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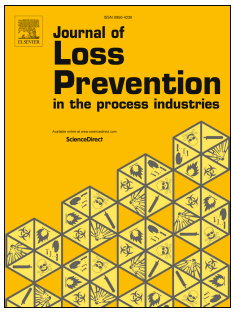


Fuzzy logic approach for identifying representative accident scenarios

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# Fuzzy Logic Approach for Identifying Representative Accident Scenarios

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## Highlights

- A new methodology is developed to improve the identification of representative accident scenarios (RAS) as part of traditional risk analysis.
- The methodology includes special correction factors connected with the quality of HAZOP analysis and the safety layers of protection.
- The degree of accuracy of the RAS selection process is increased by using the fuzzy logic approach.

## Abstract

Selecting representative accident scenarios (RAS) is one of the most discussed and important aspects of the HAZOP process, which is the main part of risk analysis. During that process, several uncertainties can occur, which may lead to critical oversights with further consequences for life and property. These mainly concern the semi-quantitative process of risk ranking, especially the evaluation of the frequency and severity of the categories of potential accident scenarios. According to our experience, other sources of uncertainty, which are hardly taken into account at this stage of the analysis, are connected with the effects of the type and performance of the safety barriers and protection measures as well as the impact of the quality of HAZOP analysis on the risk ranking process. The latter aspect depends on many continuously changing factors that are generally related to the safety culture that exists in a specific organization. These aspects are always the focal area for discussion by analysts, and these were hardly taken into account in our previous research.

In this study, both aspects, the effects of the protection layers and the quality of hazard identification analysis on the selection of RASs, are considered. The major idea is connected with the extension of the classical HAZOP study by the application of a modified risk ranking method to identify potential accident scenarios. For that process, we propose applying appropriate correction indexes concerning both aspects. The impacts of the safety layers were assessed by the efficacy index (EI), which evaluates the effectiveness of the safety barriers,