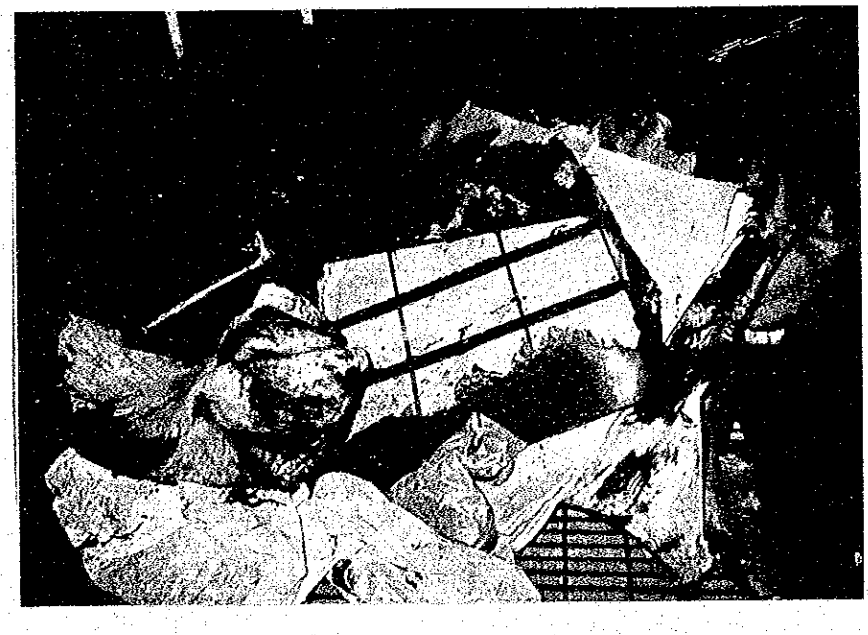
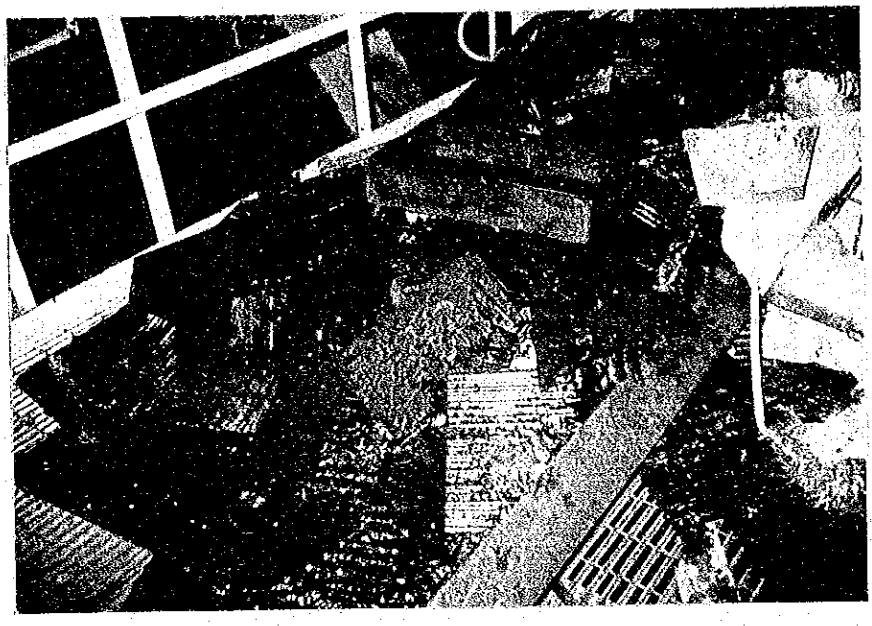
M - 2 Corroded lower portion of AH

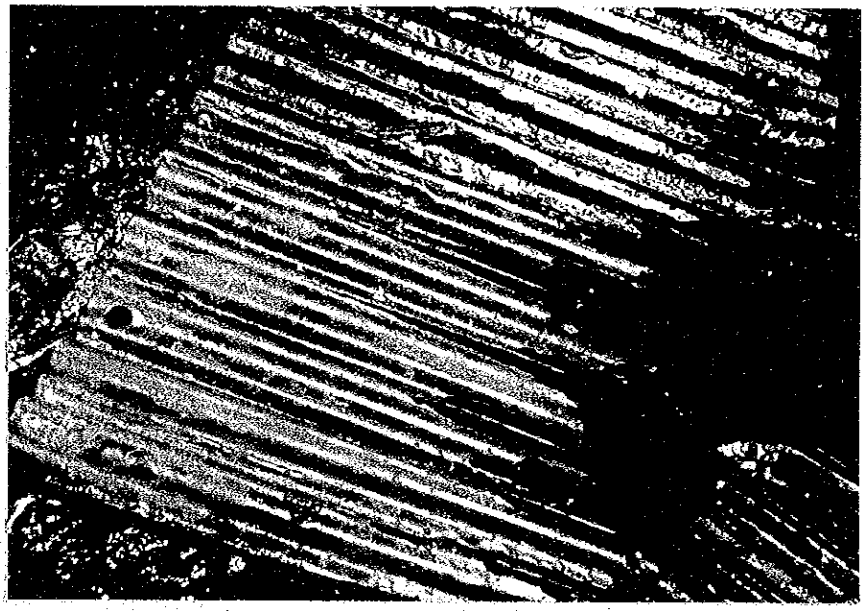
AH is seriously corroded due to poor combustion and defective steam coil air heater.



AH Washing
M - 2 Dropped out element bucket which was taken out from the ash hopper during shutdown for AH washing

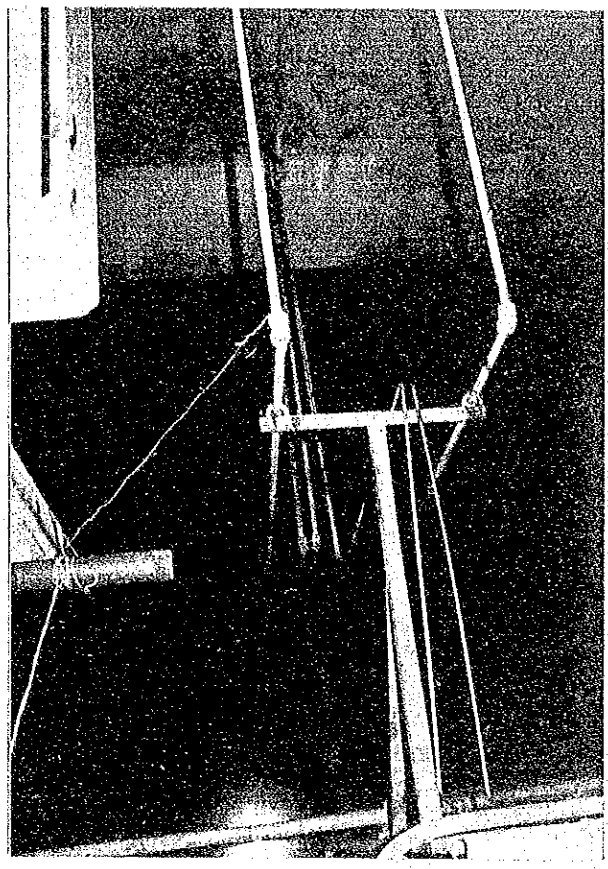
M - 2 AH cold and element - Enamel coated but corroded.





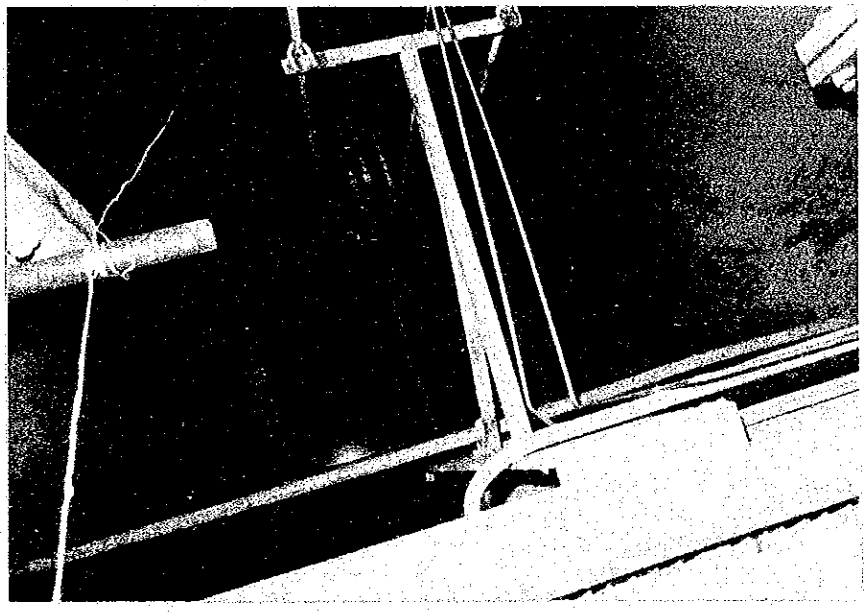
M - 2 AH COLD - END ELEMENT

M - 2 Sampling pump for condenser leak detector was submerged.



Condenser leak detector system protect the equipment from corrosion.

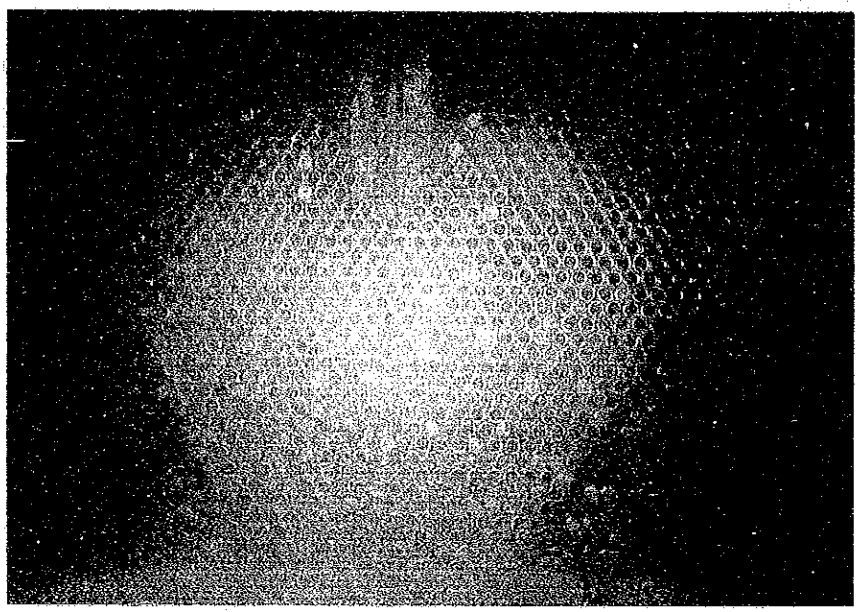
Corrosion of this system will eventually influence other equipment into corrosion .

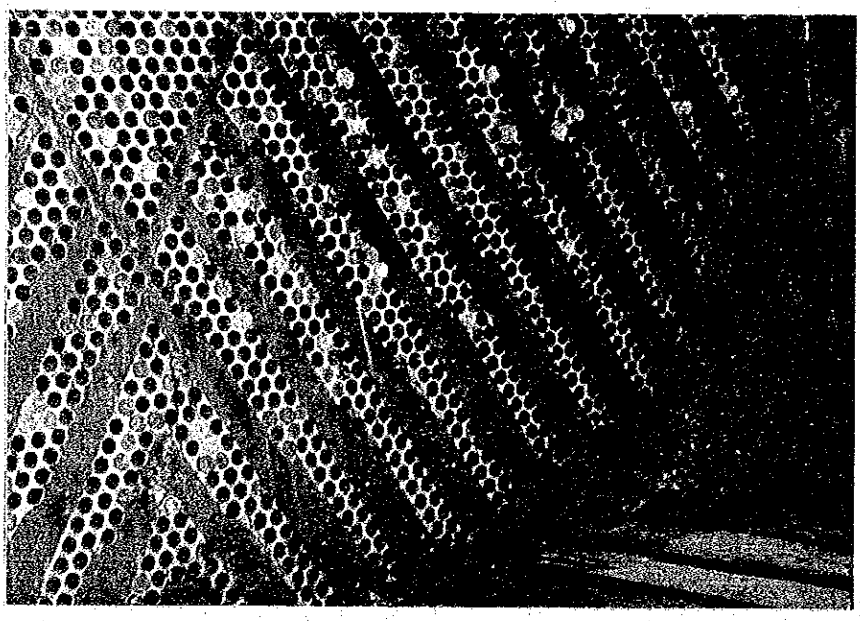


M - 2 Sampling
After draining, sampling equipment surfaced, but can not be used anymore.

M - 2 CONDENSER TUBE LEAK

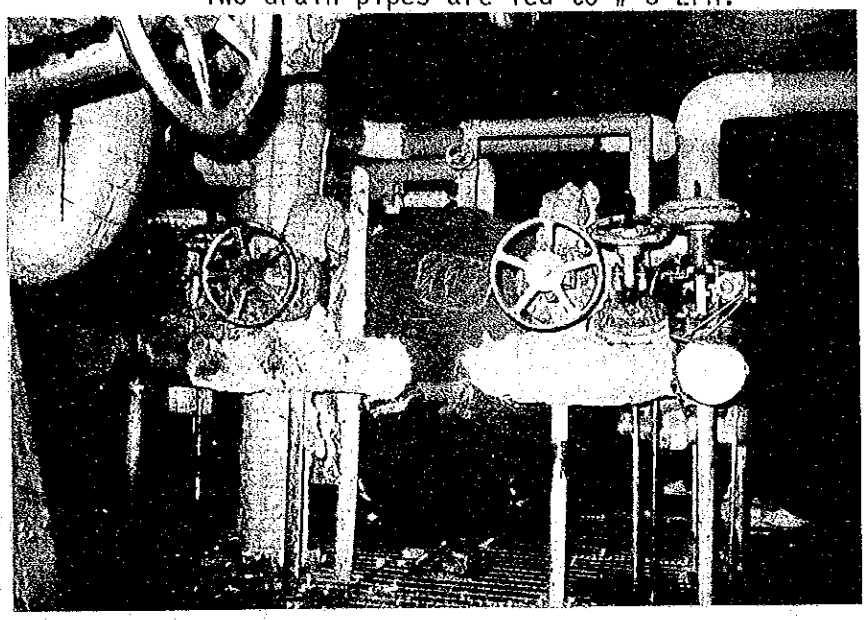
There are plenty of leaks on condenser tubes. Cause of this matter is not yet clear. But sampling of condensate water must be done during operation frequently and carefully.





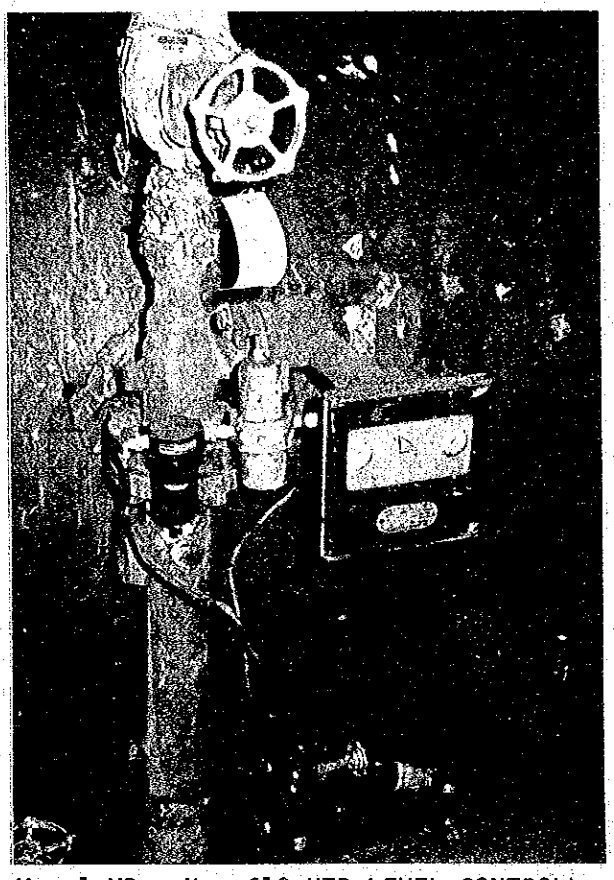
M - 2 CONDENSER (out side) There are some rust.

M - 1 LP - No. 3 HTR
Two drain pipes are led to # 3 LPH.



M - 1 There are plenty tube leaks on feed water heater

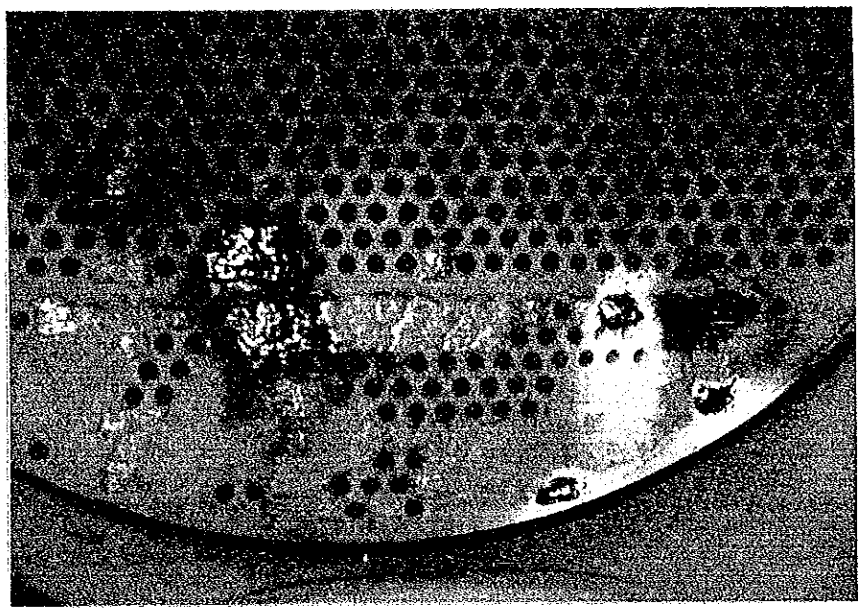
One of these causes, defective level control is pointed out.

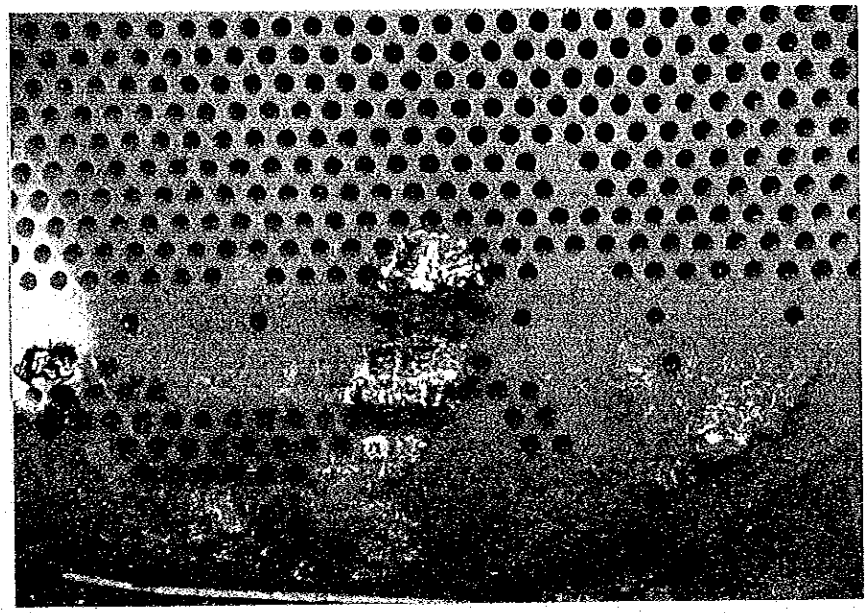


M - 1 MP - No. 613 HTR LEVEL CONTROLL
Defective level controller is isolated

Improper plugging is observed in this picture.
Rough surface causes corrosion probably.

M-1 HP - 5B Heater

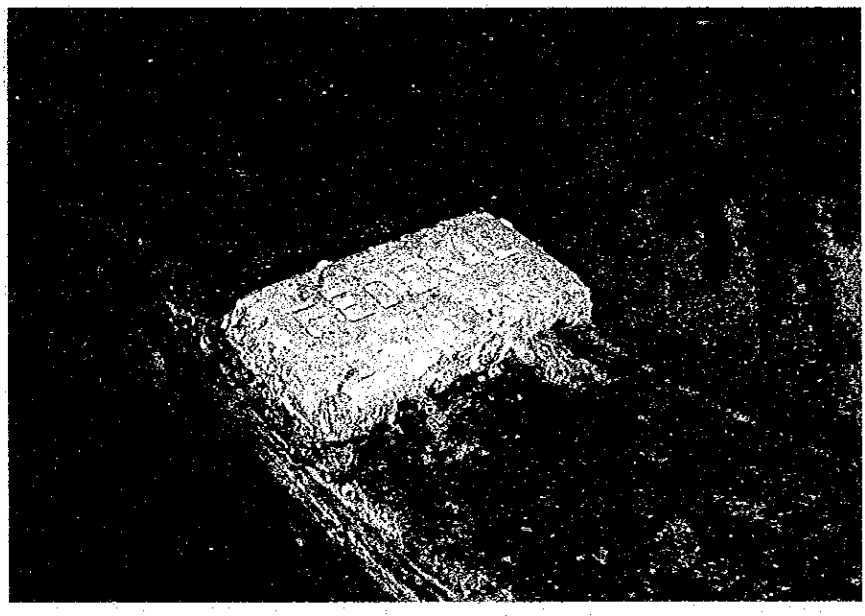




M-1 High Pressure - 5B Heater

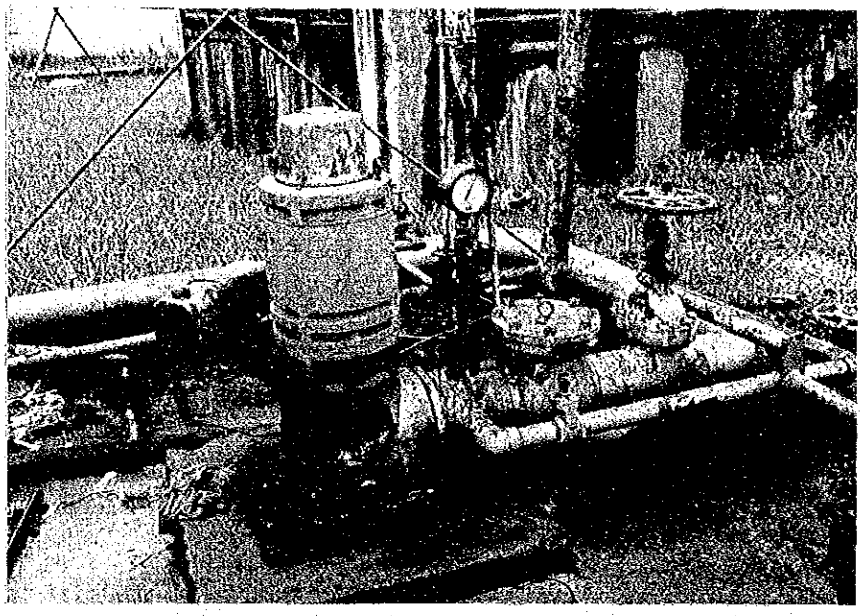
There is corrosion on water wall chamber. Needs painting.

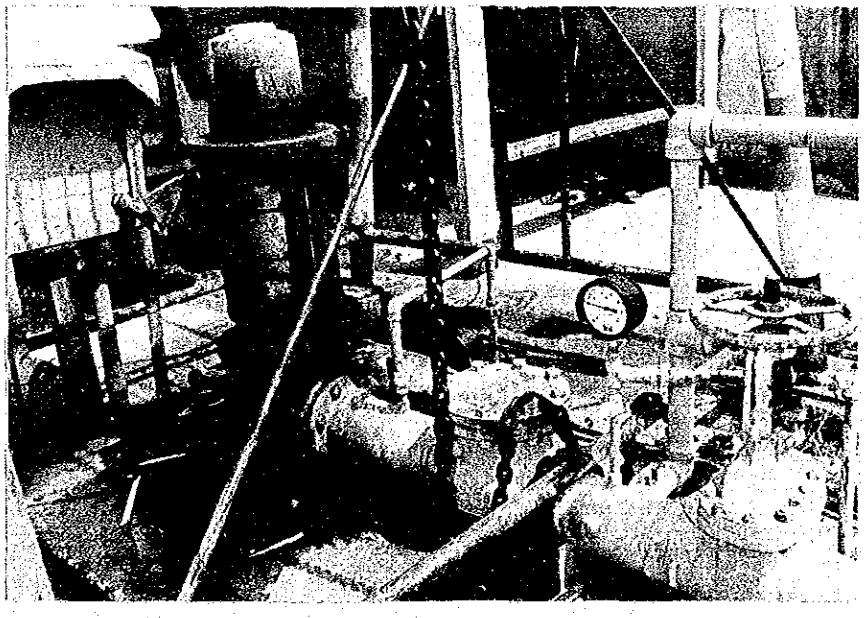
M-2 Water Chamber (Outlet side)



M-2 Heat Exchanger Zinc plate

Malaya is affected by water supply shortage. Three deep well pumps are running and one deep well is under construction. But water level is going low.

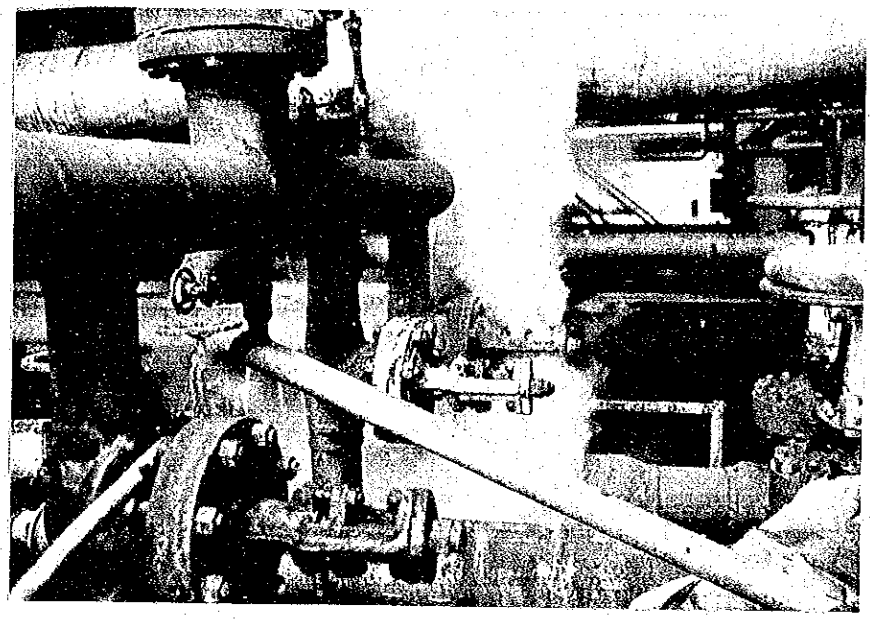


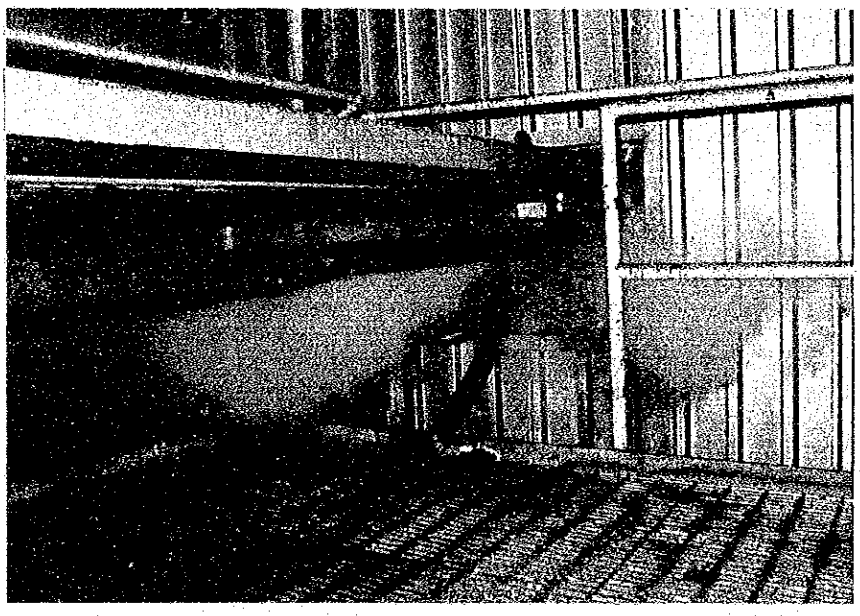


No. 2 Deep Well Pump - Dishcarge valve is slightly opened.

Inspite of water supply shortage, there are plenty of steam leaks which need immediate maintenance.

M-1 Steam leak at outdoor piping





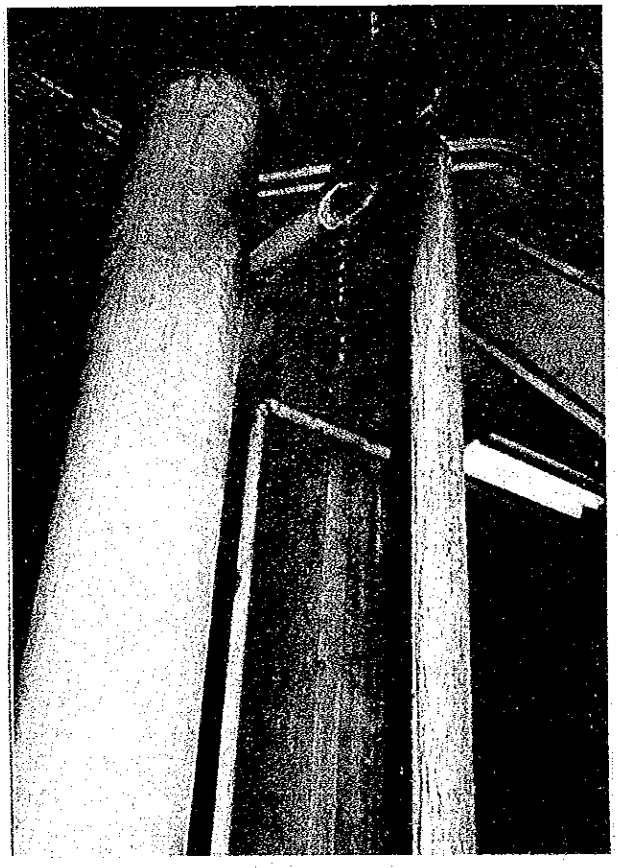
M-1 Sootblower

Steam leaks at soot blower

Broken Drain Funnel

There are plenty of leaks not only steam but also water.

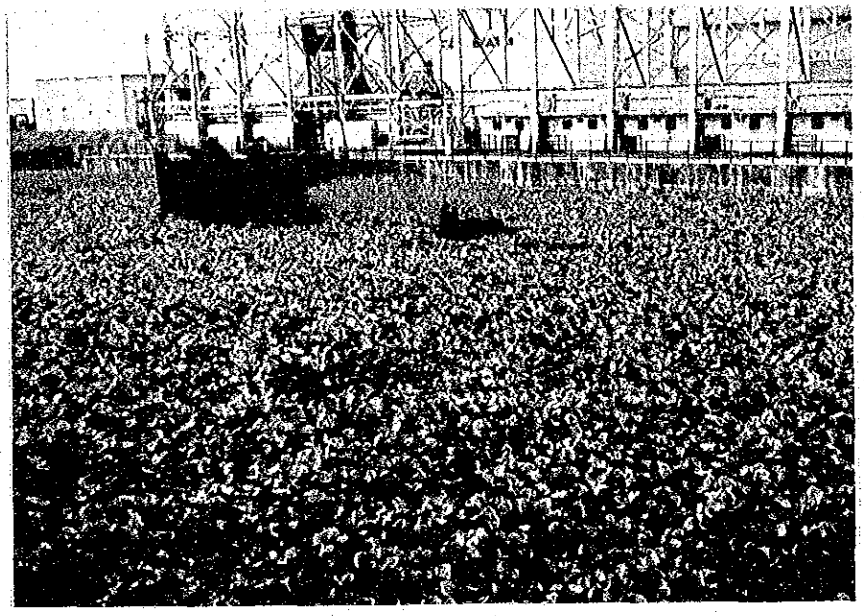
Water leaks attack and corrode equipment.

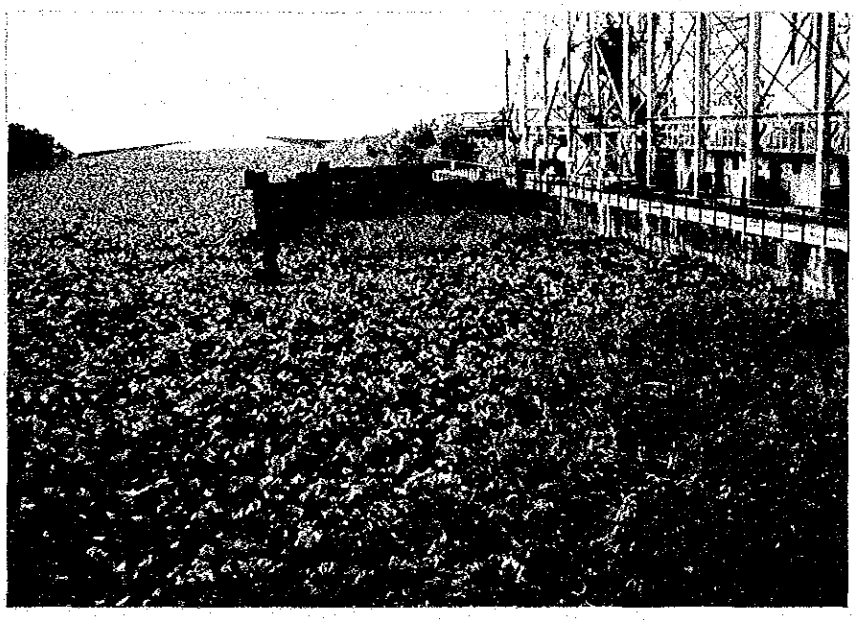


M-1 corroded water piping

Corroded water pipe

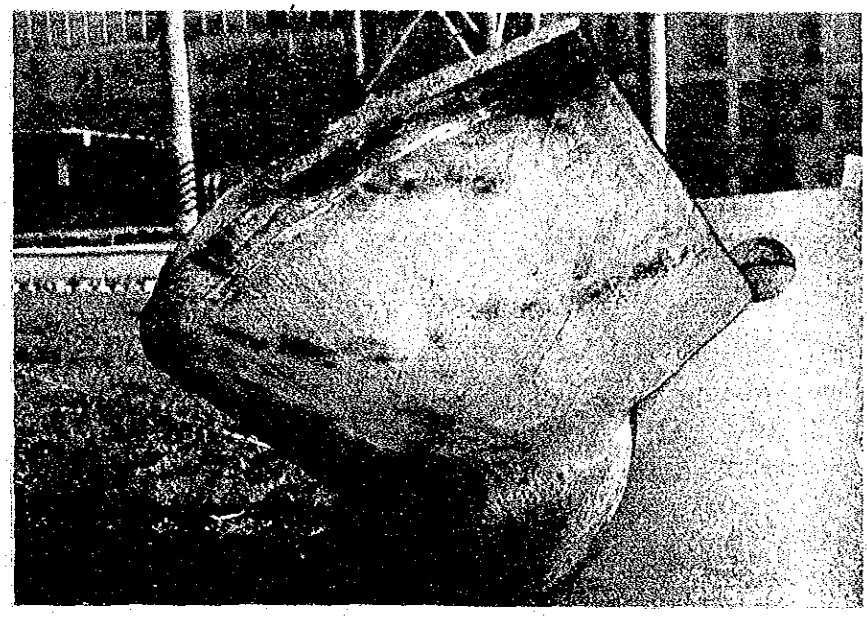
Circurating water intake, needs removal of water lilies.

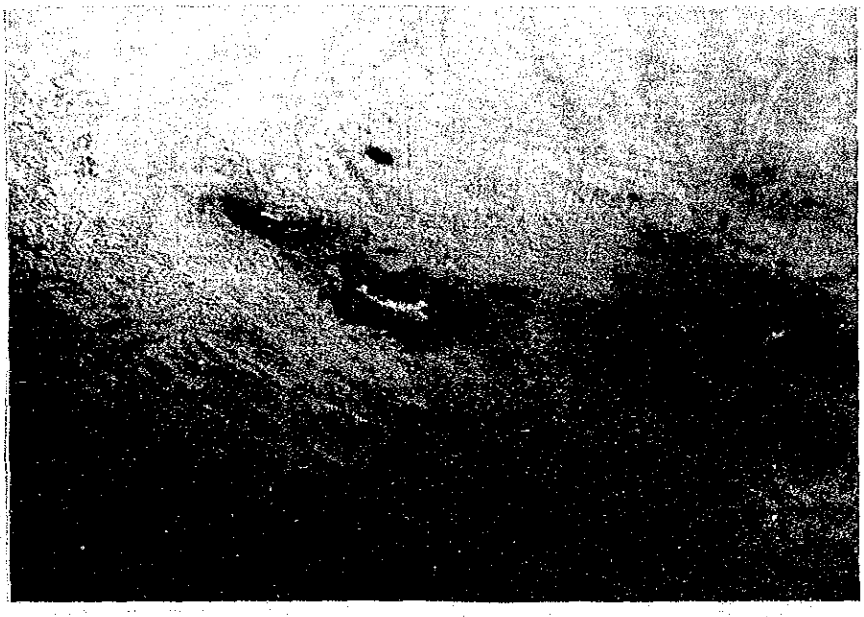




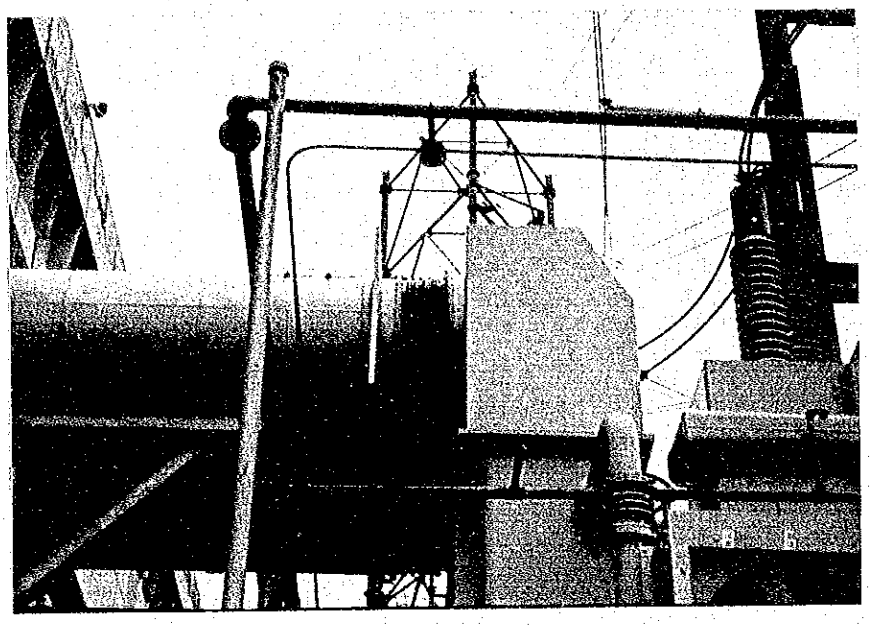
Water intake . There are plenty of water lilies

M-2 2A-CWP impellar
Stainless steel is corroded.



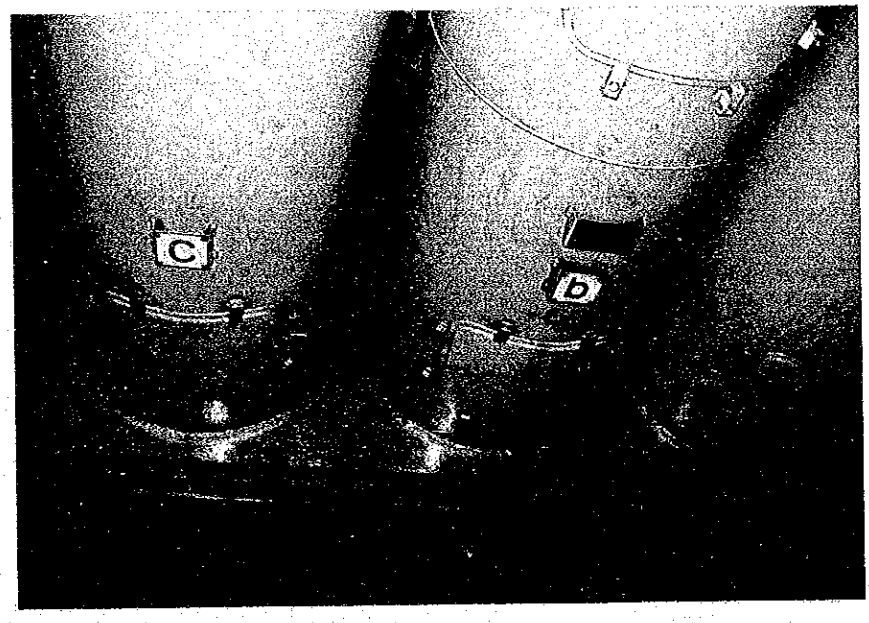


Enlarged view



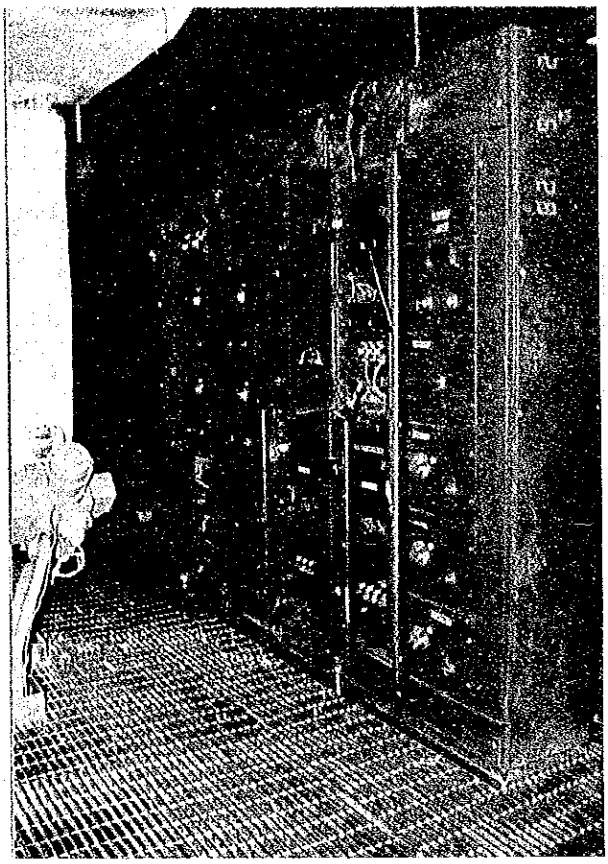
There is mis-alignment between the isolated phase bus and main transformer

M-1



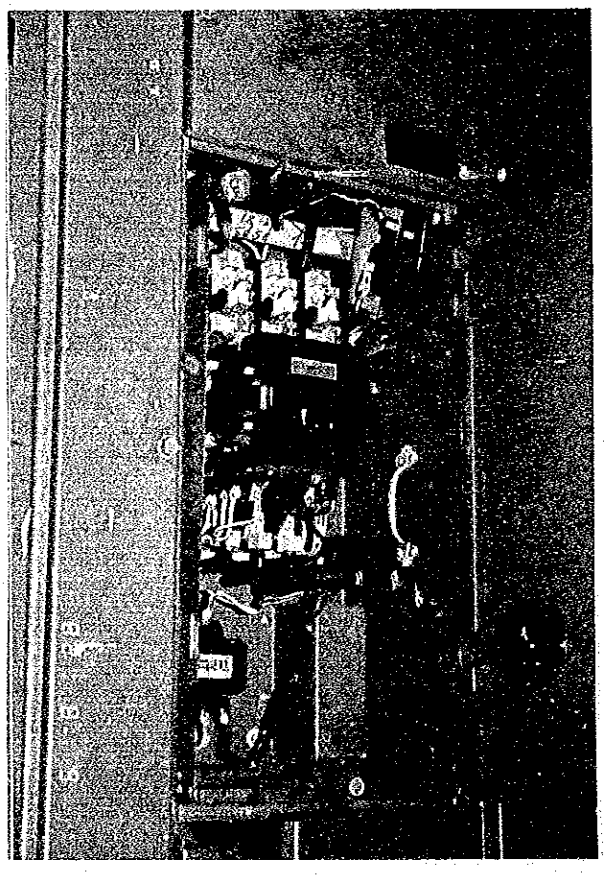
Oil leak is observed at generator bottom

M-1



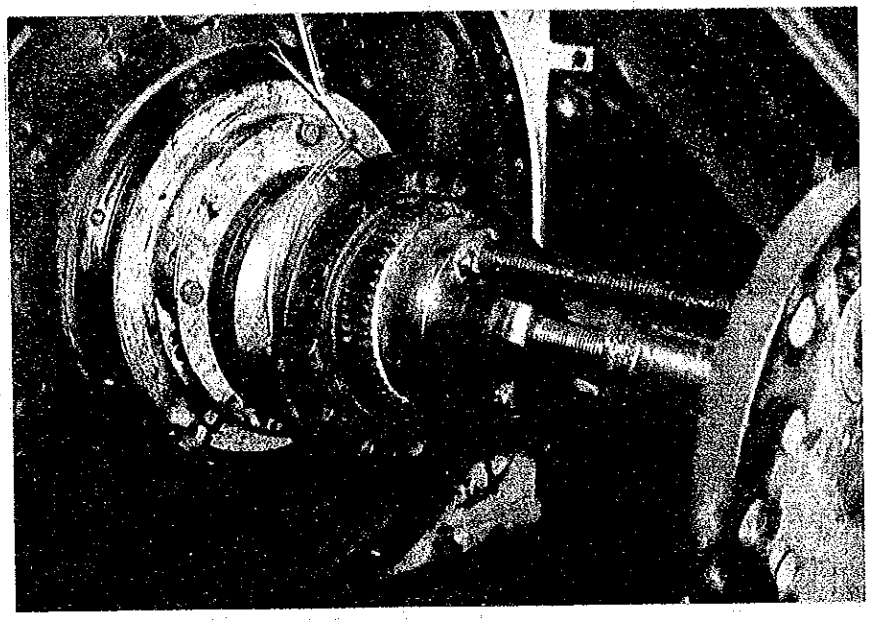
Dirty control center

M-1



Parts have been removed.

M-1



Drawing out of coupling gear using improper tools at T-BFP booster pump. Bolts are welded to the the coupling gear

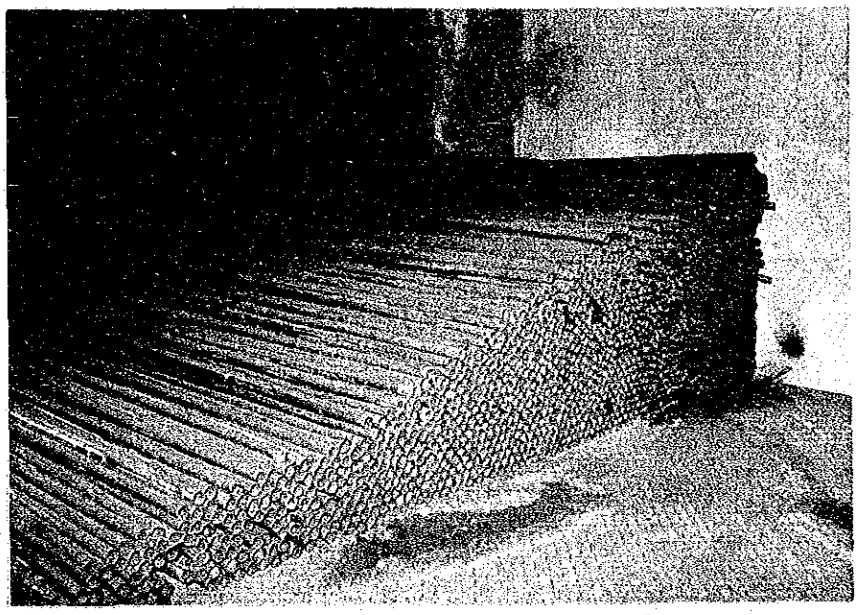
M-2

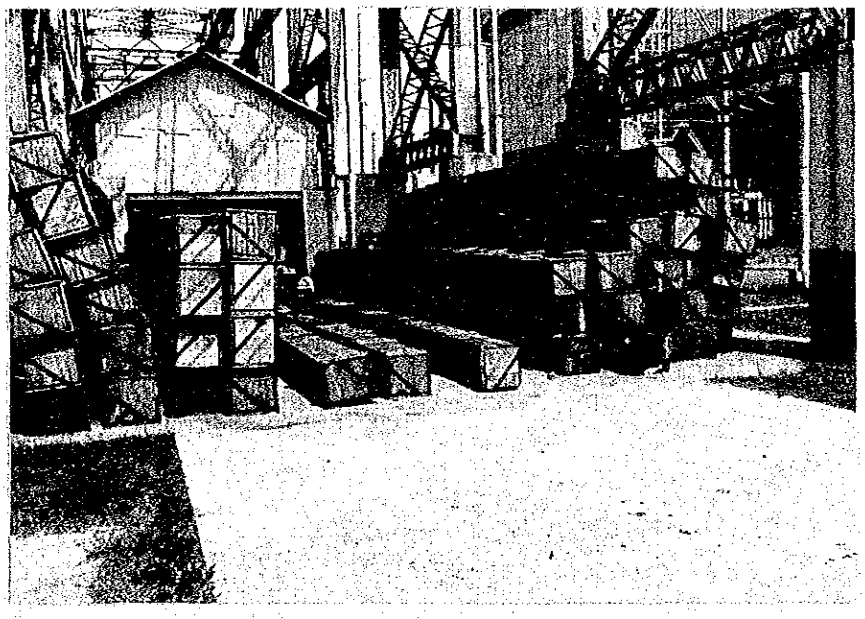
Drawing out of bearing inner race by improper tools

M-2

Poor management of spare parts is found such that new spares are left outside and turbine floor, and some of them are broken. Spare parts and materials are not properly arranged in the warehouse, unnecessary parts and equipments are being left behind.

M-2 Condenser Spare Tube

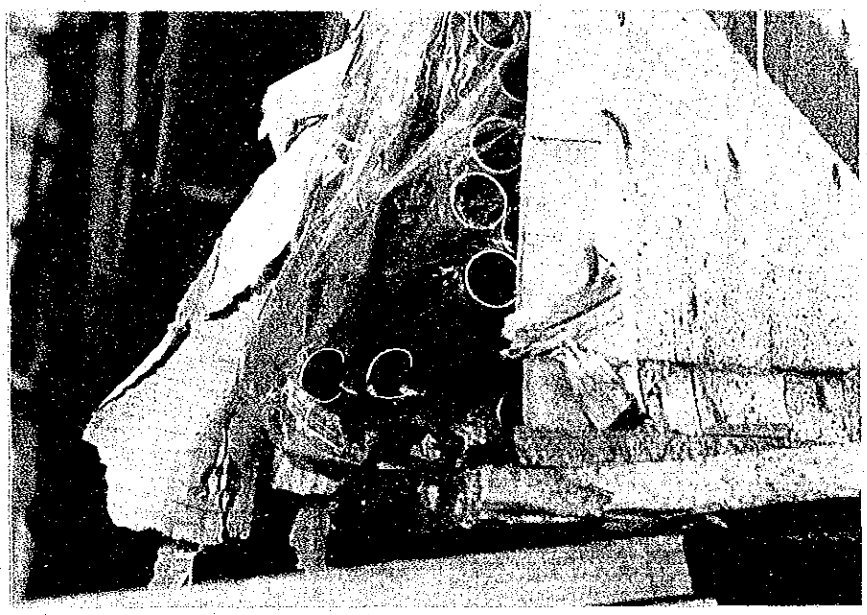


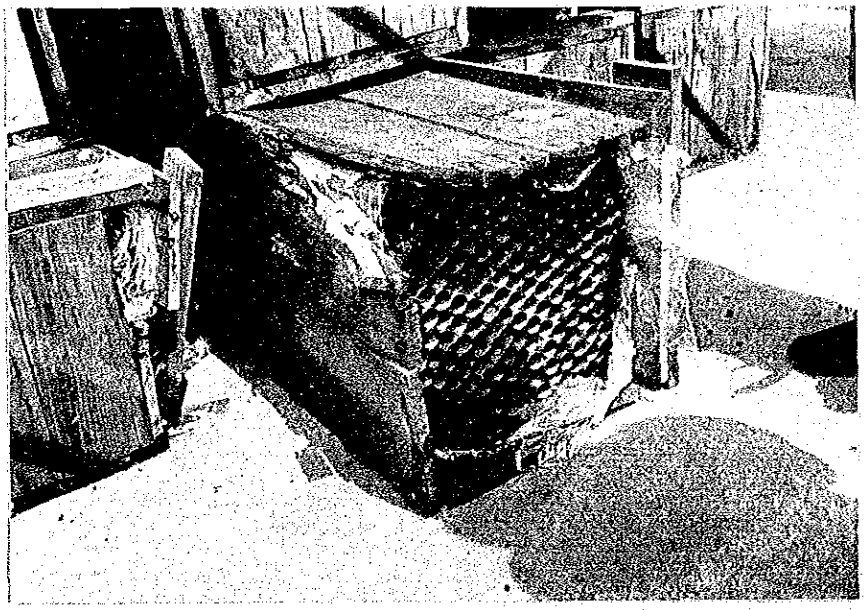


Intake Screen

M-2 spare condenser tube is left outside.

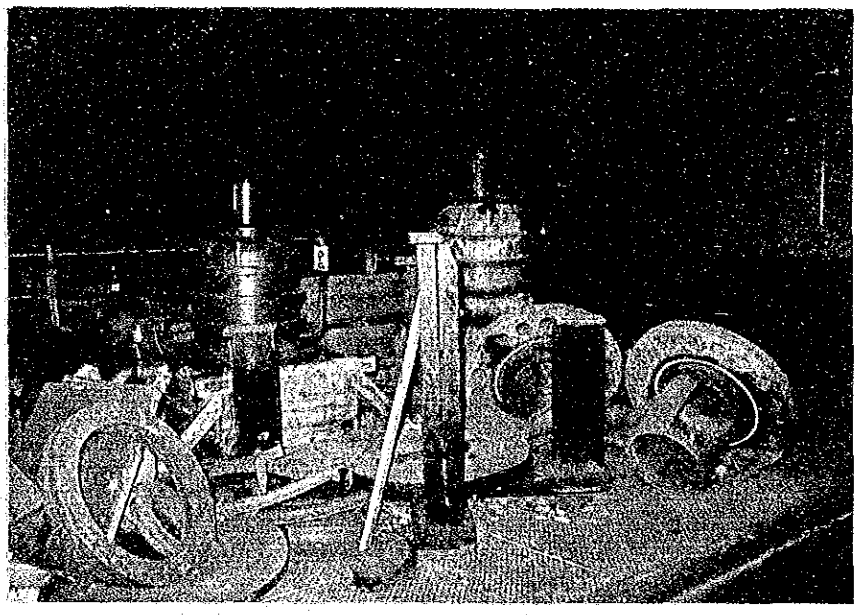
M-2 condenser spare tube.

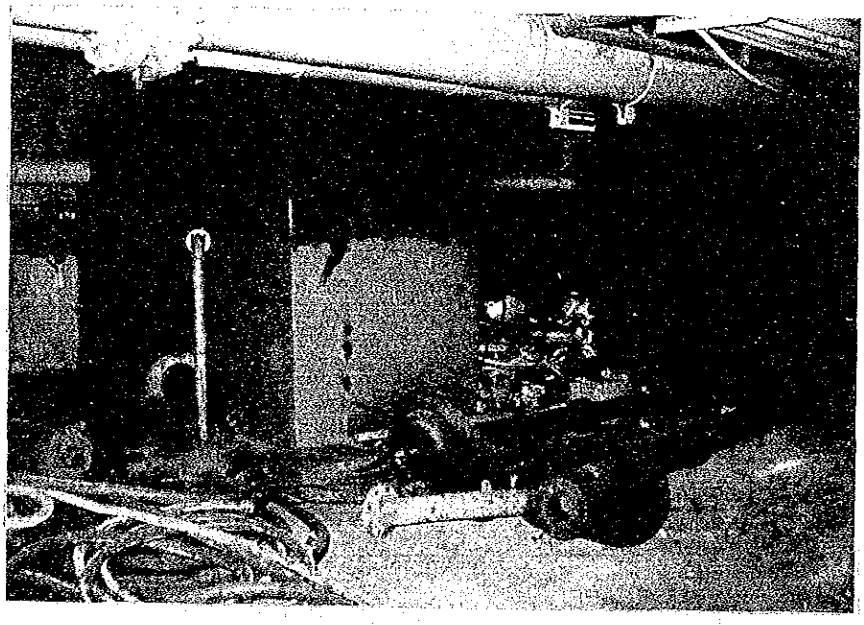




M-2 condenser spare tube.

Turbine floor is being used as warehouse.

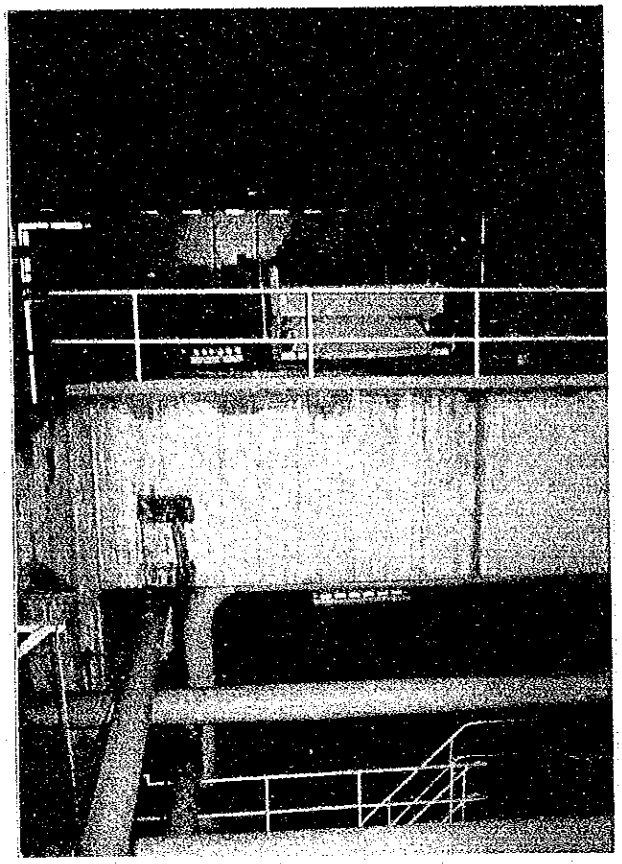




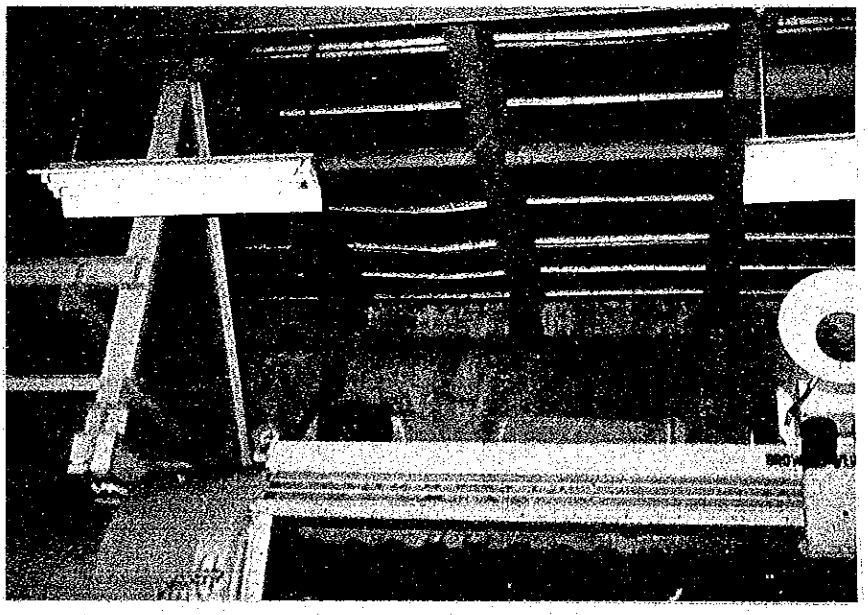
Auxiliary equipment room in which unusefull parts are being left.

Upper floor

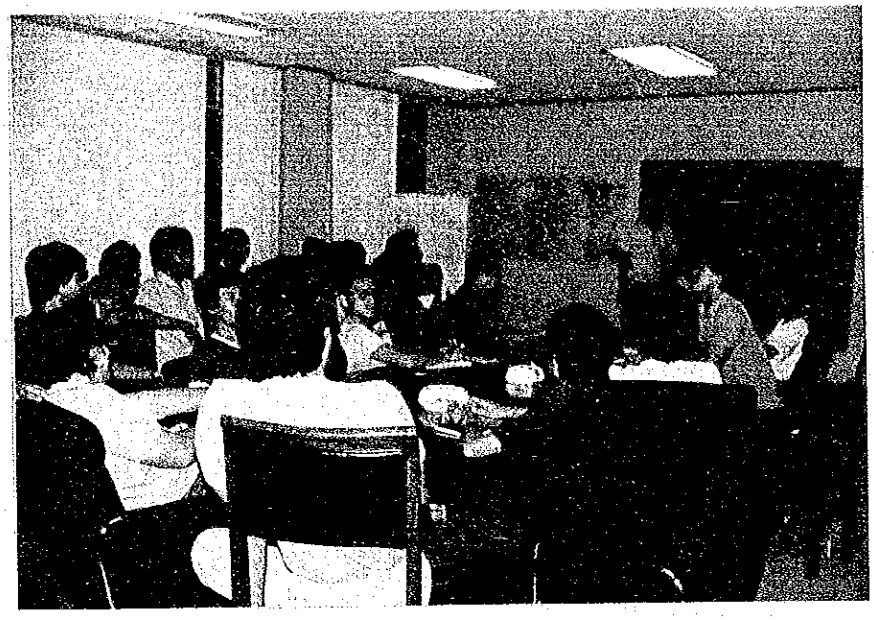
Turbine floor is partially sinking due to heavy spare equipment are stored.This is very dengerous condition.



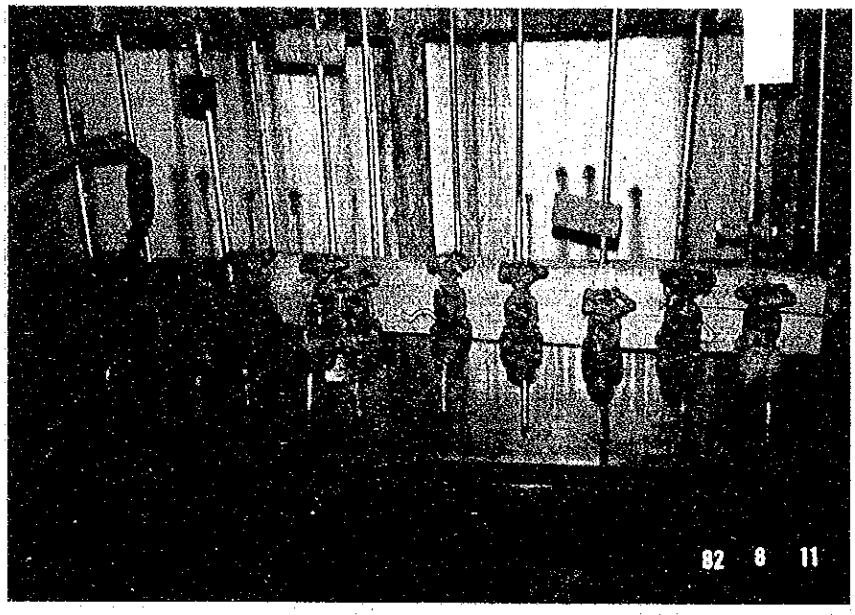
Beneath the floor.



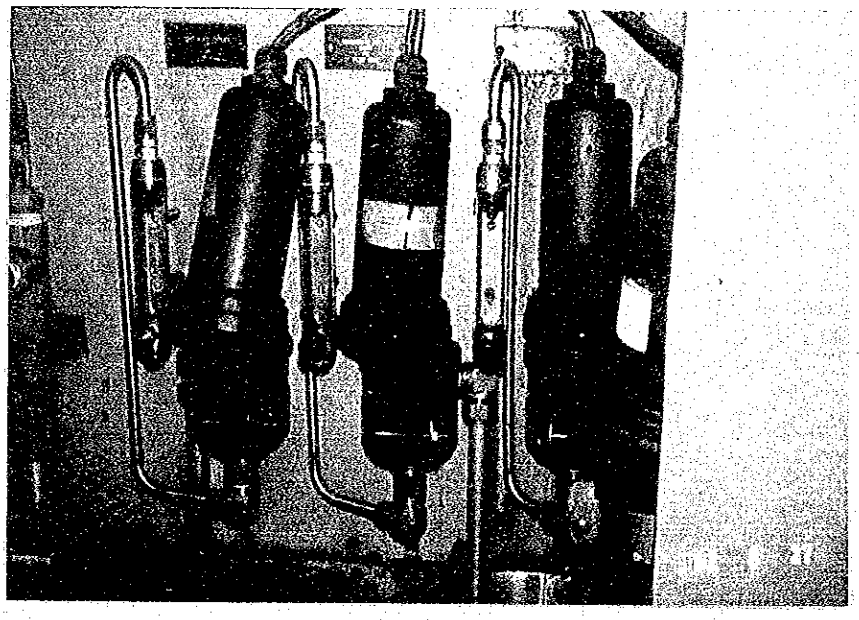
Above the isolated phase bus,floor is sinking.



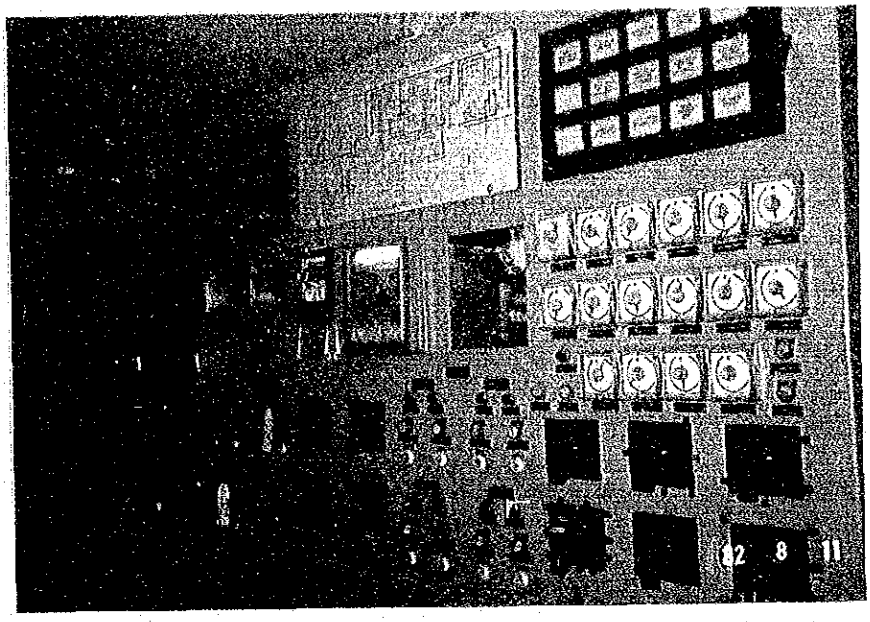
Lecture has been held everyday



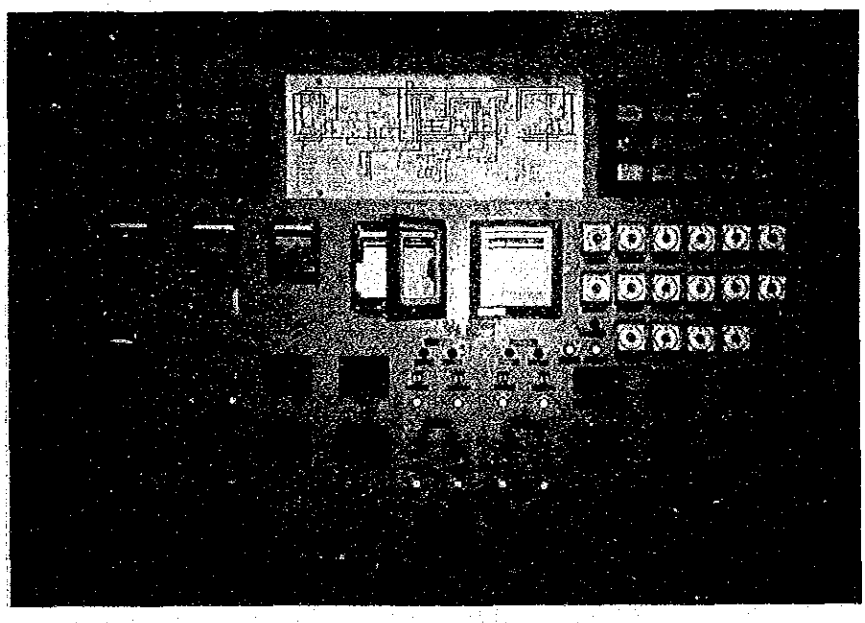
S-1 Sampling Rack



M-2 Sampling Rack
pH Detectors

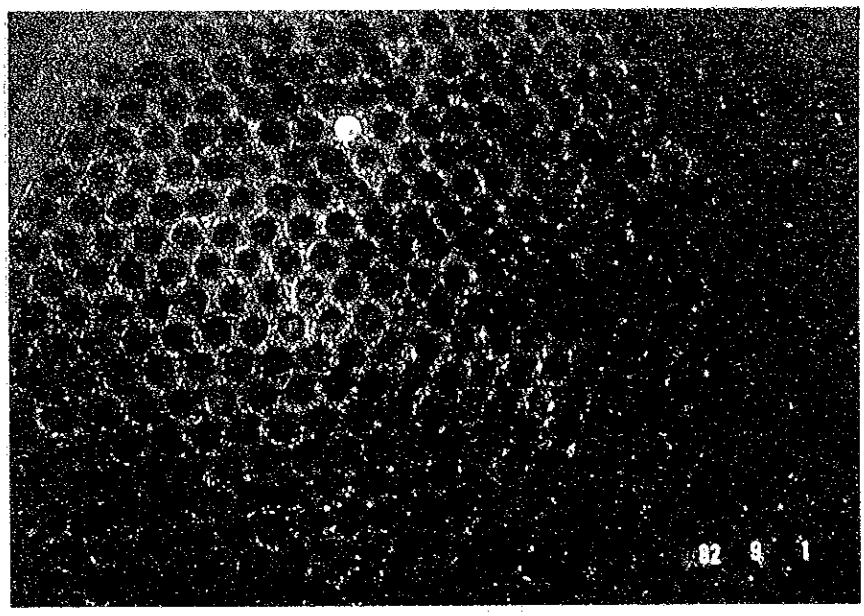


S-1 Ammonex Control Panel
Not working



M-1 Ammonex Contol Pane

Not working



M-2 Heat Exchanger

Plugged and corroded tube sheet

EXECUTIVE SUMMARY

The shortage of power supply in Luzon Grid has been very serious since January 1981, mainly caused by the short fall in the output capability and decline of reliability of the thermal power plants presently installed in Metro Manila area and suburb.

In order to cope with this critical situation, National Power Corporation (NAPOCOR) of the Philippines, solely responsible for power generation and transmission of electric power in the Philippines, launched a Rehabilitation Program to recover the output and reliability of the electric power stations in Metro Manila in August, 1979 and has been exerting his best and continuous efforts to improve the situation.

Knowing these earnest efforts, JICA team has been deeply impressed and felt much respect to the Philippine Government and NAPOCOR particularly.

Immediately after the completion of the preliminary survey by JICA in May, 1982, Minister G. Velasco of the Ministry of Energy of the Philippines has made another request to the Japanese Government for the dispatch of the survey team to proceed with the detailed survey and investigation of the thermal power plants concerned.

In response to this request, the survey team consisting of fourteen (14) experts has been dispatched to the Philippines through Japan International Cooperation Agency (JICA) in August and carried out the detailed survey from August 1 to September 30, 1982.

The findings of the Second JICA Survey team this time are as follows:

1. It is considered that the rehabilitation of the four (4) Power Plants, most especially the once-through units, namely: Gardner-2, Snyder-1 & -2, and Malaya-1 will be possible provided that the rehabilitation program will be carried out by NAPOCOR with strong and consistent effort in accordance with the recommendations/advices of the Second JICA team proposed this time as well as those in the preliminary survey done by the First JICA team.
2. The recovery of reliability and output will be possible if all the rehabilitation items are immediately and smoothly implemented in accordance with the detailed and definite rehabilitation schedule by NAPOCOR based on the recommended rehabilitation program by JICA team.
3. An outline of rough estimate concerning economical analysis will be given in the final report, however, JICA team considers that the completion of the rehabilitation program will provide adequate economical effects and gives sufficient feasibility enabling more stable power supply and much fuel saving.
4. It is anticipated that the cost, amounting to more than ₱430 million mostly consisting of foreign currency, will be needed for the realization of the program, however, the final estimate must be done on the basis of the detailed engineering of the program.
5. It seems necessary that some outside engineering consultant with high technical and engineering capability will be needed for the implementation of the rehabilitation program to meet the importance and urgency of the program.

6. It was found by JICA team that much effort is being exerted by NAPOCOR for the implementation of the rehabilitation program and reinforcement of the task force for the program are being done accordingly.

   JICA team understands that the organization of the rehabilitation program is one of the most important and essential factors for the successful completion of the program. Therefore, this effort by NAPOCOR is highly appreciated by JICA team.

7. It is a finding of JICA team that the training of the NAPOCOR personnel, both newly employed and existing people, shall be a very significant and important matter for the program.

   In view of these, JICA team recommends the establishment of the training center with thermal power plant simulator which will enable consistent and effective training of NAPOCOR personnel as early as possible.

JICA team, therefore, earnestly recommends to NAPOCOR the immediate start of the new rehabilitation program especially on the recommended items with ◎ marks followed by the implementation of the items with ○ mark presented in the Table 2-2 REHABILITATION ITEMS in the Report of this JICA Survey.

STUDY REPORT FOR REHABILITATION OF THERMAL POWER PLANTS
IN METRO MANILA IN THE REPUBLIC OF THE PHILIPPINES

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