REPORT ON REGIONAL SURVEY FOR MINERAL RESOURCES IN THE NORTHWEST AREA THE ARGENTINE REPUBLIC

PHASE I

MARCH 2002

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

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PREFACE

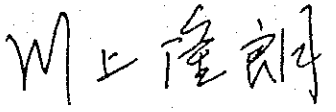
In responding to the request of the Government of the Argentine Republic, the Government of Japan decided to conduct a regional survey for mineral resources in the Northwest area, Argentine republic, and entrusted the survey to the Japan International Cooperation Agency (JICA). JICA, considering the technical nature of geology and mineral resources, entrusted the survey to the Metal Mining Agency of Japan (MMAJ).

JICA and MMAJ agreed on the Scope of Work (S/W) with the Servicio Geologico Minero Argentino, Subsecretaria de Mineria, Secretaria de Energia y Mineria, Ministerio de Infraestrutura y Vivienda of the Government of the Argentine Republic after discussing the survey program, on July 12, 2001. The survey will be carried out within a period of two years commencing from 2001.

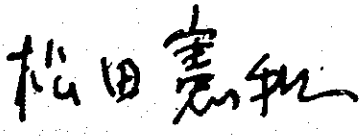
MMAJ dispatched a survey team consisting of four members to Argentina from September 20 to November 17, 2001. The survey in Argentina was carried out successfully with close cooperation of the Argentine government authorities. This report summarizes the results of the survey carried out in the first year, and it constitutes a part of the final report which will be submitted after completion of the survey of second year.

We would like to express our sincere appreciation to the officials concerned of the Argentine government, and we also grateful to the officials concerned of the Ministry of Foreign Affairs of Japan, the Ministry of Economy, Trade and Industry of Japan, and the Japanese Embassy in Argentina for their helpful supports to conduct the survey.

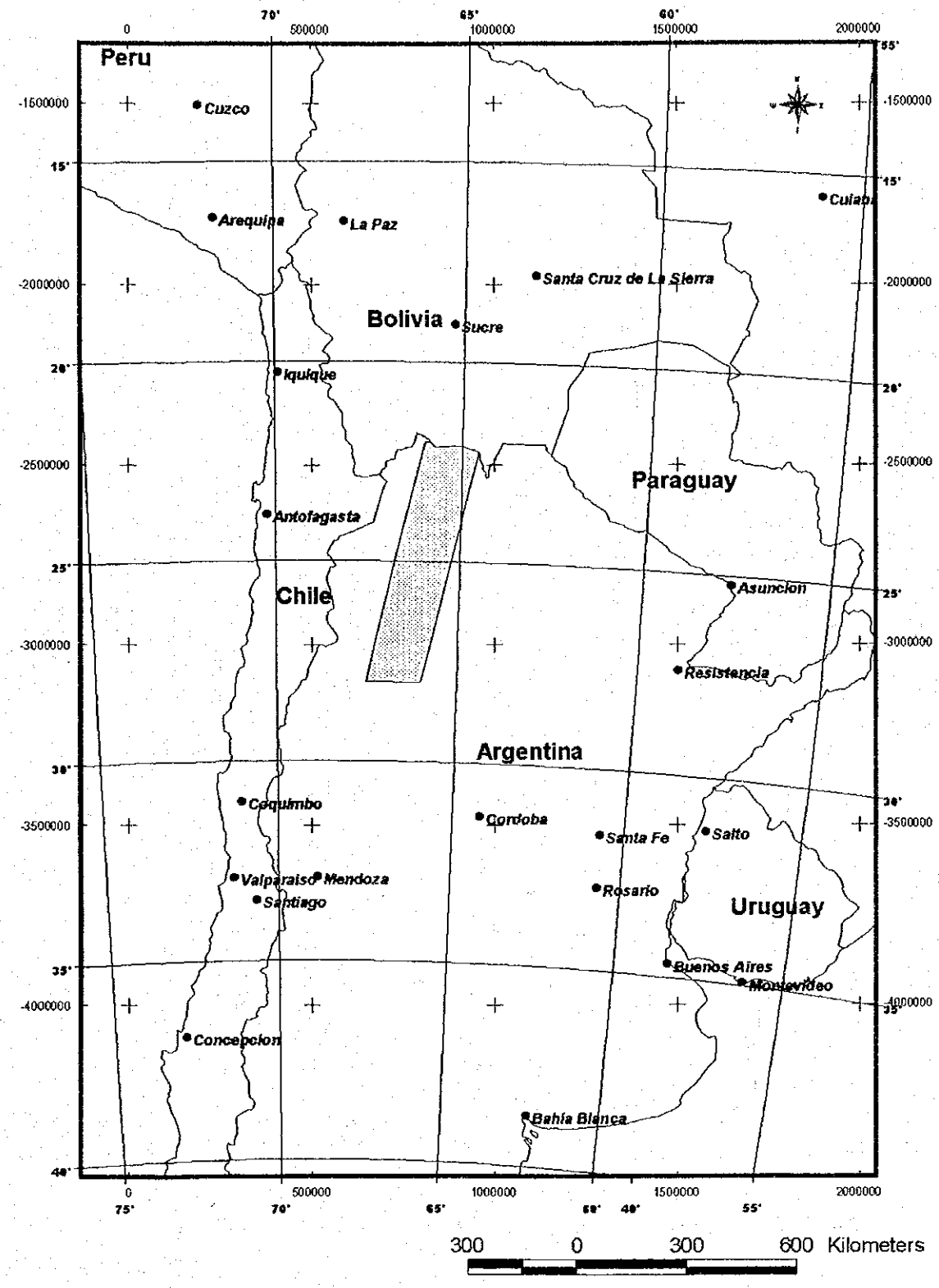
March, 2002



Takao Kawakami
President
Japan International Cooperation Agency



Norikazu Matsuda
President
Metal Mining Agency of Japan



Location map of the North West Area, the Argentine Republic.

Summary

This survey is conducted, under the scope of work in the agreement dated July 12, 2001, between the Japanese government and the Argentine government, over a time span of two years for the investigation of nonferrous metallic mineral resources in the Northwestern area of the Argentine republic. The objective is to assess mineral resources potential and to select promising areas over the entire survey area.

In this year, the first year of this project, the analysis of existing data, satellite images, airborne geophysics data, stream sediments, and ground truth were implemented. In the existing data analysis, collected information were summarized in order to concentrate on potential area for minerals. In the satellite image analysis, ASTER images were used to discriminate alteration zones and to classify the alteration minerals. For airborne geophysical analysis, magnetic and radiometric data provided by the Argentine side were processed to find relations between regional geology and mineral deposits. In geochemical analysis, stream sediment samples collected by Argentine side in the past were analyzed.

In consideration of the possibility of future mining development, this survey focused on porphyry copper and copper/gold deposits, epithermal gold/silver deposits, SEDEX-type lead/zinc deposit and volcannogenic massive sulfide deposits. The analysis shows that the SEDEX/sulfide deposits and volcanogenic massive sulfide deposits are mainly controlled by the distribution of Ordovician sediments in passive margin or magmatic arc in the north of survey area. Meanwhile, porphyry copper and copper/gold deposits, and the epithermal gold/silver deposits are restricted to the area of Tertiary volcanic rocks, which extending in the NW-SE direction from the Chilean border like arm shapes, and restricted also to the area of intrusive rocks between the arm extensions. Finally, 24 areas were selected as a promising area, then ground truth was conducted in 40 mineral showings and alteration zones outlined from the satellite images.

Consequently, it was found that the litho-geochemical exploration with using mudstone was especially effective in order to the discriminate ore horizon associated with the SEDEX-type lead/zinc deposits. Further, it was verified that the potential for the SEDEX-type lead/zinc deposit is high in the north-south trending zone from the Mina Aguilar deposit to the Pumahuasi deposit, meanwhile the potential for the volcanogenic massive sulfide deposits is particularly high in the area that volcanic-rocks are distributed in Ordovician sediments in the western part of survey area. Detailed survey will be recommended to these areas in the fuutre.

It was further shown that porphyry copper and copper/gold deposits develop in Farallon Negro area in a volcanic arm with relatively advanced erosion and in Inca Viejo area located in margin of intrusive rocks between arms, and in the west of Tucuman located in an arm's extension. On the other hand, the alteration zone related to the epithermal gold/silver deposit have a tendency to distribute in eroded area, such as Agua Caliente caldera. These mineral showings and alteration zones were

surveyed in detail in the latter half of the 1990s. However, in the second year of the project, more detailed surveys will be needed for the southeast extension of the volcanic rock arm for porphyry copper and copper/gold deposits, and to survey the alteration zones in and around the caldera for the epithermal gold/silver deposit.

In the analysis of ASTER images, the known porphyry copper and copper/gold deposits, and their related alteration zones were well discriminated and effectiveness of ASTER was verified. However, some mis-idendification of alteration zone was observed in the analysis, improvements .will be necessary as an issue in the future.

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