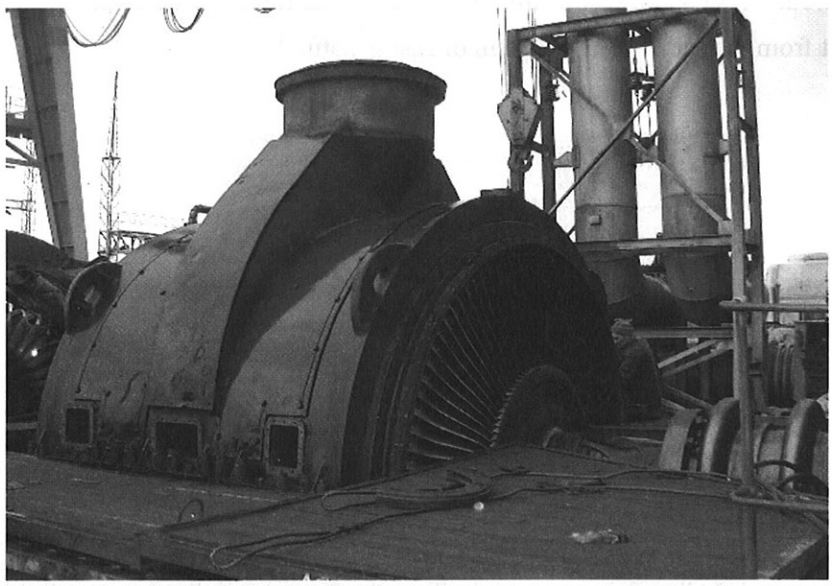
Additionally, there are holes in the condenser and heater tubes, due to aging and the lack of materials, which cause problems such as allowing the internal fluid to leak out. The staff of the DC "TASHTPP" plugs at both ends of these tubes when this occurs. The ratio of the plugged tubes to the total number of tubes is known as the plugging ratio, and when the plugging ratio exceeds the allowable value for the equipment, the heat exchange rate declines, causing a decrease in the condenser's vacuum level. Therefore, it is necessary to manage the plugging ratio and replace tubes as necessary so that the plugging ratio does not exceed the appropriate level. To prevent further decreased efficiency, it is very important that data is collected and analyzed during the next scheduled maintenance and that a planned replacement of tubes is carried out.

As Figure 5.1-5 shows, the turbine equipment is not indoor equipment, as is not common in Japan. The cover that covers the whole turbine has not been maintained, so the turbine casing is virtually exposed to the rain. The outdoor type of equipment has the merit of keeping construction costs down, but it is also susceptible to corrosion caused by rain during operation. There is also the possibility that foreign matter such as dust, which must be kept out of the turbine, may get into the equipment. This type of installation is too harsh for precision equipment such as turbines. Because the equipment is taken apart during scheduled maintenance, if this work is performed outdoors more stringent procedures than usual must be followed. As can be seen from Picture 5.1-5, the turbine, one of the most important facilities, is wet from the rain. The problem of rust is naturally a concern.

Picture 5.1-3 Condenser Vacuum Ejector

Picture 5.1-4 Turbine Cover

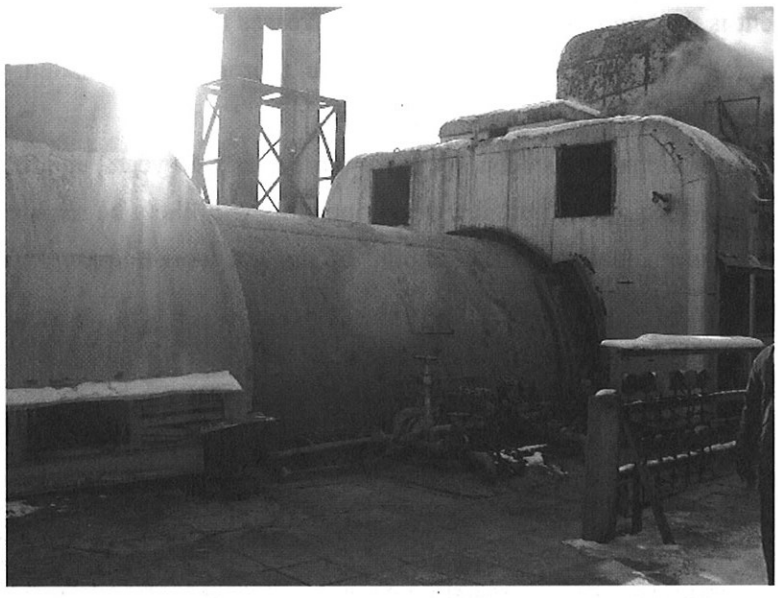


Picture 5.1-5 Outdoor Work Being Performed on a Turbine Casing

5.1.4 Electrical Equipment

On many occasions, unit shutdowns have been caused by electrical equipment failures. However, no failures have been reported to have been caused by hydrogen cooled generator or other hydrogen generating equipment. As shown in Figure 5.1-2, the number of shutdowns

caused by electrical equipment is far lower than the number caused by mechanical equipment. Like the other facilities, the external appearance of the electrical equipment indicates that it is not being properly maintained. Even so, the equipment is functioning well overall, and there do not appear to be any problems requiring immediate attention. Picture 5.1-6 shows the external appearance of a generator. The 220 kV switchgear is an outdoor switching station that is primarily composed of an air blast circuit breaker. This is being appropriately maintained, and there do not appear to be any operational problems.



Picture 5.1-6 External Appearance of Generator

5.1.5 Control Equipment

Fundamentally, the units are designed to be controlled automatically so that the prescribed values in systems such as the fuel system, air system, and steam temperature system are met in response to fluctuations in generator output. However, failures and deterioration in the regulator and drive mechanism have been a problem for the last twenty years, and it has not been possible to repair the equipment due to the difficulty in obtaining parts and devices. Except for some parts of automatic control systems, the equipment cannot be controlled automatically, so when the load changes, the modifications are made manually. Even generator output is manually controlled using the governor switch for the steam turbine. This practice is the same as that which occurred in Japanese power plants up to the mid 1960's. In order to achieve the optimum combustion for each load level, an "Optimum Map" is displayed on the control panel, and operators manually adjust the equipment so that the operating values match the values shown on the map. Consequently, the unit load fluctuation is low, at 2 MW/minute (in Japan it is 5 MW/minute), which means that there is little responsiveness to