Fuzzy logic, which is the general name of “fuzzy set analysis” and “possibility theory, is used with uncertainty and imprecision, which is inherently related to all safety issues connected with the variables and subjective evaluations. It refers also to hazard and risk assessment methods, including Layer of Protection Analysis (LOPA). The most uncertain data include all elements of the accident scenario like the consequence category, frequency data for initiating event and reliability of independent protection layers (IPLs), including human factor. Those data use to be uncertain due to the fact that we are never sure regarding accident conditions as well as frequency of failures. The proposed method develops the fuzzification for all typical principal uncertainties (events) constituting accident scenario (cause – consequence pair) by means of development of fuzzy sets and evaluation of membership functions. Subsequently, the presented method applies the fuzzy probabilistic approach for event tree typical for LOPA application. In that way the fuzzy failure probability (fuzzy reliability) is achieved. Finally, the fuzzy risk assessment is developed using risk matrix and the defuzzification provides a single risk assessment for particular accident scenario. An example of proposed fuzzy LOPA method is presented.