NATURAL DISASTERS: LIGHTNING HAZARDS AND ITS MITIGATION IN MEXICO

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ABSTRACT

Societal vulnerability to natural-related phenomena (e.g., hurricanes, earthquakes, floods, tornadoes, lightning and other extreme weather events) is observed to have significantly increased in the last hundred years, despite increasing trends are not observed of these natural phenomena. This may be explained by factors other than climate changes, most notably, an increased potential for economic and health damage due to population growth and high value and risk facilities.

Predictions of natural disasters are not always possible. However, it is of great help to use qualitative forecasts to substantially minimize the impacts of natural disasters in all those where it is posible to take preventive measures before occurring the natural phenomena (e.g., lightning activity).

It is recognized that the issue of natural disaster impacts upon the society and its facilities is interdisciplinary. This interdependance obligates to have partnerships among the affected community, government, industry and society. On the other hand, it is very important to have short-term goals and long-term concerns very well established about mitigation measures against natural disasters.

In the 1980´s decade, the implementation of strategic long-term risk management policy has improved the safety and reliability of the generation, transmission and distribution electric systems regarding lightning hazards in México. This policy is based on partnerships between Federal Government, Federal Electricity Commission (CFE) – national electric facility - and IIE. The long-term policy is formed by short-term goals or stages. The first stage consisted on the characterization of storm activities by an eleven-year program to determine the ground flash density in the territory from 1983 to 1993. Since 1998, the lightning activity has been obtained by information gathered in non-stationary satellites regarding world-wide lightning activity. The second stage consisted on the improvement of the shielding angle and the grounding systems at tower footing, high voltage substations and distribution lines. The third stage dealt with the improvement of the basic insulation level and the use of lightning arresters in distribution lines. The fourth stage consists of the implementation of line surge arresters upon 230 kV and 400 kV transmission lines in selected sites and towers, according to historical data and relevance of the line. The fifth stage consists of the elaboration of the Mexican Lightning Protection Standard for structures, buildings and high risk facilities, which is in progress, in order to ensure the correct application of mitigation measures. The last but not the least stage deals with the implementation of a national program on safety of people regarding lightning hazards in open fields.