

Methodological framework for assessment of overall hazard of an accident - a Serbian experience

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This study presents an integrating methodological framework for assessment of overall hazard of an accident by achieving synergism in application of methods for technical system reliability assessment, human reliability assessment and accident analysis. Case study performed at a company (M/s Tehnogas AD, Nis, Serbia) has confirmed that new methodological framework for assessment of level of overall hazard, is highly applicable, comprehensive and simple to perform.

Keywords: Human error, Hazard analysis, Industrial accident, Industrial environment

Introduction

An accident is an uncontrolled event, occurring during manufacturing, transport or storage, in which certain quantity of hazardous substances released into air, water or land jeopardize human lives and health, damage material goods and cause undesired environmental outcomes¹. Major accident means an occurrence (major emission, fire, or explosion) resulting from uncontrolled developments in the course of operation of particular establishment, and leading to serious danger to human health and/or environment, inside or outside the establishment, and involving one or more dangerous substances². Initiators and/or links of occurrence of accidents most often are human errors, technology failures and/or unforeseen external influences³.

Main components of a risk assessment are evaluation of probability and evaluation of possible consequences on safety, health and environment. For study purpose, methods for risk assessment are classified into four categories (technology oriented methods, human oriented methods, management oriented methods, and accident analysis methods). However, certain areas of application overlap and some methods belong to more than one group⁴⁻¹³. Among several methods for accident analysis,

some methods that can be used for both system analysis and accident investigations include Deviation Analysis (DA), Safety Function Analysis (SFA), Accident Evolution and Barrier Method (AEBM), Change Analysis (CA), Multilinear Events Sequencing (MES). However, use of any single method can not provide comprehensive evaluation of the risk of an accident because no method can independently achieve desired goals. For resolving practical problems, a synergistic effect of several mutually complementary methods is necessary⁴.

This study integrates methodological framework for assessment of overall hazard of an accident.

Proposed Method

Proposed method for assessment of level of overall hazard of an accident is based on some published studies¹⁴⁻¹⁶, and takes into consideration certain national regulations¹⁷⁻¹⁹ [Code of practice on methodology for risk assessment and mitigation of chemical and environmental accidents, Fire Safety Law (FSL) and Law on Emergency Situation Management (LESM) of the Republic of Serbia]. Proposed method is composed of following steps: i) Assessment of hazards caused by technology and manufacturing process (*TP*); ii) Assessment of hazards caused by human factor (*HF*); iii) Assessment of hazards caused by environmental impact (*E*); and iv) Assessment of level of overall hazard of an accident (*A*). *TP*, *HF*, *E* and *A* are given as

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