Development of a layer of protection analysis tool to determine the safety integrity level in process industries

ABSTRACT

The purpose of this study was to develop a tool to determine the Safety Integrity Levels (SILs) using Layer of Protection Analysis (LOPA) method. Various methods can be used in determining this SIL. However, LOPA has been chosen as the risk-based approach to evaluate the potential consequences and likelihood. Many factors could be considered in order to complete this task. To implement LOPA procedure in the real situation, an industry plant operation had been selected as a case study. The work had been initiated by gathering the information on SIL. Event Tree Analysis (ETA) has been used to develop the scenarios of each initiating events. Then undesirable outcomes of accident scenarios have been calculated. A tool is developed to generate the scenarios or sequence of events that result in undesirable outcomes. Each scenario consists of two elements which are the initiating event that starts the chain of events and a consequence that results if the chain of events continues without interruption. Finally and after developing the scenarios, the identified initiating event frequency and related Independent Protection Layers (IPLs) is generated. There are 25 initiating events that have been listed in order to proceed with LOPA.

Keyword: Layer protection analysis; Safety integrity levels; Safety instrumented system