

**REPORT
ON
GEOLOGICAL SURVEY
IN
THE CENTRAL NORTH AREA
MONGOLIA**

FINAL REPORT

MARCH 2001

**JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN**

PREFACE

In response to the request of the Mineral Resources Authority of Mongolia, Ministry of Trade and Industry, Mongolian, the Japanese Government decided to conduct mineral exploration including satellite image analyses and geological surveys to identify the possibility of existence of nonferrous metallic mineral resources in the north central area and entrusted the survey to Japanese International Cooperation Agency (JICA). In view of the fact that professional fields of geology and mineral resources would be involved in the survey, JICA appointed Metal Mining Agency of Japan (MMAJ) to be engaged in the actual activities of the survey.

This project started in FY 1999. In FY 2000 as the second year of the survey, MMAJ organized a mission consisting of five members and dispatched the mission to the site of the survey for the period from June 17 to August 12, 2000. The field survey was completed as scheduled thanks to cooperation of the Mongolian government offices including Mineral Resources Authority of Mongolia (MRAM).

This report summarizes the results of surveys conducted for two years.

We would like to express our sincere gratitude to the Mongolian government and its associated organizations. We are also grateful to persons of the Ministry of Foreign Affairs of Japan, the Ministry of Economy, Trade and Industry of Japan, and the Japanese Embassy to Mongolia who have been involved and cooperated with the project.

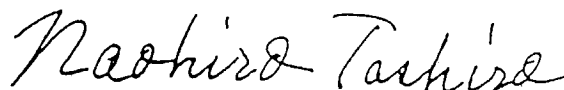
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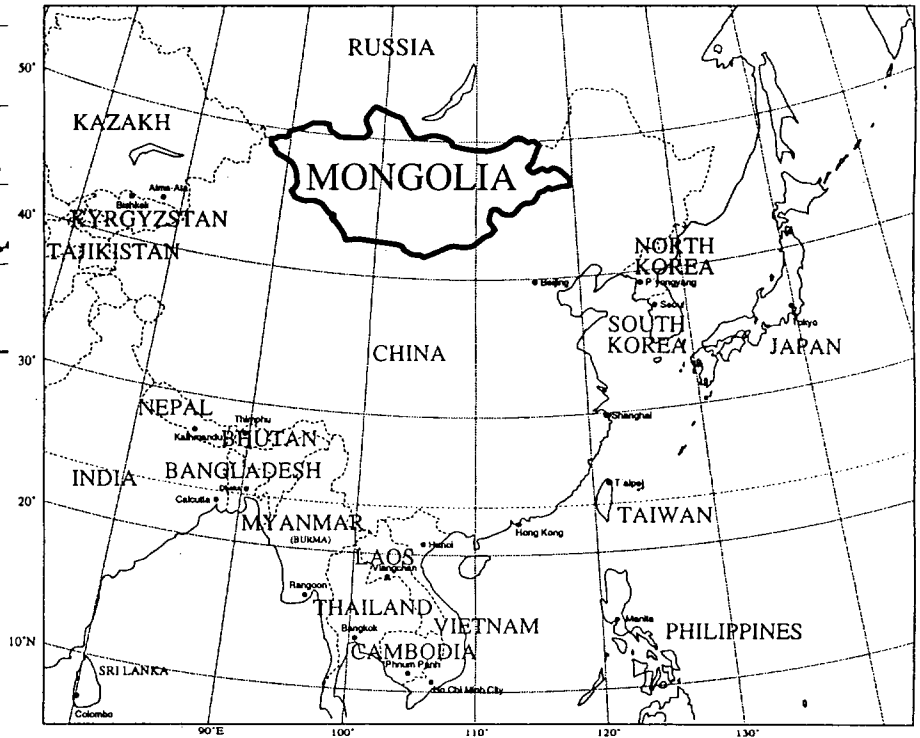
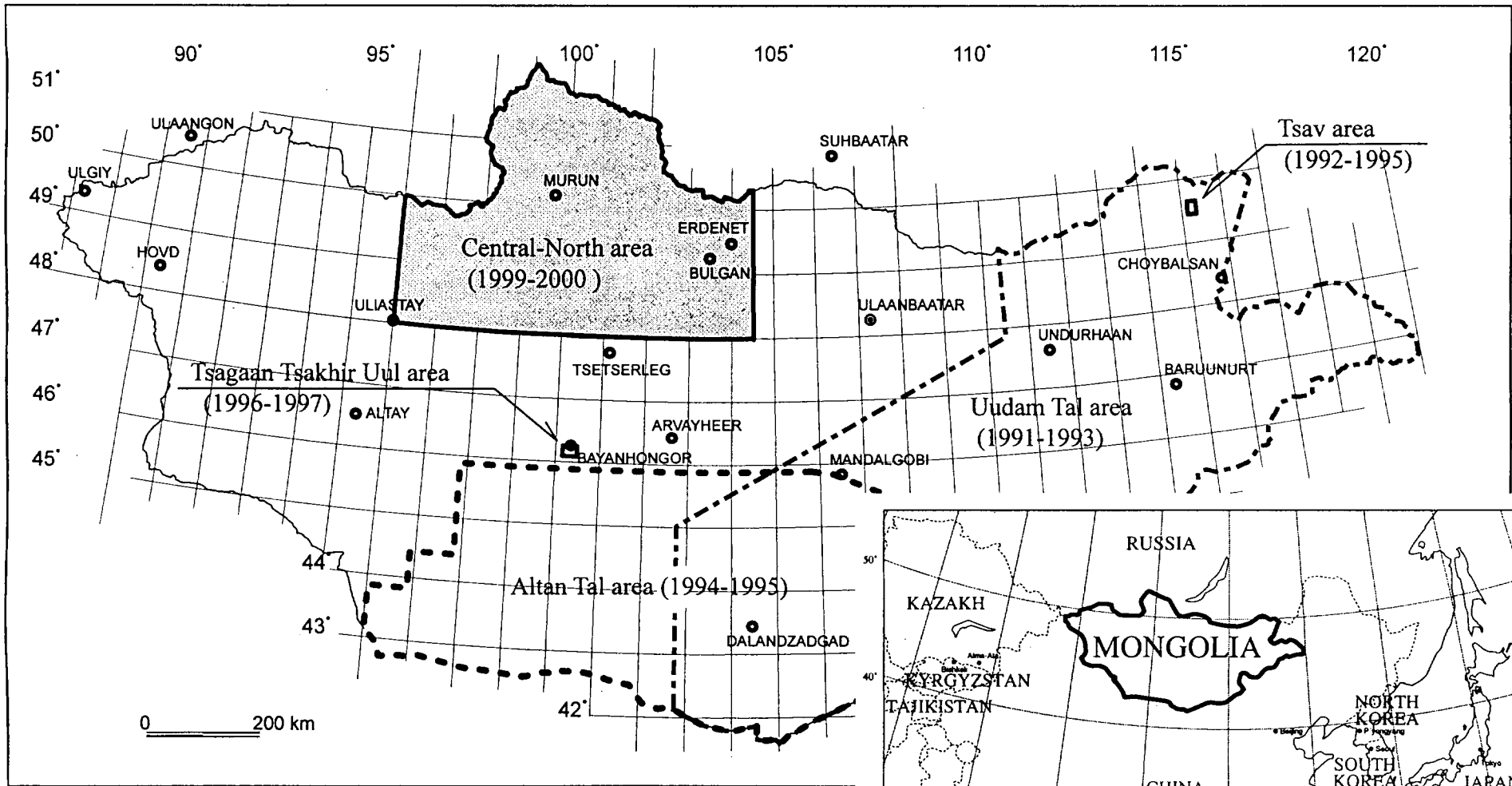
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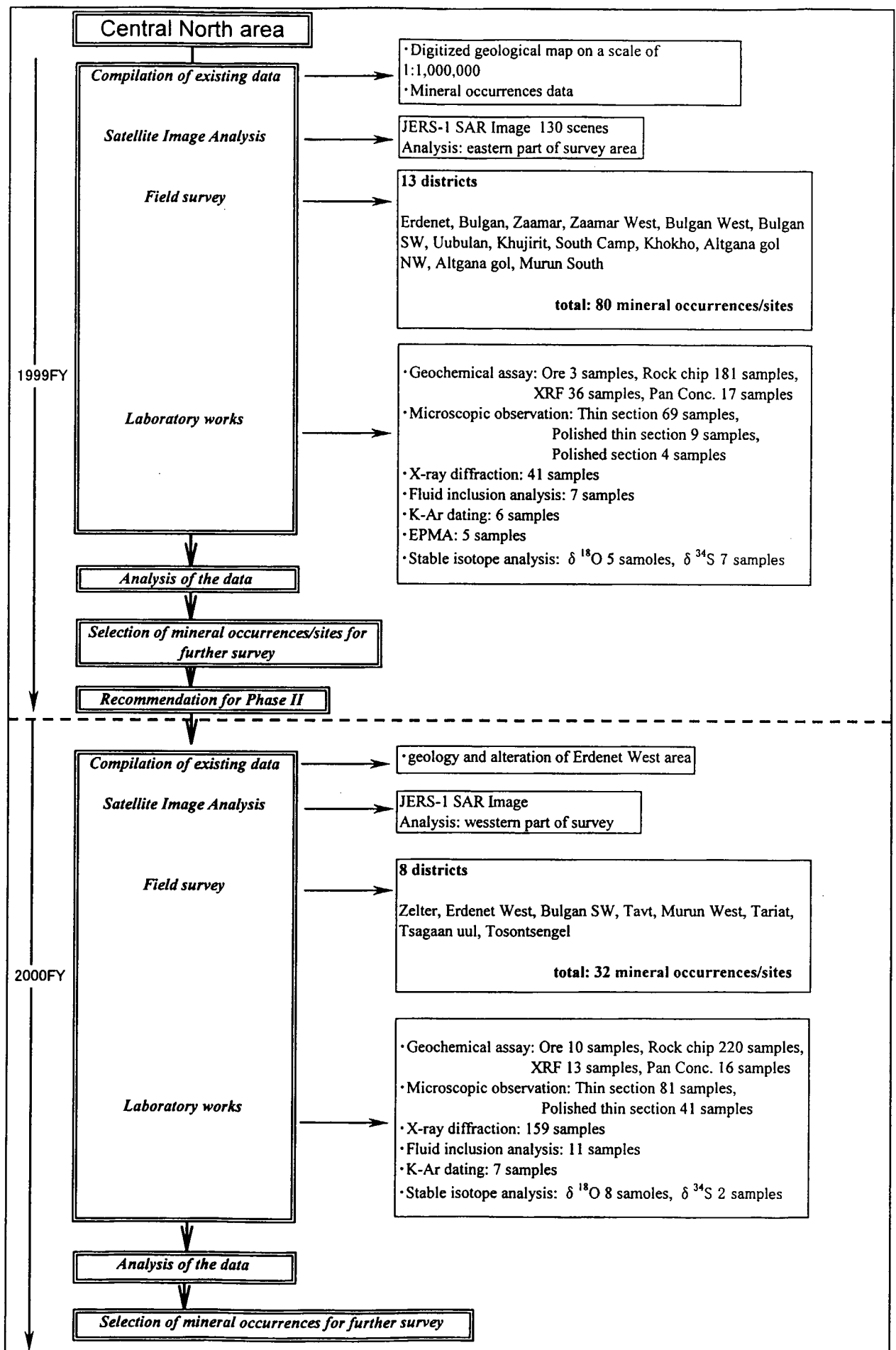
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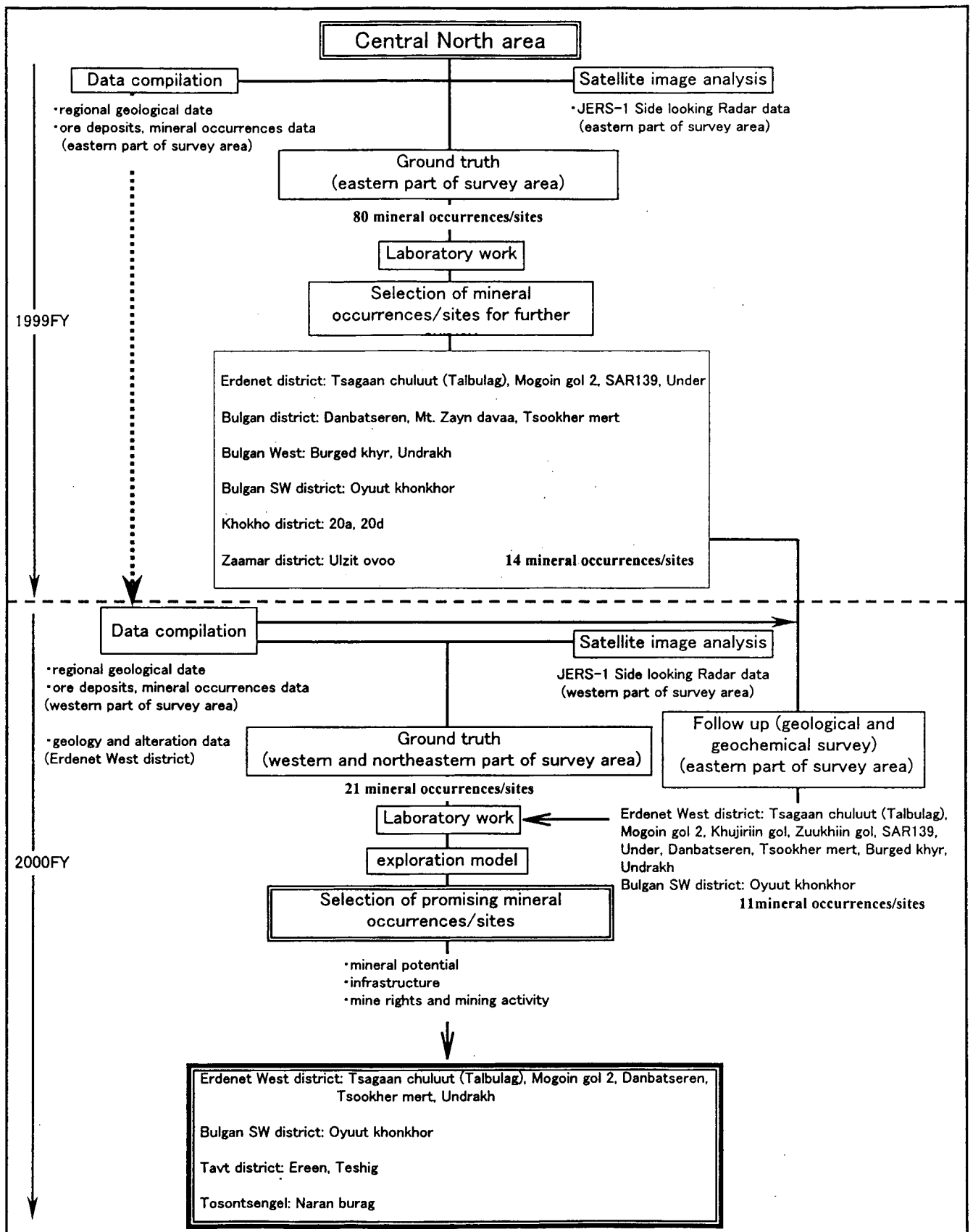
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Location map of the central north area, Mongolia



Survey flow in the central north area, Mongolia



Flow chart of the sequence of survey and the selection of promising mineral occurrences and sites in the central north area, Mongolia

SUMMARY

This survey has been carried out for a period of two years in the north central area in Mongolia. The investigated area covers an area from the north central Mongolia up to the border with Russian Federation. The purpose is to evaluate the mineral potential of nonferrous-metals within the investigated area and to select promising targets, taking into consideration a future possibility to proceed to a further study by two governments or a possibility to invite private companies for the new exploration program. This report describes the result of the survey carried out in two years.

For reference, the survey is based on the Agreement on Practical Business Affairs of Survey (specifically, under the heading of Scope of Works) which was concluded on May 27,1999 between the Mongolian and Japanese Governments.

The study comprises analysis and evaluation of existing data, analysis and interpretation of the satellite imageries, and carrying on ground truth. As to the analysis of the existing data, geology and distribution of ore deposits/mineral occurrences in the investigated area were studied as well as their characteristics, being based on mainly the data that MRAM keeps. As to the analysis of the satellite imageries, lineaments were extracted from the SAR imageries and their relationships with the known mineral occurrences were studied. Then target objectives for the ground truth were selected by integrating these studies. For the selection, priority was given to porphyry copper/molybdenum and gold deposits.

For the analysis and ground truth of the satellite imageries, the investigated area was divided into two sub-areas East and West by 100° E line , since the area is so vast as 200,000 square km. In the 1st year, ground truth was carried out for 80 mineral occurrences / investigated points in 13 districts in the sub-area east of 100° E .

In the 2nd year, ground truth was carried out for 19 mineral occurrences in 4 districts in the sub-area west of 100° E. Besides these, investigation was carried out in the Tavit and Zelter districts where ground truth was not carried out in the 1st year due to problem in access. Also follow-up studies were carried out in the Erdenet West district (10 mineral occurrences) and the Bulgan SW district (1 mineral occurrence) , which were judged to be promising from the result of the 1st year.

Geology of the investigated area is considered to have been developed from the Vendian of the Proterozoic age on, by the formation of magmatic arc and accretionary prism and by the collision between the Angara and North China cratons. Due to such a tectonic development history, various types of mineralization are expected and the result of ground truth has verified it: Mineral showings of porphyry copper/molybdenum type, epithermal type gold, pluton-

related type gold, skarn type gold and skarn type copper-lead-zinc have been located.

As a result of the study for 2 years, 10 promising mineral occurrences were selected, where the possibility of porphyry type copper/molybdenum and/or epithermal type gold deposits is considered to be high. 6 of them are concentrated within the Erdenet West district.

In the Erdenet West district, "secondary quartzite" occurs at the Tsagaan chuluut, Mogoin gol and Danbatseren mineral occurrences in the proximity of the Erdenet mine. The "secondary quartzite" is considered to be an equivalent of the lithocap, which is the upper expression of a porphyry system. Therefore, presence of porphyry type copper/molybdenum deposits may be expected at depths, as well as high sulfidation type gold deposits within the occurrences. At the Zuukhiin gol and Undrakh mineral occurrences, erosion of the porphyry system has advanced to crop out oxide copper on the surface, so that presence of mineable ore body may be expected even at the shallow depths. Also at the Tsookher mert mineral occurrence, a zone of quartz veinlets in a trench was assayed at 285.4g/t Au (assay width is 30 cm) and presence of high grade gold deposit may be expected in the proximity and/or at depths,

As to the Erdenet West district where mineral occurrences are particularly concentrated in the eastern part, it is desirable to carry on a basic investigation including the high-resolution airborne magnetic survey and so forth. The purpose is to evaluate the known ore deposits and mineral occurrences in order to select targets for the further exploration. Also detailed investigation is required for other promising mineral occurrences within the district mentioned above.

As to the Naranbulug mineral occurrence in the Tosontsengel district, presence of a porphyry type copper/molybdenum deposit may be expected and further detailed study is required. However, its priority for detailed survey will be lower compared with Erdenet West district, taking the infrastructure necessary for the mine development into consideration.

As to the other mineral occurrences which were selected as promising targets for gold, exploration works by Mongolian private companies are currently being carried on, and we hope good results will be obtained. These are as follows: Oyuut khonkhor in the Bulgan West district, where presence of the epithermal type gold deposit is expected. Ereen in the Tavit district, where presence of pluton-related type gold deposit is expected. Teshig in the Tavit district, where presence of skarn type gold deposit is expected.

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