite
Mc : marcasite Po : Pyrrhotite He : Hematite Goe : Goethite
Bo : Bornite Pn : Pentlandite

Sample No. : 1-246
Rock name : Cu-Pb-Zn veinlet

This specimen contains marcasite, galena, sphalerite and chalcopyrite.
Pyrrhotite and pyrite are associated with the following minerals. Chalcopyrite is exclusively observed within sphalerite showing exsolution texture. Concentration grade of both galena and sphalerite in this rock is low. Most part of the specimen is occupied by gangue minerals, though minute sphalerites extensively impregnate in the rock.

Sample No. : 1-350
Rock name : Cu-Pb-Zn veinlet

This specimen is partly made up of coarse-grained galena,sphalerite.
In the sphalerite, fine-grained pinkish brown mineral, possibly exsolution bornite appears. Besides, pyrite-veins occur in parallel within the galena-sphalerite band which is 0.5cm thick. The country rock is black slate. From these, this ore is estimated to belong to a stratabound type.

Sample No. : 2-247
Rock name : Cu-Zn veinlet

Pyrite veinlets are conspicuous. Besides, impregnation of very fine-grained chalcopyrite and minute sphalerite is recognized, whereas, the concentration grade of them is very low.

Sample No. : 2-373
Rock name : Cu-Zn veinlet

This specimen is mainly composed of pyrrhotite and pyrite. Both of them are coarse-grained, e.g. Pyrite is cubic attaining 0.5mm across.
The pyrrhotite is partly characterized by the texture of lamella twinning. Exsolution chalcopyrite is observed in sphalerite, while the sphalerite in question is not abundant.
At the boundary between pyrrhotite and chalcopyrite, granular and minute crystal, white in color seemingly pentlandite is observed. On this mineral, chemical analysis of Ni is required for the identification.

Sample No. : 3-126
Rock name : Iron sulfide ore

This specimen is characterized by the presence of thin pyrrhotite-band and marcasite-band. The former is thick compared with the latter.

Chalcopyrite occurs within pyrrhotite-band, but the concentration grade of chalcopyrite is low. Within the chalcopyrite, fine-grained magnetite is rarely observed. On the other hand, idiomorphic marcasite, 0.5mm across, showing weak anisotropism is recognized.

Sample No. : 3-225
Rock name : Iron sulfide veinlet

This ore is made up mainly of pyrite-aggregates in which accessory galena and sphalerite are recognized. Chalcopyrite and pyrrhotite are associated with the preceding galena and sphalerite. At the margin of pyrite-aggregates, flaky hematite probably due to oxidation is observed.

Sample No. : 3-308
Rock name : Cu-Pb-Zn veinlet

This ore is characterized by the association of chalcopyrite-pyrrhotite. Marcasite is concentrated in a part of the specimen. The marcasite showing cubic form is observed at the margin of the aggregates. The size of the cubic marcasite attains to 0.5mm across. Pyrite-veinlets are partly found in the specimen.
The pyrrhotite shows lamella texture and is not burnished. From these, the pyrrhotite is presumed to be hexagonal. In the pyrrhotite, cubic pyrite of 0.1mm across is present. This implies that pyrite is precursor of the pyrrhotite mineralization.
Irregular formed sphalerite and galena are associated with the chalcopyrite and/or pyrrhotite, while Cu, Pb, Zn minerals are very scant in abundance.

Sample No.: 3-335
Rock name : Cu veinlet

This specimen is characterized by the presence of chalcopyrite-pyrrhotite bands associated with sphalerite. In a part of pyrrhotite, dots of sphalerite and chalcopyrite occur. Though these dots are comparatively large in size, e.g. 0.05-0.1mm across, they are regarded as a product of exsolution judging from the mode of occurrence. In the sphalerite,a number of dots of pyrrhotite appear. Marcasite showing weak anisotropism forms a lenticular domain, 0.5mm across. On the other hand, fine-grained idiomorphic pyrite scatters in the gangue minerals.

Sample No. : 4-160
Rock name : Pb-Zn-Cu ore

This ore is characterized by the presence of pyrite, galena and sphalerite. Galena and sphalerite occur showing small aggregates attaining 1.5 to 2.0cm in diameter. In the sphalerite, exsolution mineral which is pinkish brown in color, resembling bornite in

Sample No.1-350 is observed. Exsolution chalcopyrite occur in sphalerite, but is very scant in abundance.

Sample No. : 4-196
Rock name : Cu ore

This specimen is composed of abundant pyrrhotite and small amount of pyrite and chalcopyrite. Within pyrrhotite, dots of chalcopyrite and sphalerite occur. The pyrrhotite is granular type. In and around the pyrrhotite, a flaky mineral, white in color, is observed. This mineral is seemingly pentlandite. Chemical analysis on Ni or Co is useful for identification of this mineral. On the other hand, scattering chalcopyrite and sphalerite are observed in some masses of pyrite.

Ap. II-9 Results of X-ray Diffractive Analysis

SAMPLE No.	ROCK TYPE	Chl	Kao	M	Qz	Pl	Cal	Dol	Sd	Cp	Sp	Gn	Py	Po	Mc
1-246	Cu-Pb-Zn veinlet	3	3	2	3	1	4				1	4	1		1
1-350	Cu-Pb-Zn veinlet	3	3	4	3	1	1				3	2	3		
1-247	Cu-Zn veinlet	1	1	2	4			2	2	2	1		1		
2-373	Cu-Zn veinlet	1	1	1	4		4		2		1		1	1	
3-225	iron sulfide ore	1	1	3	4	1			2	1	1		2		
3-238	Phyllite	4	4	1	4			3		1		1			1
3-239	Phyllite	4	4	4	4	2			2						1
3-308	Cu-Pb-Zn veinlet	1	1	2	4	1			2		1	2	1	1	1
4-056	Rhyoritic Rock	1	1	2	4	3		3	1					1	1
4-160	Pb-Zn-Cu Ore			1	4			3		1	4	3	3	1	

4:abundant , 3:common , 2:poor , 1:rare

-Abbreviations-

Chl:Chlorite Kao:Kaoline M:Mica Qz:Quartz Pl:Plagioclase Cal:Calcite Dol:Dolomite Sd:Siderite
Cp:Chalcopyrite Sp:Sphalerite Gn:Galena Py:Pyrite Po:Pyrrhotite Mc:Marcasite

Measurement Condition

Voltage	30kV
Current	20mA
Target	Cu
Filter	Ni
Slit	1°DS - 0.1mm - 1°SS
Scale Range	1000 cps
Time constant	2 sec
Measurement Range(2θ)	2 °~ 71 °
Scanning Speed	2 °/min
Chart Speed	2 cm/min
Hardware	XD-610
Software	DP-61 System

Identified mineral

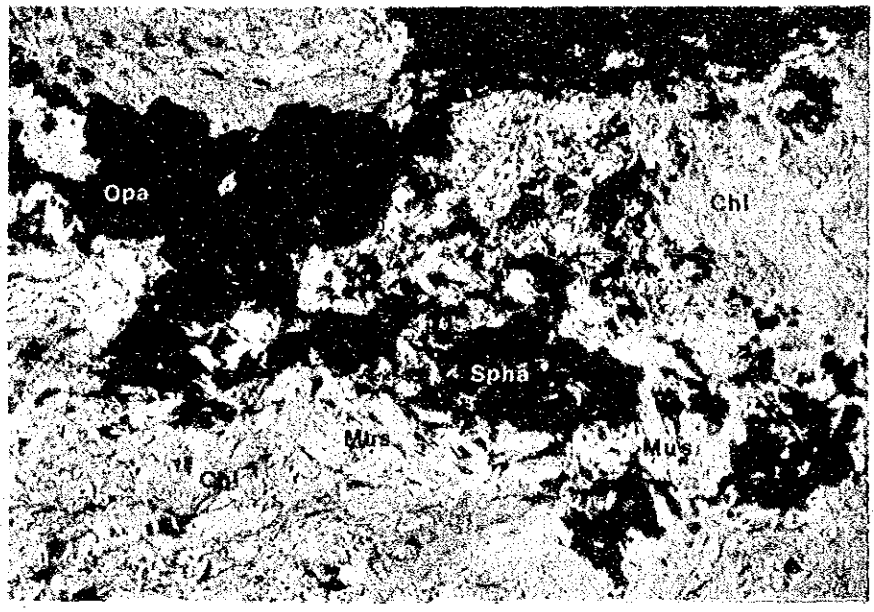
Chl	: Chlorite
Kao	: Kaoline
M	: Mica
Qz	: Quartz
Pl	: Plagioclase
Cal	: Calcite
Dol	: Dolomite
Sd	: Siderite
Cp	: Chalcopyrite
Spha	: Sphalerite
Gn	: Galena
Py	: Pyrite
Po	: Pyrrhotite
Mc	: Marcasite

Ap. II-10 Microphotographs

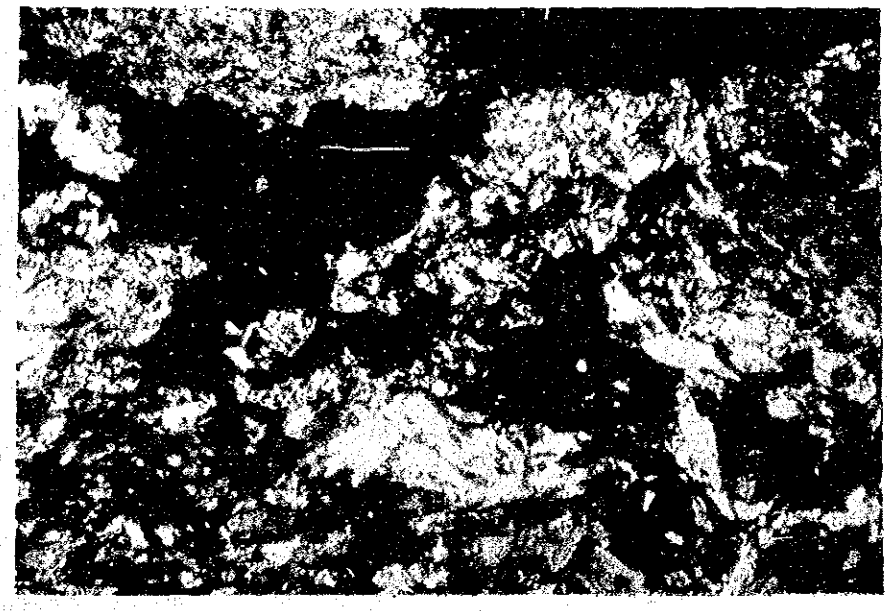
(1)

Sample No. : 1-246
Rock Name : Cu-Pb-Zn veinlet

Plain polarized



Crossed nicols



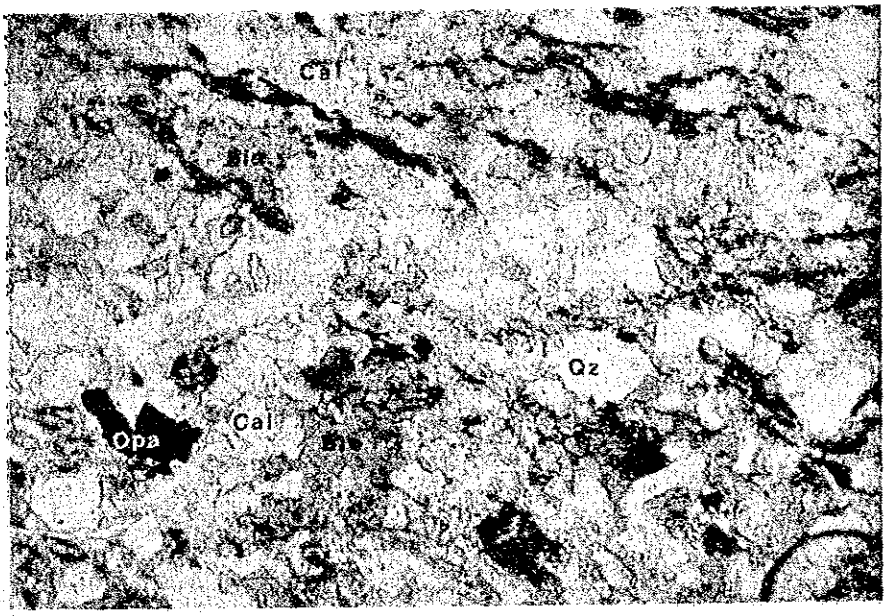
·Abbreviations·

Qz	:	Quartz
Pl	:	Plagioclase
Mus	:	Muscovite
Ser	:	Sericite
Bio	:	Biotite
Chl	:	Chlorite
Cal	:	Calcite
Sd	:	Siderite
Carb	:	Carbonate Minerals
Spha	:	Sphalerite
Opa	:	Opaque Minerals

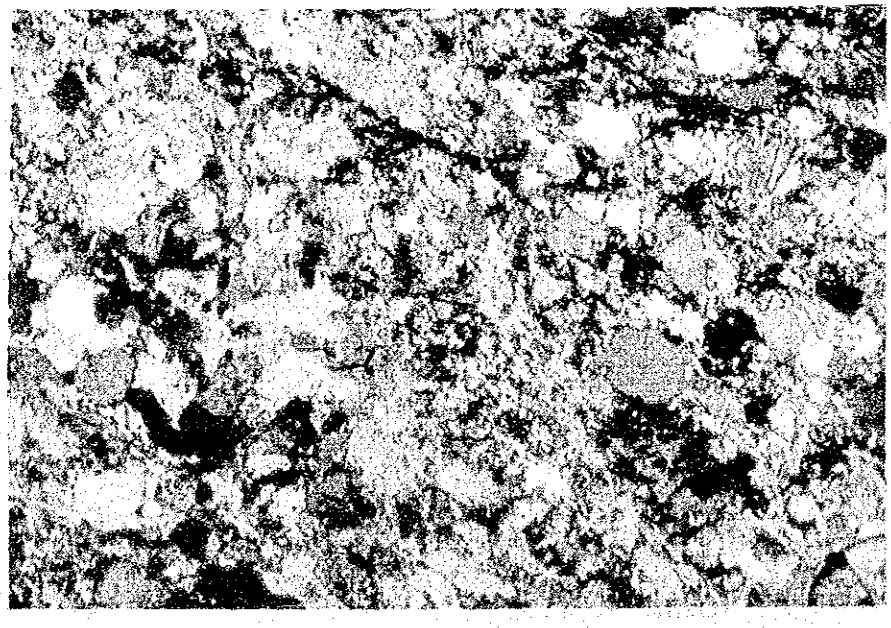
0 0.5mm

Sample No. : 1-293
Rock Name : Siltstone

Plain polarized



Crossed nicols

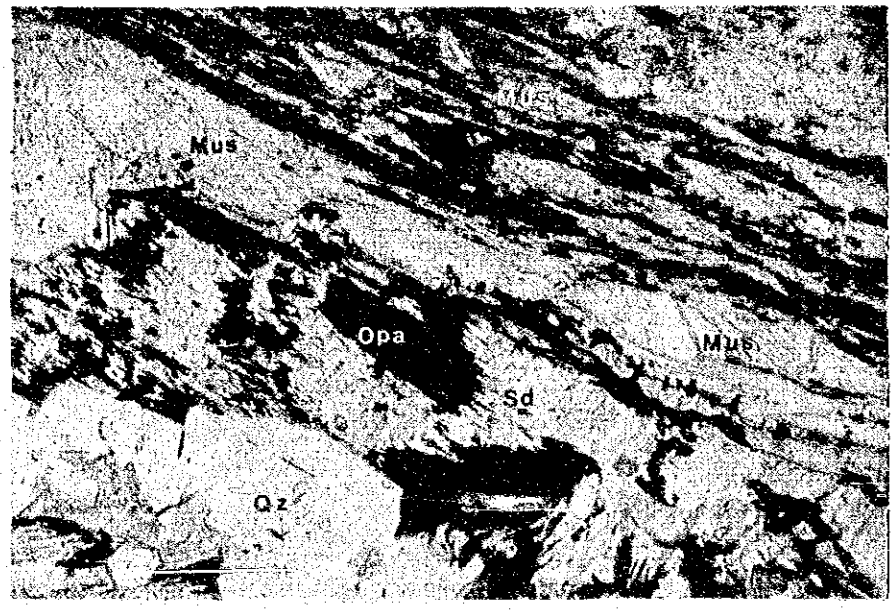


0 0.5mm

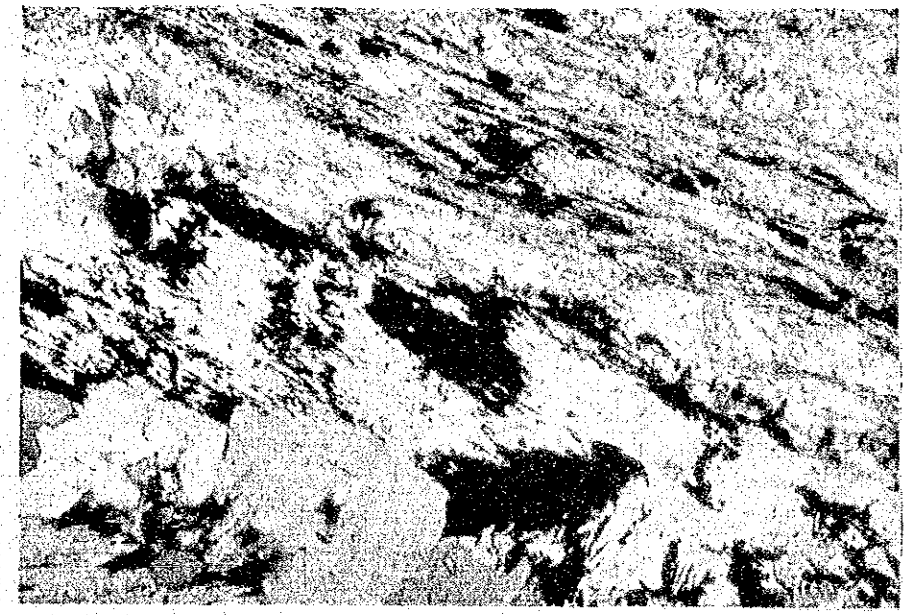
Sample No. : 2-131
Rock Name : Alternation of Phyllite & Siltstone

(3)

Plain polarized



Crossed nicols

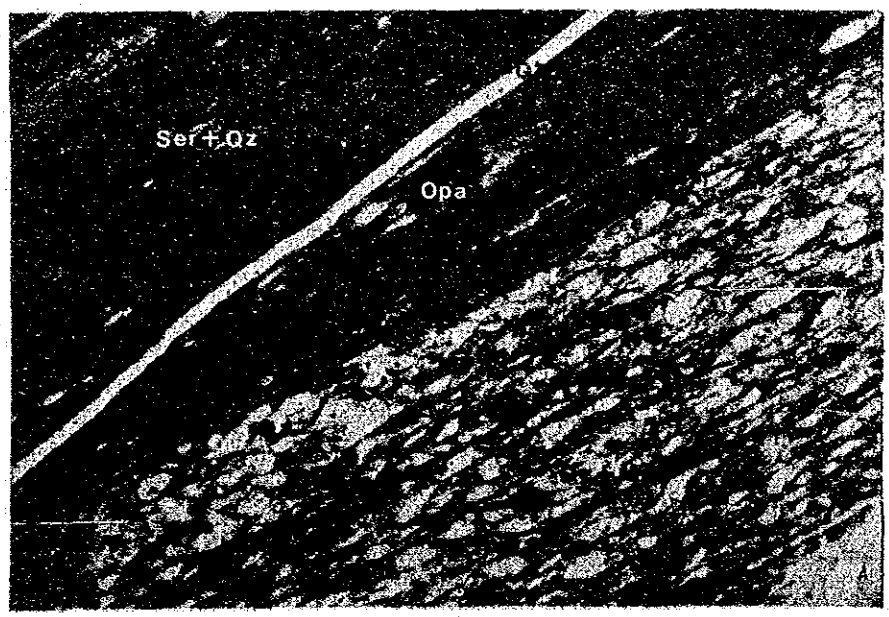


0 0.5mm

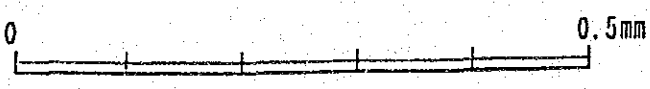
Sample No. : 3-272
Rock Name : Alternation of slate & phyllite

(4)

Plain polarized



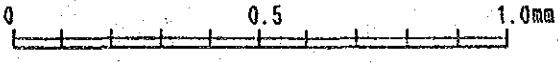
Crossed nicols



Sample No. : 4-056
Rock Name : Rhyoritic rock

Plain polarized

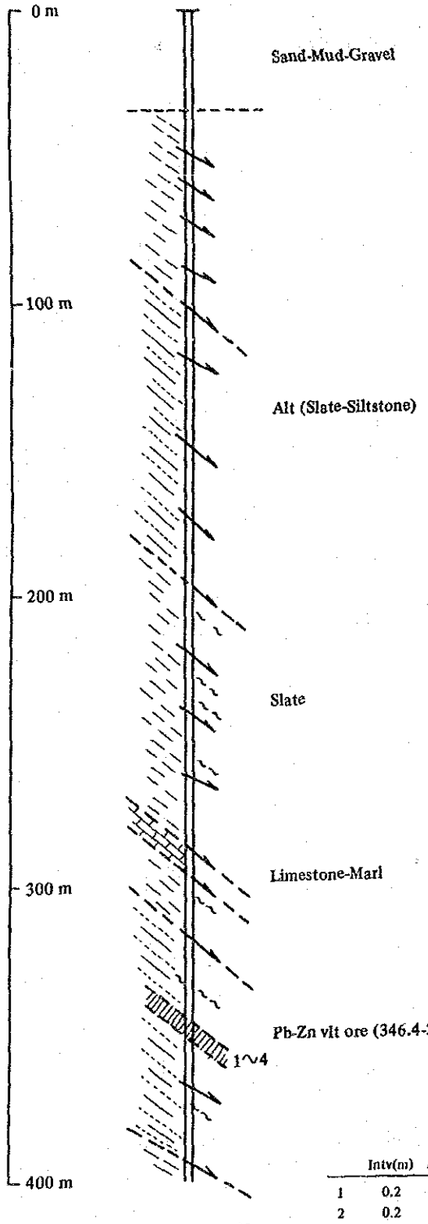
Crossed nicols



Geologic Drill Section

Scale 1 : 2,000

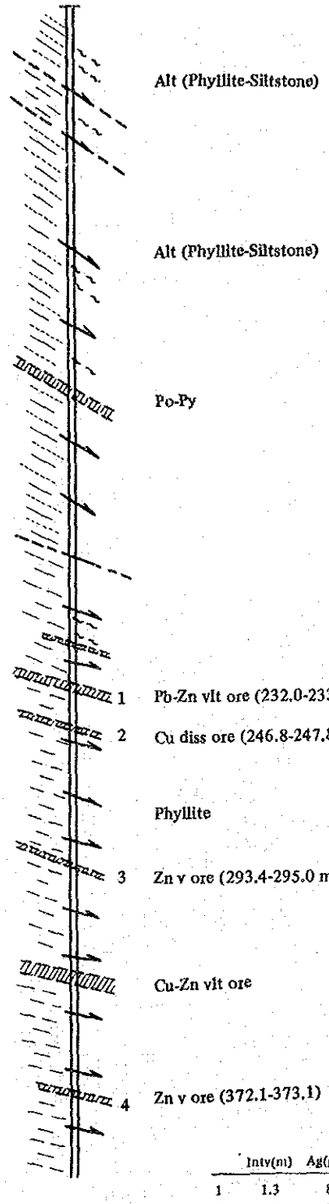
MJMH–1



400.40 m

	Intv(m)	Ag(g/t)	Cu(%)	Pb(%)	Zn(%)
1	0.2	5	0.11	6.36	0.96
2	0.2	16	0.01	0.01	7.05
3	0.1	3	0.03	6.12	16.00
4	0.1	3	0.02	9.58	9.58

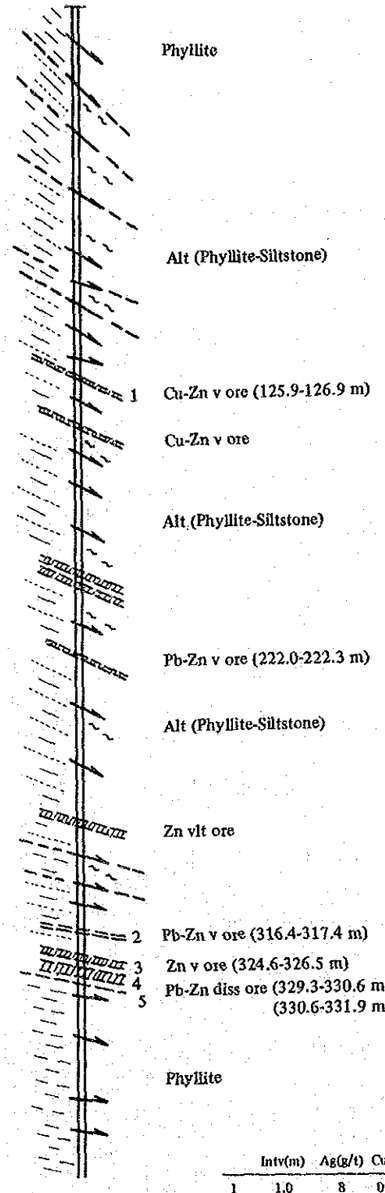
MJMH–2



401.30 m

	Intv(m)	Ag(g/t)	Cu(%)	Pb(%)	Zn(%)
1	1.3	8	0.01	2.31	1.86
2	1.0	9	1.07	0.02	0.17
3	1.6	4	0.05	0.33	1.59
4	1.0	23	0.02	0.91	1.92

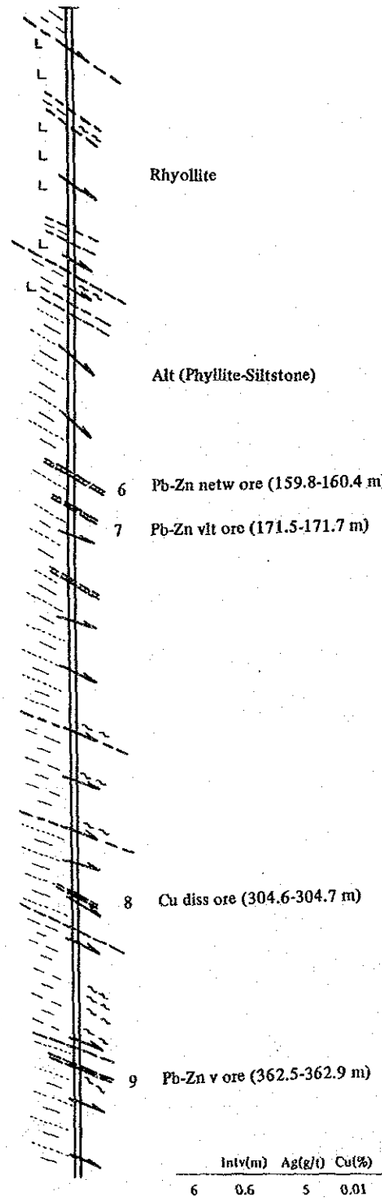
MJMH–3



400.80 m

	Intv(m)	Ag(g/t)	Cu(%)	Pb(%)	Zn(%)
1	1.0	8	0.61	0.10	0.66
2	1.0	3	0.11	0.79	0.95
3	1.9	3	0.11	0.28	2.06
4	1.3	11	0.09	3.08	2.87
5	1.3	5	0.04	0.76	0.97

MJMH–4



400.20 m

	Intv(m)	Ag(g/t)	Cu(%)	Pb(%)	Zn(%)
6	0.6	5	0.01	1.14	1.34
7	0.2	16	0.19	0.48	2.57
8	0.1	3	0.92	0.04	0.28
9	0.4	11	0.03	0.91	2.64

vlt : veinlet
v : vein
diss: dissemination