

# Methodic classification of mining accident causes: Learning lessons

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## ABSTRACT

Absolute safety does not exist and accidents occur despite risk assessment evolved over decades. But learning lessons from the accidents is crucial. In this regards systematic and methodic classification of accident causal could be helpful to improve risk communication as a prerequisite for improvement of safety. This study is concerned with analyzing and methodic classifying the causes of some mining accidents using Reasons' Model. The relation between such classified causes and their interactions are discussed in the last part of this paper. Finally, layers of protection have been recommended to adapt to such mining field so as to improve the mining safety.

Keywords: Risk assessment, safety, accident cause analysis, accident cause classification.

## INTRODUCTION

Mining is considered as a hazardous activity. Accidents in mining industries do occur now and then even though risk management and occupational safety discipline evolved over decades. Every year thousands of miners die because of mining accidents. Accidents scenario is a chain of critical events (throughout the organizational hierarchy) leading to economic loss, injury or fatalities. Accidents take place wherein complex system comprising of man, machine, technology and organizational factors interacts in an unforeseen manner. Researchers and inspectors could find different reason or causes for the accidents but they should be classified and analyzed in order to understand the situation and learn from such accidents to prevent it in the future. So, this study is concerned with analyzing and classifying the causes of mining accidents. The aim of the study is to analyze and classifying of some historical mining accidents using Reasons' Model (Swiss Cheese Model). The goal is learning lessons from historical accidents, through a methodical work, to improve safety at workplace including mining. To approach the aim of the study, four mining accidents/cases were selected from the literature and analyzed. These cases are: San Jose Copper and Gold Mine Accident (Chile), Westray coal mine disaster(Canada), Meikle gold mine accident (USA) and Jim Walter Resources (JWR) No. 5 coal mine accident (USA).This study has been prepared on the basis of a study carried out at Chalmers university of Technology (Jeganathan, 2012). It has been carried out on the basis of literature survey.

## REASONS' MODEL/SWISS CHEESE MODEL

James Reason developed Swiss cheese model based on his study on the historic accidents occurred between 1970s and 1980s. This Swiss cheese model, also known as Reason's model assumes systems approach to analyze and identify the underlying causes of an accident. This model advocates that latent errors are triggering factor for active failures to occur, which in turn translates into to an accident.

An organizational system defenses against failure are modeled as a series of barriers, represented as slices of Swiss cheese in a typical Swiss cheese model; suggesting that most accidents can be hypothesized traced back to one or more different levels of failure (Stranks, 2003). These slices constitute defenses, barriers and safeguards within the organization that prevent hazards to become losses (Figure 1). The holes in the Swiss cheese represents all possible unsafe acts committed by people in direct contact with the systems (Reason, 1990) as well as latent conditions, these holes has the property to change positions in accordance with every dynamic organization that is exposed to continues changes.