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REPUBLIC OF THE PHILIPPINES

REPORT ON


MINE TAILINGS DISPOSAL SYSTEM

IN

THE BAGUIO DISTRICT

JUNE 1978

JAPAN INTERNATIONAL COOPERATION AGENCY

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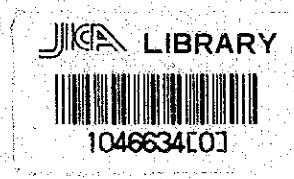
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JAPAN INTERNATIONAL COOPERATION AGENCY

Preface

The Government of Japan, in response to a request of the Government of the Republic of the Philippines, agreed to conduct a feasibility study of mine tailings disposal system in which slurry tailings in the Baguio area would be transported to the Lingayen Gulf for reclamation. The Government of Japan entrusted the Japan International Cooperation Agency (JICA) to conduct this study.

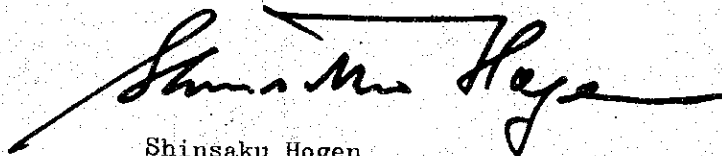
The Agency, in consideration of the present disposal of mine tailings in the Philippines and the importance of preventing environmental pollution in the area around the mine, dispatched a survey team headed by Mr. Ken Saito (Metal Mining Agency of Japan) to the Philippines for a period of thirty (30) days from January 30 to February 28, 1978.

The team carried out field investigations with the cooperation of the Government agencies concerned of the Republic of the Philippines and on returning to Japan, examined the data collected in the Philippines, the results of field survey, and prepared this report.

I hope this report will contribute to the prevention of environmental pollution stemming from mine tailings and to the economic and social development of the Republic of the Philippines as well as to the promotion of friendship between our two countries.

I wish to express my sincere thanks to the Government and officials concerned of the Philippines.

June, 1978



Shinsaku Hogen

President
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

Mr. Shinsaku Hogen
President of Japan International Cooperation Agency

Dear Sir,

I take pleasure in submitting you the feasibility report on the proposed disposal system of mine tailings which had been requested from the Government of Republic of the Philippines, who has planned to prevent the environment from the pollution caused by mine tailings by means of TLP (Tunnel, Launder and Pipeline) System. The TLP System is designed to transport the mill tailings which is discharged from six (6) mines at Baguio mining area down to the eastern sea area of the Lingayen Gulf for reclamation.

From January 30th. through February 28th. 1978, the survey mission (a team composed of 13 staffs) conducted the feasibility study such as sample collections of the tailings and inspection of the tailings disposal data relating to the six (6) mining companies as well as the data relating to the environmental problems from the competent authorities, survey and selection of the route for the TLP System, geological exploration of the land area and survey of the sea area. The mission has, further more, inspected the tailings disposal system of two (2) mines beeing now in operation at the Cebu Island and the Marinduque Island, those system of which are very similar method to the proposed TLP System.

Vicinity in the Baguio area are very steep in the topographical condition and be liable to suffer from floods by the localized torrential downpour more than a thousand (1,000) mili-meters per day during typhoon season. Because of these particular conditions, it has been a long pending object for the Philippines Government to replace an economical and efficient system for the tailings disposal system from the converntional tailings disposal system around the six (6) mines up to now.

The TLP System consists primarily of three (3) portions, that is,

- 1) Feeder lines which come from individual mine
- 2) Common line which accepts tailings slurry from the terminal of feeder lines and transport the tailings slurry to the Lingayen Gulf, and
- 3) The land to be reclaimed at the sea area

This report has a limited design scope which covers the common line leading to the terminal at the sea area, which convey annually thirteen (13) millions DMT of tailings composed of an average concentration of thirty-nine (39) percent by weight, by natural gravity utilizing the total head of six hundreds and ten (610) meters over the land distance of twenty-six (26) km and the maximum sea area distance of six point nine (6.9) kilo-meters for the tailings disposal capacity by reclaimed area of twelve (12) square kilo-meters for the period of twenty (20) years in future.

The portion of sea area will be reclaimed by the tailings, and construction works of the reclamation will be executed by four (4) embankment method; that is, by rubble, corrugated cell, raw tailings and classified tailings, which are proposed in this report.

As to the solution on the problem of ocean pollution caused by the overflow water of the disposed tailings at a shallow area in the Lingayen Gulf, it is necessary to execute a long term survey and research including a detailed investigation at the present condition and the forecast in relation to the tidal changes, ocean currents due to formation of a reclaimed land, contamination of tailings which may occur during the construction work of embankment, changes in the marine ecosystem by these factors, and so on.

The problems concerns with siltation in the farm-land and irrigation system at the down stream of the two rivers will be solved with the real operation of the TLP System.

With regard to the utilization of the reclaimed land, it is estimated that the utilization is possible in future days from now, and that concrete plans have not yet been proposed for the utilization of the reclaimed land at this moment. It is possible to respond to the demand of various utilizations if an additional work for the facility is accomplished.

In view of an estimate of the construction cost of the TLP System, the cost of common line is comparatively low; that is, it is about US Cent one (US\$ 1)/t-km, nevertheless the cost includes the tunnel driving in a range of about fifteen (15) kilo-meters distance at the mountain area. That is because large amount of about 1.0 cubic meter/second (maximum) is transported while the transportation distance is relatively short, and also launder line, which is lower in cost than pipeline, is

employed over the two third (2/3) of the entire line.

The calculated total construction cost, however, will become double when the cost for the sea area and the feeder lines are added. As a matter of course, it is inevitable for the proposed TLP System to become higher in cost than the cost of current tailings disposal.

In conclusion, it is estimated that the toll charge to be borne by individual mining company for the utilization of the TLP System will considerably affect on the production cost of the concentrate. In the view point of the original purpose of this plan which had arisen for the environmental defence and improve of the relevant surroundings and the prevention of water pollution and tailings siltation, measures for reducing cost on individual mining company should be studied.

The environmental problems of a country should be settled down by the country from direct and indirect effects on the political and social problems in the country.

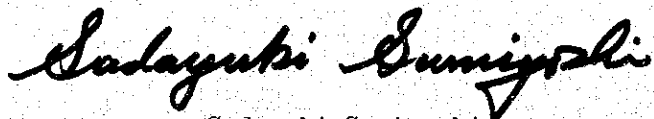
I will be very much pleased if this report would be of any help for the Philippines Government to study and examine the measure on the pollution problems of the mine tailings.

With submittance of this report I beg to transmit you that I could have so much cooperation favoured by the competent authorities and the people of the Philippines and Japan, particularly I could performed the drawing up of this report by the support of earnest assistance and active cooperation, above all by the people of Bureau of Mines of the Philippines Government who had given us the highest consideration at the survey field all throughout as well as the people of the relative six(6) mining companies, two(2) mining companies in the Cebu and Marinduque Island, Japanese Embassy in the Philippines, Japanese Ministry of Foreign Affairs, Ministry of International Trade and Industry and Metal Mining Agency of Japan.

I express you sincerely our thanks.

June, 1978 Tokyo

Yours very truly,



Sadayuki Sumiyoshi

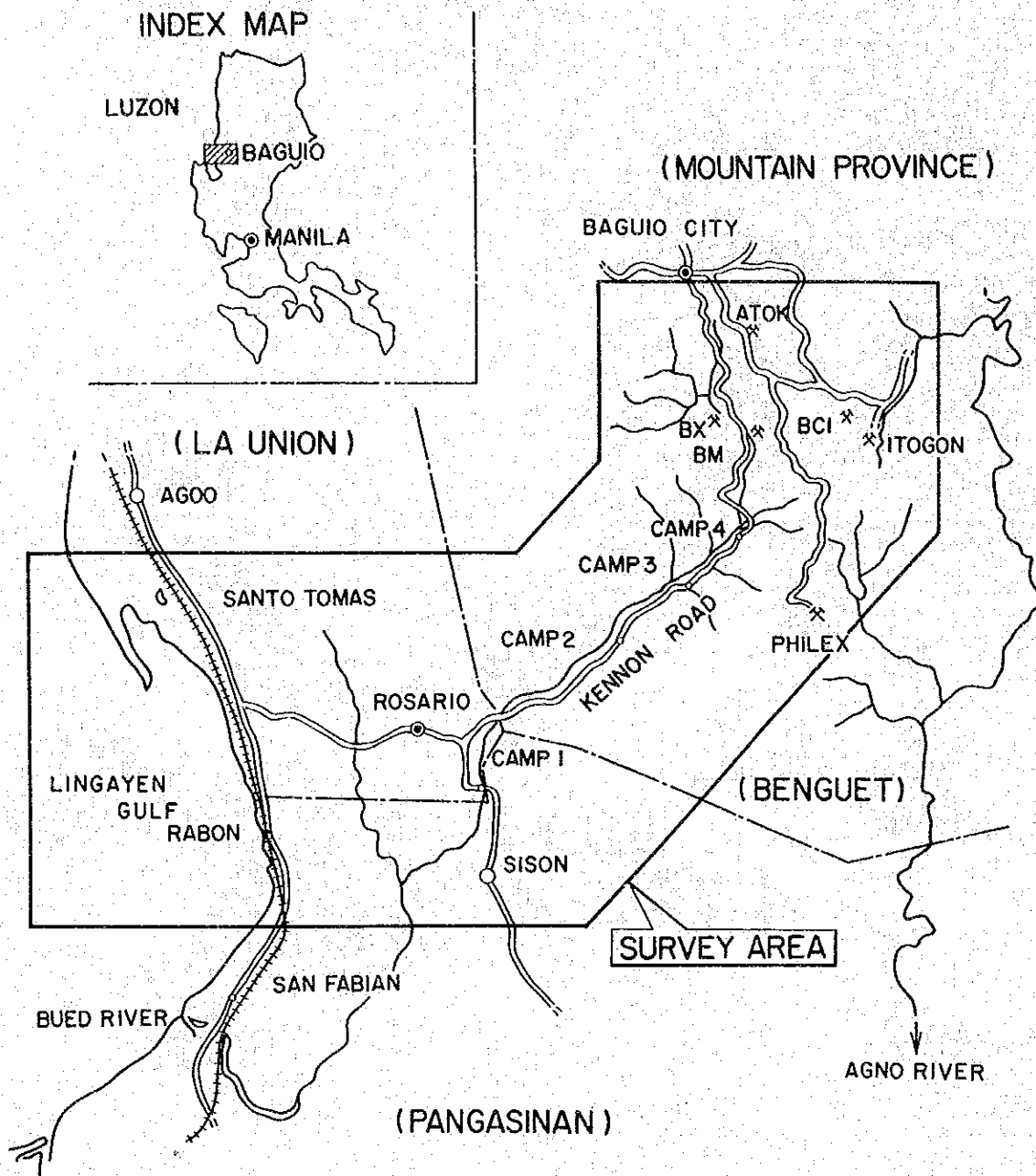
Representative director

Dowa Engineering Co., Ltd.

ORGANIZATIONS AND COMPANIES REFERRED TO IN THIS REPORT (AND DATA)

B.O.M.	Bureau of Mines, Philippines
N.P.C.C.	National Pollution Control Commission
N.E.P.C.	National Environmental Protection Council
N.E.D.A.	National Economic Development Authority
N.S.D.B.	National Science Development Board
D.N.R.	Department of Natural Resources
D.P.W.T.C.	Department of Public Works, Transportation and Communication
N.I.A.	National Irrigation Administration
N.P.C.	National Power Corporation
J.E.M.	Japanese Embassy in Manila
JICA.M	Japan International Cooperation Agency, Manila office
M.M.A.M.	Metal Mining Agency (of Japan), Manila office
N.E.A.	National Electrification Administration
N.G.A.	National Grains Authority
D.A.B.S.	Department of Agriculture, Bureau of Soils
F.C.C.	Flood Control Commission
P.N.B.	Philippine National Bank
P.A.L.	Philippine Air Lines
Atlas	Atlas Consolidated Mining and Development Corporation
Atok	Atok Big Wedge Mining Company, Inc.
B.C.I.	Benguet Consolidated, Inc.
B.X.	Benguet Exploration, Inc.
B.M.I.	Black Mountain, Inc.
C.M.I.	Consolidated Mines, Inc. (Ino Copper Project)
Itogon	Itogon-Suyoc Mines, Inc. (Itogon District)
Marcopper	Marcopper Mining Corporation
Philex	Philex Mining Corporation

LOCATION MAP OF SURVEY AREA



0 10 20 km

PHOTOGRAPHS OF TLPS ROUTE

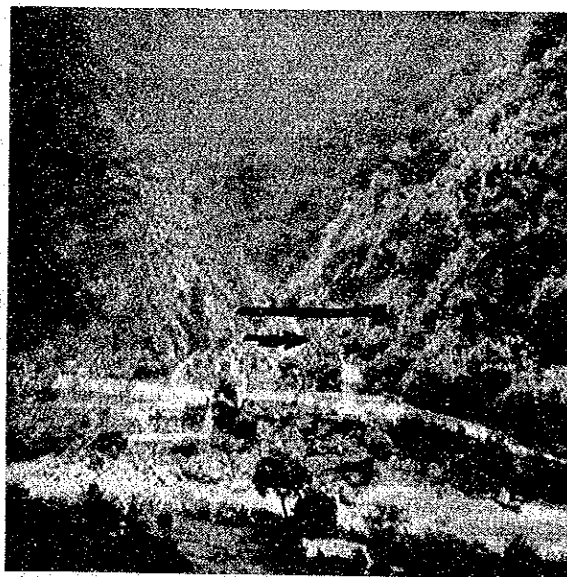
- Photo. 1 View at Camp 4. Dotted mark is the proposed starting point of the common line of the TLP System and also the connecting point of the feeder lines from the six (6) mining companies.
- Photo. 2 View at Camp 2 showing the proposed route of the launder crossing Pellmell creek connecting the tunnels on both sides.
- Photo. 3 Proposed route of launder line at Barrio Bimbecqueg crossing the farm land towards Lingayen Gulf.
- Photo. 4 Proposed route of launder line crossing the Apangat River. The arrow shows the direction towards the sea.
- Photo. 5 A view of the discharge point of the TLP System in Rabon on the Lingayen Gulf. Background is the proposed reclamation area.



Camp 4, Starting point of common line

Point. A

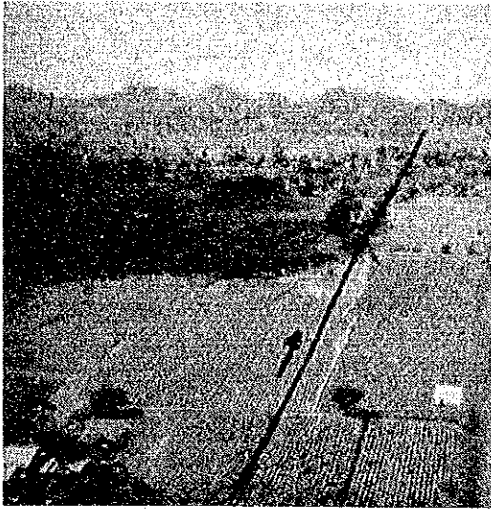
Photo 1



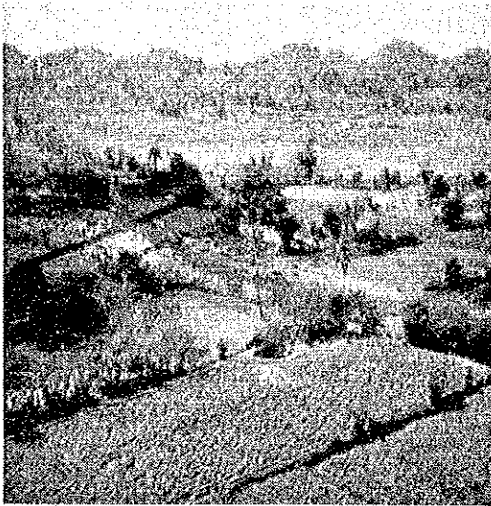
Mountainous Area

Point. G ~ Point. H

Photo 2



Field between
Point. M ~ Point. N
Photo 3



(North Route)
Crossing Apangat River
Photo 4



Rabon and Lingayen Gulf
Point. Q
Photo 5

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