

Transient Level in the Surge Chamber at the Robert-bourassa Generating Station

Authors : Maryam Kamali Nezhad

Abstract : The Robert-Bourassa development (LG-2), the first to be built on the Grande Rivière, comprises two sets of eight turbines- generator units each, the East and West powerhouses. Each powerhouse has two tailrace tunnels with an average length of about 1178 m. The LG-2A powerhouse houses 6 turbine-generator units. The water is discharged through two tailrace tunnels with a length of about 1330 m. The objective of this work, at RB (LG-2), is; 1) to establish a new maximum transient level in the surge chamber, 2) to define the new maximum equipment flow rate for the future turbine-generator units, 3) to ensure safe access to various intervention locations in the surge chamber. The transient levels under normal operating conditions at the RB plant were determined in 2001 by the Hydraulics Unit of HQE using the "Chamber" software. It is a one-dimensional mass oscillation calculation software; it is used to determine the variation of the water level in the equilibrium chamber located downstream of a power plant during the load shedding of the power plant units; it can also be used in the case of an equilibrium stack upstream of a power plant. The RB (LG-2) plant study is based on the theoretical nominal geometry of the chamber and the tailrace tunnels and the flow-level relationship at the outlet of the galleries established during design. The software is used in such a way that the results have an acceptable margin of safety, especially with respect to the maximum transient level (e.g., resumption of flow at an inopportune time), to take into account the turbulent and three-dimensional aspects of the actual flow in the chamber. Note that the transient levels depend on the water levels in the river and in the steady-state equilibrium chambers. These data are established in the HQP CRP database and updated from time to time. The maximum transient levels in the RB-East and RB-West powerhouses surge chamber were revised based on the latest update (set 4) of in-river rating curves and steady-state surge chamber water levels. The results of the revision were also used to update the technical advice on the operating conditions for the aforementioned surge chamber access while considering revisions to the calculated water levels.

Keywords : generating station, surge chamber, maximum transient level, hydroelectric power station, turbine-generator, reservoir

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