Assessing of Feasible Independent Protection Layers (IPLs) using Layer of Protection Analysis (LOPA) for flood emergency risk management

ABSTRACT

Layer Protection Analysis (LOPA) which is a risk-based approach was chosen for this purpose to evaluate the frequency and consequence to help risk decision makers for emergency risk management. Many factors have been considered in order to complete this task to achieve acceptable flood prevention and control measures. Firstly it needs to understand the event (for this case is flood) and the local conditions, prior to mitigate the major flood. In this research first the information on vulnerable flood areas and selection of feasible Independent Protection Layers (IPLs) for flood protection. Next using Event Tree Analysis (ETA) approach, incident scenario and determined consequences were assessed for the initiating event. The undesirable outcomes of the incident scenarios was calculated by a computer software namely Lopa4flood. The developed code provide with a facility to generate scenario or sequence of events for a set of safeguards. Each scenario consists of two elements; a pair of events namely initiating event and enabling condition for starting of a chain of events followed by a series of consequence if the chain of events continues without interruption. Data for initiating event, enabling condition and failures on demand of selected Independent Protection Layers (IPLs) must be entered into the software prior to run. The software then display the calculated frequency (per year) of the sequence events provided with the IPLs and the consequence impact characteristic in tabular form; whether it is 'Acceptable' (Green color), 'Intermediate Range' (Yellow color) or 'Not Acceptable '(Red Color) for users to make decision. The advantages of the software is rapid, easy to use and friendly, in fact it provides options of feasible IPLs and their PFDs to stakeholders to assess an optimum combination IPLs for flood prevention and control measures in flood emergency risk.