

PART I GENERALITIES

CHAPTER 1 INTRODUCTION

In accordance with the Scope of Work signed on 18th May 2001 between the Government of the Mongolia and the Government of Japan, a mineral exploration project of three years duration from 2001 was carried out in the Western Erdenet area. This year program corresponds to the third phase of the project.

1-1 Background and Objectives

The purpose of this survey is to find new ore deposits in Mongolia by clarifying the geology and mineral potential of the Western Erdenet area (Fig.1). The purpose of the project also includes the transfer of technical knowledge to our Mongolian counterpart.

1-2 Survey results and recommendations for Phase II survey program

During this phase, geological survey, IP geophysical survey and drilling survey were conducted in the Erdenet SE area, the Under/Shand area and the Mogoin gol area within the project area that covered an extension of 5, 500 km². The results of the survey can be summarized as follow:

(1) Mogoin gol area

White silicified zones are distributed in the northern and southern parts of the Mogoin gol area. The area is located in the crossing point of the east-west fault zone and the NW-SE fault zone. Diorite with radiometric age of 208 Ma and rhyolite porphyry with radiometric age of 210 Ma present a chemical nature of adakitic rock and with radiometric ages that are close and similar to the radiometric ages (190Ma to 210 Ma) of sericite that occurred in the Erdenet mine. Size of the north silicified zone is about 1.2 km from north to south and 2km from east to west. The mineral assemblages of hydrothermal alteration are represented by the quartz-sericite type in the central part as well as the sericite-chlorite type and the chlorite type in the surrounding area. The alteration indicates some alteration zoning similar to the hydrothermal alteration model of Erdenet mine. The central part of the southern silicified zone consists of quartz-sericite type alteration including biotite, topaz and andalusite. The alteration zoning could not be confirmed in the zone. In general, the alteration minerals can be confirmed by a high-sulfidation system related to acid hydrothermal alteration that is generally developed in the upper part of the porphyry copper ore deposits system. Regarding the geochemical results, maximum values of ore assay are Cu: 0.026%, Mo:0.001%, Pb: 0.021%, Zn: 0.004% and FeO₂: 12.72%. Factor scores of factor 5 (Hg-Cu) appeared as high in the north silicified zone and the south silicified zone.

Regarding the geophysical results, by the aeromagnetic survey it was found that the size of the low magnetic intensity is large. By the IP geophysical survey results it was found that low resistivity, high

chargeability and high metal factor are distributed within a large and wide scale and overlapped in the center of the Sharchuluut Mountain.

Based on the results of the geological and geophysical surveys conducted in the zone, drilling of MJME-M1 hole (501.80m in depth) and MJME-M2 hole (500.20m in depth) detected the surrounding mineralization of polymetallic type and porphyry copper type mineralizations including ore minerals of pyrite, chalcopyrite, sphalerite and galena.

(2) Under/Shand area

Within the Under/Shand area, a clear IP anomaly was detected on the Shand mineral showing in the Under/Shand_3 area. The Shand mineral showing, located at the cross point of the NS lineament and the NW-SE lineament, represents a blind deposit covered by Quaternary deposits. Alteration indicates a sericite-chlorite type that is part of alterations related to the formation of the porphyry copper deposit. IP anomaly was detected in the showing within a small-scale low resistivity/high chargeability zone in the area. However, the drilling survey of 17 holes conducted in the mineral showing did not detect any mineralization. On the other hand, high ore assay values including copper content were confirmed in the medium grained granodiorite with potassium alteration in the northwest outside of the Under/Shand_3 area. In the central eastern part of the Under/Shand area, white silicified zone accompanied by pyrite dissemination was confirmed.

According to these results, no further work was recommended in the Under/Shand mineral showings.

(3) Erdenet SE area

A white silicified zone was confirmed in the northeastern part of the Erdenet SE area. However, the IP geophysical survey did not detect any clear IP anomaly. The K-Ar dating indicated that the granodiorite of Selenge complex shows a radiometric age of 196 Ma. Rock chemistry indicated that the diorite in the area presents an adakitic rock nature similar as the granodiorite porphyry in Erdenet mine area. It is thought that the low magnetic anomaly detected last year in the Erdenet SE area was due to the intrusion of adakitic diorite rocks. Since no IP effect was detected in the area, there exists a low possibility that the igneous rocks are related to the existing mineralization in the area. Due to these results, no further exploration work was recommended in the area.

(4) Recommendation for Phase II

According to survey results of Phase II, the following survey programs were recommended:

- (a) The north silicified zone of the Mogoin gol area and the drilling survey was recommended for further exploration. If the results detect good mineralization, TDIP geophysical survey was recommended in the extended area toward east in order to clarify mineralization, geology and

related IP anomalies in total. Soil chemistry exploration was recommended for the phase III survey area in order to clarify the geochemical features related to porphyry copper mineralization such as Erdenet ore deposits.

(b) In phase I survey, a low magnetic anomaly was detected in the Zuukhin gol area. The crossing point of NW-SE fault zone and NE-SW fault zone is located in the area. The alteration in the central area of the area represents sericite-chlorite type alteration as some alteration similar to the Erdenet mine area. Assay results showed that copper values are more than Cu: 50 ppm and Cu: 11.740 ppm in maximum. The factor related to chemical activity of porphyry copper-molybdenum ore deposit was detected in the area as a high factor score. The mineralization continues down to more than 300 m in depth. The existing data indicated that exploration in the area was abandoned because of low ore assay estimated by drilling survey. However, as EX-EW method can be used, if oxide ores of more than Co: 0.3% are concentrated in the area; there is possibility of development of mine. The re-assessment for the deeper part of the area was expected to be estimated by the results of the geological, geochemical, geophysical and drilling surveys.

(c) According to Phase I and Phase II surveys, it was inferred that that the porphyry copper type mineralization such as Erdenet mine ore deposit is related to the adakitic igneous rock and it is located within the low magnetic anomaly of the high magnetic zone detected by the airborne survey.

For the other surveyed areas during Phase II, the following programs were recommended: 1) Reinterpretation of the results by comparing the airborne survey results and the existing geological maps, 2) Re-selecting the high potential areas from the project area, 3) Conducting geological survey and geophysical survey in the selected areas including the Khujiriin gol area and 4) Conducting drilling survey in the high anomalous zones

1-3 Coverage and Outline of Phase III

Phase III survey program included the activities of geological, geophysical and drilling surveys. The amounts of work realized in this phase are summarized in Table I-1-1, while the laboratory studies are shown Table I-1-2.

Table I-1-1 Contents and amount of works

| Contents and amount of works | | | | Amount of work |
|--|-------------------|---------------------|-------------|---|
| Geological survey Khujiriin gol area (39 km ²), Khujiriin gol north area (3 km ²), Mogoin gol central area (3km ²), Zuukhiin gol area(16 km ²), Danbatseren east area (46km ²) and Tsagaan chuluut west area (23 km ²) | | | | Total area: 133 km ² |
| Geophysical survey (TDIP) Khujiriin gol area(39 km ²), Zuukhiin gol area(16 km ²), Danbatseren east area (46 km ²) and Tsagaan chuluut west area (23 km ²) | | | | Total area: 130 km ² Line length: 70.4 km |
| Drilling survey | | | | |
| | Hole Name | Direction | Inclination | Drilling length |
| Mogoin gol area | MJME-M3 | - | 90° | 501.00m |
| | MJME-M4 | - | 90° | 501.30m |
| Zuukhiin gol area | MJME-Z1 | - | 90° | 502.10m |
| | MJME-Z2 | - | 90° | 500.45m |
| | MJME-Z3 | - | 90° | 502.00m |
| Additional work | Road Construction | 8.2km (4m in width) | | |

Table I-1-2. Laboratory works

| Survey Contents | Laboratory work | Amount number |
|---|--|---------------|
| Geological survey | Soil chemical analysis Au, Ag, As, Cu, Mo, Pb, Zn, S, Hg, Fe | 599 samples |
| | Rock chemical analysis Au, Ag, As, Cu, Mo, Pb, Zn, S, Hg, Fe | 91 samples |
| Geophysical Survey | Resistivity and chargeability | 93 samples |
| Drilling survey | Thin section | 42 samples |
| | Polished thin section | 42 samples |
| | X-ray diffraction analysis (in 20m interval) | 117 samples |
| | Chemical analysis for ore (10 elements) Au, Ag, As, Cu, Mo, Pb, Zn, S, Hg, Fe | 1300 samples |
| | Fluid inclusion | 19 samples |
| | Resistivity and chargeability | 25 samples |
| | Remanent magnetization | 7 samples |
| | K-Ar dating | 7 samples |
| $\delta^{18}\text{O}$ - δD analysis | 6 samples | |
| Re-Os dating | 1 samples | |

1-4 Survey Members of the Project

The members who participated during this phase are as follows:

Table I-1-3 Member of field survey of the project.

| Japanese survey team | | Mongolian survey team | |
|----------------------|-------------|-----------------------|------------------------|
| Motomu Goto | Team leader | Dambiisuren Bold | Project manager (MRAM) |
| | Geologist | Chuluunbat Ganbat | Geologist (MRAM) |
| Susumu Endo | Geologist | Shiiter Battovshin | Geologist (MRAM) |
| Masaru Fujita | Geologist | Lkhamsranjav Gantumur | Geophysicist (MRAM) |

1-5 Survey Period

Periods of the field survey in this phase are as follows:

Geological survey: 14th June 2003 to 19th July 2003

Geophysical survey: 14th June 2003 to 16th August 2003

Drilling survey: 14th June 2003 to 24th November 2003