

Abstract

The fire and explosion risks are omnipresent in any industrial site. It can involve major accidents. This is particularly the case in petroleum product processing complexes. Accidents resulting from fires or explosions can have serious consequences not only for human life but also for the environment and the structure site. The examples of major accidents induced by these dangerous phenomena are there to illustrate the gravity of fire and explosion accidents. And with increasingly complex industrial systems, the need becomes even more pressing to develop new global approaches to analyze and prevent fire and explosion risks. These approaches must take into account all material and human aspects involving risks and also allow safer and more economical industrial system operations.

The objective of this thesis falls within the framework defined above, which aims to implement a global strategy for fire and explosion risks analysis and their prevention in industrial sites. This analysis is applied to the GL1K and RTE petrochemical complexes located in the petrochemical zone of Skikda. Our work will be based on the combination of several tools (methods and software) in order to implement a comprehensive approach analysis of fire and explosion risks by taking targeted sites, both complexes mentioned above. We will start by using the HAZID method to identify the hazard sources, causes and consequences in the different components of the studied units. Subsequently, the exploitation of the DOW F&EI index will allow the prediction, the estimation and the quantification of the considered accidental damages. To illustrate the severity of the fire and explosion risks in the GL1K and RTE plants, the PHAST software will allow us to model and simulate the fire and explosion accident scenarios, which will give a severity indications on hazards and thus the evaluation and prevention optimization of the considered risks. Our work is completed by the integration analysis of fire risk estimation and classification results by the fuzzy logic advanced tools that will allow the elimination of inaccuracy and uncertainty in the estimation and classification of risks.

Key words: Fire/Explosion risks, Major accidents, Risks analysis, HAZID method, DOW F&EI index, Fuzzy Logic.