

PART III CONCLUSIONS AND RECOMMENDATIONS

CHAPTER 1 CONCLUSIONS

Based on the results obtained during the surveys carried out in the first phase of the Cooperative Mineral Exploration in the Western Erdenet area, the following conclusions are summarized:

1-1 Conclusion of the Geophysical Survey

As the results of airborne magnetic and radiometric surveys at the Western Erdenet area, in Area-1 it is detected an elongated magnetic lineament along NW-SE direction from the southeast corner to the center of the area with slight bending but showing a further westward continuation

This low magnetic zone, where Erdenet mine is located, are probably due to the results of demagnetization during the alteration process.

A tectonic line detected on the south part of Area-1 along an ENE-WSW seems to intersect the basement rocks and younger sedimentary basins. It is inferred that this tectonic ENE-WSW line controls the Western Erdenet area.

High Potassium anomalies are seen distributed along the same trend as the magnetic NW-SE trend in Area-1. Most of the strong potassium signatures are detected in the open pit of Erdenet mine. This NW-SE trend spreads through the westward and continues to Khujiriin Gol area.

From the interpretation of the aeromagnetic and radiometric data, most prospective zones were extracted. This zone includes a NW-SE magnetic lineament that continues westward in Area-1 and likely to be related to mineralization with potassium high signature zones.

1-2 Conclusion of the Geological Survey

The results of the geological survey and the existing data compilation indicate that the characteristics of the porphyry copper type mineralization and the chemical element behavior accompanied with mineralization were clarified in each of the areas as shown in Table I-5-1.

(1) Zuukhiin gol area

As the results of the geological survey (Fig. II-2-11), the alteration in the mineralized zone of the area is composed of sericite-chlorite type and chlorite type and indicated propylitic alteration. Especially, the central part of the Zuukhiin gol mineralized zone in the trench presents an alteration of sericite-chlorite type. The alteration related to the mineralization presents the same alteration mineral assemblage as the Erdenet mine area. The results of rock chemical analysis indicated that values of more than Cu 50 ppm with Cu 11,740 ppm in maximum are concentrated in the central part of the Zuukhiin gol mineralized zone and that the factor 2 scores of more than 0.5 related to the chemical

activity of the porphyry copper type mineralization were also distributed in the mineralized zone.

High potential for porphyry type Cu-Mo mineralization is inferred to exist in the area. According to the previous survey data, it is inferred that the mineralization is extended up to 300 m in depth. As a further survey work, it is considered that the IP geophysical survey should be conducted in the mineralized zone in order to clarify the scale of the mineralization. If the results of the survey are promising, it is considered that drilling survey should be conducted in geophysical anomalous zones.

The previous mineral exploration work was abandoned because of the low ore grade. At the present time, the technology of SX-EW method exists. If the oxide ores with more than Cu 0.3 % are distributed and concentrated in the area, the mining development may become feasible.

(2) Mogoin gol/Khujiriin gol area

The Mogoin gol mineralized zones and the Khujiriin gol mineralized zone exist in the Mogoin gol/Khujiriin gol area.

As the results of the geological survey in the Mogoin gol area, the alteration mineral assemblages of quartz-sericite-(K-feldspar)-(kaolinite), quartz-pyrophyllite-kaolinite, quartz-andalusite and quartz-andalusite-sericite are confirmed in the strong altered zone and the alteration mineral assemblages of sericite-(smectite), sericite-chlorite-(smectite) and chlorite are confirmed around the strong altered zone. These alteration mineral assemblages are generally observed in the epithermal and acidic alteration zone under high sulfidation system. The alteration zone is generally developed in the upper part of alteration system of the porphyry Cu/Au type mineralization. The results of the rock geochemistry indicate that the leached zones of elements exist in the alteration zone. However, since factor 2 scores with more than 0.5 are not distributed in the zone, it is considered that the porphyry copper type mineralization may not exist in the deeper part of the Mogoin gol area.

According to the results of the geological survey in the Khujiriin gol area, the alteration mineral assemblage of sericite-(smectite) type, sericite-chlorite-(smectite) type and chlorite type are distributed in the area. The distribution of the alteration mineral assemblages is same as the Erdenet mine area. As the results of the rock chemistry, the high copper vales of more than Cu 50 ppm and Cu 5,5072 ppm in maximum is concentrated in the center of the Khujiriin gol mineralization zone. The factor 2 scores of more than 0.5 are also concentrated in the central part of the Khujiriin gol mineralization zone. The ore samples with copper oxides show the high vale of Cu 11.13 %, Pb 5.78 %, Zn 2.64 %, Mo 0.269 % and Ag 221 ppm in maximum. Mineralization type of the Khujiriin gol mineralization zone may be not only the porphyry copper type mineralization but also the poly-metallic mineralization. The results from fluid inclusion presented an average temperature of 244.2 °C to 289.0 °C and salinity of 3.0 % to 4.0%. The temperature shows the low temperature of porphyry copper type mineralization system that indicates epithermal mineralization.

Consequently, it is considered that not only the porphyry copper type mineralization but also the poly-metallic mineralization may be occurred in the Khujiriin gol mineralization zone. The potential

is thought to be high. It is considered that a detailed geological survey and geophysical IP survey should be conducted in the Khujiriin gol mineralization zone. If the survey results are promising, it is considered that drilling survey should be conducted in the zone in order to further clarify the geology and mineralogy.

(3) Tsagaan Chuluut area

At the results of the geological survey, the Permian to Triassic granodiorite of Selenge complex is distributed in and around the Tsagaan Chuluut mountain and Triassic to Jurassic volcanic rocks cover the granodiorite.

The alteration mineral assemblage of quartz-(jarosite)-(kaolinite) type and quartz-alunite-(pyrophyllite)-(kaolinite) type is distributed in the white argillized and silicified zone in and around the Tsagaan Chuluut mountain. The alteration zone belongs to the advanced argillic alteration zone of the porphyry Cu/Au type alteration system. The expected porphyry Cu-Mo mineralization is thought to exist in the deeper part from the ground surface.

The previous geophysical survey results indicated that the white argillized and silicified zone is located in the magnetic anomaly and the IP anomaly.

It is considered the possibility that the porphyry type Cu-Mo mineralization may exist in the deeper part from the ground surface.

(4) Erdenet mine area

In the Erdenet mine area, the Erdenet NW ore deposit, the Erdenet Central ore deposit, the Erdenet Intermediate ore deposit and the Erdenet SE ore deposit are distributed. The feasibility study of the three ore deposits had already been carried out. At present, the Erdenet NW ore deposit has only been operated by open-pit methods.

In Erdenet NW ore deposit, the calculated ore reserves in 1999 was 1,400,000,000 t (Cu: 7,000,000 t, Mo: 200,000 t), the operation is feasible for 35 years. The secondary enriched sulphide is continued to 400 m from the surface. The oxidized zone is distributed from 100m to 300m from surface. The existence of primary ore was confirmed by drilling holes of 1,000 m in depth. At present, the open-pit have been mined up to 1.325 m in sea level and 8 levels.

In the Erdenet Central ore deposit, the ore reserve is confirmed to be 1,250,000 t (Cu: 0.43 %, Mo: 0.018 %) by the feasibility study. The results of the rock geochemistry indicate that the analytical vales are Cu 608 ppm, Pb 58 ppm, Zn 55 ppm, Au 32 ppb, Ag 7.7 ppm and Mo 101 ppm.

In the Erdenet Intermediate ore deposit, the analytical vales are Cu 67.777 to 185 ppm, Pb 126 to 638 ppm, Zn 71 to 689 ppm, Au 2 to 10 ppb, Ag 1.1 to 10.1 ppm and Mo 3 to 188 ppm.

In the Erdenet SE (Oyut) ore deposit, the ore reserve is confirmed to be 41,890,000 t (Cu: 0.40 %, Mo: 0.007 %) by the feasibility study.

The previous geophysical survey in the Erdenet Mine area indicate that Erdenet NW ore deposit

is located in lowest magnetic zone, in a typical highest chargeability and in a relatively lower resistivity zone.

(5) Danbatseren area

The alteration mineral assemblage of quartz-jarosite-kaolinite type is observed in the white argillized and silicified zone. The mineral assemblage shows the deeper part of the litho-cap and the path of the hydrothermal water with high temperature. The previous geochemical exploration could not be detected the geochemical anomaly. The previous geophysical anomalies was detected the high chargeability zone and was small in scale.

Porphyry copper mineralization may have occurred in the area, however, the scale of the mineralization is so small that the mineral potential appears to be low in the area.

(6) Undrakh area

The mineralized zone in the Undrak area is controlled by the porphyry type copper mineralization. But the scale of the mineralization is small and the intensity of alteration also is weak. The analytical ore assay grade is Cu 0.011% and very low. The previous geophysical survey did not indicate any geophysical anomaly.

Consequently, it is considered that the mineral potential in the Undrak area is very low.

(7) Tsookher mert area

As the results of the geological survey, the scale of the Tsookher mert mineral showing is 1.5m in width and 700 m in EW length. The ore assay grade is Au1.49g/t, Ag538g/t, Cu0.247%, Pb6.737%, Zn0.682% and Bi0.017% in maximum. The rock geochemical vales are widely ranging and low.

The scale of the Hatan hoshuu mineal showing is 50m times 50m and small. The ore grade shows vales of Cu0.006%, Pb0.005% and Zn0.004%.

In the two mineral showings, the ore assay grades are widely changing. And the scale of the mineralization was also very small. Consequently, further survey work is recommended to be conducted for the mineralized zone in this area.

1-3 Summary of the Survey

From the interpretation of the aeromagnetic and radiometric data, most prospective zones were extracted. This zone includes a NW-SE magnetic lineament that continues westward in Area-1 and likely to be related to mineralization with potassium high signature zones. This low magnetic zone, where Erdenet mine is located, are probably due to the results of demagnetization during the alteration process.

High potential areas for porphyry Cu-Mo mineralization as same as the Erdenet Mine ore deposits

(Fig. I-5-1 and 2) were extracted as follows:

(1) First priority potential area selected from airborne geophysical survey and geological survey

Three areas were extracted as follows:

- a) Southeastern Erdenet area including the Erdenet mine area
- b) Western mineralized zone including Khujiriin gol mineral showing in the Mogoin gol/
Khujiriin gol area.
- c) Central mineralized zone in the Zuukhiin gol area

(2) Second priority potential area

Second potential area presents advanced argillic alteration zone related to porphyry Co-Mo mineralization in the deeper part from the ground surface. The extracted area is as follow:

- 1) Tsagaan Chuluut mountain area with advanced argillic alteration

CHAPTER 2 RECOMMENDATIONS FOR PHASE II SURVEY

The following surveys are recommended for the first priority potential area, the second priority potential area and the areas selected by airborne geophysical in the Western Erdenet area during the Phase II survey.

- (1) The Zuukhiin gol mineralized zone and the Zuukhiin gol mineral showing are selected for the first priority potential area, where porphyry Co-Mo mineralization are expected near the ground surface. It is recommended to conduct detailed geological survey and geophysical IP survey in the two areas. According to the their results, it is recommended that drilling survey should be conducted in order to further clarify the geology and mineralization in the area.

- (2) It is also recommended to conduct reconnaissance and semi-detailed geological survey as Phase I survey in the Southeastern Erdenet area and Khujiriin gol area (Fig.I-5-2) selected by the results of the airborne geophysical survey.