REPORT
ON
THE COOPERATIVE MINERAL EXPLORATION
IN
THE SOUTH BATINAH COAST AREA
SULTANATE OF OMAN
(ENVIRONMENTAL STUDY)

(PHASE Ⅲ)

MARCH 2000

JAPAN INTERNATIONAL COOPERATION AGENCY
METAL MINING AGENCY OF JAPAN

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PREFACE

In response to the request of the Government of the Sultanate of Oman, the Japanese Government decided to conduct a Environmental Study for the Mineral Exploration Project in South Batinah Coast and entrusted the project to the Japan International Cooperation Agency (JICA) and the Metal Mining Agency of Japan (MMAJ).

JICA and MMAJ sent to Oman a survey team headed by Mr. Toshio Koizumi from February 6, 2000 to March 10, 2000.

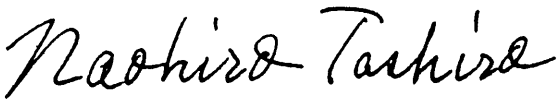
The team exchanged views with the officials concerned of the Government of Oman and conducted a field investigation in the Ghuzayn District. After the team returned to Japan, further studies were made and present report has been prepared. This report includes the survey result of environmental study.

We hope that this report will serve for the development of the mineral resources and contribute to the promotion of friendly relations between Japan and Oman.

We wish to express our deep appreciation to the officials concerned of the Government of Oman for their close cooperation extended to the team.

March, 2000

Kimio Fujita
President
Japan International Cooperation Agency



Naohiro Tashiro
President
Metal Mining Agency of Japan

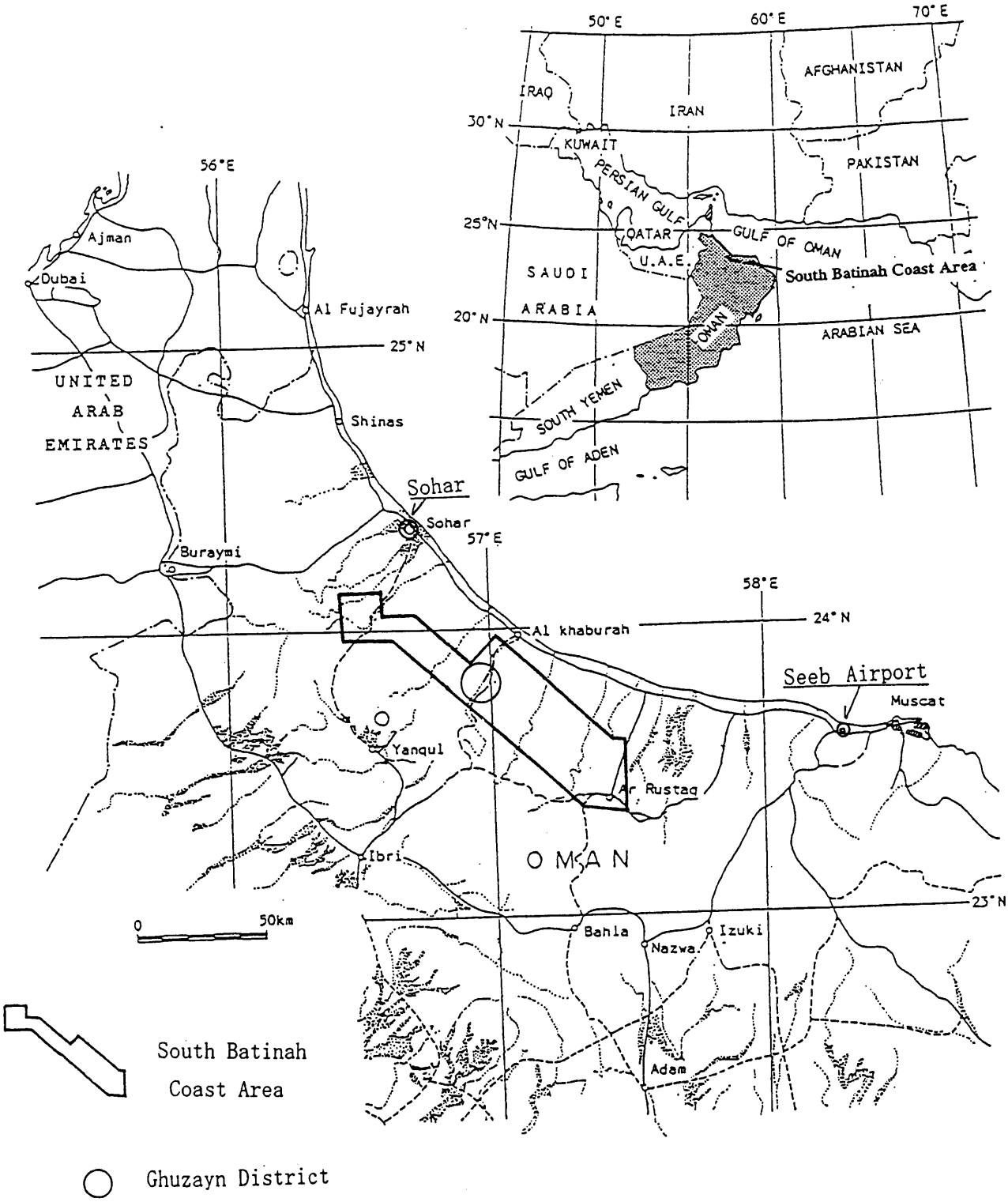


Figure 1 Location Map of the Ghuzayn District (1)

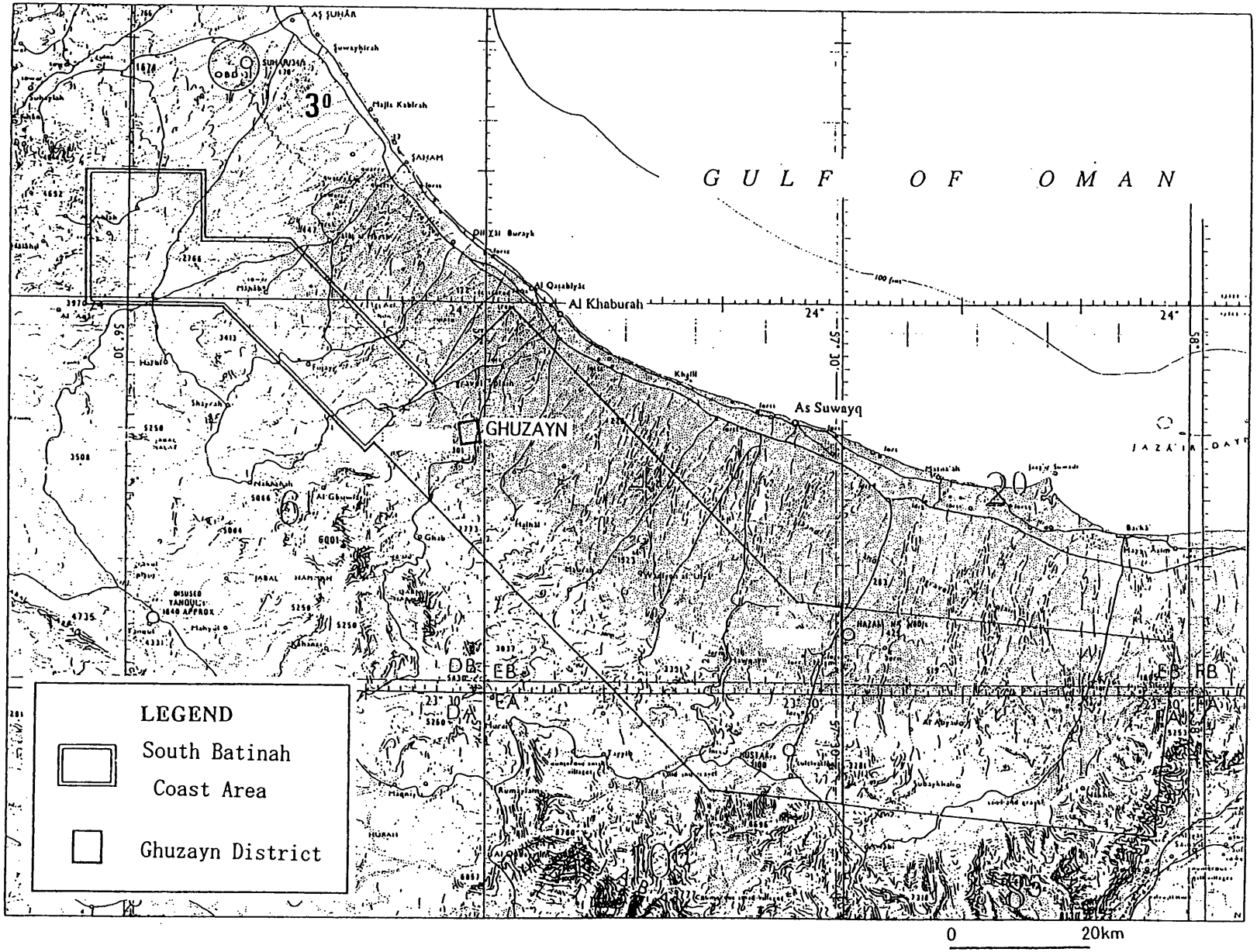


Figure 2 Location Map of the Ghuzayn District (2)

SUMMARY

Results of the "Cooperative Mineral Exploration in the South Batinah Coast Area, Sultanate of Oman (Environmental Study) (PhaseⅢ) are as follows:

(Hydrological Investigation)

- Rivers in the Ghuzayn District belong to the drainage system of Wadi al Hawasinah River.
- Sampling points of water for the hydrological investigation consist of 5 points, 3 points of surface water survey (GS-1, GS-4 and GS-3) and 2 points of well survey (GW-1 and GW-2).
- Discharge of GS-1 (Falaj) is 2.70 m^3/min, GS-4 (upper stream) is 0.30 m^3/min, and GS-3 (lower stream) is 0.084 m^3/min.
- Water wells (GW-1 and GW-2) in the district are shallow well for irrigation. Depth of groundwater table is about -7.50, -6.70 m below GL, respectively.
- Approximately same volume of ground water as surface current water is assumed to exist near the Ghuzayn District by the water balance.
- Surface water of 2.70 m^3/min is taken from the mother well near Ghuzayn Village and supplied through Falaj system for irrigation.
- The surface water and well water range in pH from 8.00 to 8.60 (weak alkalinity).
- All concentration of Cu, Zn, Pb, Ni, Cr, Mn are <0.01 mg/l. All concentration of Hg are less than detection limit.
- The average concentration of Fe is 0.03 mg/l, Maximum is 0.07 mg/l in GW-1, Minimum is <0.01 mg/l in GS-3. Those of GW-1 (Ghuzayn village) and GS-3 (river water) are relatively higher.
- The average concentration of SO_4 is 131 mg/l, Maximum is 145 mg/l, and Minimum is 114 mg/l.
- The technical transfers for the establishment of organization for the periodical hydrological investigation was carried out.

(Water Investigation of Bore Wells)

- Five bore wells (one in the upstream and four in the down stream) are drilled by the method of preventing from the drilling mud affect, and casing and screen pipes are placed to protect the bore well wall for preparing the ground water observation.
- The recovery test, water sampling, water quality measurement and water quality analysis are conducted on each bore well.

- The permeability coefficient of bore well ranges with 10^{-5} cm/s.
- MJOB-EW-3 has the little water flow of 1 l/s.
- Average gradient of groundwater table is 1/100 (=0.6°).
- The groundwater ranges in pH from 8.00 to 8.60 (weak alkalinity).
- The electric conductivity is around 100 μS/cm. Water temperature ranges in centigrade from 31.5 to 34.8.
- The maximum concentration of Fe, Cr, Ni and Mn are recorded in MJOB-EW-2. The maximum concentration of Cu, Zn and Pb are recorded in MJOB-EW-1. And, the relatively high concentration of Fe and Zn are recorded in MJOB-EW-4. These things suggest that each bore well would be under the some influence of mineralization.
- Although the concentration of SO_4 ranges wider than that of the surface water and well water, the average is almost same. The minimum of SO_4 of 80 mg/l is recorded in MJOB-EW-2 where Fe is maximum value.
- It is desirable to continue the monitoring work of water quality after the study.

(Weather observation)

- The weather observation devices are installed in Ghuzayn village and data collection was started to prepare the continual weather data. The observation items consist of temperature, humidity, wind velocity and direction and rainfall.
- The technical transfers for the establishment of organization for the periodical weather observation was conducted.

(Recommendations)

- Five long-term observations bore wells surrounding three ore bodies are constructed with the method of preventing the affect of drilling mud. It is necessary to collect long-term monitoring data on each bore well.
- It is necessary to carry out the more detailed environmental study in the Ghuzayn District for the conceptual design of mine development.
- The items of environmental investigation consist of air quality, water quality, groundwater, soil, noise and vibration, and social environment.
- It is desirable to continue the monitoring work of water quality after the study.

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