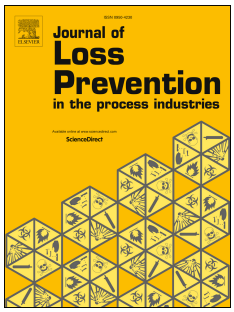
Accepted Manuscript



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PII: S0950-4230(17)30337-6

DOI: 10.1016/j.jlp.2017.04.007

Reference: JLPP 3473

To appear in: *Journal of Loss Prevention in the Process Industries*

Received Date: 12 October 2016

Revised Date: 4 January 2017

Accepted Date: 5 April 2017

Please cite this article as: Zhang, F., Zhao, G., Wang, Z., Yuan, J., Cheng, Y., Worst maximum credible accidental scenarios (WMCAS) - A new methodology to identify accident scenarios for risk assessment, *Journal of Loss Prevention in the Process Industries* (2017), doi: 10.1016/j.jlp.2017.04.007.

Worst maximum credible accidental scenarios (WMCAS) - a new methodology to identify accident scenarios for risk assessment

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ABSTRACT: The identification of accident scenarios is the key step for risk assessment in process industries. In this paper, the methodology of worst maximum credible accidental scenarios (WMCAS) was put forward based on the analysis of the existing accident scenarios (the worst accident scenarios (WAS), the maximum-credible accident scenarios (MAS) and reference accident scenarios (RAS)). The principle and procedure of WMCAS identification have also been established. Firstly, WAS can be determined based on the Methodology for the Identification of Major Accident Hazards (MIMAH) used in the frame of the Accidental Risk Assessment Methodology for Industries (ARAMIS) project. Secondly, the modified method of credibility factor in MAS is used to calculate the credibility of WAS. Finally, the WMCAS will be identified by comparing the modified credibility results of WAS. Simultaneously, a pulverized coal gasification device was selected as an illustrative example to show the application of the methodology of WMCAS. The results show that the WMCAS for the device are pool fire for the methanol vessel, mechanical explosion for the gasification furnace, vapour cloud explosion (VCE) for the scrubber and VCE for the carbon dioxide absorption tower.

Keywords: Worst maximum credible accidental scenarios (WMCAS); Risk assessment; Fault tree; Pulverized coal gasification device; Bow-tie approach

1 Introduction

In process industry, fires, explosions and other accident are often devastating and catastrophic, which is a serious threat to people's lives, properties and environment. At present, in order to prevent the occurrence of the accident, many countries have devoted lots of time to the research and development of safety management and risk assessment, future regulations of risk-based approach will require better incident scenario development[1]. Among these, the identification of the accident scenarios exerts an important influence on the layout of the plant, the safety design, the calculation of the safety protection distance and so on [2-4]. It is also a key-point in risk assessment, which directly determines the validity of the assessment results [5-9]. Besides, due to the importance of the understanding of incident consequences, computational tools such as CFD were employed to study credible release scenario [10].