

Evaluation and assessment of transformer failure on 132kV substation

ABSTRACT

Insulation coordination models are an essential part of power system studies and are used to determine the expected overhead line back-flashover rate. A study is carried out to investigate and evaluate the effect of lightning stresses on the 132 kV substation in the way to improve its reliability in the event of active lightning activities. This paper also presents the modeling guidelines on substation for this transient analysis in order to evaluate the performance and to recommend such configuration to optimize its design to be not only to withstand the stresses but to be more cost effective. The modeling and simulation are carried out using one of the most powerful power system simulations tools that is PSCAD-EMTDC and the substation layout design is adapted from 132/11 kV Simpang Renggam-Ayer Hitam substation, courtesy of Tenaga Nasional Berhad, Malaysia (TNB). The model is based on single phase line model as it is suggested by the IEEE to be adequate to represent the substation in transient analysis simulation. The outcome of this paper will be the results of lightning stresses in term of voltage level measured at particular points in substation. The results are then compared with the suggested basic lightning insulation level (BIL) for assessment of transformer failure.

Keyword: Insulation coordination; Lightning; Transformer; Substation modeling; PSCAD