UNIVERSITI TEKNOLOGI MARA

IDENTIFY THE PREVENTION BARRIERS IN THE STEAM BOILER INCIDENT CAUSATION PROCESSES

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June 2018

ACKNOWLEDGEMENT

I would like to precise my most deep gratitude to all those who prepared me the opportunity to complete this research project. Special thanks of recognition to my research supervisor, Dr Sherif Abdulbari, senior lecturer of Faculty of Chemical Engineering, Universiti Teknologi Mara, Shah Alam, for his tolerant supervision and valuable criticism of this research work. He also contribution in encouraging recommendation and inspire me to equalized my project especially in writing this research report thesis.

I would also like to extend my thanks to a PhD student, Syed Mahyuddin Bin Syed Mustafar for his beneficial and useful advice during preparation and progression of this research work. His enthusiasm to give his time so generously has been very much appreciated.

A special thanks goes to my team mate, Nur Liyana Binti Ahmad Shuib, who help me to gather the parts and gave opinion about the research project. I have to acknowledge the advice given by her especially in my research presentation that has improved my presentation skills thanks to her judgment and encouragement.

Finally, I wish to thank my parents for their support, inspiration and encouragement throughout my research work.

ABSTRACT

Promising accident modelling is becoming challenging with the growing complexity of the risky process activity. The objectives of this research are to identify the safety prevention barriers in the boiler incident causation process and to assess the plausible hazards and root causes of the boiler accident in the processing industry. The data of the boiler incident are collected through the Past Accident Analysis (PAA) to determine the accident contributors and sub accident contributors. The Fault Tree Analysis (FTA) is used to calculate the failure probability of the proposed prevention barriers based on dependency of the accident contributors and sub accident contributors. The Event Tree Analysis (ETA) is applicable to predict the consequence from the causes of the accident contributors and also to calculate the successful of the proposed prevention barriers. As conclusion, the combination of the FTA and ETA are providing an overall illustration of boiler incident process. In this study, the prevention barriers in the steam boiler incident are determined.

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CHAPTER ONE

INTRODUCTION

1.1 Research Background

A boiler is a confined vessel that transfers heat to water until it turns into the steam. Hot water or steam under pressure can be used to transfer heat into the process (VK Tripathi, 2016). The steam turbine generates steam from the boiler by occupy the heat released during the combustion of fuel. Due to the boiler eruption, there were a high number of deaths and fatalities occurred in the industrial revolution (Smith, 2001) including the damage to the environment. Nowadays, boiler accidents have shown an increasing trend despite numerous improvement have been taken to the boiler system. This issue could have been prevented if the root causes of the boiler accidents can be identified and the consequence of the root causes can be avoided with specific prevention barrier.

According to (Freudenburg, 2010), the accident investigation is conducted in order to identify the main accident contributions to avoid their constraints. To determine how and why an accident occurred can be identified, (Manatakis, 2009) state by using an appropriate accident analysis technique. Hence, accident analysis techniques are useful to find the root causes of an accident and also their relationship to the unsafe or unfavorable situation. The early actions can be taken immediately to prevent the accident from occur in the future. So, it is very important to select the right techniques for each type of accidents in order to find the causes of the accident. Besides, the suitable analysis technique will prevent an accident from happen again.

Nowadays, there are some accident techniques that have been used to solve the investigation. But each of the techniques also has their own positive as well negative implication. Event Trees Analysis (ETA) is one of these techniques. The event tree provides a systematic methodology to investigate the procedure of the accident that involves a difficult system. It is also identifying the sequence of the events after the accident occurred. The journal from (Villemeur, 1991) state that when the number of events increases, the image spread like a tree. This visual representation is a graphical model that illustrates the direction and reduces the needs