

**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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<b>JR</b>
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## PREFACE

In response to the request of the Government of the Sultanate of Oman, the Japanese Government decided to conduct an 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.

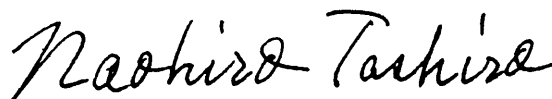
March, 2000



Kimio Fujita

President

Japan International Cooperation Agency



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Metal Mining Agency of Japan

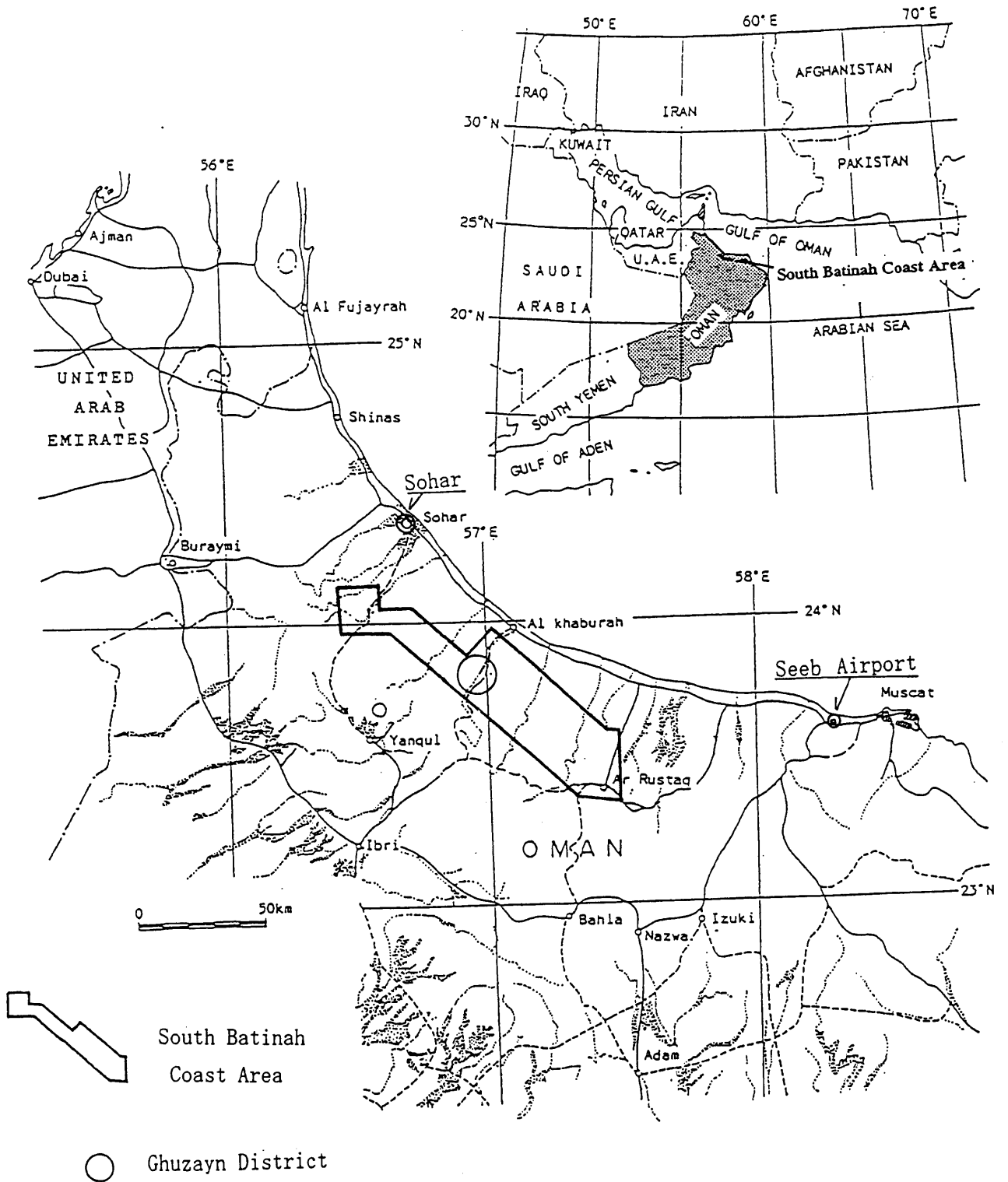


Figure 1 Location Map of the Ghuzayn District (1)

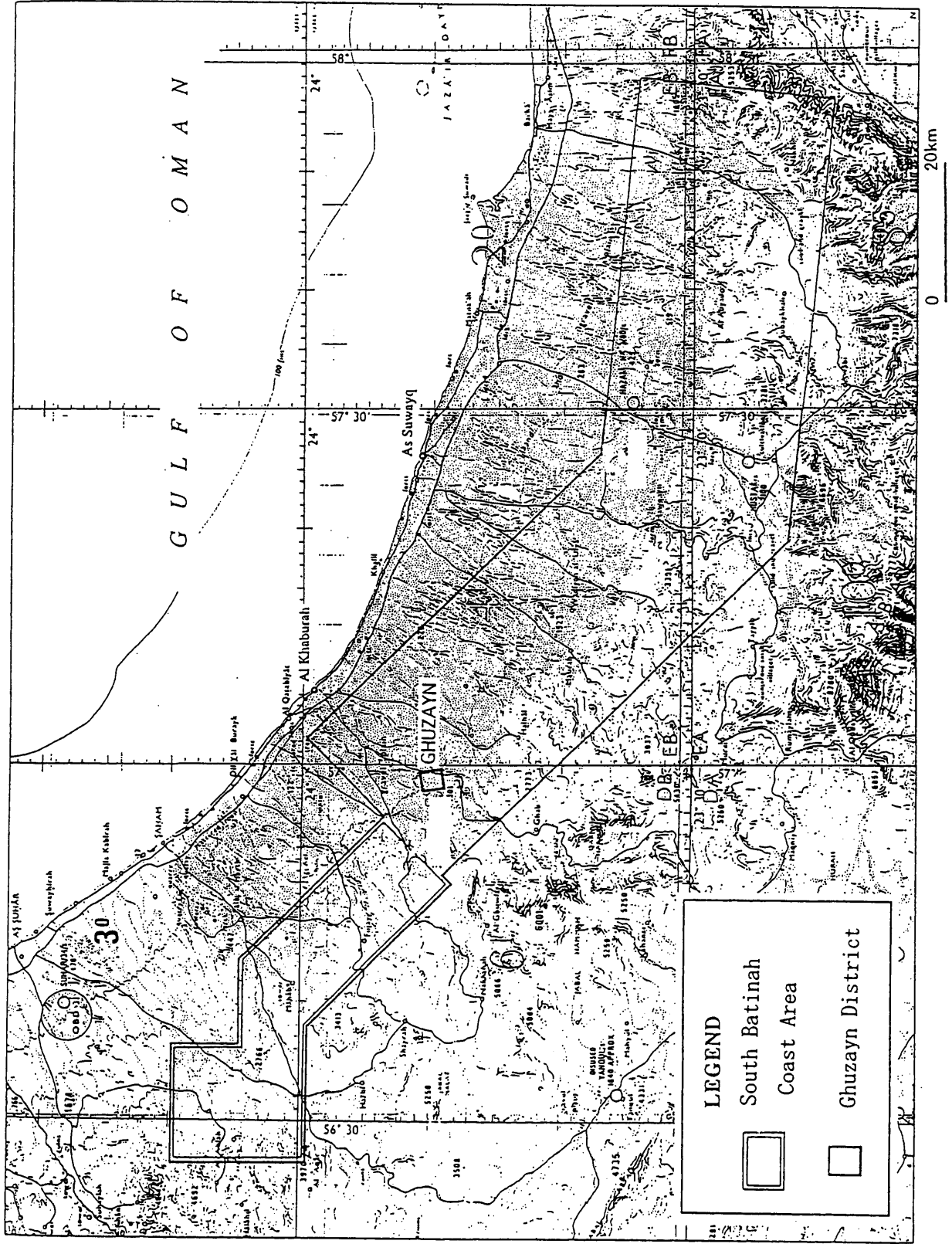


Figure 2 Location Map of the Ghuzayn District (2)

## SUMMARY

Results of the "Cooperative Mineral Exploration in the South Batinah Coast Area, Sultanate of Oman (Environmental Study) (Phase III) 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<sup>3</sup>/min, GS-4 (upper stream) is 0.30 m<sup>3</sup>/min, and GS-3 (lower stream) is 0.084 m<sup>3</sup>/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<sup>3</sup>/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<sub>4</sub> 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 ( $=0.6^\circ$ ).
- The groundwater ranges in pH from 8.00 to 8.60 (weak alkalinity).
- The electric conductivity is around  $100 \mu\text{S/cm}$ . 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  $\text{SO}_4$  ranges wider than that of the surface water and well water, the average is almost same. The minimum of  $\text{SO}_4$  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.

## CONTENTS

Preface

Location Map of the Ghuzayn District

Summary

Contents

(Page)

### PART I GENERAL

Chapter 1 Introduction .....	1
1-1 Background of the Study .....	1
1-2 Objectives of the Study .....	1
1-3 Location of the Study area .....	1
1-4 Period of the Study .....	1
1-5 Content of the Study .....	1
1-5-1 Hydrological Investigation .....	2
1-5-2 Ground Water Investigation .....	3
1-5-3 Weather Observation .....	4
1-5-4 Establishment of Organization for investigation and observation ..	4
1-6 Study Team .....	4
Chapter 2 Geography of the Study Area .....	7
2-1 Location and Access .....	7
2-2 Topography and Drainage System .....	7
2-3 Climate and Vegetation .....	7
Chapter 3 Outline of the Study Area .....	10
3-1 General Geology .....	10
3-2 Mineralization .....	11
3-3 Environment .....	11
Chapter 4 Survey Results .....	15
4-1 Hydrological Investigation .....	15
4-1-1 River Survey .....	15
4-1-2 Well Survey .....	15
4-1-3 Water Quality Analysis .....	16

4-2	Ground Water Survey .....	16
4-2-1	Selection of Bore Well Location .....	16
4-2-2	Drilling of Bore Well .....	17
4-2-3	Recovery Test.....	17
4-2-4	Water Quality Analysis .....	18
4-3	Weather Observation .....	18
4-3-1	Installation of Weather Observation Devices .....	19
4-3-2	Collection of Weather Data .....	19
4-4	Establishment of Organization for Monitoring.....	19
Chapter 5	Conclusions and Recommendations .....	20
5-1	Conclusions .....	20
5-2	Recommendations .....	21

## PART II SURVEY RESULTS

Chapter 1	Hydrological Investigation .....	22
1-1	Objectives .....	22
1-2	Investigation Area .....	22
1-3	Investigation Method .....	22
1-3-1	River Survey .....	22
1-3-2	Well Survey .....	23
1-4	Survey Results .....	23
1-4-1	River Survey .....	23
1-4-2	Well Survey .....	25
1-4-3	Water Quality Analysis .....	26
Chapter 2	Water Investigation of Bore Wells .....	28
2-1	Objectives .....	28
2-2	Selection of Bore Well Location.....	28
2-3	Investigation Method .....	28
2-3-1	Drilling of Bore Well.....	28
2-3-2	Recovery Test .....	29
2-3-3	Water Quality Analysis .....	30
2-4	Survey Results .....	30
2-4-1	Drilling and Construction of Bore Well.....	30



2-4-2	Result of the Recovery Test	44
2-4-3	Water Quality Analysis	45
Chapter 3	Weather Observation	48
3-1	Objectives	48
3-2	Location of Weather Observation	48
3-3	Method of Weather Observation	48
3-4	Results of Weather Observation	48
3-5	Establishment of Organization for Weather Observation	51
Chapter 4	Establishment of Organization for Monitoring	52
Chapter 5	Considerations	53
5-1	Hydrological Condition	53
5-1-1	Water Balance	53
5-1-2	Groundwater	56
5-2	Water Quality	61
5-2-1	Water Quality of Surface Water and Water Well	61
5-2-2	Water Quality of Groundwater in the Bore Wells	62
5-2-3	Water Quality around Orebodies	63

### PART III CONCLUSIONS AND RECOMMENDATIONS

Chapter 1	Conclusions	64
Chapter 2	Recommendations	66

#### References

- Appendices :
1. Measurement Card for Discharge
  2. Investigation Card of Bore Wells
  3. Weather Observation Data

## LIST OF FIGURES AND TABLES

(Page)

### (Figures)

Figure 1	Location Map of the Ghuzayn District (1)	
Figure 2	Location Map of the Ghuzayn District (2)	
Figure I-1-1	Location Map of Monitoring Point .....	5
Figure I-2-1	Topographic Map of the Ghuzayn District .....	9
Figure I-3-1	Geologic Map of the Ghuzayn District .....	13
Figure II-2-1	Structure of Bore Well (MJOB-EW-1) .....	35
Figure II-2-2	Structure of Bore Well (MJOB-EW-2) .....	36
Figure II-2-3	Structure of Bore Well (MJOB-EW-3) .....	37
Figure II-2-4	Structure of Bore Well (MJOB-EW-4) .....	38
Figure II-2-5	Structure of Bore Well (MJOB-EW-5) .....	39
Figure II-2-6	Columnar Section of Bore Well (MJOB-EW-1, 2) .....	41
Figure II-2-7	Columnar Section of Bore Well (MJOB-EW-3, 4) .....	42
Figure II-2-8	Columnar Section of Bore Well (MJOB-EW-5) .....	43
Figure II-5-1	Schematic Water Balance in the Ghuzayn District.....	57
Figure II-5-2	Water Table in the survey area.....	60

### (Table)

Table I-1-1	Content of the Study .....	2
Table I-1-2	Water Quality Analysis for Surface Water .....	3
Table I-1-3	Participants for the Study .....	4
Table I-3-1	Laws and Regulations Related to the Environment .....	12
Table I-3-2	Effluent Standard of Waste Water .....	14
Table I-4-1	Measurement Result of Discharge and Water Quality .....	15
Table I-4-2	Measurement of Water Level and Water Quality .....	16
Table I-4-3	Permeability Coefficient .....	17
Table II-1-1	Measurement Method of Discharge .....	22
Table II-1-2	Measurement Result of Discharge and Water Quality .....	24
Table II-1-3	Measurement Result of Water Level and Water Quality .....	26
Table II-1-4	Analytical Results of Water in the Ghuzayn District .....	26
Table II-2-1	Measurement Time for the Recovery Test .....	30

Table II-2-2	List of Equipment for Drilling and Construction Bore Well.....	32
Table II-2-3	Bore Well Drilling Rig – Technical Data .....	33
Table II-2-4	List of Drilling and Well Construction Materials .....	34
Table II-2-5	Permeability Coefficient .....	45
Table II-2-6	Measurement Result of Ground Water Quality .....	45
Table II-2-7	Analytical Result of Ground Water Quality in Bore Wells .....	46
Table II-3-1	Weather Observation Devices.....	49
Table II-4-1	Monitoring Plan the Ghuzayn District .....	52
Table II-5-1	Location Data and Ground Water Level of Monitoring Point.....	59