CHAPTER 3 DRILLING SURVEY

3-1 Background and Objectives

In the Phase I of this mineral exploration program, data compilation, geological survey and airborne geophysical survey were conducted in the project area of 5.500km^2. Low magnetic areas were detected in the Erdenet SE area, Under/Shand area and Mogoin gol area.

In Phase II, based on the results of geological survey and geophysical survey (TDIP method) conducted in the Erdenet SE area, Under/Shand area and Mogoin gol area promising geochemical and geophysical anomalies were detected in the Mogoin gol area. The promising results in Mogoin gol prompted the drilling of 2 holes (MJME-M1 and M2, total length of 1,000m).

In Phase III, from the six new areas where geological and geophysical surveys were conducted, only in Zuukhiin gol area promising exploration results were discovered.

The objectives of the drilling survey for Phase II was to further clarify the existence of mineral potential in Mogoin gol area and the Zuukhiin gol area by drilling in places where promising results were discovered, such as in the low magnetic anomalous zone detected by airborne geophysical survey, in high geochemical anomalous zones of Cu discoved by the geological survey, and high chargeability zones detected by the geophysical TDIP survey.

For the above reasons, drilling survey was extended in Mogoin gol area by drilling two more holes (MJME-M3 and M4, total length of 1,000m). Drilling survey was also conducted in three holes (MJME-Z1, Z2 and Z3, 1,500m in total length) in high anomalous zone discovered in Zuukhiin gol area

3-2 Location and amount of work

The Mogoin gol area and Zuukhiin gol area, where the drilling survey areas was conducted, are located 30km NW and 25km NE, respectively, from Erdenet mine. The locations of the areas are shown in fig. 2 and the drilling sites in Fig II-3-1 and Fig. II-3-2. The drilling sites were located by using two GPS units (GPS315) made by MAGELLAN. These locations are as follows:

Area	Drill Hole	Geographical Coordinates	UTM Coordinates
Mogoin gol	MJME-M3	49° 11′ 31.7″ N, 103° 45′ 37″ E	5449550N, 409670E
	MJME-M4	49° 11′ 32.6″ N, 103° 46′ 13.0″ E	5449570N, 410400E
Zuukhiin gol	MJME-Z1	49° 13′ 05.5″ N, 104° 13′ 41.0″ E	5452000N, 443790E
	MJME-Z2	49° 12′ 54.3″ N, 104° 13′ 36.9″ E	5451660N, 443700E
	MJME-Z3	49° 13′ 03.6″ N, 104° 14′ 01.3″ E	5451940N, 444200E

Amounts of the works are shown in Table I-1-1 and Table I-1-2.

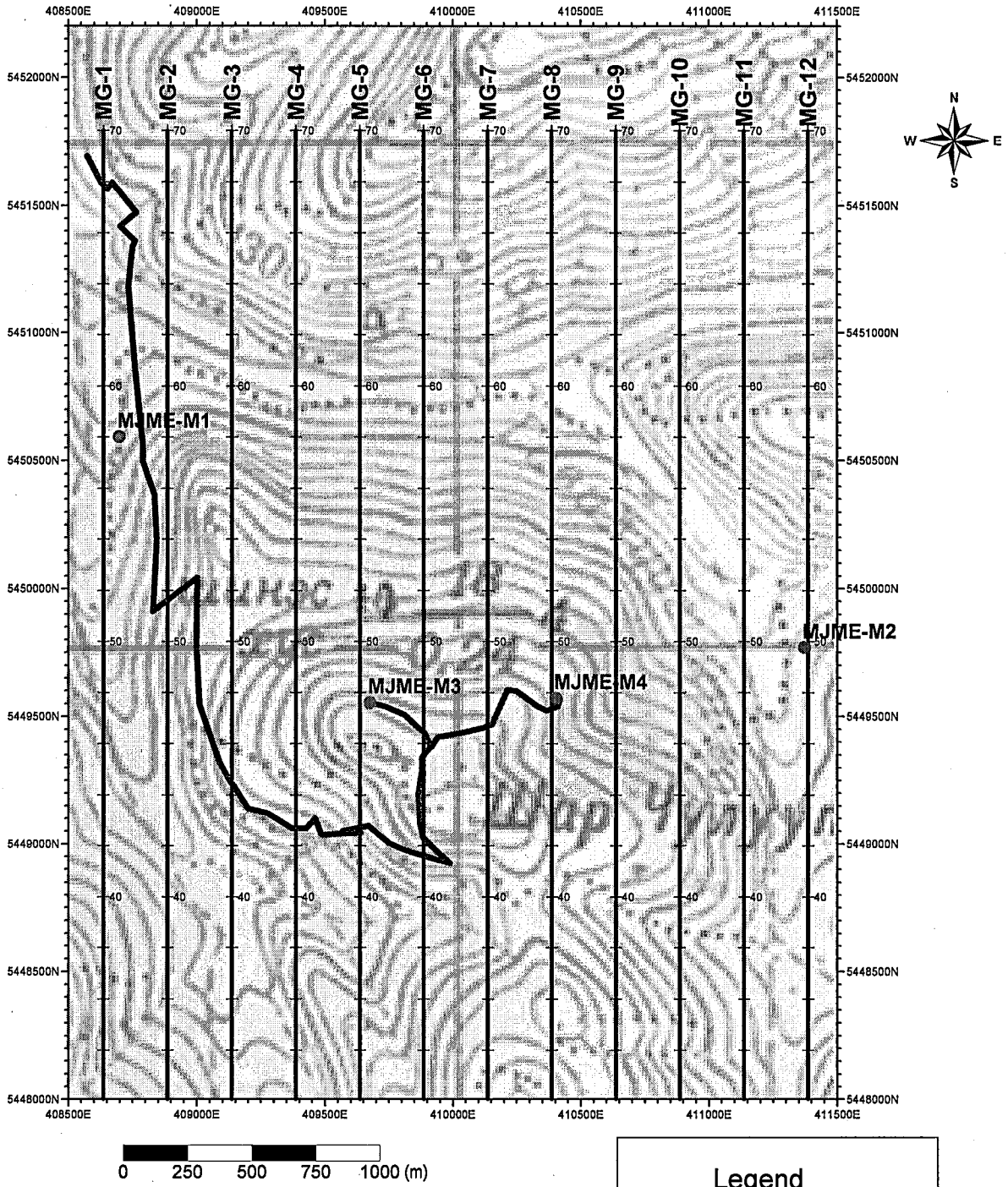


Fig. II-3-1 Location of drilling sites of MJME-M3 and MJME-M4 on the topographic map of the Mogoin gol area

Drilling sites of MJME-M3 and M4 in the Mogoin gol area

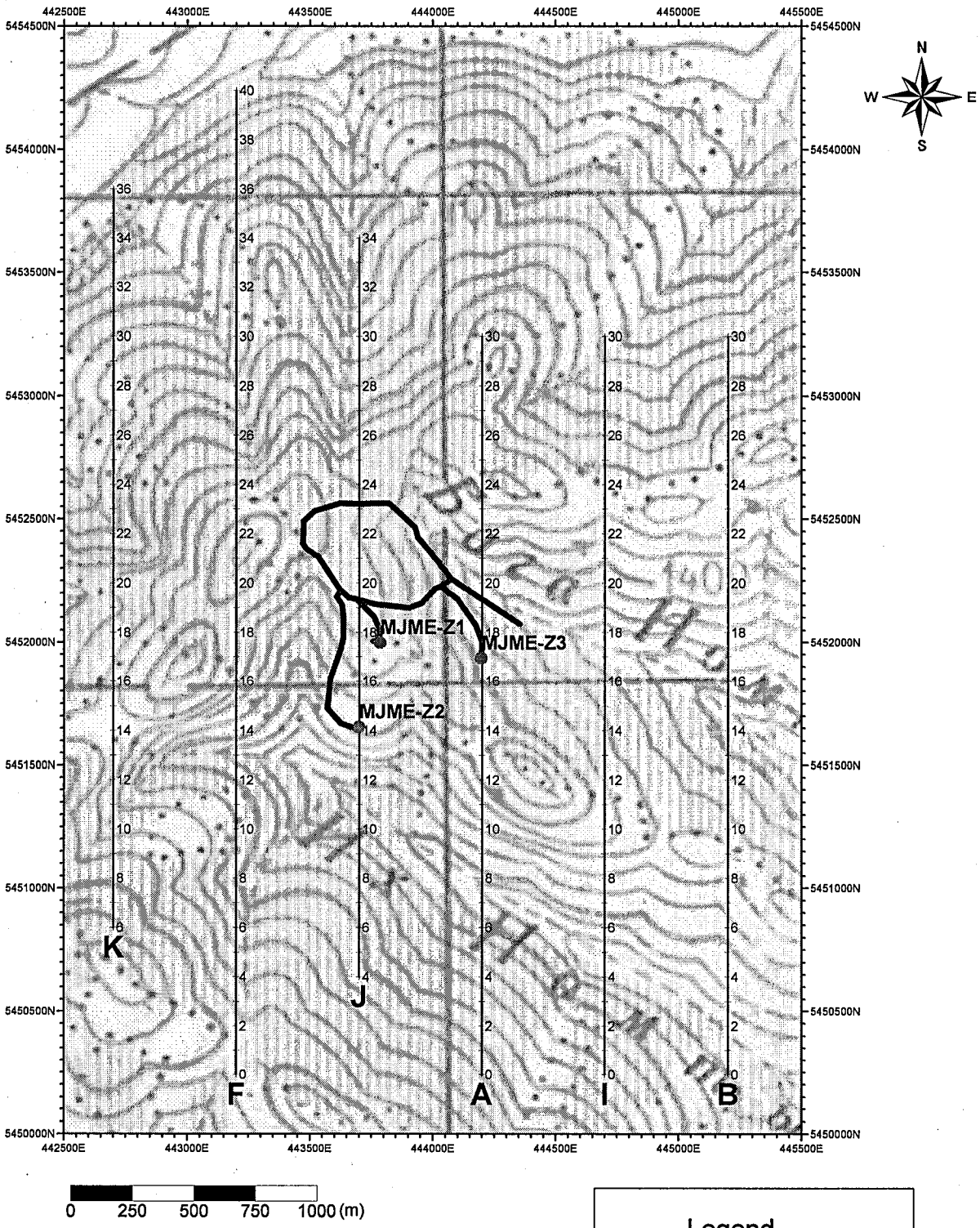


Fig. II-3-2 Location of drilling sites of MJME-Z1, MJME-Z2 and MJME-Z3 on the topographic map of the Zuukhiin gol area

3-3 Survey Method

3-3-1 Field survey

(1) Drill hole location, depth, direction and inclination are shown in Fig. II-3-1, Fig. II-3-2 and Table I-1-1.

(2) Method. The conventional wireline diamond drilling method was used.

(3) Drilling equipments and casing pipes. Drilling rigs utilized were MKS-5 type drilling machine made in Russia with a maximum drilling depth is 800m by BQ size. Drilling equipments are shown Appendix 15. Casing pipes were prepared 60% of planned drilling length.

(4) Drilling core diameter. Diameter of drilling core was bigger than BQ size.

(5) Core sampling and core recovery.

(6) Management and treatment of drilling cores for core laboratory analysis

(7) Core logging

(8) Laboratorial test and chemical analysis. Contents and amount of works were shown Table I-1-2.

(9) Mud water, mud waster, etc.

(10) Restoration Work. After completion of drilling work, the drilling site was restored.

(11) Road Repairment. The road was repaired to avoid problems with the residents.

3-3-2 Drilling Period

Drilling period and drilling progress of hole No. MJME-M1 and MJME-M2 are shown appendix 15.

Area	Hole No.	Drilling Depth	Start of drilling	End of drilling	Drilling period
Mogoin gol	MJME-M3	501.00m	2003/July/14	2003/September/04	53 days
Mogoin gol	MJME-M4	501.30m	2003/July/13	2003/September/04	54 days
Zuukhiin gol	MJME-Z1	502.10m	2003/September/18	2003/October/16	29 days
Zuukhiin gol	MJME-Z2	500.45m	2003/October/09	2003/November/11	34 days
Zuukhiin gol	MJME-Z3	502.00m	2003/October/22	2003/November/12	22 days

3-4 Drilling Survey Results

3-4-1 Laboratory analysis of rocks

Laboratory works conducted during this Phase III included observation of thin section analysis and polished thin section analysis under microscope, X-ray diffraction analysis, fluid inclusion analysis, chemical analysis of ore samples, measurement of resistivity and chargeability, remanent magnetism, K/Ar dating, rock chemical analysis, soil chemical analysis, measurement of oxygen and hydrogen isotope and Re/Os dating. Results of these tests are presented in Appendix 1 to 16.

(1) Results of thin section analysis

42 rock samples were collected from two drilling cores. Rock thin sections were made and observed under microscope. The results of rock observation for thin sections are shown Appendix 1.

The rocks observed were Permian volcanic rocks and granites, Triassic diorite porphyry and granodiorite, Triassic to Jurassic andesite dyke and alteration rock from the mineralized zone.

(2) Description of Polished Thin Section for Ore Samples

42 ore samples were collected from the mineralized zone of two drilling cores, and polished thin section were made and observed under microscope. The results of observation for ore polished thin sections are shown Appendix 2.

The following ore minerals were observed: pyrite, goethite, hematite, limonite, magnetite, chalcopyrite, chalcocite, covelite, bornite, azurite, sphalerite, galena and phyrrotite. Alteration minerals of quartz, muscovite, sericite, chlorite, epidote, and carbonate were also observed.

In the drilling cores of Mogoin gol area, ore minerals consist mainly of pyrite and goethite but rarely of chalcopyrite and sphalerite.

In the drilling cores of Mogoin gol area, ore minerals consist mainly of pyrite and goethite in iron mineral, chalcopyrite, chalcocite, covelite, bornite and azurite in copper minerals, sphalerite in zinc mineral and galena in lead mineral. Copper minerals were more dominant in Zuukhiin gol area than in Mogoin gol area. Mineralization stages are shown in Appendix 2. Two copper mineralization stages exist in the mineralization of Zuukhiin gol area, being Molybdenite mineralization the in late stage.

(3) X-ray diffraction analysis

117 rock samples were collected from five drilling cores. The results of X-ray diffraction analysis for rock and ore samples are shown Appendix 3.

The detected alteration minerals are quartz, plagioclase (albite), potassic feldspar, biotite, hornblende, sericite, chlorite, kaolinite, epidote, pyrophyllite, smectite, talc, epi-stilbite, alunite, jarocite, calcite, dolomite, laumontite, pyrite, rutile, hematite, sphalerite, galena and halite.

The alteration mineral assemblages from drilling cores in Mogoin gol area are classified as follows:

1) quartz-K-feldspar-sericite-pyrite

2) quartz-sericite-alunite-(jarocite)-rutile

3) quartz-sericite-kaolinite-pyrophyllite-alunite-pyrite-rutile

4) quartz-sericite-kaolinite-alunite-pyrite-rutile

5) quartz-sericite-jarocite-rutile

6) quartz-sericite-pyrite-rutile

7) quartz-albite-chlorite-sericite-pyrite-rutile

8) quartz-chlorite-sericite-pyrite-rutile

These mineral assemblages are associated to acidic alteration to phyllic alteration of porphyry copper type mineralization system. Generally speaking, these minerals occurred during the middle to upper part of the porphyry copper type mineralization system. The genesis temperature is moderate (350℃ to 150℃). Pyrophyllite mineral was detected from drilling cores of MJME-M4 and the genesis temperature of pyrophyllite is more than 250℃. The alteration is partly associated partly to pyrophyllite alteration zone of acidic alteration.

The alteration mineral assemblages from drilling cores in Zuukhiin gol area can be classified as follow:

1) quartz-sericite-pyrite-

2) quartz-chlorite-sericite-pyrite

3) quartz-chlorite-sericite-pyrite-calcite

4) quartz-chlorite-pyrite-calcite

5) quartz-chlorite-sericite-pyrite

6) quartz-chlorite-sericite-pyrite-dolomite

These mineral assemblages are associated with phyllic alteration to propylitic alteration of porphyry copper type mineralization system. At 163m depth of MJME-Z1 hole, pyrophyllite mineral was detected and the genesis temperature of pyrophyllite resulted in more than 250℃. At 160m depth of MJME-Z2 hole, abundant biotite minerals were detected. At 260m in depth, quartz index of biotite mineral presented a maximum value of 10. If the biotite is secondary biotite, its genesis temperature is more than 300℃. The detection of K-feldspar indicated that the alteration probably corresponds partly to a potassic alteration zone. Alteration found in JME-Z3 drilling cores is associated to propylite alteration type and consists of quartz-chlorite-pyrite-calcite and quartz-chlorite-sericite-pyrite. In the deeper part of the drill hole MJME-Z3, the alteration in the detected dolomite minerals is probably caused by neutral hydrothermal alteration. The alteration in the Zuukhiin gol area indicated that phyllic alteration to propylitic alteration appears widely in granitic rocks where hot water partly passed through the fractures.

(4) Ore assay analysis

1,300 ore samples for ore chemical analysis were collected from the five drilling cores. The results of

ore chemical analysis data are shown in Appendix 4. Ore analysis of these five holes shows the following results:

	Hole No.	MJME-M3	MJME-M4	MJME-Z1	MJME-Z2	MJME-Z3
Cu (%)	min. (%)	<0.001	<0.001	0.008	0.007	0.005
	max. (%)	0.660	0.037	0.784	0.671	0.455
	Average (%)	0.009	0.006	0.086	0.120	0.039
Pb (%)	min. (%)	0.002	<0.001	0.000	<0.000	0.000
	max. (%)	0.033	0.012	2.270	0.005	0.375
	Average (%)	0.008	0.004	0.013	0.002	0.004
Zn (%)	min. (%)	0.001	0.001	0.003	0.004	0.003
	max. (%)	0.120	0.032	0.828	0.132	0.926
	Average (%)	0.010	0.009	0.011	0.009	0.012
Au (g/)	min. (g/t)	<0.01	<0.01	<0.05	<0.05	<0.05
	max. (g/t)	0.06	0.36	80.8	1.27	0.07
S (%)	min. (%)	0.12	0.03	<0.01	<0.01	<0.01
	max. (%)	10.48	10.20	4.97	2.49	2.39
Fe (%)	min. (%)	1.14	1.14	1.47	2.45	2.45
	max. (%)	12.9	15.90	5.08	6.16	4.78

The following table shows average copper values in drill cores intervals where Cu values were relatively high.

Area	Hole No.	Interval			Cu average
		m	to	m	(%)
Mogoin gol	MJME-M3	**4.50**	**-**	**501.00**	**0.0089**
		239.70	-	254.95	0.0694
	MJME-M4	**6.00**	**-**	**501.30**	**0.0059**
		72.50	-	95.70	0.0184
Zuukhiin gol	MJME-Z1	**10.00**	**-**	**502.10**	**0.0863**
		10.00	-	28.60	0.1235
		155.30	-	203.60	0.1403
		445.60	-	502.10	0.0970
	MJME-Z2	**5.80**	**-**	**500.45**	**0.1200**
		170.90	-	336.00	0.1632
		356.60	-	379.20	0.1504
		485.35	-	500.45	0.1504
	MJME-Z3	**5.70**	**-**	**502.00**	**0.0388**

Analytical data of drilling cores in the Zuukhiin gol area show that molybdenum value becomes higher from MJME-Z1 to MJME-Z2 and MJME-Z3.

(5) Fluid Inclusion Test

19 samples for fluid inclusion analysis were collected as follows: 4 samples from MJME-M3 hole, 6

samples from MJME-M4 hole, 2 samples from MJME-Z1 hole, 3 samples from MJME-Z2 hole, 4 samples from MJME-Z3 hole, total 19 samples. The results of homogenization temperature and salinity and the histogram of homogenization temperature are shown in Appendix 5.

Homogenization temperature and salinity tests could not be done in Mogoin gol area samples because the 10 samples of quartz veins consisted of very fine-grained quartz minerals. The following table shows the results of measurements of homogenization temperature and salinity.

Area	Hole No.	Depth (m)		Temperature		Salinity(%)
		m to m		Range (℃)	Average (℃)	(NaCl eq.)
Zuukhiin gol	MJME-Z1	57.60	57.75	152 - 248	197.3	1.217
	MJME-Z1	163.30	163.40	121 - 209	166.9	12.003
	MJME-Z2	144.40	144.45	182 - 263	231	2.267
	MJME-Z2	428.10	428.15	231 - 312	266.6	1.208
	MJME-Z2	482.10	482.30	152 - 213	187.1	10.098
	MJME-Z3	99.00	99.25	142 - 195	173.6	2.11
	MJME-Z3	285.00	285.05	124 - 187	160.4	1.927
	MJME-Z3	311.70	312.00	198 - 262	236.2	1.952
	MJME-Z3	473.20	473.25	151 - 205	176.8	2.916

The analytical results of homogenization temperature of fluid inclusion in quartz vein show 160℃ to 267℃ in average. The temperature of MJME-Z2 hole is relatively high, 231℃ to 312℃ at 428m depth and 267℃ in average. The salinity of three holes is 1.21% to 12.00%. The salinity is relatively high, 12.00% at 263m depth of MJME-Z1 hole and 10.10% at 248m depth of MJME-Z2 hole.

The homogenization temperature and salinity showed a tendency to be higher in the samples from the drill hole MJME-Z2 than in MJME-Z1 and MJME-Z3. It is considered that hydrothermal fluid had originally high temperature and high salinity, but became low in temperature and in salinity during its passage through granodiorite. Sericite minerals were collected from altered rocks around quartz veins and used for isotope analysis of oxygen and hydrogen. Results of the analysis are described later in this chapter in paragraph (11) analysis of oxygen and hydrogen isotopes.

(6) Measurement of Resistivity and Chargeability

25 samples for measurements of resistivity and chargeability were collected from MJME-M3 to MJME-Z3 holes. 5 samples were collected for each hole. The results of resistivity and chargeability are indicated in Appendix 6.

The electrical properties of resistivity and chargeability in rocks were measured according to the IP time domain procedures in the laboratory. For this purpose, it was used a Lab Downhole Transmitter LDT-10 made by Zonge.

The results of resistivity and chargeability are shown in the following table

Hole No.	Area	Sampling depth		Rock Name	Resistivity (Ωm)	Chargeability (mV/V)	Cu (%)
		from	to				
MJME-M3	Mogoin gol	99.80	99.90	oxidized crystalline tuff	4302.8	4.0	0.009
MJME-M3	Mogoin gol	201.90	202.00	silicified tuff	1158.5	4.7	0.033
MJME-M3	Mogoin gol	288.00	288.10	silicified tuff	280.1	6.6	0.012
MJME-M3	Mogoin gol	381.60	381.80	silicified tuff	362.5	27.2	0.006
MJME-M3	Mogoin gol	481.60	481.70	crystalline tuff	634.4	3.3	0.002
MJME-M4	Mogoin gol	103.15	103.25	silicified tuff	977.3	2.4	0.008
MJME-M4	Mogoin gol	206.50	206.60	silicified tuff	728.9	2.5	0.005
MJME-M4	Mogoin gol	300.00	300.10	silicified tuff	7157.3	2.7	0.006
MJME-M4	Mogoin gol	403.00	403.10	silicified tuff	1276.5	3.1	0.003
MJME-M4	Mogoin gol	500.60	500.70	silicified tuff	1623.6	1.6	0.002
MJME-Z1	Zuukhiin gol	100.70	100.80	altered granodiorite	1176.9	12.8	0.349
MJME-Z1	Zuukhiin gol	199.95	200.05	altered granodiorite	1975.9	12.6	0.141
MJME-Z1	Zuukhiin gol	302.05	302.15	granodiorite	1004.4	6.6	0.076
MJME-Z1	Zuukhiin gol	400.10	400.20	granodiorite	8169.9	4.9	0.047
MJME-Z1	Zuukhiin gol	500.00	500.10	granodiorite	8273.4	2.7	0.101
MJME-Z2	Zuukhiin gol	100.45	100.55	altered granodiorite	1179.9	6.9	0.099
MJME-Z2	Zuukhiin gol	199.85	199.95	med. granodiorite	7617.6	10.1	0.157
MJME-Z2	Zuukhiin gol	299.05	299.15	micro diorite	343.1	130.4	0.127
MJME-Z2	Zuukhiin gol	400.00	400.10	micro diorite	11394.6	7.4	0.136
MJME-Z2	Zuukhiin gol	500.00	500.10	med. granoiorite	6796.9	11.5	0.193
MJME-Z3	Zuukhiin gol	100.25	100.35	silicified granodiorite	17186.3	4.4	0.019
MJME-Z3	Zuukhiin gol	199.30	199.40	altered granodiorite	231.4	60.6	0.011
MJME-Z3	Zuukhiin gol	300.50	300.60	altered granodiorite	8730.7	3.5	0.076
MJME-Z3	Zuukhiin gol	400.20	400.30	green altered granodiorite	5399.9	1.4	0.024
MJME-Z3	Zuukhiin gol	499.80	499.90	green altered granodiorite	884.5	3.6	0.022

(7) Measurement of Intensity of Natural Remanent Magnetization

In order to clarify the source of low magnetic anomaly detected by airborne survey, seven rock samples for measurement of natural remanent magnetization were collected in low magnetic anomalous zones of the Erdenet Mine area, Zuukhiin gol area, Zuukhiin gol east area, Tsagaan Chuluut west area and Khujiriin gol north area. The observed data is shown in Appendix 7, while the analyzed results in Fig. II-3-3 and Fig. II-3-4. A summarized result of the data is shown in the following table.

Area	Sample No.	Rock Name	Intensity of Remanent Magnetization (kA/m)	After Demagnetization, Remanent Magnetization Intensity (kA/m)	Declination (°)	Inclination (°)	Magnetized normaly or reversely.
Erdenet Mine	EM1	andesite porphyry	4.830E-04	4.660E-05	206.85	50.63	normaly
	EM3	syanite with copper minwralization	5.780E-05	5.630E-05	6.10	-79.72	reversely
	EM4	granodiorite	3.490E-05	3.910E-05	50.49	-70.22	reversely
Zuukhiin gol	ZG2	andesite dyke	6.760E-03	1.150E-03	79.32	-9.69	unknown
	ZG3	andesite dyke	3.360E-02	8.790E-03	352.13	15.53	unknown
Tsagaan Chuluut West	TSW1	andesite	7.200E-02	2.550E-02	78.19	-0.04	unknown
Khujiriin gol north	KN1	Basaltic andesite dyke	3.630E-06	7.760E-07	34.15	26.47	nornaly

Rock samples of granodiorite (EM4) and syenite porphyry (EM3) of the Selenge complex and Erdenet complex were collected from the open-pit of Erdenet Mine. Since the samples were reversely magnetized, the very low magnetic anomaly in huge scale, detected by airborne survey is probably caused by reverse magnetization of granitic rock of Erdenet complex. Inclination of magnetization presents high values between 70 to 79 degrees. Since rock sample of andesite dyke (EM1) intruded in syenite porphyry was normally magnetized, it is considered that the magnetic pole changed before the intrusion of andesite dyke. The fact that the andesite dyke did not contain mineralization with chalcopyrite and molybdenite, implies that it intruded in the syenite porphyry after the formation of porphyry copper type ore deposits. Mineralization occurred before the normal magnetization event.

A rock sample of andesite dyke (ZG2) collected in Zuukhiin gol area shows a high natural remanent magnetization (10^{-3} kA/m) with a low inclination (-9°). It is not clear whether the remanent magnetization was normal or reverse.

A rock sample (ZG3) of andesite dyke intruded in Triassic to Jurassic volcanic rocks collected in the eastern part of the Zuukhiin gol area shows high natural remanent magnetization (10^{-3} kA/m) with a low

inclination (16°). It is not clear whether the remanent magnetization process was normal or reverse.

A rock sample of andesite (TWS1) collected from Triassic to Jurassic volcanic rocks in the Tsagaan Chuluut West area shows very high natural remanent magnetization (10^{-2} kA/m) and a low inclination (0°). It is not clear whether the remanent magnetization was normal or reverse.

A rock sample of basaltic andesite (KN1) intruded in Permian volcanic rocks distributed in the Khujiriin gol north area shows a low natural remanent magnetization (10^{-7} kA/m) and normally magnetized with an inclination of 26° .

(8) K/Ar isotope dating

In order to clarify if the geological age when the intruded rocks were either normally magnetized or reversely magnetized, measurements of K/Ar isotope dating were conducted on the same seven samples used for measurement of natural remanent magnetization. K/Ar dating results of analytical data are shown in Appendix 7 as well as in the table shown below. The results of K/Ar dating indicating the measurement results of natural remanent magnetization and its geological relationship are shown in Fig. II-3-5.

Area	Sample No.	Coordinates		Rock Name	Sample type	K-Ar age (Ma)	Geologic Age
		N	E				
Erdenet Mine	EM1	5429705	436682	andesite porphyry	whole rock	191.1±5.8	lower Jurassic
	EM3	5429705	436682	syenite with copper minwralization	whole rock	208.0±5.4	lower Jurassic
	EM4	5429705	436682	granodiorite	whole rock	224.8±5.9	late Triassic
Zuukhiin gol	ZG2	5451466	444220	andesite dyke	whole rock	183.7±4.8	lower Jurassic
	ZG3	5451411	453483	andesite dyke	whole rock	191.3±5.1	lower Jurassic
Tsagaan Chuluut West	TSW1	5436618	420530	andesite	whole rock	198.1±5.1	lower Jurassic
Khujiriin gol north	KN1	5455141	400042	basalt dyke	whole rock	206.0±5.5	lower Jurassic

Rock samples for K/Ar dating collected in the open-pit of Erdenet Mine were granodiorite of Selenge complex, syenite porphyry of Erdenet complex and andesite dykes. The estimated ages show clearly different ages. The granodiorite (225Ma) of Selenge complex and the syenite porphyry (208Ma) of Erdenet complex show reverse magnetization while the andesite dykes (191Ma) shows normal magnetization. During the ages from 208Ma to 191Ma, the magnetic pole changed its polarization.

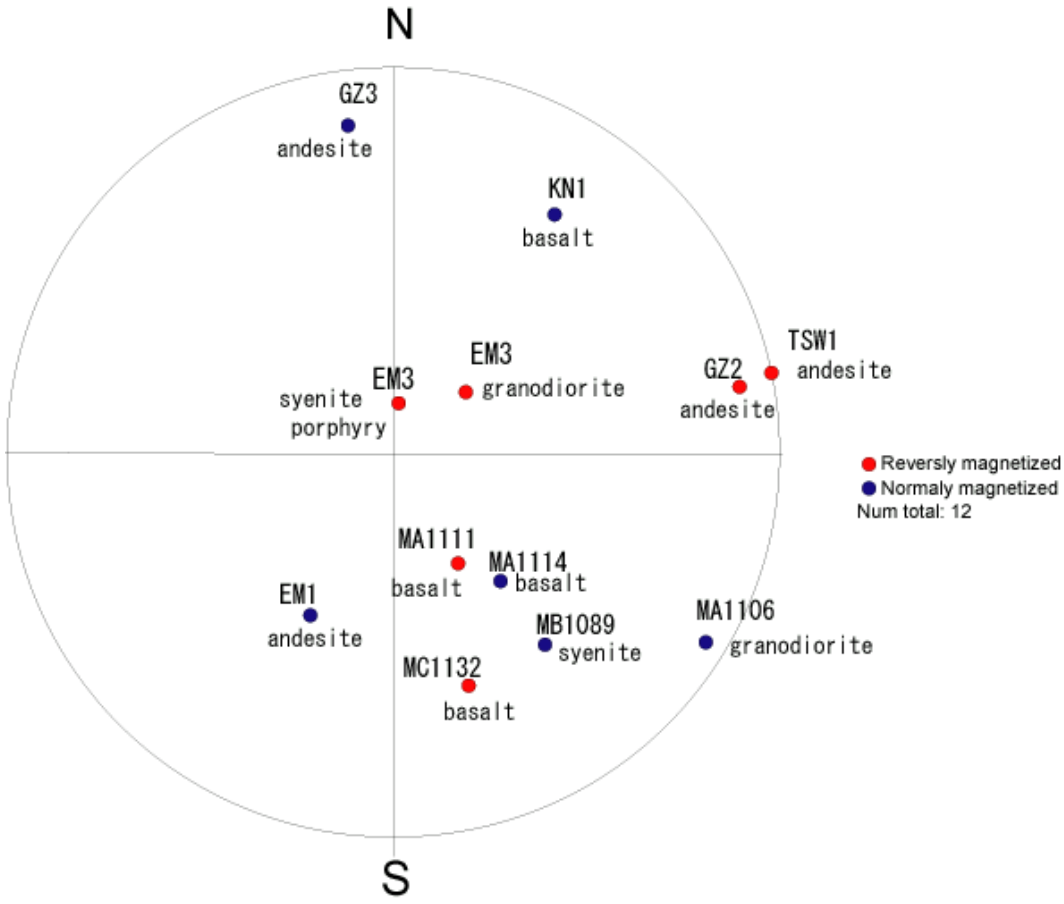
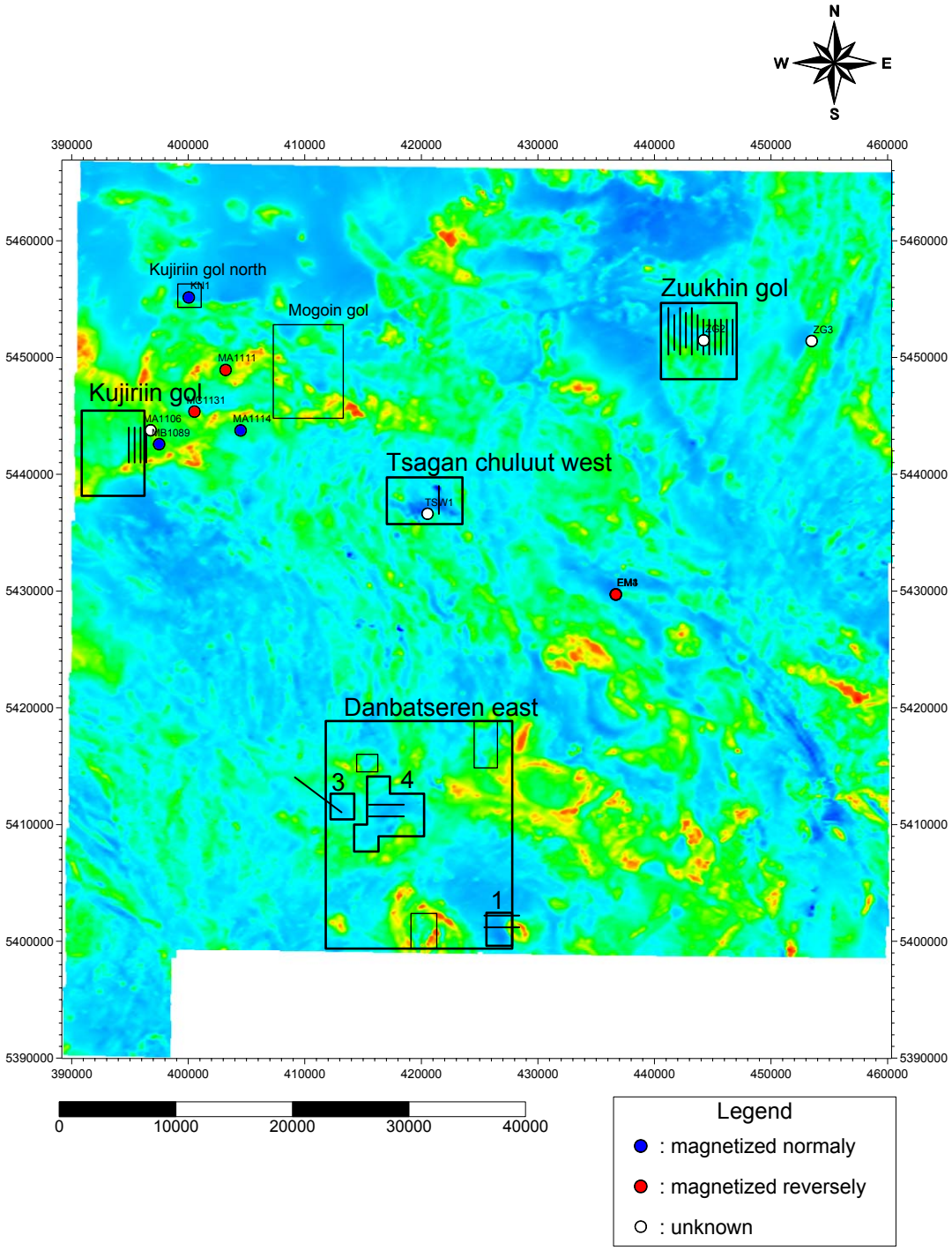


Fig. II-3-3 Remanent magnetization results shown on the Schmit net.


N
W
E
S
390000
400000
410000
420000
430000
440000
450000
460000
5460000
5450000
5440000
5430000
5420000
5410000
5400000
5390000
Kujiriin gol north
KN1
Mogoin gol
MA1111
Kujiriin gol
MA1131
MA1106
MB1089
MA1114
Zuukhin gol
ZG3
Tsagan chuluut west
TSW1
EM3
Danbatseren east
3
4
1
0
10000
20000
30000
40000
Legend
: magnetized normaly
: magnetized reversely
: unknown

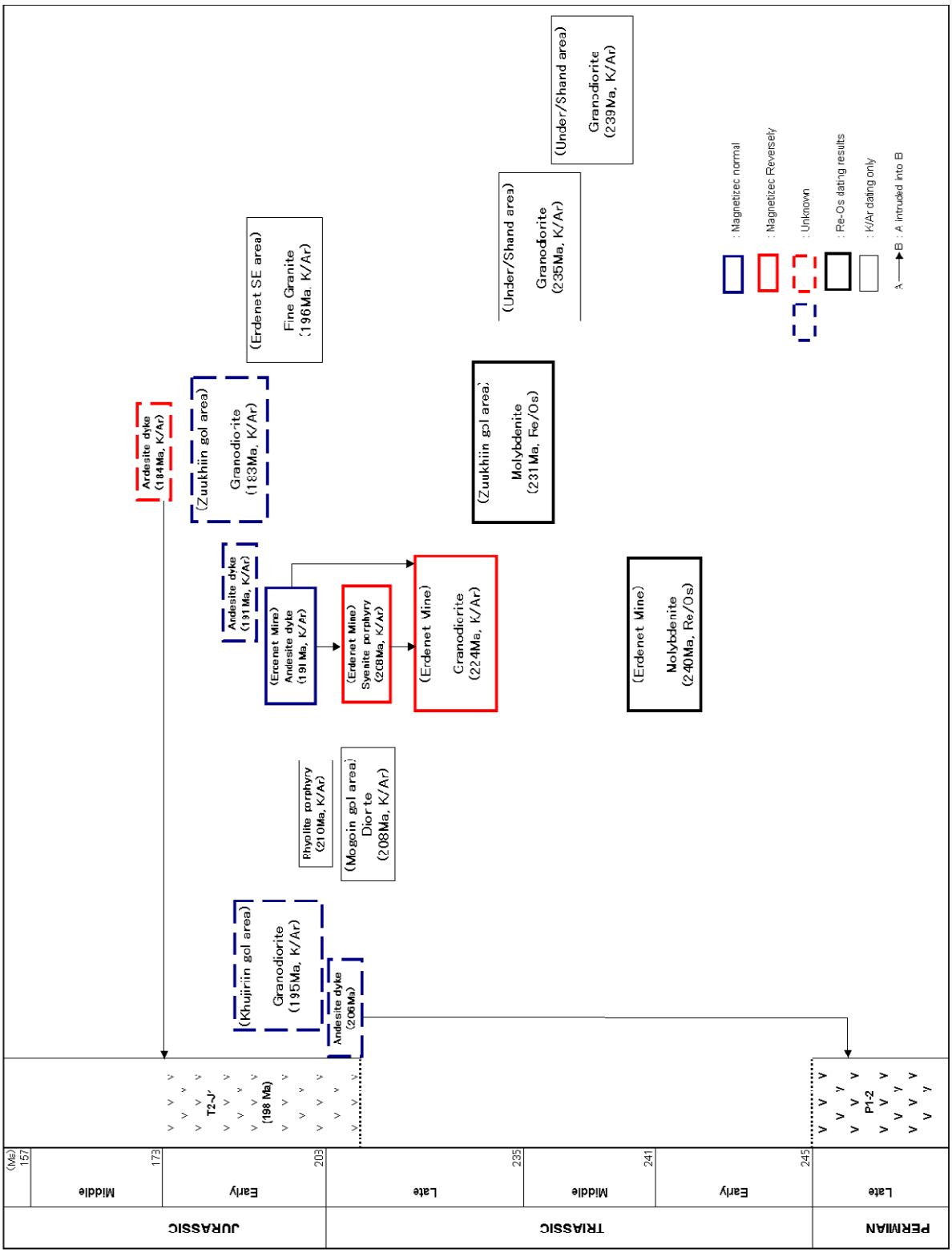


Fig. 12 Results of remanent magnetization, K/Ar dating and Re/Os dating on the geologic column.

(9) Rock chemical analysis

91 mineralized rocks were collected to conduct rock chemical analysis of the mineral showings found while conducting the geological survey. Analitical data are shown in Appendix 9.

(10) Soil chemical analysis

Soil sampling for soil geochemical survey were conducted mainly in the central parts of the low magnetic anomaly zone detected by airborne survey. The amount of soil samples was 578. Analitical data are shown in Appendix 10.

(11) Isotope analysis for oxygen and hydrogen

One or two samples for analysis were collected from the drill cores taken from MJME-Z1, MJME-Z2 and MJME-Z3 holes in order to clarify the geochemical characteristics of oxygen and hydrogen isotopes related to the copper mineralization process in Zuukhiin gol area. The samples that required sericitization around quartz vein with pyrite and chalcopyrite, were first crushed and then separated by using water. They were later separated by heavy liquid to collect the sericite minerals were collected.

Analitical data are shown in the following table and in Appendix 11.

Borehole No.	Depth		Rock name	H_2O (wt%)	δ D (‰)	$\delta^{18}O$ (‰)	Temperature (℃)
MJME-Z1	57.60	57.75	sericite alterated , granodiorite	3.3	-196.0	2.8	197.3
MJME-Z1	163.30	163.40	sericite alterated , granodiorite	2.6	-204.0	4.3	166.9
MJME-Z2	247.70	247.80	sericite alterated , granodiorite	3.2	-192.0	5.1	
MJME-Z2	482.10	482.30	sericite alterated , granodiorite	1.7	-176.0	-0.8	266.6
MJME-Z3	99.00	99.25	sericite alterated , granodiorite	4.4	-175.0	1.4	173.6
MJME-Z3	311.70	312.00	sericite alterated , granodiorite	3.6	-179.0	3.2	236.2

As shown in the figure of $\delta^{18}O$ vs. δ D diagram by Taylor(1979), analitical data of oxygen and hydrogen isotopes in sericite minerals collected from drilling cores in Zuukhiin gol area was plotted near the kaolinite line and marked under the distribution range of the Climax ore deposit shown in isotope figure of porphyry copper deposits.

Isotope ratio values of ore solution were calculated from values of oxygen and hydrogen isotopes by using the homogeneous temperature of fluid inclusion in quartz veins. This calculation is based on the fact that quartz veins in granodiorite and sericite minerals in the host rock required silicification and sericitization around quartz veins in materials that were made at the same time. These calculated values are shown in Appendix 11.

(12) Re/Os isotope dating

A sample with molybdenum mineralization was collected at 241.60m to 241.65m in depth in the drill core of MJME-Z2 in the Zuukhiin gol area. This sample was useful to conduct the Re/Os isotope dating analysis. Analitical data is shown in Appendix 12 and also in the following table.

Sample Number	Re, ppm	^{187}Os, ppb	Age, Ma
MJME-Z2, 241.60m to 241.65 m	226.8 (2)	550.3 (2)	231.3 ± 0.8
MJME-Z2, 241.60m to 241.65 m	202.20 (4)	490.6 (3)	231.3 ± 0.7

Watanabe and Stein (2000) conducted the Re/Os isotope dating analysis of molybdenite collected from the Erdenet Mine. The age of Re/Os dating was estimated in 240.60±0.8Ma. The Re-Os age of the Erdenet Mine is 10Ma in difference and older than the Zuukhiin gol area.

The Re/Os dating ages, the K/Ar dating ages and the results of natural remanent magnetization are indicated in Fig. II-3-5. The K/Ar dating ages of granodiorite and syenite porphyry show 224.8±5.9Ma and 208.0±5.4Ma, however, they were younger than the Re/Os dating ages of molybdenite. The process indicates probably that original magma was melted first, then molybdenite crystallized during rising or emplacing of magma and finally, the magma was completely emplaced in situ.

3-4-2 Drilling Survey Results

(1) Mogoin gol area

Introduction

Background information that was useful to decide the drilling survey during the Phases II and III in Mogoin gol area can be mentioned as follows:

- Analyzed results of existing data previous to Phase I. This data included copper Mineralization, geochemical anomalies and geophysical anomalies detected by ground magnetic survey and IP survey in the area.
- Low magnetic zones detected during the aeromagnetic survey of Phase I
- The geological survey of Phase I and Phase II detected copper mineralization zones including azurite on surface and rock geochemical anomalies.
- TDIP geophysical survey of Phase II detected very high IP anomaly zones in this area.

(i) MJME-M3

This drill hole corresponds to the MG5-48 point of the geophysical survey line located at the top of Sharchuluut Mountain. This site is located on basement rocks or collovial deposits. Surrounding geology consists of Quaternary deposits, Permian volcanic rocks, Permian granitic rocks and dyke.

Geology : Drilling cores of MJME-M3 are mainly composed of Quaternary deposits ftom 0.00m to 2.50m and basement rock from 2.50m. Basement rocks are mainly Permian to Triassic andesitic volcanic rocks and dyke.

As follows, the drilling core logging is briefly described. The drilling column is shown Appendix 17. The geologic cross section of MJME-M3 is shown in Fig. II-3-6.

0.00m～2.50m Light brown C layer of soil section: gravels.

2.50m～8.70m Light brownish grey, weathered silicified rock: rocks are strongly silicified. limonite-minerals filling in fractures. Lenticular limonite occurs abundantly from 5.90m to 6.05m.

8.70m～18.80m Light brownish grey, weathered and argillized silicified rock. Rock alteration with strong silicification. Limonite and hematite veins abundantly occur.

18.80m～32.50m Light brownish grey argillized silicified rock. Brecciation and fracture developed partly. Alteration: shows strong silicification.

32.50m～34.00m Light brownish grey, silicified rock. Alteration with strong silicification.

34.00m～46.50m Reddish brown oxidized, silicified rock. Alteration with silicification and sericitation. Along the fracture, limonite-hematite veins (with few pyrite). Mineralization: grey, silicified rock, moderate to partly very fine grained, chalcopyrite.

46.50m～55.30m White to Light brownish white, silicified rock. Alteration: weak silicification, strongly argillized, strong sericitation. Mineralization: moderate network pyrite. From 37.70m to 38.00m, reddish brown, oxidized, silicified rock and limonite-hematite veins. 47.00m to 47.20m, azurite veinlets and spots. 48.00m to 48.60m, spotted azurite.

55.30m～62.00m White, argillized, silicified rock and reddish brown oxidized, silicified rock. Alteration with moderate silicification, strongly argillized, few quartz veins. Strong sericitation. Mineralization: strong network along the fractures, limonite-hematite veins (few pyrite). Mineralization: grey, silicified rock, moderate

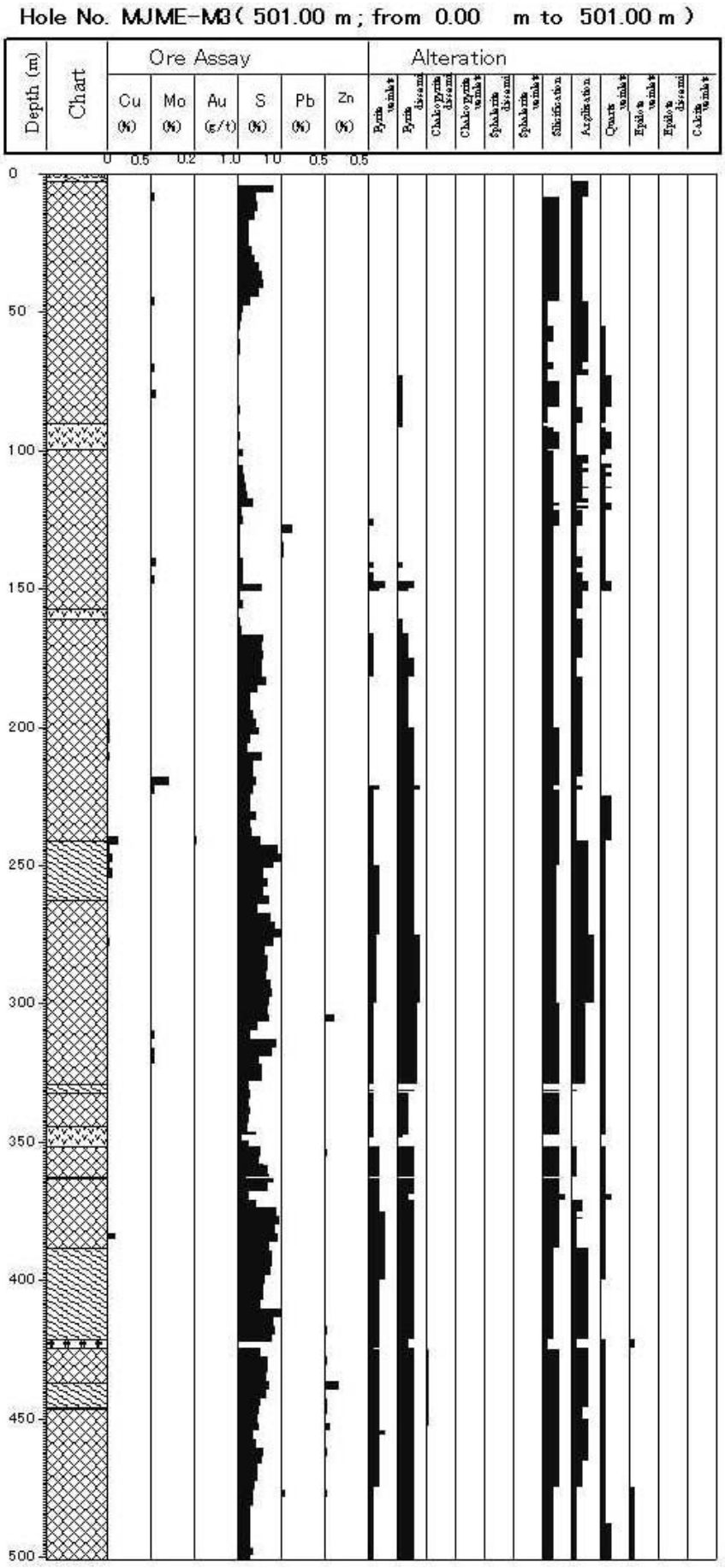


Fig. II-3-6 Mineralization and alteration on the geologic column of MJME-M3.

to partly very fine grained, chalcopyrite. 47m to 54m, azurite veinlets. At 59.25m, spotted azurite.

62.00m～68.00m White to Light brownish grey, argillized and silicified rock. Limonite-hematite veinlets. Alteration: weak silicification, strong argillized, weak quartz veins, strong sericitation. Mineralization: weak pyritization. From 64m to 66m, azurite veinlets and spotted azurite.

68.00m～71.00m Reddish brown oxidized, argillized silicified rock. Fractured and sheared zone. Network limonite-hematite. Alteration with moderate silicification, moderate argillization, weak quartz veins, strong sericitation. Mineralization: moderate network limonite-hematite.

71.00m～73.00m Fractured, sheared zone. Light brown argillized silicified rock. Alteration: weak silicification, strong argillized, weak quartz veins, strong sericitation. Mineralization: weak network limonite-hematite. Along the fracture, limonite-hematite veins (few pyrite). Grey silicified rock. Moderately spotted azurite, partly very fine grained, chalcopyrite.

73.00m～84.20m Brownish grey hard silicified rock. Network quartz veins. Network limonite-hematite veins. Alteration: strongly silicified, weak argillization, moderate quartz veins, weak sericitation. Mineralization of weak network limonite-hematite and weak pyrite dissemination.

84.20m～92.20m Fracture zone. Light brown, argillized and silicified rock. Alteration: weak silicification, moderately argillized, weak quartz veins, moderate sericitization. Mineralization: moderate network limonite-hematite. Along the fracture, limonite-hematite veins.

92.20m～91.20m Brown, oxidized, andesite dyke.

91.20m～92.20m Reddish brown oxidized, silicified rock with network limonite-hematite. Alteration: weak silicification, weak argillization, weak sericitation. Mineralization: strong network limonite-hematite.

92.20m～93.10m Brownish grey silicified rock with network limonite-hematite. Alteration: moderately silicified, weak argillization, weak quartz veins, weak sericitation. Mineralization: moderate network limonite- hematite.

93.10m～99.40m Reddish brown plagioclase porphyritic andesite with network quartz veins. Alteration: strongly silicified, weak argillization, moderate quartz veins, weak sericitation. Mineralization: moderate network limonite-hematite. Along the fracture, limonite-hematite network veins (with few pyrite). At 96.30m, spotted azurite.

99.40m～101.90m Brown, oxidized, silicified rock. Alteration: weak silicification, weak argillization, weak quartz veins, weak sericitation. Mineralization: weak network limonite-hematite. Grey silicified rock. Moderate to fine grained, chalcopyrite dissemination.

101.90m ～ 105.00m White, argillized zone. Alteration: moderately silicified, strongly argillized, strong sericitation. Mineralization: moderate network limonite-hematite.

105.00m～106.70m Light brownish grey argillized silicified rock. Alteration: moderately silicified, moderately argillized, moderate quartz veins, strong sericitation. Mineralization: weak network limonite-hematite. Along the fracture, limonite-hematite network veins (with few pyrite). Grey, silicified rock. Moderate to fine grained, chalcopyrite dissemination.

106.70m～108.10m Creamy white, argillized zone. Alteration: moderately silicified, strongly argillized, weak quartz veins, strong sericitation. Mineralization: moderate network limonite-hematite.

108.10m～109.40m Light brownish grey, argillized silicified rock. Epidote-chlorite veinlets. Alteration: moderately silicified, moderately argillized, moderate quartz veins, moderate sericitation. Mineralization: strong network limonite-hematite. Along the fracture, limonite-hematite network veins (few pyrite). grey, silicified rock. moderate to fine grained, chalcopyrite dissemination.

109.40m～109.85m Brownish white, argillized zone. Alteration: weak silicification, strongly argillized, weak quartz veins, strong sericitation. Mineralization: strong network limonite-hematite.

109.85m ～ 113.20m Light brownish grey silicified rock. Network limonite-quartz limonite-chlorite network veins. Alteration: moderately silicified, moderately argillized, weak quartz veins, moderate sericitation. Mineralization: strong network limonite-hematite.

113.20m～113.70m Brown, limonite-argillized silicified rock. Alteration: moderately silicified, strongly argillized, strong sericitation. Mineralization: strong network limonite-hematite.

113.70m～117.70m Reddish brownish grey argillized silicified rock. Network limonite, white clay veins. Alteration: moderately silicified, moderately argillized, weak quartz veins, weak sericitation. Mineralization: strong network limonite-hematite. Along the fracture, limonite-hematite network veins (with few pyrite). Mineralization: grey, silicified rock having fine grained, pyrite dissemination.

117.70m～119.15m White grey, argillized rock. Alteration: moderately silicified, strongly argillized, weak quartz veins, weak sericitation. Mineralization: moderate network limonite-hematite.

119.15m～120.00m Light yellowish brown, oxidized, silicified rock. Alteration: strongly silicified, weak argillization moderate quartz veins, weak sericitation. Mineralization: moderate network limonite-hematite.

120.00m～121.30m White, argillized silicified rock. Alteration: moderately silicified, strongly argillized, moderate quartz veins, moderate sericitation.Mineralization: weak network limonite-hematite.

121.30m～127.30m White, argillized silicified rock. Alteration: strongly silicified, moderately argillized, quartz veins, moderate sericitation. Mineralization: weak network limonite-hematite, weak pyrite dissemination.

127.30m～138.30m Yellow to Light brown, oxidized, rock. limonite-goethite veinlets. Alteration: moderately silicified, weak argillization, weak quartz veins, weak sericitation. Mineralization: weak network limonite-hematite.

138.30m～140.60m Light brown limonite-oxidized, argillized silicified rock. Alteration: moderately silicified, moderately argillized, weak quartz veins, weak sericitation. Mineralization: moderate network limonite-hematite.

140.60m～142.70m Light brown argillized silicified rock. Alteration: moderately silicified, moderately argillized, weak quartz veins, moderate sericitation. Mineralization: moderate network limonite-hematite, weak pyrite veins, weak pyrite dissemination.

142.70m～144.20m Yellow to light brown oxidized, silicified rock. Alteration: moderately silicified, weak argillization, weak quartz veins, weak sericitation. Mineralization: weak network limonite-hematite.

144.20m～147.20m Light brownish grey, argillized silicified rock. Alteration: moderately silicified, moderately argillized, weak quartz veins, strong sericitation. Mineralization: moderate network limonite-hematite, weak pyrite veins, weak pyrite dissemination.

147.20m～151.25m Grey to light brownish grey, argillized silicified rock. Alteration: weak silicification, strong argillized, moderate quartz veins, strong sericitation. Mineralization: weak brecciated, moderate network veins, strong pyrite veins, strong pyrite dissemination.

151.25m～157.35m Yellow to light brownish grey limonite-oxidized, silicified rock. Alteration: moderately silicified, moderately argillized, moderate sericitation. Mineralization: moderate network veins.

157.35m～160.90m Light brown plagioclase porphyritic andesite. Alteration: moderately silicified, weak argillization, moderate sericitation. Mineralization: moderate network veins.

160.90m～161.20m yellow limonite-argillized rock. Alteration: moderately silicified, moderately argillized, weak sericitation. Mineralization: weak quartz network veins.

161.20m～175.20m Light grey, argillized silicified rock. Alteration: moderately silicified, moderately argillized, moderate sericitation. Mineralization: moderately brecciated, weak network pyrite veins, weak pyrite veins, moderate pyrite dissemination.

175.20m～182.40m Grey, pyrite dissemination strong silicified rock. Alteration: moderately silicified, weak argillization, moderate sericitation. Mineralization: weak network pyrite veins, weak pyrite veins, strong pyrite dissemination.

182.40m～199.00m Grey, pyrite dissemination strong silicified rock. Alteration: moderately silicified, weak argillization. Mineralization: moderate pyrite dissemination.

199.00m～200.40m Grey, pyrite dissemination strong silicified rock. Quartz pyrite network veins. Alteration: strongly silicified, weak argillization, moderate sericite. Mineralization: strong pyrite dissemination.

200.40m～201.50m Grey, pyrite, argillized rock. Alteration: strongly silicified, weak argillization, moderate sericite. Mineralization: strong pyrite dissemination.

201.50m～218.10m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, moderate sericite. Mineralization: strong pyrite dissemination.

218.10m～218.15m Grey, pyrite dissemination strong silicified rock. Alteration: moderately silicified, moderately argillized, moderate sericite. Mineralization: moderate brecciated, strong pyrite network veins, moderate pyrite veins, strong pyrite dissemination.

218.15m～221.00m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, moderate sericite. Mineralization: brecciated, strong pyrite dissemination.

221.00m～223.00m Porous pyrite concentation. Alteration: moderately silicified, moderately argillized, moderate sericite. Mineralization: moderately brecciated, strong network pyrite, moderate pyrite veins, strong pyrite dissemination.

223.00m～241.00m Grey, pyrite dissemination strong silicified rock. Alteration: strongly silicified, weak argillization, moderate quartz veins, strong sericite. Mineralization: moderate network pyrite, weak pyrite veins, strong pyrite dissemination.

241.00m～262.40m Grey, argillized silicified rock. Fractured faults zone. drille core: flaky. Alteration: strongly silicified, strongly argillized (kaolinite, sericite), weak quartz veins, strong sericite. Mineralization: moderate brecciated, moderate network pyrite, weak pyrite veins, strong pyrite dissemination. grey, argillized silicified rock having chalcopyrite dissemination and network pyrite veinlets.

262.40m～300.00m Light grey, to grey, pyrite dissemination, argillized rock. Argillized and sheared zonefaults zone .drilling core: flaky. Alteration: strongly silicified, strongly argillized, weak quartz veins, strong sericite, pyrophyllite veins. Mineralization: moderate network pyrite, moderate pyrite veins, strong pyrite dissemination . At 271m, pyrite sulfide veins (3mm).

300.00m～321.50m Light grey to grey, argillized silicified rock. Argillized and sheared zonefaults zone. Drilling core: flaky. Alteration: moderately silicified, strong argillized, weak quartz veins, strong sericite, pyrophyllite veins, fluorite veinlets. Mineralization: strong network pyrite, moderate pyrite veins, strong pyrite dissemination.

321.50m～322.25m Creamy colored, silicified, argillized rock. Alteration: strongly silicified, moderately argillized, weak quartz veins, moderate sericite, pyrophyllite veins, fluorite veinlets. Mineralization: moderate network pyrite, moderate pyrite dissemination.

322.25m～329.30m Grey, argillized silicified rock. Argillized and sheared zone, faults zone. Drilling core: flaky. Alteration: strongly silicified, strong argillized, weak quartz veins, strong sericite, pyrophyllite veins, fluorite veinlets. Mineralization: weak network pyrite, strong pyrite veins, strong pyrite dissemination.

329.30m～330.50m Greenish grey, basaltic andesite dyke. Alteration: weak quartz veins, moderate chlorite. Mineralization:

very weak chalcopyrite dissemination.

330.50m～330.80m Grey, argillized silicified rock. Argillized and sheared zone, faults zone. Drilling core: flaky. Alteration: strongly silicified, strongly argillized, weak quartz veins, strong sericite, pyrophyllite veins, fluorite veinlets. Mineralization: weak network pyrite, strong pyrite veins, strong pyrite dissemination.

330.80m～331.00m Gark greenish grey, basaltic andesite dyke. Alteration: weak quartz veins, moderate chlorite. Mineralization: very weak chalcopyrite dissemination.

331.00m～331.70m Grey, argillized silicified rock, argillized and sheared zone, faults zone. Drilling core: flaky. Alteration: strongly silicified, strongly argillized, weak quartz veins, strong sericite, pyrophyllite veins, fluorite veinlets. Mineralization: weak network pyrite, strong pyrite veins, strong pyrite dissemination.

331.70m～332.40m Gark greenish grey, basaltic andesite dyke. Alteration: weak quartz veins, moderate chlorite. Mineralization: very weak chalcopyrite dissemination.

332.40m～347.40m Grey, strong silicified rock. Alteration: strongly silicified, weak quartz veins, moderate sericite, pyrophyllite veins, fluorite veinlets, kaolinite veinlets. Mineralization: weak network pyrite, weak pyrite veins, moderate pyrite dissemination, very weak chalcopyrite dissemination.

347.40m～347.40m Greenish grey, andesite dyke. Alteration: weak sericitation, moderate chlorite. Mineralization: weak network pyrite, pyrite veinlets, weak pyrite dissemination, very weak chalcopyrite dissemination. Along the fracture, gark chlorite, chalcopyrite dissemination.

347.40m～348.65m Greenish grey, andesite dyke. Alteration; moderate chlorite. Mineralization: very weak chalcopyrite dissemination.

348.65m～351.70m Greenish grey, andesite dyke. Alteration: moderate chlorite. Mineralization: very weak chalcopyrite dissemination. Dyke intruded in dyke. From 349.50m to 351.50m, gark chlorite veinlets with few chalcopyrite dissemination and azurite.

351.70m～362.80m Grey, strong silicified rock. Alteration strongly silicified, weak quartz veins, moderate sericite. Along the fracture, pyrophyllite-fluorite veinlets. Mineralization: weak network pyrite, weak pyrite veins, strong pyrite dissemination, very weak chalcopyrite dissemination. At 356.40m, quartz-sulfide veins. quartz-sulfide veins: 1cm in width, including very fine and very few, chalcopyrite. At 358.00m, 7cm in width, with pyrite-chalcopyrite spotted, quartz veins (7cm in width).

362.80m～363.40m Greenish grey, andesite dyke. Alteration: weak quartz veins, moderate chlorite. Mineralization: very weak chalcopyrite dissemination.

363.40m～368.85m Grey, strong silicified rock. Alteration: strongly silicified, weak quartz veins, moderate sericite, along the fracture, pyrophyllite-fluorite veinlets. Mineralization: weak network pyrite, moderate pyrite veins, strong pyrite dissemination, very weak chalcopyrite dissemination.

368.85m～371.20m Light grey, very hard silicified rock (original rock : silicified, granular texture, granitic rock?). Alteration: strongly silicified, moderate quartz veins, weak sericitization. Mineralization: moderate network pyrite, moderate pyrite veins, moderate pyrite dissemination, very weak chalcopyrite dissemination. Along the fracture, gark chlorite having chalcopyrite dissemination.

371.20m～388.60m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veins, moderate sericite. Mineralization: moderate network pyrite, strong pyrite veins, strong pyrite dissemination, very weak very fine grained chalcopyrite dissemination. Along the fracture, dark chlorite with chalcopyrite dissemination.

388.60m～422.15m Grey, argillized silicified rock. Fracture and faults zone. Rock: flaky fractured. Alteration: moderately silicified, strong argillized, weak quartz veins, strong sericite. Along the fracture, pyrophyllite veinlets. Mineralization: moderate network pyrite, strong pyrite veins, strong pyrite dissemination, very weak and very little chalcopyrite dissemination. At 419.50m, massive pyrite sulfide (3-4cm). Very fine and very few native copper.

421.60m～423.30m Greenish grey, andesite dyke. Fractured and fractured zone. From 423.30m to 443.00m, grey, fractured argillized silicified rock. Rock flaky fractured. Alteration: strongly silicified, strongly argillized (white clay), moderate sericitation. Mineralization: strong pyrite dissemination, pyrite veinlets, weak chalcopyrite dissemination.

421.60m～424.40m Greenish grey, fine grained, diorite (to gabbro) to andesite (marginal phase) dyke. Fractured. Alteration: moderately silicified, weak argillization, weak quartz veins, weak chloritized, weakly epidotized. Mineralization: weak network pyrite, moderate pyrite dissemination, weak chalcopyrite dissemination, From 421.80m to 421.90m, partly chalcopyrite lenses.

423.30m～437.40m Grey, fractured argillized silicified rock. Rock: flaky fractured. Alteration: moderately silicified, strong argillized, weak quartz veins, moderate sericitation. Mineralization: weakly brecciated, weak network pyrite, weak pyrite dissemination, weak chalcopyrite dissemination.

437.40m～447.00m Grey, fractured argillized silicified rock, rock flaky fractured. Alteration: moderately silicified, strong argillized (white clay and pyrite clay), weak quartz veins, moderate sericitation. Mineralization: weak brecciated, weak network pyrite, weak pyrite dissemination, weak chalcopyrite dissemination.

447.00m～453.00m Grey, argillized silicified rock, fractured strongly, parting farctured. Alteration: moderately silicified, moderately argillized, weak quartz veins, moderate sericitation. Mineralization: weak network pyrite, moderate pyrite dissemination, weak chalcopyrite dissemination.

453.00m～472.00m Grey, argillized silicified tuff rock, fractured, parting fractured flaky. Alteration: moderately silicified,

	moderately argillized, weak quartz veins, moderate sericitation. Mineralization: weak network pyrite, moderate pyrite dissemination, weak chalcopyrite dissemination, partly chalcopyrite spots.
472.00m～501.30m	Grey, silicified tuff, rock: fractured, partly fractured flaky. Alteration: strongly silicified, moderately argillized, weak quartz veins, moderate sericitation. Mineralization: weak network pyrite, moderate pyrite dissemination, very weak with little chalcopyrite dissemination.
501.30m	Drilling stopped.

Alteration: According to X-ray diffraction analysis, from 19m to 140m, silicified tuff includes mainly alteration minerals of quartz, plagioclase (albite), sericite, alunite, jarosite and rutile. Mineral assemblage includes mainly quartz-sericite-alunite-jarosite alteration or quartz-sericite alteration. Other minerals are kaolinite. Secondary enrichment includes jarosite mineral. From 160m～300m, silicified tuff with alteration minerals mainly of quartz, sericite, pyrite, rutil and consisting mainly of quartz-sericite-pyrite. Another alteration mineral is kaolinite. From 320m to 460m, silicified tuff includes alteration minerals mainly quartz, plagioclase (albite), chlorite, sericite, laumontite, pyrite, and consisting mainly of quartz-chlorite-sericite-pyrite alteration. Other minerals are laumontite, epi-stilbite, rutile and kaolinite. From 480m to 500m, silicified tuff presents alteration minerals mainly quartz, potassic feldspar, sericite, pyrite and consists mainly of quartz -potassic feldspar-sericite-pyrite alteration in mineral assemblage. This mineral assemblage corresponds to acidic alteration type.

Mineralization : Microscopic observation detected pyrite, goethite, hematite and magnetite. Pyritization was confirmed from 50m to the bottomhole. Hematite minerals were distributed from 50m to 80m and Goethite minerals from 370m in depth. Alteration related to Mineralization is mainly quartz-(sericite) mineral assemblage.

Ore assay results of silicified tuff indicated that the range goes from less than Cu 0.001% to Cu 0.660%, Pb 0.002% to Pb 0.033 %, Zn 0.001 % to Zn 0.120%, S 0.12% to S 10.48%. Average values of assay grade are Cu 0.009%, Pb 0.008 % and Zn 0.010%.

(ii) MJME-M4

This drill hole was located on the station MG-12-50 of a geophysical survey line on the eastern part of the top of Sharchuluut Mountain of Mogoin gol area. The drill hole site is located on Quaternary stream sediments and colluvial deposits. Geology of the area consists of Quaternary deposits, Permian volcanic rocks, Permian granitic rocks and dyke.

Geology : Drill cores consisted mainly of Quaternary deposits from 0.00m to 34.20m and Basement rocks from 34.20m. Basement rocks are mainly Permian to Triassic andesitic volcanic rocks strongly silicified,

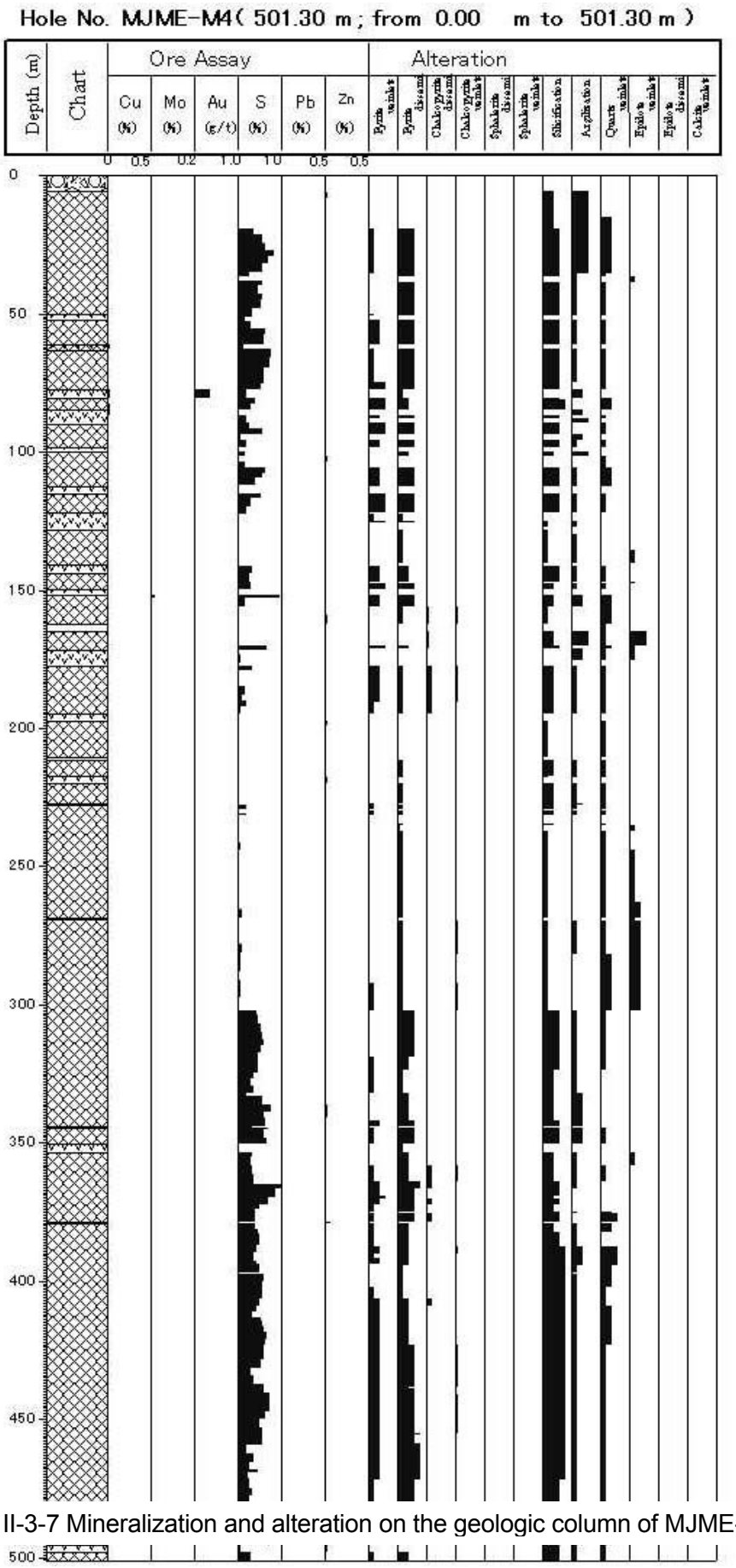


Fig. II-3-7 Mineralization and alteration on the geologic column of MJME-M4.

pyrite-mineralized rock partly argillized and rarely andesitic dyke. The drilled cores were faulted, fractured and cracked, and the cores were flaky crushed, partly consisted of powdered and clashed.

As follows, the drilling core logging is briefly described. The drilling column is shown Appendix 17. The geologic cross section of MJME-M4 is shown Fig. II-3-7.

0.00m～5.40m Weathered breccia (C layer of soil section), brown colored gravels: weathered white, argillized silicified rock filled by limonite-films in fractures and surfaces.

5.40m～7.00m Light brownish grey, silicified rock with many pyrite holes. Limonite-films occur in fractures.

7.00m～8.70m Light brownish grey to white, argillized silicified rock. Limonite-films occur in fractures.

8.70m～15.00m Yellowish brownish grey, limonitized rock with many oxide iron.

15.00m～17.50m Light grey, rock silicified and strongly argillized with moderate quartz veins. White clay veins are intruded. Limonite dissemination.

17.50m～19.00m White argillized rock, moderately silicified and strongly argillized with moderate quartz veinlets. Silicified breccia.

19.00m～35.70m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets. Mineralization: network and veinlets of pyrite, pyrite dissemination. From 33.10m to 33.60m, spotted azurite confirmed in quartz veins.

35.70m～36.00m Pale green, andesitic dykes. Alteration: weak argillization, weak quartz veinlets, strong chlorite. Mineralization: weak network and pyrite dissemination.

36.00m～36.30m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets. Mineralization: network and veinlets, pyrite dissemination.

36.30m～38.25m Light greenish grey, andesite dyke. Alteration: weak argillization, strong chlorite, weak epidote.

38.25m～50.95m Gark grey to grey, strong silicified rock. Alteration: strongly silicified, weak quartz veinlets, moderate sericite. Mineralization: weak network, weak veinlets, strong pyrite dissemination. From 42.30m to 45.50m, spotted azurite occurs in quartz veins.

50.95m～52.10m Pale green, andesitic dyke. Alteration: moderate chlorite. From 50.00m to 51.00m, pyrophyllite veins.

52.10m～61.20m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, moderate sericite. Mineralization: weak network, moderate veinlets, weak pyrite dissemination.

61.20m～63.00m Green to brownish green, andesitic dyke. Alteration: moderate chlorite. From 61.30m to 63.00m, reddish colored, hematite-limonite-veinlets.

63.00m～77.50m Grey, strong silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, moderate sericite. Mineralization: weak network, weak pyrite dissemination. From 63.00m to 77.50m, pyrophyllite veinlets.

77.50m～80.70m Pale green, argillized chloritized andesite. Alteration: weak argillization, moderate chlorite.

80.70m～84.80m hard, glassy, silicified rock. Alteration: hard strongly silicified, moderate quartz veinlets. Mineralization: strong network, strong pyrite veinlets, strong pyrite dissemination.

84.80m～86.60m Brownish green grey to pale green, andesitic dyke. Alteration: moderately argillized, moderate chlorite. Hematite-limonite-veinlets.

86.60m～87.90m Gark grey, silicified rock. Alteration: strongly silicified, moderate sericitation. Mineralization: strong pyrite dissemination, moderate pyrite veinlets, strong pyrite dissemination.

87.90m～89.40m Green to greenish white, argillized andesite dyke. Alteration: strongly argillized.

89.40m～93.70m Grey, silicified fractured rock. Alteration: strongly silicified, weak quartz veins, strong sericitation. Mineralization: strong network pyrite, strong pyrite veinlets, strong pyrite dissemination. From 90.40m to 96.00m, sheared zone.

93.70m～95.70m Green to greenish white, fractured argillized andesite dyke. Alteration: strongly argillized, strong chlorite.

95.70m～98.30m Grey, fractured and silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, strong sericitation. Mineralization: strong pyrite dissemination, moderate pyrite veinlets, strong pyrite dissemination. Pyrophyllite veins.

98.30m～100.00m Green to brownish green, andesite dyke. Alteration: moderate chlorite.

100.00m～101.40m White, argillized silicified rock. Alteration: moderately silicified, strong argillized, strong sericitation. Mineralization: strong pyrite dissemination, moderate pyrite veinlets, strong pyrite dissemination.

101.40m～104.00m Gark brownish grey andesitic lava. Alteration: weak quartz veinlets, moderate chlorite.

104.00m～105.70m Gark brownish grey andesitic lava. Alteration: weak quartz veinlets, moderate chloritization.

105.70m～112.30m Grey, silicified rock. Alteration: strongly silicified, weak argillization (pyrophyllite-sericite veinlets), weak sericitation. Mineralization: weak network pyrite, pyrite veinlets, strong pyrite dissemination. string shape, nodular shape of pyrite. From 107.70m to 112.30m, pyrophyllite veins.

112.30m～115.05m Greenish grey, andesite dyke. Alteration: moderate chlorite. At 114.60m, azurite veinlets.

115.05m～121.70m Light grey, silicified rock. Alteration: strongly silicified, weak argillization (pyrophyllite-sericite

veinlets), weak quartz veins, moderate sericitation. Mineralization: moderate network pyrite, strong pyrite veinlets, strong pyrite dissemination. From 120.40m to 121.00m, pyrite veins of 2mm to 0.2mmin width. From 121.00m to 121.50m, reddish colored, porphyritic hematite and pyrite veinlets.

121.70m～122.30m Greenish grey, andesite dyke. Alteration: moderate chlorite.

122.30m～127.20m brownish green grey, andesitic dyke and reddish dyke. Alteration: weak silicification, weak chloritization. Mineralization: weak pyrite dissemination, very weak and little chalcopyrite dissemination. Chlorite veinlets.

127.20m～128.50m Pale green to green andesite dyke. Alteration: weak chloritization.

128.50m～140.20m Gark greenish grey, andesitic basalt dyke. Alteration: weak silicification, quartz veins and veinlets, weak chloritization, chlorite veinlets. Mineralization: weak pyrite dissemination, very weak with few chalcopyrite dissemination. From 132.50m to 132.52m, 133.80m to 134.50m, 135.40m to 136.10m, 134.10m to 134.30m, 138.80m to 139.20m, 139.60m to 140.50m, epidote veinlets. Around 138.80m fractured basalt occurs, azurite veinlets, around basalt dayke fine grained with few chalcopyrite dissemination.

140.20m～141.20m Greenish grey, andesite dyke. Alteration: chlorite. Angle: 30degree.

141.20m～147.35m White grey, silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, strong sericitation, pyrophyllite veinlets. Mineralization: strong network pyrite, moderate veinlets of pyrite, moderate pyrite dissemination. Several cm of partly massive pyrite. Very fine and very few chalcopyrite, at 146m, pyrite-chalcopyrite veinlets (1mm). Hematite-limonite-veinlets. From 145.00m to 147.35m, pyrophyllite veins.

147.35m～147.80m Greenish grey, andesite dyke, Alteration: chlorite. Angle: 30 degrees and 45 degrees.

147.80m～149.90m White grey, silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, moderate sericitation, epidote veins. Mineralization: strong network pyrite, moderate veinlet of pyrite, moderate pyrite dissemination, very fine and very few chalcopyrite. From 147.80m to 149.90m, pyrophyllite veins and pyrophyllite.

149.90m～152.00m Greenish grey, andesite dyke. Alteration: weak chloritization.

152.00m～156.20m Light grey to light greenish grey, silicified rock. Alteration: moderately silicified, moderately argillized, moderate quartz veinlets, moderate sericitation, chlorite veinlets. Mineralization: strong network pyrite, moderate pyrite veinlets, strong pyrite dissemination. At 153.10m, 5cm width massive pyrite. very fine and very few chalcopyrite. From 152.00m to 156.20m, pyrophyllite veins and pyrophyllite.

156,20m～162.20m Green to greenish grey, silicified, tuff. Alteration: weak silicification, moderate quartz veinlets, moderate sericitation, weak chloritization. Mineralization: weak pyrite dissemination, weak network and veinlets of pyrite. Very fine and very little chalcopyrite. At 156.40m, quartz-hematite-chalcopyrite veins (2cm in width), from 156.20m to 162.00m: quartz-pyrite veins. From 159.00m to 161.00m: spotted chalcopyrite.

162.20m～165.00m Gark green basaltic andesite dyke. Alteration: weak quartz veinlets, chlorite.

165.00m～170.20m Green, chlorite-epidote, argillized farctured zone clacked and farctured. Alteration: moderately silicified, strong argillized, weak quartz veinlets, moderate sericitation, strong chlorite, strong epidote. very fine with very few chalcopyrite.

170.20m～171.10m White grey, brecciated silicified rock. Alteration: strongly silicified, moderate quartz veinlets, weak chloritization, weak epidote veinlets. Mineralization: strongly brecciated, strong network pyrite, weak veinlets of pyrite, weak pyrite dissemination.

171.10m～175.20m Gark green basaltic andesite dyke. Alteration: moderate sericite-kaolinite argillized, moderate chlorite, weak epidote veinlets. At 173.80m: azurite films.

175.20m～175.60m White grey to light greenish grey, silicified rock. Alteration: strongly silicified, moderate sericitation, weak chloritization. Mineralization: strongly brecciated, strong network pyrite, strong pyrite veinlets, strong pyrite dissemination, massive veins of pyrite. Very fine and very few dissemination of chalcopyrite. From 175.20m to 175.60m: brecciated massive pyrite.

175.60m～177.60m Gark green basaltic andesite dyke. Alteration: moderate chlorite.

177.60m～190.40m Light greenish grey, silicified, tuff. Alteration: moderately silicified, weak argillization, moderate sericitation, weak chloritization, pyrophyllite veins. Mineralization: moderate pyrite veinlets, weak pyrite dissemination, weak chalcopyrite dissemination, very fine and very few dissemination of chalcopyrite. At 177.80m: 3cm massive pyrite veins. From 184m to 185m along the fracture: azurite veinlets occur, partly very fine and with very few native copper. At 186.5m: pyrite-chalcopyrite-sphalerite-quartz veins (2cm).

190,40m～190.60m Gark green basaltic andesite dyke. Alteration: weak chloritization.

190.60m～194.70m Light greenish grey, silicified, tuff. Alteration: moderately silicified, moderate sericitation, weak chloritization, pyrite-quartz veinlets. Mineralization: moderate pyrite veinlets, weak pyrite dissemination, weak chalcopyrite dissemination, very fine and very few dissemination of chalcopyrite. Along the fracture, azurite veinlets occur.

194.70m～197.50m Gark green basaltic andesite dyke.Alteration: weak chloritization, weak potassic feldspar alteration:

197.50m～201.50m light greenish grey, silicified tuff. Alteration: weak silicification, weak quartz veinlets, weak sericitation, weak chloritization. Pyrite-quartz veinlets. Mineralization: weak pyrite dissemination .

201.50m～201.65m greenish grey, basaltic andesite dyke. chlorite.

201.65m～210.50m Light brownish grey silicified tuff. Alteration: strongly silicified, moderate sericitation, weak chloritization. Mineralization: pyrite dissemination. Epidote-quartz veins.

210.50m～211.30m Brownish green basaltic andesite dyke. Alteration: chloritization.

211.30m～213.40m Light brownish grey, silicified tuff. Alteration: strongly silicified, moderate sericitation, weak chloritization. Mineralization: pyrite dissemination. Very fine and with very few native copper .

211.40m～217.80m Light brownish grey, silicified tuff. Alteration: strongly silicified, moderate sericitation, weak chloritization. Mineralization: pyrite dissemination. very fine and very few native copper .

217.80m～219.70m Greenish grey, andesite dyke. Alteration: chlorite. Pyrophyllite veinlets, pyrophyllite.

219.70m～227.10m Light grey, silicified, tuff. Alteration: moderately silicified, weak argillization, weak quartz veinlets, moderate sericitation, weak chloritization. Mineralization: weak pyrite dissemination, very fine and very little chalcopyrite dissemination.

227.10m～227.85m Greenish grey, andesite dyke. Alteration: moderately silicified, moderately argillized, weak quartz veinlets, weak sericitation, weak chloritization. Mineralization: weak pyrite veinlets, weak pyrite dissemination.

227.85m～229.60m Pinkish colored, crystalline tuff. Alteration: moderately silicified, weak argillization, weak quartz veins, weak sericitation, weak chloritization. Mineralization: weak pyrite veinlets, weak pyrite dissemination, very weak and few of chalcopyrite dissemination. At 228.50m: chlorite veinlets.

229.60m～230.05m Greenish grey, andesite dyke. Alteration: weak chloritization.

230.05m～231.55m Pinkish colored, crystalline tuff. Alteration: moderately silicified, weak argillization, weak quartz veinlets, weak sericitation, weak chloritization. Mineralization: weak chalcopyrite veinlets, weak pyrite dissemination, very fine and very little chalcopyrite dissemination.

231.55m～231.75m Greenish grey, andesite dyke. Alteration: weak chloritization.

231.75m～234.85m Greenish grey, andesite dyke. Alteration: weak chloritization.

234.85m～235.20m Pinkish colored, silicified crystalline tuff. Alteration: moderately silicified, weak quartz veinlets, weak sericitation, weak chloritization, weak epidote. Mineralization: weak pyrite dissemination.

235.20m～237.00m Pinkish colored, andesitic porphyry Alteration: weak chloritization.

237.00m～244.10m Pinkish colored, silicified, crystalline tuff. Alteration: weak silicification, weak argillization, weak quartz veinlets, weak chloritization, moderate epidote veinlets, potassic feldspar alteration Mineralization: weak pyrite dissemination.

244.10m～268.70m Pinkish colored, silicified, crystalline tuff. Alteration: weak silicification, weak quartz veinlets, weak sericitation, weak chloritization, weak epidote veinlets, calcite veinlets. Mineralization: weak pyrite dissemination. At 241.30m: chalcopyrite dissemination. From 245.30m to 263.00m: calcite veinlets. From 247.20m to 269.00m: epidote veins.

268.70m～269.50m Gark greenish grey, andesite dyke. Alteration: moderate chlorite, weak epidote.

269.50m～302.10m Pinkish to brownish grey crystalline tuff. Alteration: weak silicification, weak argillization, weak quartz veinlets. Mineralization: weak pyrite. From 270m to 306m: calcite veinlets. From 271m to 271.50m: epidote veins. From 275m to 282m, very fine and very few chalcopyrite. At 296.70m: spotted chalcopyrite.

302.10m～323.80m Grey to light grey, silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, moderate sericitation, weak chloritization. Mineralization: moderate brecciated, moderate network pyrite, strong pyrite dissemination, very weak fine grained, slight chalcopyrite dissemination. At 324.50m and along the fracture: 0.5mm native copper. At 317m: spotted cubic pyrite.

323.80m～332.20m Grey to light greenish grey, lapilli tuff. Alteration: moderately silicified, weak argillization, weak sericitation, weak chloritization. Mineralization: weak network pyrite, weak pyrite dissemination.

332.20m～342,29m Grey, lapilli tuff. Alteration: moderately silicified, moderately argillized, moderate sericitation. Mineralization: moderate pyrite dissemination.

342,29m～344.00m Gark grey, silicified, lapilli tuff. Alteration: strongly silicified, weak argillization, weak sericitation, weak chloritization. Mineralization: weak brecciated, moderate network pyrite, moderate pyrite veinlets, strong pyrite dissemination, weak chalcopyrite dissemination.

344.00m～344.60m Greenish grey, andesite dyke. Alteration: weak chloritization.

344.60m～350.60m Grey to light grey, brecciated pyrite dissemination silicified rock. Alteration: strongly silicified, moderately argillized, weak quartz veinlets, moderate sericitation. Mineralization: moderate brecciated, weak network pyrite, weak pyrite veinlets, strong pyrite dissemination. very weak fine grained with few chalcopyrite dissemination.

350.60m～353.50m Greenish grey, andesite dyke. Alteration: weak, chlorite. Mineralization: weak networkand pyrite dissemination. very weak fine grained with slight chalcopyrite dissemination.

353.50m～358.40m Light greenish grey, silicified, lapilli tuff. Alteration: moderately silicified, weak argillization, moderate sericitation, weak chloritization, weak epidote. Mineralization: weak network pyrite, moderate pyrite dissemination. very weak fine grained with slight chalcopyrite dissemination.

358.40m～363.80m Light greenish grey, silicified, lapilli tuff.Alteration: moderately silicified, weak argillization, weak quartz veinlets, moderate sericitation, weak chloritization. Mineralization: weak network pyrite, weak

pyrite veinlets, moderate pyrite dissemination. weak chalcopyrite dissemination.

363.80m～366.80m Sulfide riched silicified rock (pyrite>chalcopyrite). Alteration: strongly silicified, weak sericitation. Mineralization: moderate brecciated, strong network pyrite, moderate pyrite veinlets, strong pyrite dissemination. Moderate chalcopyrite dissemination. powdered and fractured pyrite.

366.80m～369.20m Sulfide rich silicified rock. Alteration: moderately silicified, weak sericitation. Mineralization: strong brecciated, moderate pyrite veinlets, strong pyrite dissemination. very fine with very little chalcopyrite dissemination. From 363.80m to 368.80m: sulfide rich pyrite dissemination. At 368m, along the fracture, very fine and very few of native copper. In tubular core, sulfide (pyrite,chalcopyrite?).

369.20m～370.30m Grey, pyrite dissemination silicified rock. Alteration: strongly silicified, weak sericitation. Mineralization: strong brecciated, strong network pyrite, moderate pyrite veinlets, strong pyrite dissemination. moderate chalcopyrite dissemination. Pyrite dissemination, very fine with very little chalcopyrite dissemination.

370.30m～372.20m Grey, pyrite dissemination, silicified rock. Alteration: strongly silicified, moderate sericitation. Mineralization: moderate brecciated, moderate network pyrite, moderate pyrite veinlets, strong pyrite dissemination. moderate chalcopyrite dissemination. Nodular shape pyrite, pyrite dissemination, very fine with very little chalcopyrite dissemination.

372.20m～375.70m Grey, silicified, lapilli tuff. Alteration: moderately silicified, weak argillization, moderate sericitation. Mineralization: strong brecciated, strong network pyrite, weak pyrite veinlets, strong pyrite dissemination. very fine and very little chalcopyrite dissemination.

375.70m～378.60m Grey, to light grey, brecciated pyrite dissemination silicified rock. Alteration: strongly silicified, strong quartz veinlets, moderate sericitation. Mineralization: strong brecciated, strong network pyrite, weak pyrite veinlets, strong pyrite dissemination, veinlets and veinsof pyrite. weak chalcopyrite dissemination.

378.60m～379.10m Greenish grey, andesite dyke. Alteration: moderate chlorite.

379.10m～387.50m Grey to light grey, brecciated pyrite dissemination silicified rock. Alteration: strongly silicified, moderate sericitation. Mineralization: strong pyrite dissemination, veinlets and veins of pyrite. very weak fine grained, a few chalcopyrite dissemination.

387.50m～394.60m Very hard grey, brecciatedsilicified rock. Alteration: strongly silicified, moderately argillized ,strong quartz veinlets, pyrophyllite veins. Mineralization: moderate brecciated, strong network pyrite, moderate pyrite dissemination, weak chalcopyrite dissemination. Irregular quartz veins.

394.60m～396.80m Very hard grey, brecciated and silicified rock. Alteration: strongly silicified, weak argillization, moderate quartz veinlets, weak sericitation, pyrophyllite veins. Mineralization: moderate brecciated, pyrite dissemination,very fine and very little chalcopyrite dissemination.

396.80m～397.40m Light brown quartz limonite-silicified rock. Alteration: strongly silicified, weak quartz veinlets. Mineralization: moderate pyrite dissemination, very fine and very little chalcopyrite dissemination.

397.40m～400.10m Hard grey, silicified rock. Alteration: strongly silicified, weak argillization, moderate quartz veinlets, pyrophyllite veins. Mineralization: moderate brecciated, weak network pyrite, weak pyrite dissemination, very fine and very little chalcopyrite dissemination.

400.10m～406.60m Very hard grey, silicified rock. Alteration: strongly silicified, weak argillization, weak quartz veinlets, weak sericitation. Mineralization: weak brecciated, weak network pyrite, weak pyrite dissemination, very fine and very little chalcopyrite dissemination. Along the fracture, white clay veins. From 400.10m to 401.20m: shearing with pyrite veinlets. From 402.20m to 406.20m: little pyrite dissemination and very fine and very little of chalcopyrite dissemination.

406.60m～409.30m Very hard grey, silicified rock. Sulfide veins irregularly occur. Alteration: strongly silicified, weak argillization, weak quartz veinlets, weak sericitation. Mineralization: strong brecciated, moderate network pyrite, weak pyrite dissemination, weak copper mineral dissemination. Sulfide veins: 407.30m to 407.50m, 407.80m to 408.20m, 409.15m to 409.25m, moderate , 5cm to 5mm in max..

409.30m～413.80m Very hard grey, silicified rock. Alteration: strongly silicified, weak argillization, moderate quartz veinlets, weak sericitation. Mineralization: strongly brecciated, moderate network pyrite, moderate pyrite dissemination, very fine with very little of chalcopyrite dissemination .

413.80m～414.65m Very hard grey, silicified rock. Alteration: strongly silicified, weak argillization, moderate quartz veinlets, weak sericitation. Mineralization: strong brecciated, moderate network pyrite, moderate pyrite dissemination, very fine and very little of chalcopyrite dissemination. At 413.80m: 2mm chalcopyrite veinlets, from 413.80m to 414.65m: 10mm to 5mm chalcopyrite-(fine grained)sulfide veins.

406.60m～416.10m Grey, very hard silicified rock. Sulfide veins occurred irregulay. Alteration: strongly silicified, weak quartz veins, weak sericitation. Mineralization: moderate pyrite dissemination, very weak chalcopyrite dissemination. Sulfide veins: 407.30m to 407.50m, 407.80m to 408.20m, 409.15m to 409.25m, veins, moderate. At 415m: 2mm chalcopyrite veinlets, 415m to 416m: 5mm sulfide veins.

414.65m～427.10m Light grey bto grey, very hard silicified rock. Shearing. Alteration: strongly silicified, strong quartz veins, very weak sericitation. Mineralization: partly brecciated, moderate pyrite network to veinlets, weak pyrite dissemination, weak chalcopyrite dissemination (partly veinlets). sulfide veins occurred.

414.65m～428.40m Light grey to grey, very hard silicified rock. shearing. Alteration: strongly silicified, weak argillization (veinlets clay), strong quartz veins, very weak sericitation. Mineralization: partly brecciated, moderate

	pyrite network to veinlets, weak pyrite dissemination, weak chalcopyrite dissemination (partly veinlets). At 413.80m: 2mm chalcopyrite veins. sulfide veins (mainly pyrite, very fine and very few of chalcopyrite vein occur at 413.80m to 414.65m, 415.00m to 415.60m, 417.40m to 448.20m, 419.60m to 419.90m, 422.60m to 422.65m, 423.80m to 424.90m, 425.40m to 426.20m, 426.60m to 426.80m, 427.70m to 427.80m. 428.40m to 447.20m.
428.40m～442.35m	Light grey to grey, hard silicified rock, shearing, 432.50m to 435.2m: mylonite. Alteration: strongly silicified, weak argillization (veinlets clay, pyrophyllite veinlets), strong quartz veins, yellowish veinlets (440.40m to 442.35m), very weak sericitation. Mineralization: partly brecciated, moderate pyrite network to veinlets (shearing), weak pyrite dissemination, very fine and very little of chalcopyrite dissemination. At 428.40m: 10mm pyrite-chalcopyrite-quartz veins. sulfide veins (mainly pyrite, very) occur at 428.40m to 428.50m, 429.80m to 429.90m, 430.60m to 430.80m, 431.60m to 432.00m, 432.60m to 435.10m, 435.80m to 436.70m, 437.20m to 437.40m, 438.90m to 439.10m, 439.70m to 441.40m, 441.90m.
442.35m～477.30m	Grey, ,hard silicified rock. shearing, 432.50m to 435.2m: mylonite. Alteration: strongly silicified, weak argillization (veinlets clay, pyrophyllite veinlets), strong quartz veins, yellowish veinlets (440.40m to 454.00m), anhydrite veins, very weak sericitation. Mineralization: partly brecciated, moderate pyrite network to veinlets (shearing), weak pyrite dissemination, very fine and very little of chalcopyrite dissemination. sulfide veins (mainly pyrite). pinkish colored, quartz.
477.30m～496.50m	Grey, hard, silicified rock. shearing.Alteration: strongly silicified, weak argillization (veinlets clay white, clay, pyrophyllite veinlets), moderate quartz veins, weak sericitation. Mineralization: partly brecciated, moderate pyrite network to veinlets (shearing), moderate pyrite dissemination, very fine and very little chalcopyrite dissemination, weak sulfide veins (mainly pyrite).
496.50m～496.80m	Greenish grey, andesite dyke.
496.80m～501.00m	Grey, hard, silicified rock. shearing. Alteration: strongly silicified, weak argillization (veinlets clay white, clay, pyrophyllite veinlets), moderate quartz veins, weak sericitation. Mineralization: partly brecciated, moderate pyrite network to veinlets (shearing), moderate pyrite dissemination, very fine and very little chalcopyrite dissemination, weak sulfide veins(mainly pyrite).
501.00m	drilling stop.

Alteration: According to X-ray diffraction analysis, silicified tuff detected altered minerals of quartz, sericite, kaolinite, pyrophyllite, alunite and pyrite. Mineral assemblages were mainly quartz -sericite-pyrophyllite-alunite-pyrite. Other minerals were plagioclase (albite), smectite and rutile. These alteration minerals show acidic alteration type to phyllic alteration type. From 80m to 140m, silicified tuff included quartz, sericite, alunite and pyrite, and including mainly quartz-sericite-pyrite mineral. Other minerals are kaolinite, calcite and rutile. Alteration minerals show phyllic alteration type. From 160m to 360m, silicified tuff occurred; alteration is relatively weak and includes quartz, plagioclase (albite), potassic feldspar, chlorite, sericite and pyrite, showing mainly quartz -albite-potassic feldspar-chlorite-sericite-pyrite mineral assemblage. Other minerals are laumontite, calcite and rutile. From 380m to 500m, silicified tuff includes quartz, sericite, kaolinite, alunite, pyrite and rutil, and associated mainly to quartz-sericite-kaolinite alunite-pyrite-rutile in mineral assemblage. Other minerals are potassic feldspar and halite. The alteration is phyllic alteration type.

Mineralization: Microscopic observation identified ore minerals of pyrite, goethite, hematite, limonite, magnetite, chalcopyrite and sphalerite. Coexisting halcopyrite and sphalerite are observed from 180m to 370m. Mineralization and alteration until 160m from the surface are mainly quartz-sericite-chlorite-pyrite. Until 300m, tuff includes potassic feldspar and albite, relatively alteration is weak, consists mainly of quartz -chlorite-epidote-pyrite. Until 500m, the rock includes mainly alteration of quartz -(sericite)-pyrite mineral assenblage.

Ore assay in the silicified tuff shows that ore assay grade are less than Cu 0.001% to Cu0.660%, Pb

0.002% to Pb0.033%, Zn 0.001% to Zn 0.120% and S 003% to S 15.90%. Average values of ore assay are Cu 0.006%, Pb 0.004% and Zn 0.009%.

(iii) Discussion

The drilling survey results conducted around the Sharchuluut Mountain in the Mogoin golarea are shown in the geologic section (Fig. II-3-8), including geological charts of MJME-M1, MJME-M2, MJME-M3 and MJME-M4.

MJME-M3: The cores identified mainly strong pyrite mineralization such as dissemination and network veinlets in Permian to Triassic strongly silicified tuff. The geology consists of Permian to Triassic tuff, fine grained, granodiorite dyke and andesite dyke. Faults zones were detected at 250m, 330m, 400m and 440m. Alterations related to mineralization are quartz-sericite-alunite-jarosite alteration, quartz -sericite alteration, quartz-sericite-pyrite alteration, quartz-chlorite-sericite-laumontite-pyrite alteration and quartz-potassic-feldspar-sericite-pyrite alteration. Potassic feldspar bearing Alteration was confirmed. From 330m to 440m, alteration in moderately silicified tuff is mainly composed of sericite-chlorite alteration. Genesis temperatures of mineralization are approximately 300℃ of hidrothermal activity indicating neutrality to acid hydrothermal water. Mineralization is probably a system of porphyry copper-type mineral including strong pyritization at the center.

MJME-M4: The cores identified mainly the strrong pyrite mineralization such as dissemination and network veinlets in Permian to Triassic strong silicified tuff. The geology consists of Permian to Triassic tuff, fine grained, granodiorite dyke and andesite dyke. Faults zones were detected at 160m and 335m which are tought to be reverse faults. Genesis temperatures of mineralization are approximately 300℃ of higrothermal activity, indicating neutrality to acid hydrothermal water but seems to be higher than MJME-M3 core. Mineralization consists of strong pyritization with chalcopyrite and sphalerite, and perhaps forms a system of porphyry copper-type mineral or poly-metallic typoe Mineralization.

Homogeneous temperarures resulted in 147℃ to 165℃ in MJME-M1 cores and 173℃ to 188℃ in MJME-M2 cores, which are relatively low. Maximum temperature was 291℃. Salinities were 3.9% to 17.3% in MJME-M1 and 1.8% in MJME-M2 cores. Maximum salinity was 10%.

Therefore, the drilling survey results in the area indicated that mineralization in the central part of Sharchuluut Mountain corresponds probably to the upper part of a system of porphyry copper-type mineralization such as silica cap, or a hydrothermal poly-metallic type mineralization.

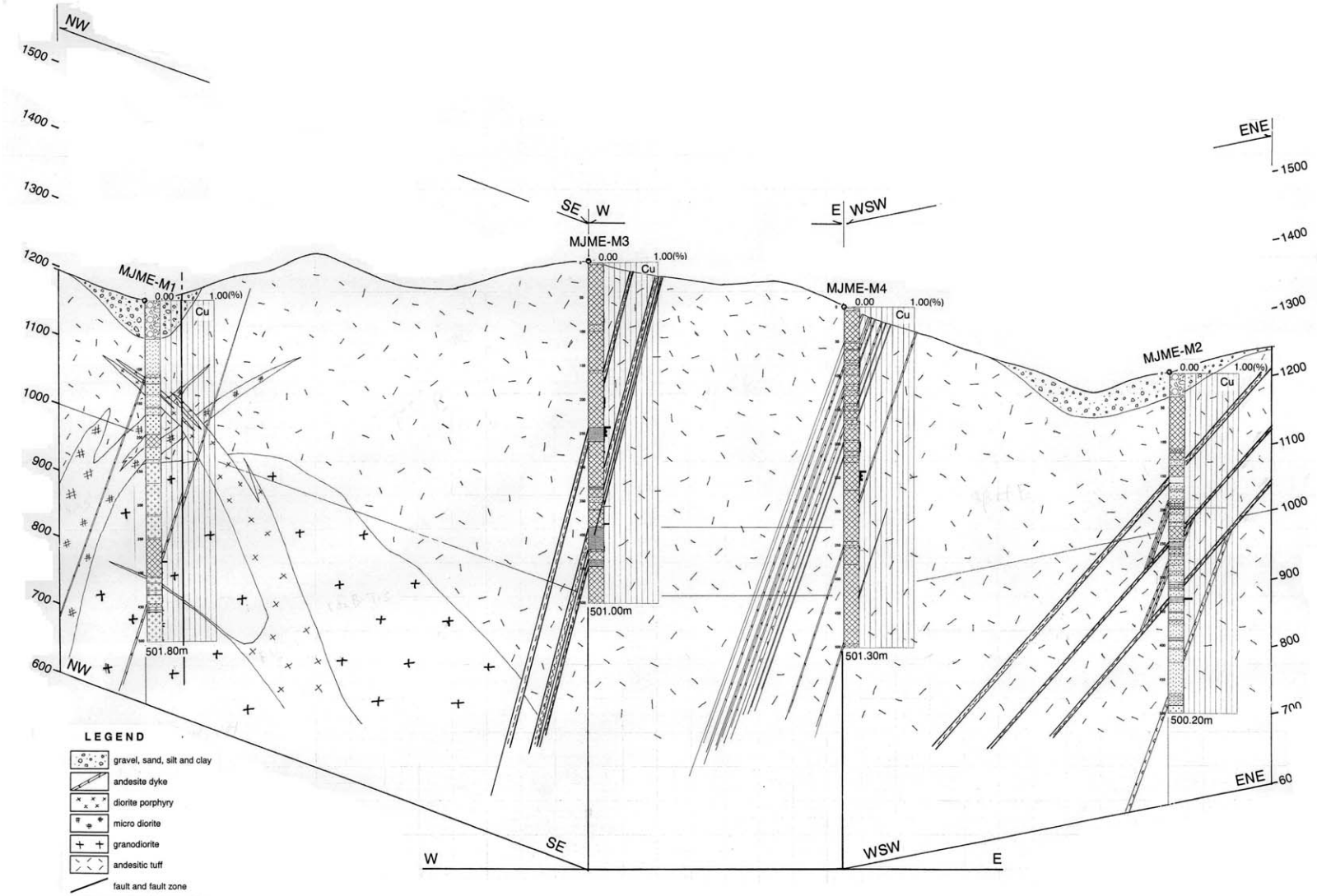


Fig. II-3-8 Geologic cross sections and panel diagram of MJME-M3 and MJME-M4 in the Mogoin gol area.

(2) Zuukhiin gol area

Introduction

Background information that was useful to decide the drilling survey during the Phases III in Zuukhiin gol area can be mentioned as follows:

- Analysis of existing data previous to Phase I. Previous geochemical surveys as well as geophysical surveys, such as ground magnetic and IP electrical survey, were able to detect anomalies.
- Low magnetic zones were detected during the aeromagnetic survey of Phase I
- The geological survey results of Phase I, detected on the ground copper mineralization zones including malachite and chalcopyrite as well as rock geochemical anomalies of Cu, Pb and Zn.
- In Phase III, soil geochemical anomalies of more than Cu 200ppm and Zn 100ppm to Zn 200ppm were found concentrated in the area. High ore grade values of Cu, Zn, and Ag were found distributed along a east to west trending in the central part of the area.
- Also in Phase III, TDIP geophysical survey detected very high IP anomalies in the area

(i) MJME-Z1

This drill hole was sited on the station J-18 of the geophysical survey line J located in the eastern part of the Zuukhiin gol area. The drilling site was constructed on the colluvial deposits.

Geology : It consists mainly of Quaternary deposits from 0.00m to 10.20m and basement rocks from 10.20m to the bottom. The basement rocks consist mainly of granitic rocks and dyke.

As follows, the drilling core logging is briefly described. The drilling column is shown in Appendix 16. The results of rock chemical analysis of the drill cores are also attached in Appendix 4. The drilling chart of MJME-Z1 and results of rock chemical analysis and alteration minerals are shown in Fig. II-3-9.

0.00m～10.20m	Topsoil. Along the fractures, limonite films and spotted limonite are seen in the weathered granite.
10.20m～16.50m	Weathered granodiorite. Oxide copper along the fractures, malachite films.
16.50m～18.80m	Granodiorite. Along the fractures, malachite films and veinlets occurred spotting in the rock. Along the hematite and limonite veins: malachite and black minerals, chalcopyrite in the hematite veinlets.
18.80m～52.80m	Granodiorite. partly fractured zone, limonite films and limonitization. Along the fractures, malachite films and spotted malachite in the rock. Along the hematite and limonite veins, malachite, black copper minerals (block soot and needles), slight bornite and chalcocite.
52.80m～67.40m	Granodiorite. Alteration: weak chloritization, partly feldspar changed to light brown to light pinkish color, quartz veinlets. Mineralization: films and spotted malachite. 54.00m from top, films and spotted malachite film. along the fractures, limonite films and limonitization, fine grained pyrite holes. From 57.60m to 57.75m, 2cm to 1cm chalcopyrite-quartz veins, sericitization and silicification. From 62.50m to 63.00m, high angle fractures having molybdenite films, rarely chalcopyrite-bornite fine grained, dissemination.
67.40m～69.40m	Dark greenish grey, andesite dyke. Alteration: weak chloritization.
69.40m～72.10m	Granodiorite. Alteration of weak chloritization, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of limonite films and limonitization along the fractures, pyrite holes of fine grains. From 70.40m to 70.80m, chalcopyrite-pyrite dissemination along the fractures,
72.10m～76.20m	Dark greenish grey, andesite dyke. along the fractures, anhydrite veinlets. contact angle 20 degrees.
76.20m～101.30m	Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of limonite films and limonitization along the fractures. Granite having partly secondary biotite. From 85.00m to 92.80m, quartz veins and network veins with chalcopyrite. Chalcopyrite dissemination. 92.80m to 93.30m, chalcopyrite veinlets and chalcopyrite dissemination. 93.60m to 93.90m, along the fractures, molybdenite films. 98.10m to 98.20m, chalcopyrite bearing pyrite veins and dissemination. In the mineralization, alteration of

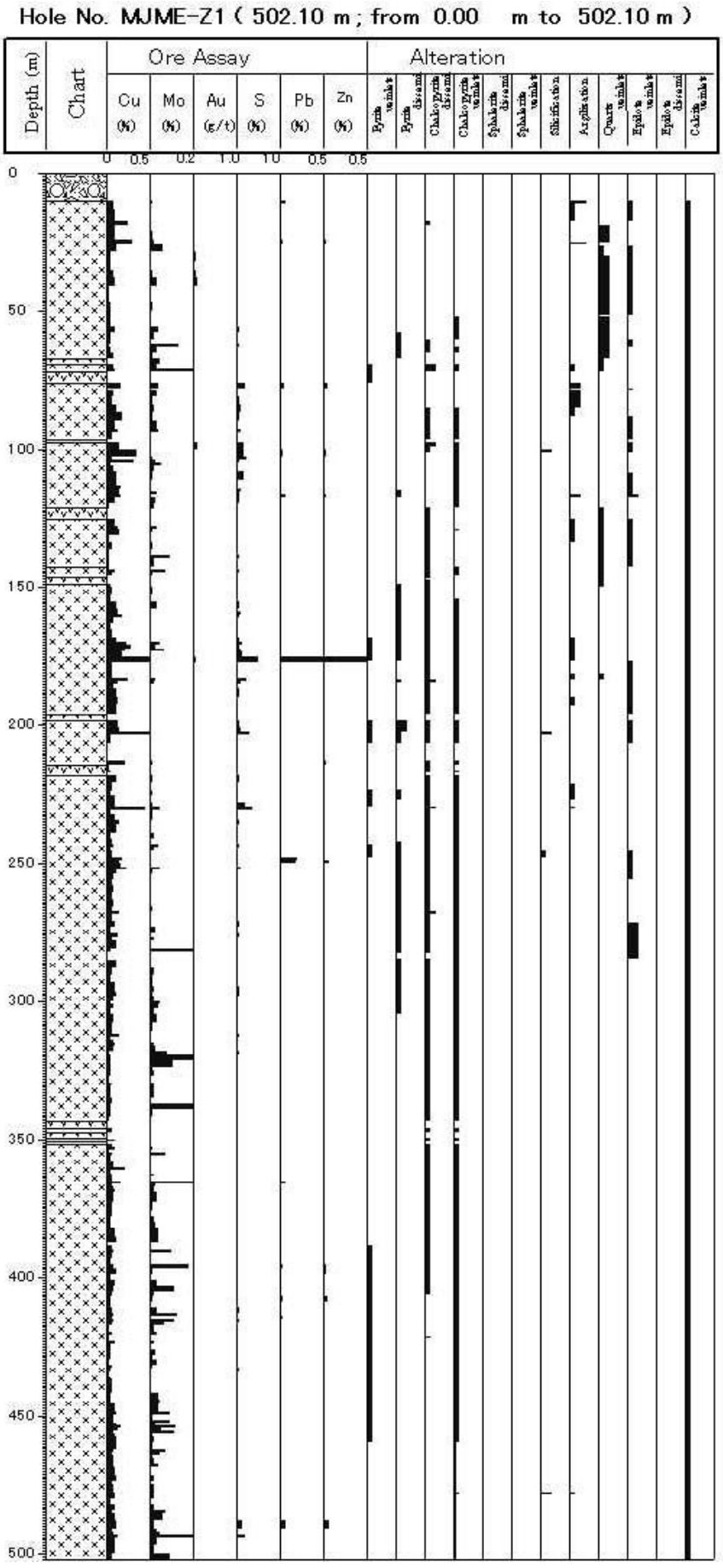


Fig. II-3-9 Mineralization and alteration on the geologic column of MJME-Z1.

silicification and sericitization. 100.95m to 101.25m, quartz chalcopyrite veins (2cm) and chalcopyrite dissemination.

101.30m～121.35m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. mineralization of quartz chalcopyrite veins, chalcopyrite dissemination. 103.60m to 103.90m, chalcopyrite veins and chalcopyrite bearing pyrite veins (3mm). 108.05m to 108.20m, chalcopyrite veins (4mm). 108. 50m to 108.90m, quartz chalcopyrite veins (1cm). 116.50m to 118.50m, chalcopyrite bearing fractured zone.

121.35m～125.60m Dark greenish grey, andesite dyke(30degrees). Alteration of weak chloritization, calcite veinlets.

125.60m～142.45m Light grey to light pinkish grey, granodiorite. At 127.70m, pink aprite dyke. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite veinlets and veins, chalcopyrite dissemination. 128.60m to 128.75m chalcopyrite veins (2mm) and chalcopyrite dissemination.

142.45m～142.85m Greenish grey, andesite dyke. Alteration of chloritization. Mineralization of very fine grained and very few chalcopyrite.

142.85m～145.70m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination. 143m to 145m, chalcopyrite, bornite along the fractures, veinlets and dissemination. 144.50m to 144.80m, quartz-chalcopyrite veinlets (10mm, dip 10degrees) and chalcopyrite dissemination. 145.20m to 145.50m, quartz-chalcopyrite veinlets (5mm, dip 20degrees) and chalcopyrite dissemination.

145.70m～146.70m Greenish grey, andesite dyke. Alteration of chloritization. Mineralization of very fine grained and very few chalcopyrite.

146.70m～147.40m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination.

147.40m～148.90m Greenish grey, andesite dyke. Alteration of chloritization, mineralization of very fine grained and very few chalcopyrite.

148.90m～149.20m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination.

149.20m～150.10m Greenish grey, andesite dyke. Alteration of chloritization, mineralization of very fine grained and very few chalcopyrite.

150.10m～154.10m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination. 138.90m quartz-chalcopyrite veinlets (3mm, dip 30degrees) and chalcopyrite dissemination. 150.00m to 154.10m, chalcopyrite dissemination and chalcopyrite veinlets. At 151.40m, molybdenite occurred along the fractures.

154.10m～195.90m Light grey to light pinkish grey, granodiorite. At 159.4m and 160. 3m, pink aprite dyke. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination. At 156.20m, quartz-chalcopyrite veinlets (3mm, dip 30degrees) and chalcopyrite dissemination. 159.20m to 163.45m, two pyrite-chalcopyrite veinlets and chalcopyrite veinlets, three quartz chalcopyrite veins. 168.25m to 168.45m, molybdenite-chalcopyrite-pyrite (10mm, angle 5degrees). 172.50m to 175. 80m, quartz chalcopyrite veinlets. 178.25m to 178.45m, quartz-molybdenite-chalcopyrite vein (20mm, angle 10 degrees). 178.90m to 180.30m, quartz chalcopyrite veinlets.

195.90m～198.20m Andesitic basalt dyke.

198.20m～206.50m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, calcite veinlets, partly feldspar changed light brown to light pinkish color, quartz veinlets. Mineralization of chalcopyrite dissemination. 182m to 184m, pyrite-chalcopyrite veinlets and quartz chalcopyrite veins. 202m to 204m, chalcopyrite veinlets, quartz pyrite-chalcopyrite veins and pyrite-chalcopyrite veins .

206.50m～212.80m Andesitic basalt dyke.

212.80m～214.20m Light grey to light pinkish grey, granodiorite.

214.20m～216.60m Andesitic basalt dyke.

216.60m～217.00m Light grey to light pinkish grey, granodiorite.

217.00m～218.00m Andesitic basalt dyke.

218.00m～257.70m Light grey to light pinkish grey, granodiorite. Gradually changed to porphyritic granodiorite. Relatively many mafic minerals in parts. Mineralization of weak chalcopyrite dissemination. 237.10m to 257.70m, three molybdenite-chalcopyrite veinlets (1mm to 4mm), five pyrite-chalcopyrite veinlets (1mm to 3mm), along the fractures, chalcopyrite films and dissemination, molybdenite veinlets (3mm 5degrees, 2mm 60degrees), quartz pyrite-chalcopyrite veinlets (2mm).

257.70m～271.70m Light grey to light pinkish grey, granodiorite. Mineralization of weak chalcopyrite dissemination. 258m to 261m, along the fractures, chalcopyrite films, molybdenite-chalcopyrite veinlets (45degrees). 264m to 266m, chalcopyrite veinlets and molybdenite veinlets.

271.70m～275.00m Light grey to light pinkish grey, granodiorite. Relatively many mafic minerals . Copper mineralization of weak chalcopyrite dissemination. 263m to 273m, fractures having quartz pyrite-chalcopyrite veinlets, chalcopyrite films, pyrite-chalcopyrite veinlets.

275.00m～282.20m light grey to light pinkish grey, granodiorite. weak chalcopyrite dissemination. 276m to 278m, quartz pyrite-chalcopyrite veinlets (80degrees) and pyrite-chalcopyrite veinlets. 279m to 282m, quartz pyrite-chalcopyrite veinlets (80degrees) and pyrite-chalcopyrite veinlets (30degrees).

282.20m～284.90m Dark grey andesite dyke.

284.90m～286.80m Light grey to light pinkish grey, granodiorite. Weak chalcopyrite dissemination. At 286.80m, chalcopyrite veinlets (2mm, 60degrees).

286.80m～286.90m Dark grey andesite dyke.

286.90m～304.70m Light grey to light pinkish grey, granodiorite. weak chalcopyrite dissemination. 288m to 292m, pyrite-chalcopyrite two veinlets. 294m to 301m, molybdenite-chalcopyrite veinlets (1mm), pyrite-chalcopyrite veinlets (1mm), along the fractures, molybdenite films, quartz chalcopyrite-pyrite veinlets. 302m to 304m, quartz pyrite-chalcopyrite veinlets(30degrees) and pyrite-chalcopyrite veinlets.

304.70m～305.10m Brown fine grained, granite(aprite).

305.10m～324.70m Light grey to light pinkish grey, granodiorite. 311m to 313m, pyrite-chalcopyrite veinlets. 314m to 322m, quartz-pyrite-chalcopyrite veinlets, pyrite-chalcopyrite veinlets, quartz molybdenite veinlets. 322m to 324m, fractures having chalcopyrite dissemination and films.

324.70m～324.70m Dark grey andesite dyke.

324.70m～336.10m Light grey to light pinkish grey, granodiorite. copper mineralization at 328m, quartz veinlets. At 330m, pyrite-chalcopyrite veinlets and chalcopyrite-molybdenite veinlets. At 331m, fractures having chalcopyrite and molybdenite in dissemination. At 336m, molybdenite veinlets(1mm).

336.10m～336.60m Pinkish brown fine grained, granite.

336.60m～343.30m Light grey to light pinkish grey, granodiorite. At 338m, molybdenite veinlets(1mm, 2degrees).

343.30m～241.60m Dark grey andesite dyke.

341.60m～347.40m Light grey to light pinkish grey, granodiorite. At 347m, chalcopyrite veinlets(1mm, 30degrees).

347.40m～349.80m Dark grey andesite dyke.

349.80m～350.00m Light grey to light pinkish grey, granodiorite.

350.00m～350.10m Light pinkish brown fine grained, granite(aprite). At 350m, chalcopyrite veinlets(1mm, 0 degrees) and chalcopyrite dissemination.

350.10m～350.60m Light grey to light pinkish grey, granodiorite.

350.60m～351.60m Dark grey andesite dyke.

351.60m～362.90m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, weak epidotization, calcite veinlets, propylitization. 352m to 354m, pyrite-chalcopyrite veinlets(films, 3degrees), fractures having chalcopyrite veinlets. 355m to 356m, fractures having chalcopyrite veinlets, quartz chalcopyrite veinlets(1mm, 50degrees), molybdenite-chalcopyrite minerals, bornite veinlets(1mm). At 360m, pyrite-chalcopyrite veinlets. 360m to 361m, along the fractures, chalcopyrite veinlets and films(1mm, 0degrees) and chalcopyrite dissemination.

362.90m～363.20m Pinkish brown fine grained, granite.

363.20m～387.30m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, weak epidotization, calcite veinlets, propylitization. 362m to 367m, fractures having pyrite-chalcopyrite veinlets, chalcopyrite films, molybdenite veinlets, quartz molybdenite-chalcopyrite chalcopyrite-pyrite veinlets. At 370m, molybdenite-chalcopyrite films. At 375m, molybdenite-chalcopyrite and chalcopyrite-pyrite films. At 380m, chalcopyrite films(1mm, 60degrees). At 382m, molybdenite-chalcopyrite chalcopyrite-pyrite films. 383m to 384m, chalcopyrite films, pyrite films, copper chalcopyrite-pyrite films. At 386m, chalcopyrite-pyrite films.

387.30m～388.50m Dark grey andesite dyke.

388.50m～394.90m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, weak epidotization, calcite veinlets, propylitization. 389m to 391m, copper chalcopyrite films, pyrite films(5degrees). 394m to 394. 5m, copper chalcopyrite-pyrite films, chalcopyrite films(1mm, 60degrees).

394.90m～410.70m Light grey to light pinkish grey, granodiorite. Alteration of weak chloritization, weak epidote veinlets , calcite veinlets, propylitization. 396m to 397m, chalcopyrite films. At 400m, chalcopyrite spots. 401m ot403m, pyrite films, chalcopyrite films, quartz veinlets. 407m to 410m, pyrite veinlets (70degrees), chalcopyrite-pyrite films, quartz pyrite veinlets, chalcopyrite films, molybdenite spots, chalcopyrite films.

410.70m～502.10m Light grey to light grey granodiorite. Alteration of weak chloritization, propylitization. copper mineralization: 412m to 421m, pyrite films, chalcopyrite films, molybdenite chalcopyrite films, chalcopyrite-pyrite films, along the fractures, chalcopyrite spots. 421m to 428m, pyrite films (5degrees, 60degrees, 30degrees), chalcopyrite films(70degrees, 20degrees), quartz pyrite veinlets (5mm, 30 degrees), molybdenite films, chalcopyrite-pyrite films, along the fractures, chalcopyrite spots. 430m to 433m, pyrite films (5degrees, 20degrees, 30degrees). 436m to 438m, pyrite films. At 443m, pyrite films(60degrees). 448m to 451m, pyrite films(60degrees, 20degrees), quartz pyrite veinlets(2mm,

20degrees). 453m to 455m, quartz pyrite-chalcopyrite veinlets(1mm, 30degrees), chalcopyrite films (70 degrees), quartz pyrite veinlets(5degrees). 459m to 460m, network pyrite. 461m to 467m, pyrite films (20degrees), chalcopyrite films(45degrees, 60degrees), quartz veinlets(1mm, 30degrees). At 469m, pyrite-chalcopyrite films. 478m to 484m, quartz sericite alteration having pyrite dissemination, fractures having pyrite dissemination (30degrees), chalcopyrite films(70degrees, 5degrees, 80degrees). pyrite films: at 485.70m(30degrees), 490.20m (1degrees), 497.00m (30degrees), 501.70m(1degrees). Quartz-pyrite veins (5mm, 30degrees): 501.90m.

502.10m drilling stopped.

Alteration： According to X-ray diffraction analysis, granodiorite includes mainly alteration minerals of quartz , plagioclase (albite), potassic feldspar, chlorite-sericite, calcite, pyrite, and rarely kaolinite, propylite, laumontite, hornblende, alunite, rutile, sphalerite and galena. From upper part to lower part of drilling cores, approximately same alteration such as chlorite-sericite-calcite–pyrite in mineral assemblage. Laumontite minerals were found at 220m, propylite at 163m, alunite at 176m. Mainly propylite alteration in mineral assemblage.

Mineralization： From results of microscopic observation, ore minerals in granodiorite consist of pyrite, goethite, hematite, limonite, magnetite, chalcopyrite, malachite, sphalerite and galena. Paragenesis of chalcopyrite and sphalerite was observed at 176m, paragenesis of chalcopyrite and galena at 408m. Alteration related to mineralization consists of quartz, carbonate minerals, sericite, chlorite, and mainly quartz -sericite –chlorite in mineral assemblage, including calcite.

From results of rock chemical analysis, ore assay values ranges less than Cu 0.008% to Cu 0.784%, and average value of copper is Cu 0.086%. Ranges of ore assay were Pb 0.003% to Pb 2.270 %, Zn 0.003% to Zn 0.828%. Maximum values of other elements were Au 80.8g/t and S 4.97%.

(ii) MJME-Z2

This hole is located at the point J-14 of the TDIP geophysical survey line J in Zuukhiin gol area. Drilling site was constructed on colluvial deposits.

Geology： Drilling cores consisted mainly of Quaternary deposits from 0.00m to 7.90m and basement rocks under 3.20m. The basement rocks consist mainly of granitic rocks and dykes.

The core descriptions are annotated as follows, and the drilling charts are attached in Appendix 17. The results of rock chemical analysis of the drilling cores are also attached in Appendix 4. The drilling chart of MJME-Z2 and results of rock chemical analysis and alteration minerals are indicated in Fig. II-3-10.

0.00m～3.00m Soil C layer (including fragments and gravels of weathered granodiorite).

3.00m～7.90m Soil C layer including weathered granodiorite. Fractures having malachite films, hematite films, limonite films.

7.90m～10.00m Weak weathered granodiorite. Alteration of weak chloritization, propylitization. along the fractures, limonite films and veinlets. Mineralization of limonite films and veinlets along the fractures and spotted malachite in the fractures.

10.00m～19.65m Granodiorite. Alteration of weak chloritization, propylitization. Mineralization of limonite films and veinlets along the fractures and spotted malachite in the fractures.

18.50m～19.75m Dark greenish grey, andesite dyke.

19.25m～23.30m Light greenish grey, granodiorite. Alteration of weak chloritization, propylitization. light brown colored along the fractures. Mineralization of limonite films and veinlets along the fractures, spotted malachite in

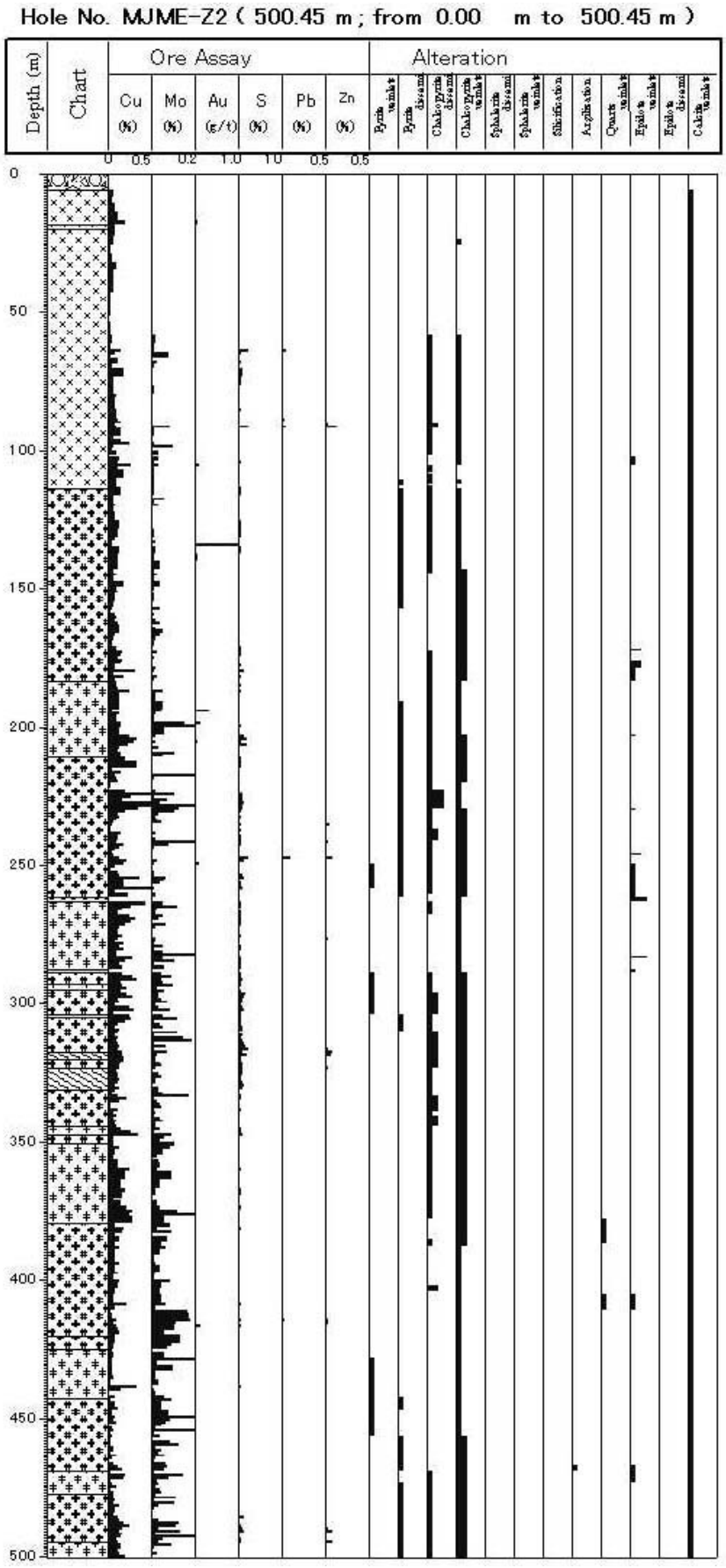


Fig. II-3-10 Mineralization and alteration on the geologic column of MJME-Z2.

fractures.

23.30m～23.90m Pinkish brown fine grained, syenite dyke

23.90m～36.65m Light greenish grey, granodiorite. Alteration of weak chloritization, propylitization. light brown colored along the fractures. Mineralization of limonite films and veinlets along the fractures, spotted malachite. at 31m, limonite and hematite, malachite along the fractures.

36.65m～36.95m Pinkish brown fine grained, syenite porphyry dyke.

36.95m～49.70m Light greenish grey, granodiorite. 42m to 49m, flaked rock. Alteration of weak chloritization, propylitization. light brown colored along the fractures. 35m to 38m, limonite and hematite and malachite in fractures, spotted malachite. At 38m, malachite, limonite and hematite in fracture. 39m to 40m, fractures having limonite and hematite and malachite.

49.70m～50.60m Pinkish brown fine grained, syenite porphyry dyke.

50.60m～57.45m Light grey granodiorite. Alteration of weak chloritization, propylitization. fractures colored light brown. 52m to 58.30m, limonite and hematite along the fractures, malachite occurred in films and spots.

57.45m～58.10m Pinkish brown fine grained, syenite porphyry dyke.

58.10m～88.30m Light grey granodiorite. Alteration of weak chloritization, propylitization. Fractures colored light brown. Until 61.30m, malachite along the fractures. Until 62.75m, fractures having oxide iron minerals as limonite, and oxidized zone. Under this level, no oxidized minerals. Copper mineralization: 62m to 64m, pyrite-chalcopyrite network and veinlets (0degrees to 10degrees), 66m to 71m, chalcopyrite films(70degrees), pyrite-chalcopyrite network veinlets(30degrees), pyrite-chalcopyrite veinlets (5mm, 30 degrees), pyrite network veinlets30degrees). At 79m, pyrite-chalcopyrite network and films(20degrees to 30degrees). 82m to 86m, pyrite-chalcopyrite network veinlets(5degrees), chalcopyrite films(5degrees), quartz chalcopyrite veinlets(10mm, 30degrees), quartz pyrite-chalcopyrite veinlets(10mm, 30degrees), pyrite-chalcopyrite films(5degrees).

88.30m～88.50m Pinkish brown syenite .

88.50m～90.10m Light grey granodiorite. Alteration of weak chloritization, propylitization. copper mineralization : 89m to 97m, quartz-chalcopyrite veinlets(1mm, 30degrees), chalcopyrite dissemination, quartz- pyrite-chalcopyrite veinlets(3mm, 0degrees), chalcopyrite films and chalcopyrite dissemination, pyrite films(20degrees).

90.10m～90.30m Pinkish brown syenite (70degrees).

90.30m～101.80m Light grey granodiorite. Alteration of weak chloritization, propylitization.

101.80m～102.10m Dark greenish grey, andesite dyke.

102.10m～104.15m Light grey granodiorite. Alteration of weak chloritization, propylitization. Copper mineralization of 101m to 103m, pyrite veinlets(3mm, 45degrees), quartz-chalcopyrite veinlets(3mm, 30degrees), chalcopyrite dissemination along the fractures.

104.15m～104.35m Dark grey andesite dyke(including granodiorite fragments).

104.35m～105.35m Light grey granodiorite. Alteration of weak chloritization, propylitization.

105.35m～105.40m Quartz potassic feldspar veins (including chalcopyrite).

105.40m～108.10m Light grey granodiorite. Alteration of weak chloritization, propylitization. 105m to 106m, quartz chalcopyrite veinlets(3mm, 30degrees), chalcopyrite(5mm, 15mm), pyrite veinlets(2mm, 0degrees) in quartz-potassic feldspar veins.

108.10m～108.30m Dark grey andesite dyke (including granodiorite fragments).

108.30m～110.30m Greenish grey, diorite. Alteration of weak chloritization, propylitization.

110.30m～111.95m Light grey granodiorite. At 111m, lenticular quartz chalcopyrite veinlets(3mm to 10mm, 10degrees).

111.95m～112.95m Pinkish brown syenite . Alteration of weak chloritization, propylitization.

112.95m～113.45m Light grey granodiorite. Alteration of weak chloritization, propylitization.

113.45m～131.50m Dark grey fine grained, gabbro. Alteration of weak chloritization, propylitization. At 120m, chalcopyrite- pyrite veinlets(1mm, 30degrees). At 123m, quartz chalcopyrite veinlets(10mm～1mm, 60degrees). 127m to 128m, chalcopyrite veinlets (2mm, 30degrees), chalcopyrite-molybdenite quartz veinlets (45degrees). 129m to 131m, quartz pyrite veinlets(4mm30degrees, 2mm30degrees).

131.50m～144.45m Grey, fine grained, gabbro, fine grained to moderate grained and heterogeneous. Alteration of weak chloritization, propylitization. Copper mineralization at 135m, pyrite-chalcopyrite films. At 140m, chalcopyrite-molybdenite dissemination along the fractures. At 144m, quartz chalcopyrite-pyrite veinlets (5mm30degrees).

144.45m～148.00m Grey, heterogeneous, fine grained, gabbro and pegmatitic quartz-potassic feldspar syenite dyke. At 147m, chalcopyrite films.

148.00m～175.40m Grey, fine grained, gabbro, fine grained to moderate grained and heterogeneous. Alteration of weak chloritization, propylitization. 150m to 153.80m, network of chalcopyrite films and chalcopyrite-pyrite films. At 152. 50m, quartz chalcopyrite veinlets(2mm30degrees, quartz sericitization). 155m to 162m, chalcopyrite films(20degrees, 30degrees, 40degrees), quartz chalcopyrite veinlets (3mm 60degrees, 10mm45degrees, 2mm45degrees), pyrite films(45degrees, 30degrees). 164m to 167m, chalcopyrite films(20degrees, 30degrees), quartz chalcopyrite veinlets(2mm30degrees). 170m to 174m, chalcopyrite films(60degrees, 20degrees, 50degrees), quartz chalcopyrite veinlets(2mm30degrees), pyrite-

chalcopyrite films(30degrees). 174m to 175.40m, network of chalcopyrite films.

175.40m～183.40m Grey, fine grained, gabbro, fine grained, to moderate grained and heterogeneous. Alteration of weak chloritization, epidote veins in fractures and veins, and epidotization. Copper mineralization: 174.50m to 183.40m, network of chalcopyrite films. At 176m, chalcopyrite veinlets(2mm40degrees), chalcopyrite films. 179m to 180m, quartz chalcopyrite veins (2mm40degrees, 5mm45degrees, 4mm45degrees), chalcopyrite films, chalcopyrite veinlets.

183.40m～183.55m Fault and dark grey fault clay.

183.55m～195.10m Light grey granodiorite. 194.70m to 195.00m, sheared zone (argillized). Weak chloritization. Copper mineralization: 183m to 184m, chalcopyrite veinlets, pyrite films. At 185m, pyrite films. 193m to 194m, pyrite-chalcopyrite films(20degrees).

195.10m～210.85m Light grey granodiorite. 203.20m to 203.23m, light brown syenite. Copper mineralization: 195m to 196m, chalcopyrite films(30degrees), quartz chalcopyrite veinlets(70degrees). 198m to 200m, chalcopyrite films(20degrees), quartz-chalcopyrite veinlets (40degrees), molybdenite-chalcopyrite veinlets (80 degrees), pyrite veinlets, quartz chalcopyrite-pyrite veinlets(2mm, 20degrees). 201m to 207m, molybdenite-chalcopyrite veinlets(45degrees), quartz-pyrite veinlets(30degrees), chalcopyrite-pyrite veinlets (30degrees), pyrite veinlets and films.

210.85m～212.05m Grey, fine grained, gabbro.

212.05m ～ 215.10m Light grey granodiorite, grey, fine grained, gabbro, brecciated. Bad core recovery. copper mineralization: 209m to 212m, chalcopyrite films an pyrite films, chalcopyrite dissemination, quartz chalcopyrite veinlets(45degrees), chalcopyrite films(45degrees), chalcopyrite veinlets(3mm30degrees).

215.10m ～ 219.10m Grey, fine grained, gabbro. Alteration of weak chloritization, partly epidotization. Copper mineralization: 215m to 216m, mineralizations of three veins. Chalcopyrite films(30degrees), pyrite films, quartz chalcopyrite-pyrite veinlets(2mm70degrees).

219. 10m～225.25m Quartz-potassic feldspar syenite . Alteration of weak chloritization, partly epidotization. 218m to 221m, mineralization of five veins. Pegmatite having molybdenite dissemination, chalcopyrite films (30 degrees, 40degrees), pegmatite having chalcopyrite dissemination. 223m to 224m, mineralization of four veins. pyrite films, chalcopyrite films, chalcopyrite dissemination, quartz pyrite veinlets (3 mm 30degrees).

225.25m～231.30m Grey, fine grained, gabbro. 224m to 230m, network mineralization veins. Chalcopyrite dissemination, chalcopyrite films, pyrite films.

231.30m～231.70m Light grey granodiorite. Alteration of weak chloritization, partly epidotization.

231.70m～233.40m Grey, fine grained, gabbro. Alteration of weak chloritization, partly epidotization. 230m to 233m, mineralization of five veins. Pyrite films, chalcopyrite films.

233.40m～240.50m Grey, fine grained, gabbro, heterogeneous. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralized veins having epidote chlorite-sericite silicification. Copper mineralization: 233m to 236m, mineralization of five veins. Chalcopyrite-pyrite films(40degrees), pyrite films(60degrees), network pyrite films. 238m to 240m, mineralization of five veins. Network of chalcopyrite films(30 to 70degrees), chalcopyrite films and dissemination (20degrees).

240.50m～260.50m Grey, heterogeneous, fine grained, gabbro. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralization veins, epidote heterogeneous, fine grained silicification. Copper mineralization: 242m～243m, four mineralization veins. Quartz veins (1mm10degrees), chalcopyrite veinlets(20degrees), quartz chalcopyrite veinlets(5mm10degrees, 60degrees). 245m to 246m, four mineralization veins. chalcopyrite veinlets(80degrees, 70degrees, 30degrees), quartz chalcopyrite veinlets(60degrees). 247m to 256m, 22 mineralized veins. Quartz chalcopyrite veinlets (5mm 10 degrees, chalcopyrite and pyrite in dissemination), chalcopyrite veinlets(2mm30degrees, 2mm 10 degrees), chalcopyrite dissemination(249m to 250m), quartz chalcopyrite veinlets (60degrees), quartz chalcopyrite-pyrite veinlets(2mm10degrees, 30degrees, 20degrees, 3mm45degrees, 2mm5degrees). 257m to 257.85m, 5 mineralization veins. . chalcopyrite-pyrite veinlets(20degrees), quartz chalcopyrite veinlets (3degrees). 257m to 262m, 12 mineralization veins. chalcopyrite-pyrite veinlets(20degrees, 30degrees), quartz chalcopyrite veinlets(30degrees, 20degrees), chalcopyrite veinlets and dissemination.

260.50m ～ 261.50m Granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralization veins and epidote-chlorite-sericite silicification.

261.50m～263.20m Hard, silicified rhyolite (epidotization).

263.20m～278.45m Grey, heterogeneous, fine grained, gabbro. 264m to 268m, 13 mineralization veins. Quartz pyrite veinlets(2mm20degrees), chalcopyrite films(40degrees, 10degrees), network chalcopyrite films, pyrite films, quartz chalcopyrite veinlets(1mm30degrees). 270m to 274m, 4 mineralization veins. 3 network chalcopyrite films, spotted lenticular chalcopyrite.

278.45m ～ 289.00m Granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralization veins and epidote chlorite-sericite silicification.

289.00m～287.75m Grey, heterogeneous, fine grained, gabbro. Copper mineralization: 282m to 283m, 2 mineralization veins. Quartz molybdenite-chalcopyrite films and veinlets. At 287m, 2 mineralization veins. chalcopyrite films, pyrite films.

287.75m～289.00m Greenish grey, andesite dyke. 289m to 290m, mineralization veins. pyrite films.

289.00m～292.80m Grey, heterogeneous, fine grained, gabbro.

292.80m～295.00m Light grey granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralization veins. Epidote-chlorite-sericite silicification. 291m to 299m, 23 mineralized veins. Chalcopyrite veinlets(30degrees, 60degree, chalcopyrite dissemination), chalcopyrite films, quartz chalcopyrite veinlets(2mm40degrees), chalcopyrite-pyrite veinlets and films(2mm30degrees), molybdenite-chalcopyrite veinlets(1mm30degrees), pyrite veinlets and films(0degrees), network pyrite veinlets.

295.00m～299.20m Grey, heterogeneous, fine grained, gabbro.

299.20m～299.30m Pinkish, moderate grained, granite. Alteration of weak chloritization, epidote veinlets, partly epidotization, partly mineralization veins. Epidote chlorite-sericite silicification.

299.30m～304.20m Grey, heterogeneous, fine grained, gabbro, 251.50m to 252.20m, 3 pegmatitic quartz potassic feldspar dyke (10cm). 299m to 303m, network chalcopyrite films and chalcopyrite dissemination.

304.20m～305.00m Light grey granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization. Copper mineralization: 304m to 306m, 6 mineralization veins. Chalcopyrite films(45degrees, 70degrees), chalcopyrite-pyrite films, quartz chalcopyrite veinlets(2mm30degrees).

305.00m～308.00m Grey, fine grained, gabbro. At 307m, chalcopyrite films(30degrees).

308.00m～308.35m Light grey granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization.

308.35m～308.60m Grey, fine grained, gabbro.

308.60m～310.15m Light grey granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization. 308m to 314m, 6 mineralization veins. Pyrite veinlets(3mm40degrees, 1mm30degrees, sericite silicification), chalcopyrite films(30degrees), quartz pyrite veinlets(1mm30degrees, 2mm20degrees, 10mm 30 degrees), network pyrite films(30cm).

310.15m～333.40m Grey, fine grained, gabbro. 317.45m to 320.25m, 323.60m to 331.40m, fractures zone, along the fractures. Alteration of weak chloritization, along the fractures, calcite films. Copper mineralization: chalcopyrite films, quartz chalcopyrite veinlets. 315m to 321m, 25 mineralization veins. quartz pyrite veinlets(10mm30degrees, 1mm30degrees), network of pyrite films(25cm, 10degrees, 0degrees), pyrite films(2degrees), chalcopyrite veinlets(1mm20degrees). 323m to 329m, 6 mineralization veins. chalcopyrite films(20degrees, 30degrees, 50degrees), quartz pyrite veinlets(3mm20degrees, 2mm 20 degrees), network chalcopyrite films(4m), pyrite veinlets(2mm30degrees). 329m to 332m, network chalcopyrite films(70degrees, 50degrees, 20degrees, 0degrees).

333.40m～339.20m Light grey fine grained, diorite.

339.20m～340.80m Light grey moderate grained, granodiorite.

340.80m～344.45m Light grey fine grained, diorite.

344.45m～347.40m Light grey moderate grained, granodiorite.

347.40m～347.80m Light grey fine grained, diorite.

347.80m～350.70m Grey, fine grained, gabbro.

350.70m～358.25m Light grey moderate grained, granodiorite.

358.25m～358.65m Grey, fine grained, gabbro.

358.65m～369.35m Light grey moderate grained, granodiorite.

362.75m～369.35m Light grey moderate grained, granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization. 363m to 370m, 40 mineralization veins. Copper mineralization: network of chalcopyrite-pyrite films(30degrees), quartz pyrite veinlets(5mm30degrees), pyrite-chalcopyrite veinlets (4mm 40 degrees), chalcopyrite films(60degrees to 70degrees).

369.35m～370.00m Dark grey heterogeneous, fine grained, gabbro.

370.00m～379.20m Light grey moderate grained, granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization. Copper mineralization: 371m to 375m, 7 mineralization veins. chalcopyrite films (45 degrees), pyrite-chalcopyrite films(10degrees, 1mm20degrees), quartz pyrite veins (5mm2degrees, 6mm10degrees), network of chalcopyrite veinlets and films(30degrees to 10degrees), spotted and dissemination of chalcopyrite.

379.20m～387.90m Dark grey fine grained, gabbro. 376m to 381m, 50mineralization veins. Chalcopyrite films(45degrees), chalcopyrite veinlets(1mm20degrees), network of chalcopyrite films), quartz pyrite veinlets(20degrees), pyrite veinlets(20degrees), chalcopyrite-pyrite films. 382m to 384m, 50 mineralization veins. pyrite films, chalcopyrite films, quartz pyrite veinlets(2mm40degrees), pyrite veinlets(3mm30degrees). 384m to 388m, 15 mineralization veins. pyrite films, chalcopyrite films, pyrite-molybdenite films, pegmatitic syenite having granular chalcopyrite.

387.90m～388.70m Light grey moderate grained, granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization.

388.70m～397.20m Dark grey fine grained, gabbro. 389m to 397m, 50 mineralization veins. chalcopyrite-pyrite films, chalcopyrite films, pyrite films, in 20cminteraval, network quartz veins (70degrees to 20degrees).

397.20m～397.60m Pinkish, pegmatitic syenite (granular pyrite and chalcopyrite).

397.60m～400.20m Dark grey fine grained, gabbro. 399m to 400m, 6 mineralization veins. Network chalcopyrite films, 2

chalcopyrite veinlets(2mm30degrees).

400.20m～401.80m Light grey moderate grained, granodiorite. Alteration of weak chloritization, epidote veinlets and partly epidotization.

401.80m～420.20m Dark grey fine grained, gabbro. Alteration of weak chloritization and epidote veinlets. At 404.10m, granodiorite dyke, at 409.70m and 411. 10m, granite dyke. 401m to 405m, 60 mineralization veins. chalcopyrite films and veinlets(10degrees to 30degrees), chalcopyrite-pyrite veinlets(1mm10 to 20 degrees). 406m to 411m, 7 mineralization veins. Chalcopyrite spots, chalcopyrite veinlets(10degrees to 30degrees). 412m to 417m, 20 mineralization veins. chalcopyrite films(20degrees to 45degrees), pyrite veinlets(3mm45degrees), chalcopyrite veinlets(3mm10degrees), network chalcopyrite films(20degrees to 45degrees). 417.65m to 418.45m, 16 mineralization veins. 3 chalcopyrite veinlets(1mm, 20degrees to 30degrees), chalcopyrite films(10degrees to 40degrees).

420.20m～425.10m Grey, fine grained, diorite. Alteration of weak chloritization. Copper mineralization: 422m to 423m chalcopyrite-pyrite veinlets(1mm65degrees).

425.10m～441.60m Grey, moderate grained, diorite. Alteration of weak chloritization. 425m to 427m, 2 mineralization veins. Chalcopyrite films(45degrees), epidote pyrite veins (10mm45degrees). At 430m, chalcopyrite films. 431m to 434m, 3 mineralization veins. Chalcopyrite films (40degrees), quartz pyrite veinlets (4mm 20 degrees). 436m to 439m, chalcopyrite films (2degrees, 20degrees), chalcopyrite dissemination (15cm). At 433m, pyrite veinlets (4mm10degrees).

441.60m～441.80m Dark grey andesite dyke.

441.80m～450.70m Grey, moderate grained, diorite(gabbroic). Alteration of weak chloritization. Copper mineralization: 433m to 451m, 11 mineralization veins. Chalcopyrite films(10degrees, 20degrees), pyrite veinlets (20 degrees), chalcopyrite veinlets(1mm10degrees, 2mm10degrees), network quartz veins (30cm), quartz pyrite veinlets(1mm, 20～30degrees).

450.70m～451.10m Grey, moderate grained, gabbroic diorite. Alteration of generally weak chloritization.

451.10m～451.40m Dark grey fine grained, gabbro.

451.40m～452.10m Grey, moderate grained, gabbroic diorite. Alteration of generally weak chloritization.

452.10m～453.60m Dark grey fine grained, gabbro.

453.60m～454 00m Grey, moderate grained, gabbroic diorite. Alteration of generally weak chloritization.

454.00m～469.25m Dark grey fine grained, gabbro. Copper mineralization: 457m to 459m, pyrite films and network films. At 458m, chalcopyrite films, quartz pyrite veinlets(3mm60degrees). 459m to 464m, 8 mineralization veins. pyrite-chalcopyrite veinlets(1mm30degrees), quartz chalcopyrite veinlets(2mm30degrees), quartz veinlets(1mm60degrees, 1mm20degrees), pyrite veinlets(1mm20degrees, 3mm30degrees). 464m to 466m, 2 mineralization veins. pyrite veinlets(1mm30degrees), chalcopyrite films. At 468m, chalcopyrite veinlets(2mm20degrees).

469.25m～494.90m Grey, moderate grained, gabbroic diorite. partly potassic feldspar alteration. Alteration of generally weak chloritization. Copper mineralization: generally weak chalcopyrite dissemination. 469m to 471m, network pyrite films. At 472m, pyrite films. 473m to 474m, spotted chalcopyrite(2mm to 1mm). 474m to 475m, 3 chalcopyrite films and chalcopyrite dissemination. 475m to 477m, 2 mineralization veins. chalcopyrite veinlets(1mm10degrees, 1mm60degrees), spotted chalcopyrite and chalcopyrite dissemination. 481.10m to 481.90m, network pyrite films. 481.90m to 282.30m, 4 chalcopyrite veinlets (1mm40degrees) and quartz pyrite-chalcopyrite veinlets(1mm20degrees to 10degrees). 482.20m to 282.30m, quartz pyrite veins (10mm40). Copper mineralization: at 482m, 3 quartz veins (1 to 2mm 10degrees). 486m to 491m, 10 mineralization veins. quartz pyrite veinlets(10 to 20mm 5 to30degrees) and pyrite dissemination, quartz chalcopyrite-sphalerite veinlets(80degrees), chalcopyrite-pyrite dissemination, pyrite films. At 493m, pyrite veinlets(1mm30degrees).

494.90m～497.90m Grey, moderate grained, diorite(weak chalcopyrite dissemination). Alteration of generally weak chloritization. At 497m, chalcopyrite dissemination.

497.90m～498.20m Grey, moderate grained, gabbroic diorite. Alteration of generally weak chloritization. Partly potassic feldspar alteration(weak chalcopyrite dissemination). 498m to 500m, copper mineralization: spotted chalcopyrite, quartz chalcopyrite veinlets(20degrees), chalcopyrite films, pyrite veinlets(30degrees).

498.20m～500.00m Light pinkish colored, granite porphyry (weak chalcopyrite dissemination). Alteration of generally weak chloritization.

500.00m～500.45m Grey, moderate grained, gabbroic diorite. Alteration of generally weak chloritization. Partly potassic feldspar alteration (weak chalcopyrite dissemination).

500.45m drilling stopped.

Alteration: Results of X-ray Diffraction Analysis of rock samples consisting of granodiorite, fine grained and diorite mainly detected alteration minerals of quartz, plagioclase (albite), potassic feldspar, hornblende, biotite, chlorite, sericite, calcite, and pyrite. The alteration minerals show mainly propylite alteration in mineral assemblage.

Mineralization: As the results of microscopic observation of granodiorite, fine grained and diorite, ore minerals consist mainly of pyrite, goethite, hematite, magnetite, chalcopyrite, chalcocite, sphalerite and molybdenite. Paragenesis of chalcopyrite and sphalerite can be observed in whole core. Alteration minerals observed were quartz, carbonate minerals, sericite, chlorite and epidote, and alteration is basically mineral assemblage of mainly quartz-sericite-chlorite including epidote and calcite.

Rock chemical analysis indicated that ore assay values ranged from less than Cu 0.007% to Cu0.678% with a copper average values of Cu 0.120%. Analytical values ranged from less than Pb 0.001% to Pb 20.005 %, Zn 0.004% to Zn0.132%. Maximum gold value is Au 1.27g/t in and maximum sulfur value is S 2.49%.

(iii) MJME-Z3

This hole is located at geophysical survey line J-14 point in Zuukhiin gol area. The drilling site was constructed on colluvial deposits. Geology in ground surface consists of Quaternary deposits, Permian granitic rocks and dykes.

Geology : The drilling cores consist mainly of Quaternary deposits from 0.00m to 3.90m and basement rocks under 3.90m. The basement rocks consist mainly of granitic rocks and dyke.

The core descriptions were annotated as indicated below. The drilling charts are found attached in Appendix 17. The results of rock chemical analysis of the drilling cores are also attached in Appendix 4. The drilling chart of MJME-Z3 and results of rock chemical analysis and alteration minerals are indicated in Fig. II-3-11.

0.00m～2.70m Topsoil, gravels. Brown silty sand to sandy silt.
2.70m～3.90m Brecciated gravel.
3.90m～18.60m Weathered granodiorite. Along the fractures, limonite films. Alteration of weathered alteration, weak argillized, weak chlorite, fractures having calcite clay.
18.60m～44.30m Granodiorite. Alteration of weak chloritization, partly epidotization, fractures having calcite clay. Copper mineralization : along the fractures, oxide iron and limonite veins. Fractures having oxide iron and limonite veins. At 29m, chalcopyrite veinlets(0degrees). 31m o 33m, 3 mineralization veins. pyrite films, pyrite veinlets. 35m to 36m, 2 mineralization veins. pyrite films. 40m to 44m, 3 mineralization veins. pyrite films, network pyrite films.
44.30m～47.10m Greenish grey, andesite dyke. Alteration of weak chloritization, partly epidotization.
47.10m～90.60m Granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization. Copper mineralization: at 50m, pyrite films. At 56m, pyrite veinlets. At 62m, pyrite films and dissemination. At 67m, pyrite films and dissemination. 73m to 75m, 2mineralization veins. pyrite veinlets (2mm30degrees), quartz chalcopyrite-pyrite veinlets(3mm20degrees). At 77m, network pyrite films. At 83m, quartz chalcopyrite veins (10mm40degrees, sericite silicification). At 87m, network pyrite films.
90.60m～90.65m Greenish grey, andesite dyke.
90.65m～111.70m Granodiorite. Alteration of weak chloritization, epidote veinlets, partly epidotization, along the fractures, chlorite veinlets. Copper mineralization: 99m to 102m, 8 mineralization veins. quartz chalcopyrite veins (10mm30degrees), chalcopyrite-pyrite veinlets(60degrees), 4 pyrite films, network pyrite films. 104m to 107m, 4 mineralization veins. quartz veins (2mm30degrees), host rock having pyrite dissemination and 3 pyrite veinlets.
111.70m～112.40m Fault (epidote chlorite in fault clay).
112.40m～201.20m Granodiorite. Alteration of weak chloritization, along the fractures, chlorite veinlets, along the fractures, light brown colored. At 116m, pyrite films (70degrees) and pyrite dissemination. 120m to 122m, 2 mineralization veins. 2 pyrite films and pyrite dissemination. 128m to 129m, 4 mineralization veins.

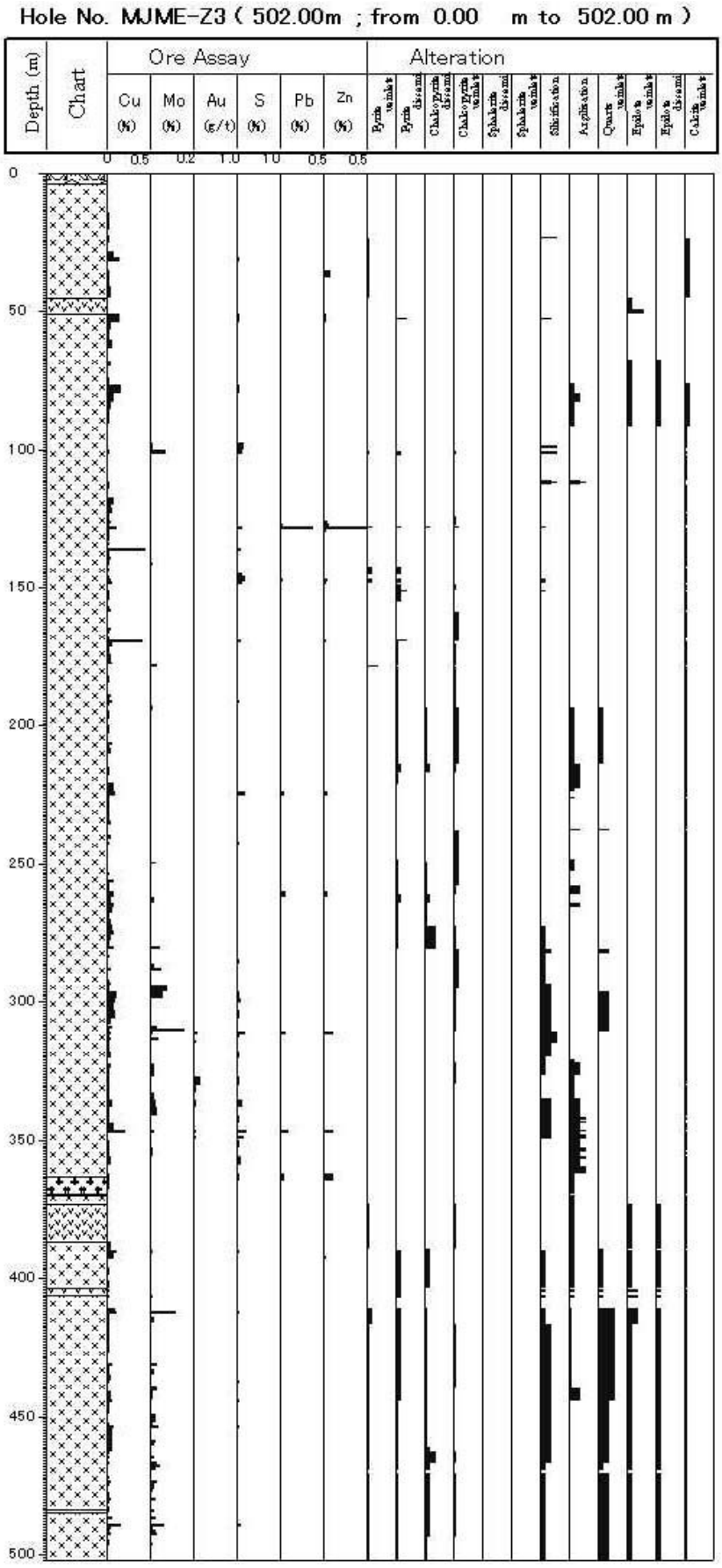


Fig. II-3-11 Mineralization and alteration on the geologic column of MJME-Z3.

	chalcopyrite-molybdenite veinlets(1mm30degrees), quartz chalcopyrite-molybdenite veinlets (80 degrees), network chalcopyrite films, molybdenite veinlets(90degrees). At 135m, pyrite veinlets. 143m to 146m, 4 mineralization veins. quartz pyrite veinlets(3mm45degrees, sericite silicification), 3 pyrite films(70degrees, 60degrees, 0degrees). 146m to 148m, 4 mineralization veins. 3 quartz pyrite veinlets (10mm5degrees, sericite silicification), pyrite veinlets(3mm45degrees). 150m to 153m, mineralization veins. silicified veinlets, pyrite dissemination, chalcopyrite-pyrite dissemination, pyrite dissemination. At 157m, network pyrite films. At 159m, pyrite films. 163m to 170m, 6 mineralization veins. chalcopyrite films(40degrees), chalcopyrite veinlets(3mm45degrees), chalcopyrite lenticular and dissemination. 173m to 174m, network pyrite films. 175m to 177m, 3 pyrite films and calcite veinlets. 178m to 180m, 2 mineralization veins. pyrite-chalcopyrite-molybdenite veinlets(1mm40degrees), network pyrite films. 182m to 183m, 3 calcite veinlets(1mm～4mm, 30degrees to 45degrees). At 186m, chalcopyrite veinlets(1mm20degrees). 188m to 190m, network pyrite films and veinlets(1mm～3mm, 0degrees), pyrite-chalcopyrite films (2 to 5degrees). 190m to 192m, calcite veins (40 to 10mm 10 degrees). 192m to 192m, chalcopyrite veinlets(10degrees). 193m to 199m, 60 network calcite veinlets and films(10degrees to 60degrees). 199m to 201m, 2 mineralization veins. chalcopyrite films (45 degrees), pyrite veinlets(2mm0degrees).
201.20m～243.50m	Granodiorite. Alteration of weak chloritization, along the fractures, chlorite veinlets, calcite veinlets, along the fractures, partly pinkish brown colored. 203m to 204m, network calcite veins. At 216m, calcite chlorite veins. Copper mineralization: chalcopyrite films and veinlets from 90m to 193m, at 195m and 200m, 205m to 208m, chalcopyrite films and veinlets. At 206m and 206m, 207m to 209m. very weak chalcopyrite dissemination under 190m. at 223m, calcite veinlets(2mm30degrees). At 225m, pyrite argillized veins (5mm30degrees). At 226m, pyrite veinlets(10degrees). 230m to 232m, 3 pyrite films(10degrees, 30degrees, 70degrees). At 235m, pyrite films(40degrees). 240m to 242m, 2 pyrite films (5degrees). 242m to 244m, 3 mineralization veins. pyrite films(0 to 5degrees), pyrite veinlets (1 mm 50degrees), quartz chalcopyrite-pyrite veinlets(2mm0 to 5degrees).
243.50m～274.20m	Granodiorite(very weak chalcopyrite dissemination). Alteration of weak chloritization, along the fractures, chlorite veinlets, calcite veinlets, along the fractures, partly pinkish brown colored and epidote veinlets. Copper mineralization : at 246m, chalcopyrite films. 247m to 248m, chalcopyrite-pyrite films. 248m to 250m, network pyrite films. 253.30m to 257m, 10 mineralization veins. chalcopyrite films(70degrees, 80degrees, 5degrees), pyrite veinlets(3mm45degrees), silicification veins (4cm sericite silicification). At 261m, pyrite-chalcopyrite veinlets(1mm45degrees). At 264m, pyrite- chalcopyrite veinlets(2degrees). At 268m, 3 mineralization veins. quartz pyrite veinlets(40degrees), pyrite veinlets(80degrees). 271m to 278m, 3 mineralization veins. pyrite veinlets(2degrees), network pyrite films, spotted chalcopyrite dissemination.
274.20m～284.10m	Greenish grey, granodiorite(very weak chalcopyrite dissemination). Alteration of weak silicification, chloritization, along the fractures, chlorite veinlets, calcite veinlets. copper mineralization : 271m to 274m, 3 mineralization veins. pyrite veinlets(2degrees), network pyrite films, spotted chalcopyrite dissemination. 275m to 278m, 20 mineralization veins. network pyrite films(70degrees), pyrite-chalcopyrite films. 280m to 284m, 30 mineralization veins. 2 chalcopyrite veins (2 to 3mm10degrees) and chalcopyrite dissemination, network pyrite-chalcopyrite films(20), quartz veins (4mm30degrees).
284.10m～293.80m	Greenish grey, granodiorite. Alteration of weak silicification, chloritization. along the fractures, chlorite veinlets, calcite veinlets. Copper mineralization: 294m to 294m, 14 mineralization veins. pyrite-chalcopyrite films(30degrees, 20degrees), quartz pyrite-chalcopyrite veinlets(4mm20degrees, 2mm20degrees), 5 quartz pyrite veins (15mm20degrees, 5mm20degrees, 4mm30degrees), chalcopyrite films(0degrees), network pyrite films.
293.80m～340.70m	Greenish grey, granodiorite. Alteration of weak silicification, chloritization, quartz veins , along the fractures, chlorite veinlets, calcite veinlets. Copper mineralization: 294m to 295m, 5 mineralization veins. quartz chalcopyrite veinlets(70degrees, sericite silicification and chalcopyrite dissemination), chalcopyrite-sphalerite veinlets(70degrees), quartz chalcopyrite veinlets(sericite silicification and chalcopyrite dissemination). 298m to 300mm, quartz chalcopyrite veinlets(5mm70degrees, sericite silicification and chalcopyrite dissemination), quartz chalcopyrite veinlets(10mm70degrees, sericite silicification and chalcopyrite dissemination(1mm to 2mmgrains)). 301m to 304m, 4 mineralization veins. Chalcopyrite veinlets(3mm50degrees), chalcopyrite dissemination(40cm, 1 to 2mm chalcopyrite grains), pyrite veinlets(1 to 2mm), chalcopyrite dissemination(1 to 2mm chalcopyrite grains). 304m to 306m, 4 mineralization veins. Chalcopyrite veinlets (2mm70degrees, 20degrees, chalcopyrite dissemination), pyrite veinlets(2mm5degrees), pyrite-chalcopyrite veinlets (2mm5degrees). 311m to 315m, quartz chalcopyrite veinlets and quartz pyrite-molybdenite veins (5mm to 20mm, 30degrees to 70degrees, chlorite-sericite silicification), network quartz pyrite veinlets. At 318m, quartz chalcopyrite veins (10mm45degrees, chalcopyrite dissemination). At 321m, quartz pyrite-molybdenite veins (5mm 20degrees). At 324m, chalcopyrite dissemination(40cm). At 328m, chalcopyrite-pyrite dissemination (30cm). At 331m, pyrite veinlets(0degrees). At 333m, chalcopyrite-pyrite dissemination. At 337m, quartz veins (15mm30degrees, sericite silicification). At 338m, quartz veins (7mm30degrees).
340.70m～363.30m	Greenish grey, granodiorite (argillized, chloritization, partly silicification). Sericite silicification zone: 341.10m to 341.30m, 342.00m to 342.60m, 343.60m to 344.00m, 346.70m to 347.10m, 348.00m to 349.70m, 352.80m to 352.90m, 353.95m to 354.10m, 355m to 357m, 359.50m to 362.20m. Copper

	mineralization : 346m to 347m, quartz pyrite veinlets1mm20degrees, 10mm20degrees).
363.00m～369.50m	Greenish grey, fine grained, diorite(chloritization, partly silicification).
369.50m～370.10m	Greenish grey, andesite to micro diorite dyke.
370.10m～373.10m	Light pinkish brown granodiorite(potassic feldspar alteration, epidote along the fractures).
373.10m～386.80m	Greenish grey, andesite to micro diorite dyke.
386.80m～389.30m	Light pinkish colored, granodiorite (partly potassic feldspar alteration, epidote along the fractures).
389.30m～389.70m	Fractured, light pinkish colored, granodiorite .
389.70m～403.60m	Light greenish grey, granodiorite(chloritization, partly potassic feldspar alteration, epidote). Copper mineralization: at 402m, chalcopyrite films(1mm10degrees).
403.60m～404.10m	Greenish grey, andesite dyke(weak chloritization).
404.10m～405.10m	Light greenish grey, granodiorite(chloritization, silicification, partly potassic feldspar alteration, irregular quartz feldspar veins).
405.10m～406.00m	Greenish grey, andesite dyke(weak chloritization).
406.00m～407.30m	Light greenish grey, granodiorite(chloritization, silicification, partly potassic feldspar alteration, irregular quartz feldspar veins , pyrite dissemination).
407.30m～410.80m	Greenish grey, andesite dyke(weak chloritization).
410.80m～419.40m	Light greenish grey, granodiorite(chloritization, silicification, partly potassic feldspar alteration, irregular quartz feldspar veins , pyrite dissemination). Copper mineralization: at 413m lenticular and spotted chalcopyrite-pyrite-molybdenite. At 415m, pyrite dissemination(sericite silicification). At 416m, spotted chalcopyrite dissemination.
419.40m～462.90m	Light greenish grey, granodiorite. Including irregular quartz veins, silicification, chloritization, epidotization, partly potassic feldspar alteration. Copper mineralization: 419.40m to 462.90m, weak pyrite dissemination, weak chalcopyrite dissemination(partly spotted granular chalcopyrite), few pyrite veinlets.
462.90m～502.00m	Greenish grey, granodiorite. Including irregular quartz veins. silicification, chloritization, epidotization, partly potassic feldspar alteration. Generally very weak chalcopyrite dissemination and pyrite dissemination. Copper mineralization: 461m to 478m, chalcopyrite dissemination. 466m to 468m, chalcopyrite-pyrite-sphalerite dissemination, chalcopyrite-pyrite veinlets(90degrees), partly quartz veins having chalcopyrite-sphalerite minerals grains. 480m to 482m, chalcopyrite-pyrite dissemination, partly quartz veins having chalcopyrite minerals grains. 493m to 502m, weak pyrite dissemination.
502.00m	drilling stopped.

Alteration： X-ray diffraction analysis of granodiorite and fine grained diorite were detected mainly in alteration minerals of quartz, plagioclase (albite), potassic feldspar, hornblende, biotite, chlorite-sericite, calcite, dolomite and pyrite and rarely of talc, laumontite. Dolomite mineral was detected at a depth of deeper than 420m. The alteration mineral shows mineral assemblage of mainly propylite alteration.

Mineralization: According to the results of microscopic observations in granodiorite, ore minerals detected were pyrite, goethite, magnetite, chalcopyrite and sphalerite. Paragenesis of chalcopyrite and sphalerite was shown in the whole cores. Alteration mineral consists mainly of quartz, carbonate minerals, sericite and chlorite, and rarely of epidote. Alteration is mainly a mineral assemblage of sericite -chlorite.

Rock chemical analysis indicated that ore assay values were from less than Cu 0.005% to Cu 0.455%, and with a copper average value of Cu 0.039%. Other assay values were from less than Pb 0.01% to Pb 0.375% and Zn 0.003% to Zn in range. Gold value is Au 0.07g/t and Sulfur is S 2.39%.

(iv) Discussion

As a result of drilling survey on the top of Sharchuluut Mountain in Zuukhiin gol, geologic sections for each of the drill holes MJME-Z1, MJME-Z2 and MJME-Z3 are shown in Fig. II-3-12.

MJME-Z2 hole core consists of granodiorite, diorite and fine grain diorite belonging to Selenge Complex and dykes of pegmatitic syenite, fine grain granodiorite and andesite. Many chalcopyrite veinlets

and dissemination occurred in whole cores. Fault zones were observed at 320m and 330m in MJME－M2 hole. Mineralization and alteration were generally weak, and sericite-chlorite mineral assemblage and mainly propylite alteration. The hydrothermal activity is approximately neutrality to acidic alteration. Mineralization consists mainly of chalcopyrite including pyrite and is formed porphyry type copper ore deposits type. Homogeneous temperatures of fluid inclusions in quartz veins were 167℃ to 197℃ in MJME-Z1 core, 187℃ to 267℃ in MJME-Z2 core and 160℃ to 237℃ in MJME-Z3. The temperatures show a tendency to increase toward MJME-Z2. On the other hand, salinities were ranging from 1.2‰ to 12.0‰ in MJME-Z1 cores, 1.3‰ to 10.1‰ in MJME-Z2 cores and 1.9‰ to 2.9‰ in MJME-Z3 cores. The salinities show a tendency to increase toward western side.

The drilling survey in the Zuukhiin gol area results shows that mineralization is porphyry copper type ore deposits.

For future exploration works, it is recommended to clarify the expansion of copper mineralization toward southwestern area including its geological and mineralogical features.

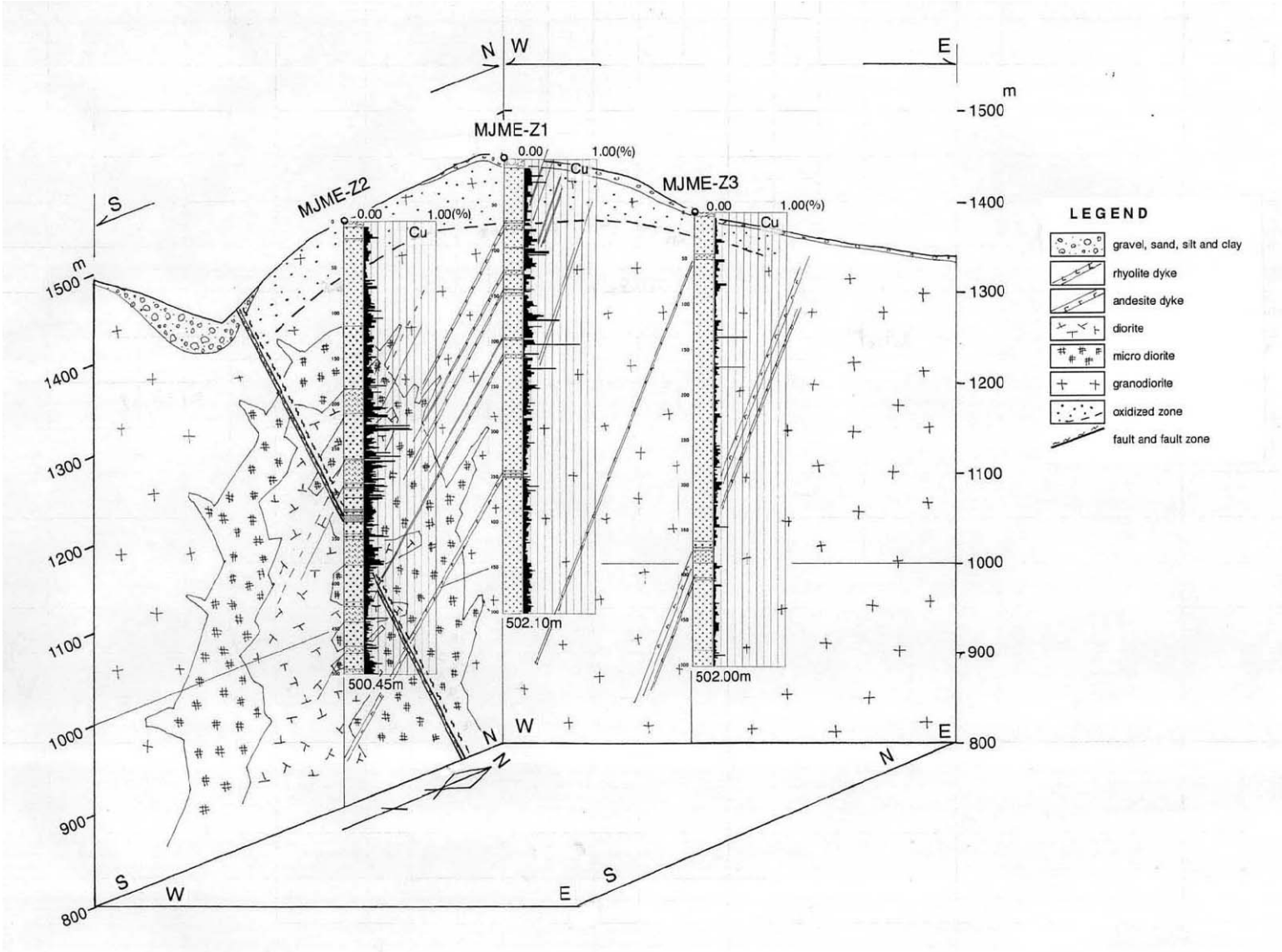


Fig. II-3-12 Location of drilling sites of MJME-Z1, MJME-Z2 and MJME-Z3 on the topographic map of the Zuukhiin gol area

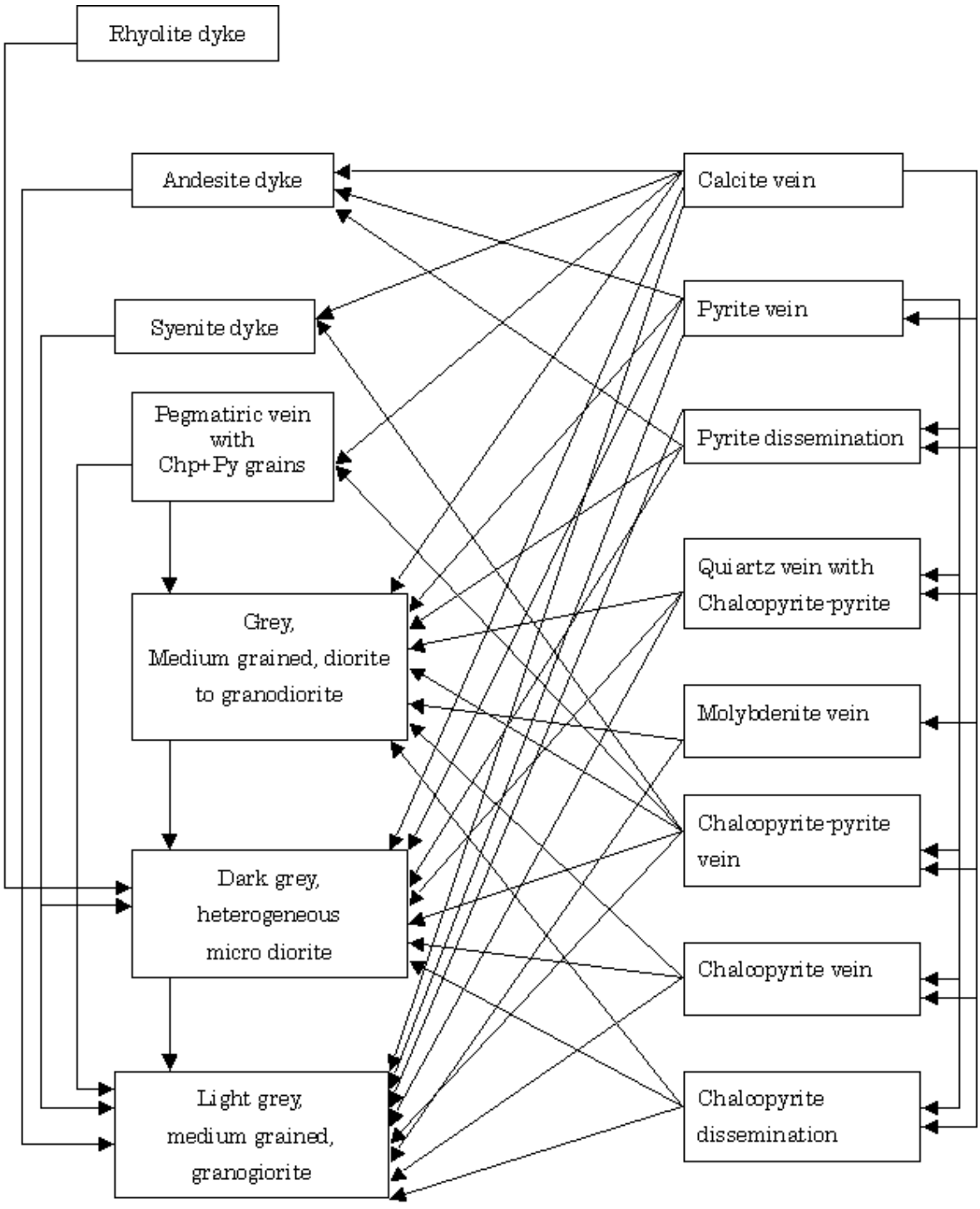


Fig. II-3-13 Igneous activity and mineralization of MJME-Z2 in Zuukhiin gol area

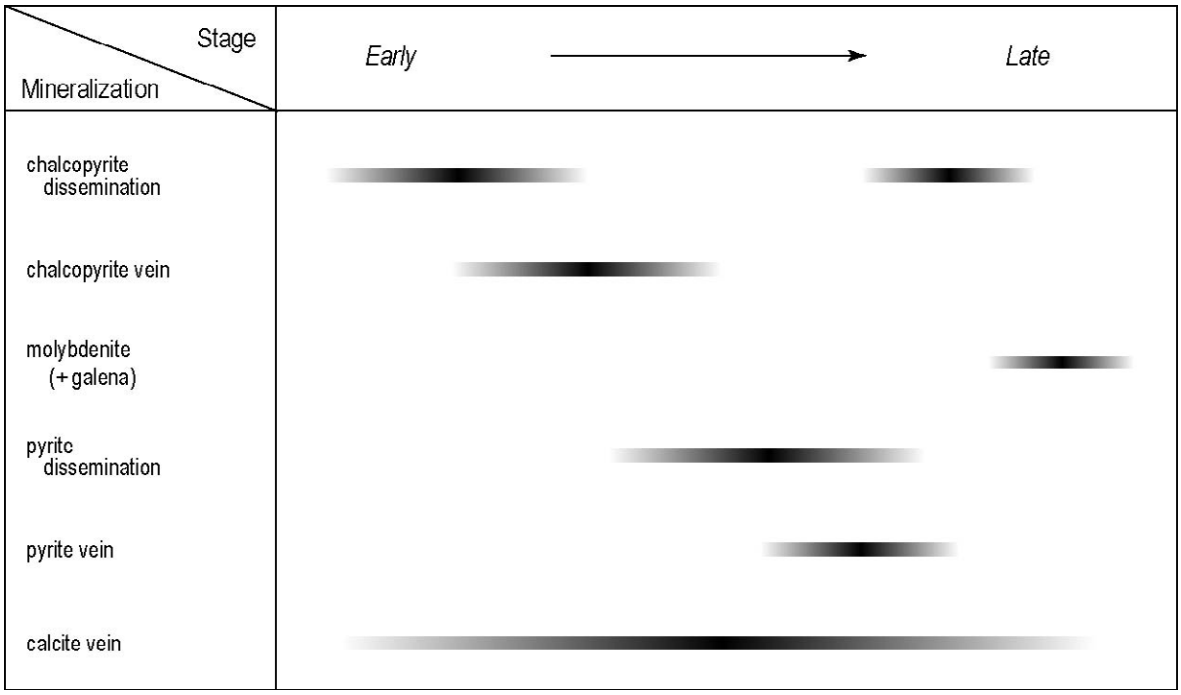


Fig. II-3-14 Mineralization stage in Zuukhiin gol area.