UNIVERSITI TEKNOLOGI MARA

ANALYSIS OF AGING FACTOR EFFECT FROM BLEVE FIREBALL IMPACT AT DYNAMIC PARAMETER CONDITION

ABANG AMRUN BIN ABANG BUSSRI

Thesis submitted in fulfillment of the requirements for the degree of

Bachelor of Engineering

(Chemical Engineering)

Faculty of Chemical Engineering

July 2019

ABSTRACT

The probability of burn victim survival from BLEVE fireball impacts during the transportation of LPG can be estimated by understanding the thermal radiation model and the consequences of BLEVE towards human. The sequence of a BLEVE fireball event is been analysed in collecting the factors that effecting the severity of victims during the occurrences of BLEVE. Solid flame model has been used in this simulation to obtain all the characteristics of the fireballs. All the models related has been distinguished to fiend which one is more appropriate and contains more information related to the studies. Lynchburg, Virginia has been chosen as the location of the study. Thermal radiation by solid flame model is taken as the main parameter to be compared with tables and figures in determining the consequences of a BLEVE event. Different chances of survival probability are discussed based on a few elements such as distance, time, age and total burn body surface area.

ACKNOWLEDGEMENT

Firstly, I would like to express my greatest gratitude to my supervisor Ir Dr Zulkifli Bin Abdul rashid for the continuous support of my bachelor study and related research for his patience, motivations and immense knowledge. His guidance help me in all the time of research and writing of this thesis. I could not have imagined having a better supervisor and advisor for my research study.

TABLE OF CONTENTS

CHAPTER ONE
INTRODUCTION

1.1 Boiling Liquid Expanding Vapor Explosion

Boiling Liquid Expanding Vapor Explosion (BLEVE) may occurs when a pressurized vessels containing flammable gas such as propane, which suddenly released major causing from leaking or tank rupture will initiate an explosion, when exposed to the present of sparks ignition that will led to incident of BLEVE. Walls stated that when the vessels containing the liquids is at a temperature above its boiling point at normal atmospheric pressure, the vessels might experience BLEVE explosion. The common BLEVE phenomenon from the explosion is the jet fires, pool fires, fireballs and vapor cloud expansion. All of this types of fire produces during the explosion has different characteristic and parameters prior to the situation during the explosion. In this study, the BLEVE effect is specifically choose which is the fireball. All relations related to fireball will be described later in the sub section in this study. BLEVE can occurs at many situation and places as long the vessels or tank containing the flammable liquid is accidently depressurized.

Reid also defining BLEVE as the sudden loss of liquid in the vessels at a superheated temperature and utilize the atmospheric conditions. It is already being prove that the explosion resulting from the failure of the vessels containing a liquid at a temperature significantly above its boiling point at normal atmospheric pressure. Moreover, The Center for Chemical Process Safety also defined the BLEVE process as a sudden release of a huge mass of depressurized superheated liquid to the atmosphere which would cause some serious effect such as blast wave, thermal radiation, vessel fragments and even fatality.

1.2 Problem Statement

In every chemical plant, accident might occur and harm the whole process plant,