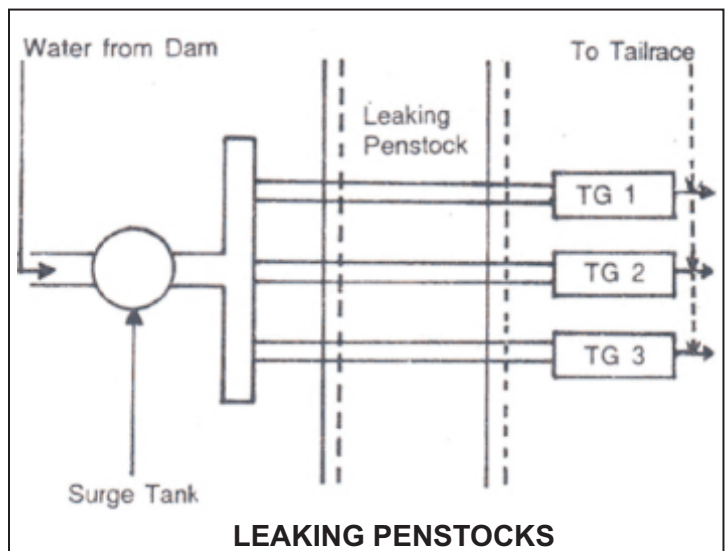


- 1) The power house of the **Chamera Hydroelectricity Power Project** is situated at Khairi in the Chamba district of Himachal Pradesh, India. The installed capacity of the project is 540 MW with 3 Turbine generators of equal capacity. The three generators are fed from a common tunnel which is near the surge tank into the three penstock tunnels. The project is under the aegis of the **National Hydroelectricity Power Corporation (NHPC)** India.
- 2) The NHPC officials had been plagued with continuous water leakages inside the penstock tunnels. Unable to solve this vexing problem, NHPC officials approached **CICO** Group of companies to inspect the locations of water ingress and to suggest immediate remedial measures to stop the water leakages, as continuous leakage of water inside the penstock could lead to serious damages.

- 3) Senior technical personnel of **CICO** after inspection suggested the use of **POLYGROUT** - a water-reactive expandable chemical for sealing of the leakage.

- 4) The surrounding rock of the tunnels had been grouted by cement grouts through deep holes inside the rock. These holes are referred as direct holes. However, leakages from these direct holes were more pronounced in the upper half of the tunnels. In addition, high leakage concentration was found near the construction joints of the concrete lining of the tunnels.



- 5) *The rectification work consisted of:*
 1. Injection of **POLYGROUT** in direct holes through which water was leaking.
 2. Injection of **POLYGROUT** at construction joints, by drilling holes.
- 6) In both the cases 100x6 mm diameter nozzles were used through which **POLYGROUT** was injected under a maximum pressure of 2 Kg/Cm². The nozzles were fixed in the newly drilled holes near the construction joints or in the direct holes by means of quick setting mortar which attains stability within 10 minutes of mixing. **CICO** No.3 along with ordinary Portland Cement provided the Quick setting compound.
- 7) In addition to the penstock tunnels some other spots where water was leaking were also successfully sealed with **POLYGROUT**. The spots included anchor bolts of the turbine generator and portions of the vertical walls and raft of the turbo-generator building. The work was carried out within a limited period to the full satisfaction of the NHPC Authorities.