

1984年10月1日現在までの実施状況について報告する。

1. 1984年度の実施状況

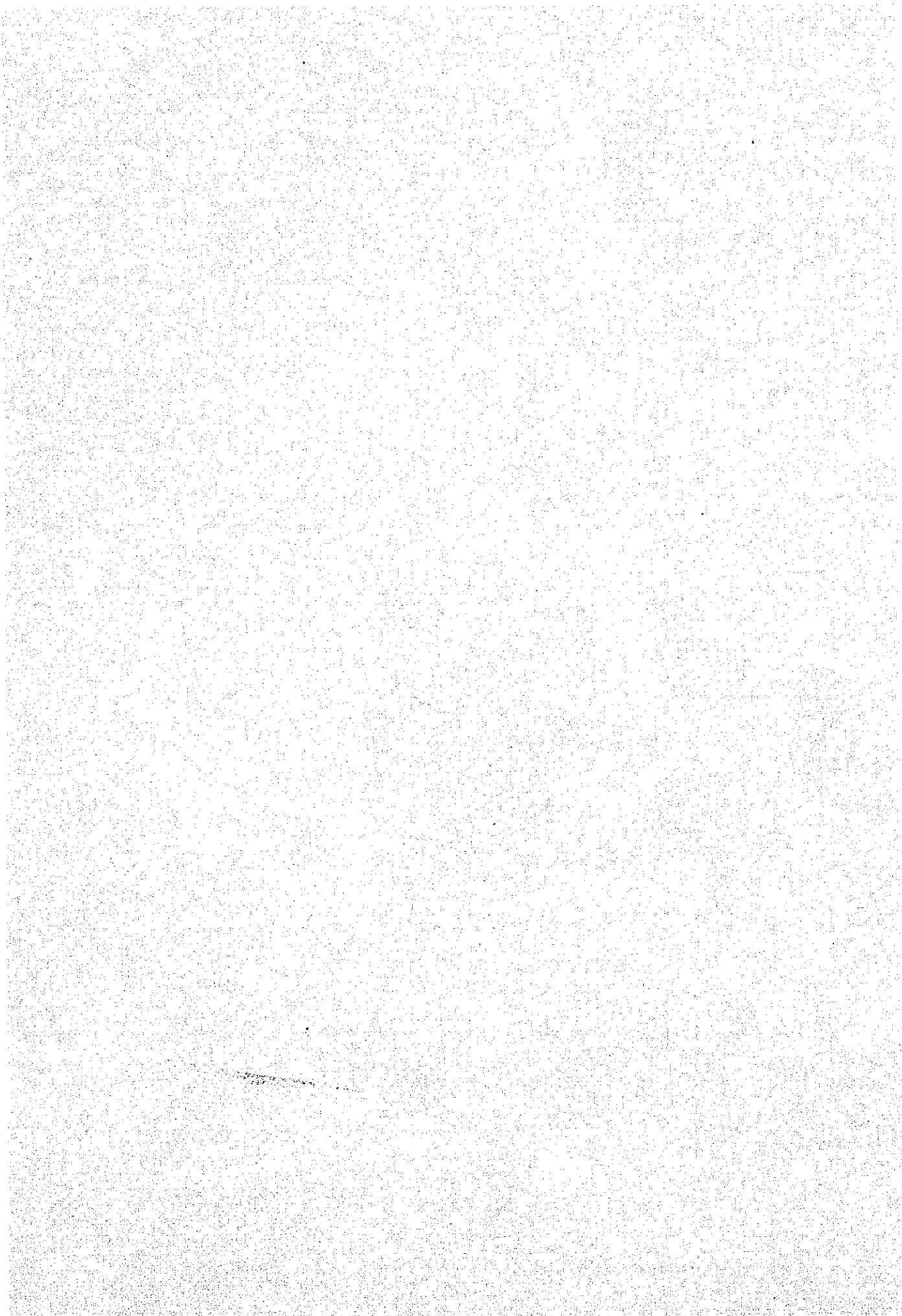
1.1 1984年度の実施状況

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1984

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THE LAO PEOPLE'S DEMOCRATIC REPUBLIC

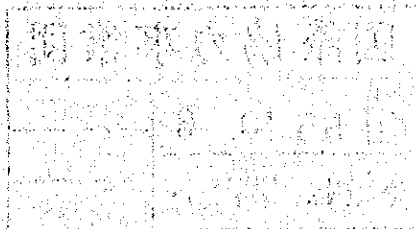
***REPORT ON THE BASIC DESIGN STUDY
FOR
REPAIR OF NAM NGUM DAM POWER STATION***

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July 1980



JAPAN INTERNATIONAL COOPERATION AGENCY

TOKYO, JAPAN

国際協力事業団	
受入 月日	84.5.19
月日	55.10.0
登録No.	05201
	SDS

PREFACE

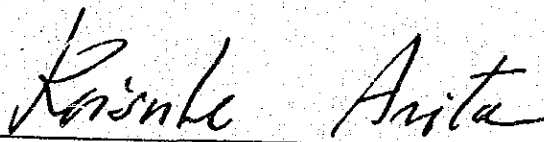
In response to the request of the Government of the Lao People's Democratic Republic, the Japanese Government decided to conduct a Basic Design Study for Repair of the Nam Ngum Dam Power Station and entrusted this study to the Japan International Cooperation Agency. The J.I.C.A. sent to Laos a survey team headed by Mr. S. Ichikawa from May 19 to June 12, 1980.

The team exchanged views with the officials concerned of the Government of Laos and conducted thorough investigation, studies on the objects to be repaired, scheme of repair, etc. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will be helpful for the successful repair of the Nam Ngum Dam Power Station and may contribute to the promotion of friendly relations between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Lao People's Democratic Republic for their close cooperation extended to the team.

July, 1980.

A handwritten signature in dark ink, appearing to read 'Keisuke Arita', is written over a horizontal line.

Keisuke Arita
President

Japan International Cooperation Agency

REPORT ON THE BASIC DESIGN STUDY
FOR REPAIR OF NAM NGUM DAM POWER STATION

CONTENTS

SUMMARY	i
CHAPTER-I INTRODUCTION	1-1
1.1 Present State of Nam Ngum Power Station	1-1
1.2 Corrosion in Hydraulic Turbine	1-1
1.3 Neccessity of Repair of Hydraulic Turbines of No.1 and No.2 Generating Units.....	1-2
CHAPTER-II OBSERVATIONS OF NO.1 AND NO.2 GENERATING UNITS	2-1
2.1 Hydraulic Turbines	2-1
2.1.1 Specifications of Hydraulic Turbines	2-1
2.1.2 Outline of Observations	2-1
2.1.3 Observations by Components	2-1
2.2 Generators	2-4
2.2.1 Specifications of Generators	2-4
2.2.2 Outline of Observations	2-4
2.2.3 Observations by Components	2-4
2.3 Other Electrical Equipment	2-5
2.3.1 Object	2-5
2.3.2 Outline of Observations	2-5
2.3.3 Observations by Components	2-6
2.4 Waterway Facilities	2-7
2.4.1 Object	2-7
2.4.2 Outline of Observations	2-8
2.4.3 Observations by Components	2-8
CHAPTER-III REPAIR ITEMS	3-1
3.1 Purport	3-1

3.2	Classification of Repair Items	3-1
CHAPTER-IV	SCHEME OF REPAIR	4-1
CHAPTER-V	REPAIR SCHEDULE	5-1
5.1	Overall Schedule	5-1
5.2	Manufacturing Schedule	5-1
5.3	Transportation Period	5-1
5.4	Site Work Schedule	5-1
5.5	Site Manning Schedule	5-2
CHAPTER-VI	COST ESTIMATE	6-1
CHAPTER-VII	EFFECT OF REPAIR	7-1

APPENDIX-I NAMES OF EXPERTS AND COUNTERPARTS

APPENDIX-II NOMENCLATURE OF PARTS AND COMPONENTS OF
HYDRAULIC TURBINE

APPENDIX-III PHOTOGRAPHS

- PHOTO-1 Discharge Ring below Runner
(Unit No.2)
- PHOTO-2 Draft Tube Inside Air Pipe
(Unit No.2)
- PHOTO-3 Draft Tube Inside Wall
(Unit No.2)
- PHOTO-4 Crack below Air Pipe
(Unit No.2)
- PHOTO-5 Runner Vane (Unit No.1)
- PHOTO-6 Runner Cone (Unit No.1)
- PHOTO-7 Runner Cone and Runner Key seen
from below (Unit No.1)
- PHOTO-8 Shaft Seal seen from below
(Unit No.1)
- PHOTO-9 Inside of Spiral Case
(Unit No.2)
- PHOTO-10 Leading Edge and Surface Condition of
Stay Vane (Unit No.1)
- PHOTO-11 Loss of Metal between Stay Ring and
Bottom Ring
- PHOTO-12 Surface Condition of Stay Vane
(Unit No.1)
- PHOTO-13 Leading Edge of Guide Vane
(Unit No.1)
- PHOTO-14 Head Cover Fixing Bolt
(Unit No.2)

PHOTO-15 Head Cover Coupling Section
(Unit No.2)

PHOTO-16 Shaft Seal (Unit No.2)

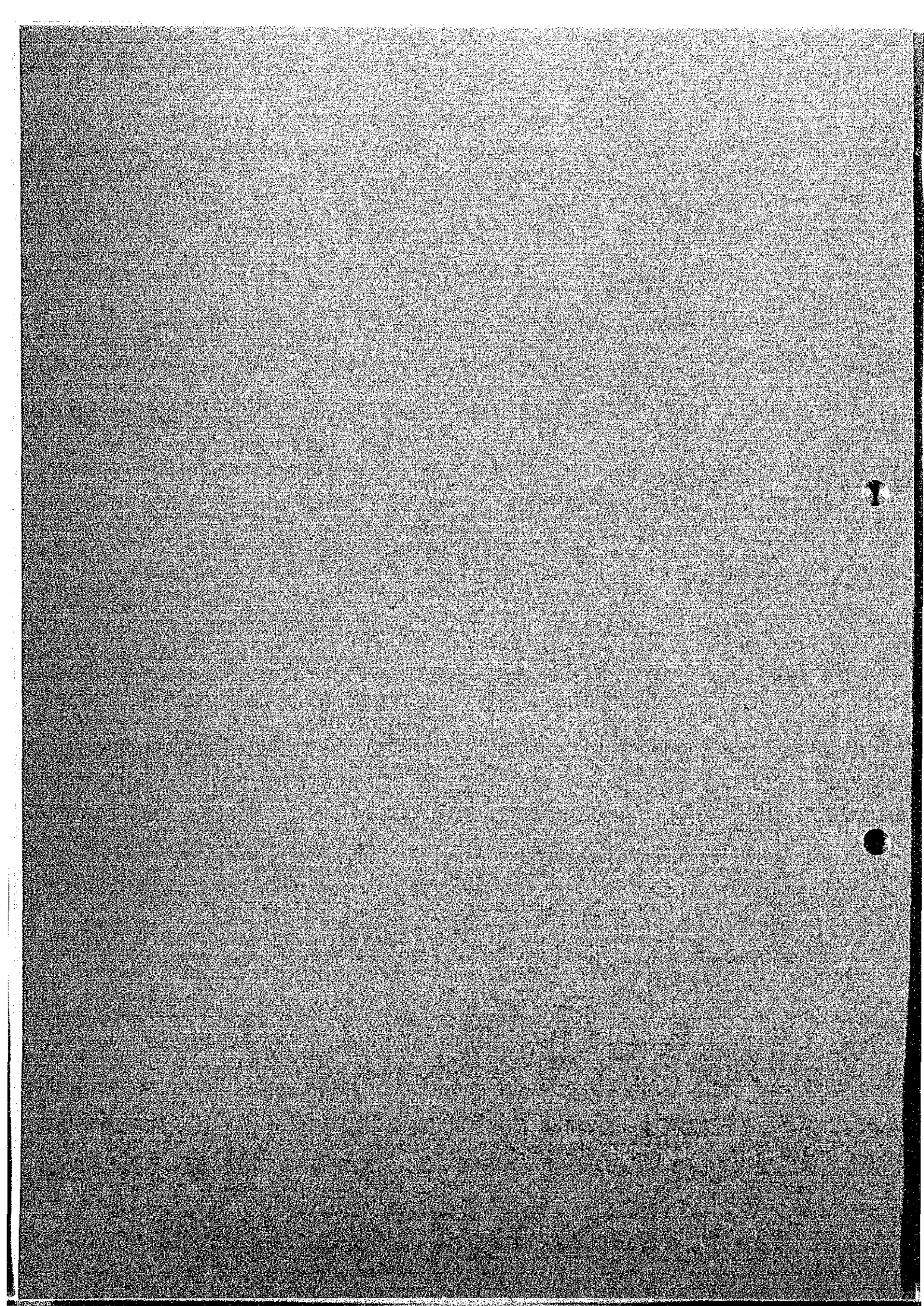
PHOTO-17 Inside of Governor Actuator
(Unit No.2)

PHOTO-18 Inside of Governor Actuator
(Unit No.2)

APPENDIX-IV DRAWING

Field Machining Plan

SUMMARY



SUMMARY

1. Hydraulic turbines of No.1 and No.2 generating units in the Nam Ngum Power Station have lost one of the elementary function due to corrosive characteristic of water in the Nam Ngum reservoir.

This corrosion inside the turbine has developed since the commencement of operation of the No.1 and No.2 units in February 1972. Technically it can be said that at present nothing is found to be susceptible of causing danger to the turbine operation within one year onwards even if the present continuous running at full output is to be maintained. It is eventually recommendable, however, to repair the turbines within an early stage.

2. After technical examination, it has been concluded that all of guide vanes which corroded to an excessive extent are to be replaced with stainless steel made guide vanes which are very resistant against corrosion. For the purpose of replacement of the existing corroded guide vanes with stainless steel ones, both the hydraulic turbines and the generators have to be overhauled completely. It would be very advantageous and meaningful for Laotian engineers and staff in the Nam Ngum Power Station to gain their experience concerning overhaul work for the first time because inspection of the generating equipment has never been executed by overhaul since commissioning of the Nam Ngum Power Station.

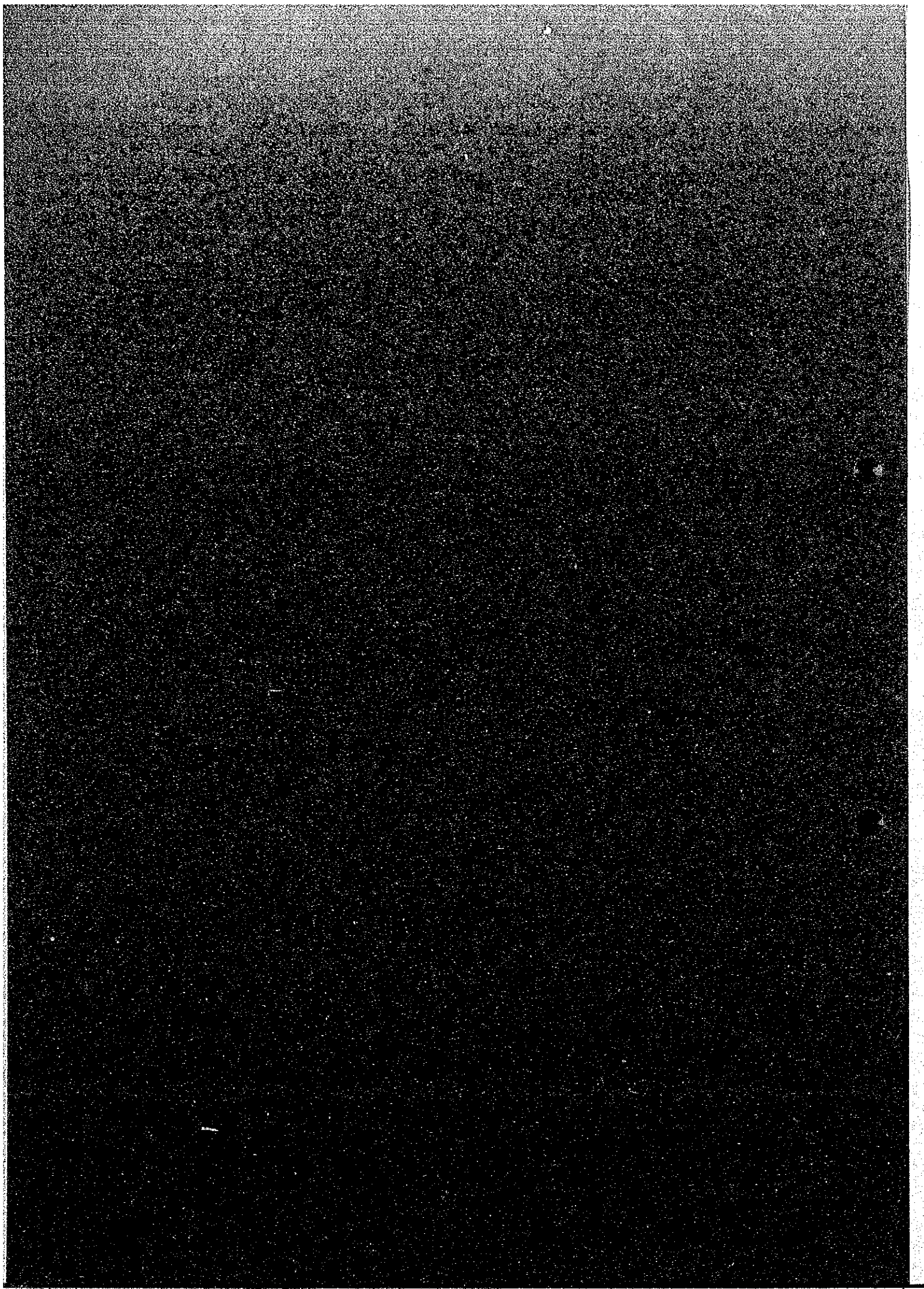
3. It will take a period of about nine (9) months for design and manufacture of the said guide vanes and other articles necessary for repair work. And the period for ocean transportation and inland transportation would be around two (2) months in view of actual results in case of the first stage and the second stage development. When the overall schedule of repair is tentatively established from October 1, 1980 to March 15, 1982, a period allocated to the field work becomes six and a half (6.5) months. Even though special regard will be paid to several particulars such as circumstances in the Nam Ngum Power Station, possible influence upon power system operation during stoppage of No.1 and No.2 units, probable restriction in mobilization of skillful technicians, execution of repair in this period of 6.5 months is considered sufficiently achievable and realistic.

4. Estimated costs for the repair are as follows:

	(x 1,000 Yen)
i) Design and manufacture of parts and components (including transportation)	260,000
ii) Despatch of personnel	130,000
iii) Local cost and general expenses	120,000
iv) Engineering cost	40,000
Total	<u>550,000</u>

5. After the existing guide vanes will have been replaced with stainless steel made ones, the anti-corrosive character against water will be drastically improved. Therefore, a large scale repair will not be needed for a period of 20 to 25 years even though the present operation pattern of the Nam Ngum Power Station should continue for a long time in the future.

CHAPTER-I
INTRODUCTION



CHAPTER-I INTRODUCTION

1.1 Present state of Nam Ngum Power Station

Construction of the Nam Ngum Power Station was executed in two stages. In the first stage development, dam, power house, waterway facilities and generating equipment (No.1 and No.2 units having 15,000 KW each) were constructed and installed with fund contributed by nine countries including Japan and administrated by International Bank for Reconstruction and Development (IBRD). And, the first stage development was completed in February 1972. Extension of the power house, waterway facility and generating equipment (No.3 and No.4 units having 50,000 KW each) was completed in 1978 under the second stage development which had been accomplished with loan of the Government of Japan, Asian Development Bank (ADB), etc.

Since completion of both stages, the Nam Ngum Power Station has been continuously operated 24 hours a day under full output condition by utilization of its abundant reservoir water to supply electric energy to consumers in Vientiane City and in northeastern zone in Thailand. It is worthy of special mention that a bulky energy is being exported from Laos to Thailand. Then, Laos gains a fairly amount of foreign currency from Thailand through this energy export.

1.2 Corrosion in Hydraulic Turbines

Impoundment of the Nam Ngum Reservoir which has a gross capacity of about 7.2 billion cubic meters was started prior to deforestation. It has been judged that decay of many plants under water caused generation of hydrogen sulfide. This hydrogen sulfide dissolves in reservoir water which has eventually corrosive characteristic against steel. In fact, corrosion inside the hydraulic turbine had been observed within less than one year after completion of the first stage development.

Principal purpose of investigation executed this time was to observe the present extent of the corrosion and to presume a tendency in progress of the corrosion with lapse of time.

Although results of the investigation are detailed in CHAPTER II of

this report, it is given as a conclusion that rate of progress of the corrosion itself is now stagnant. However, extent of the corrosion is so severe that the repair should have to be done within an early stage.

1.3 Necessity of Repair of Hydraulic Turbines of No.1 and No.2

Units

It is judged that the hydraulic turbines will be serviceable without any technical apprehension even though the present operating condition should be continued for a period of about one year from now on. It is noted, however, that the water turbines do not stop even though guide vanes^{4.1} should close fully. In other word, the hydraulic turbines in the Nam Ngum Power Station have already lost one of their most fundamental functions. This means that appropriate repair is needed within an early stage. Besides the guide vanes of the hydraulic turbines, there were found several defective points which may cause a fatal accident or trouble if the repair would remain undone.

On the other hand, there may be other problem in portions which were not inspected this time because it was impossible to carry out partial disassembly of the generating equipment. A fact that periodical inspection had never been carried out throws a shadow of uneasiness on soundness of equipment condition.

It is strongly recommended to carry out a precise inspection on various parts of other equipment besides the hydraulic turbines in case overhaul will be done in order to make operation of power equipment more stable or sure in future. Fortunately, there was found out nothing particular in electrical equipment while insulation oil leakage of main transformer has to be stopped as early as possible.

^{4.1} As to technical term on hydraulic turbines, refer to APPENDIX-II for easy understanding.