ASSESSMENT OF NEAR MISS INCIDENT MANAGEMENT SYSTEM IN KENYA PIPELINE COMPANY LIMITED

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Assessment of Near Miss Incident Management System in Kenya Pipeline Company Limited

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

This research is dedicated to my beloved parents, Mrs Rose M Mbuvi and the late Mr.Stephen Mbuvi Ndua for bringing me up and educating me with meagre resources. Also special dedication to my dear wife Ms Felister M Mukeku and our lovely children, Victor and Blessings for their love and great support during my studies at JKUAT.

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ABBREVIATIONS AND ACRONYMS

AGO	Automotive Gasoline Oil
APPA	American Public Power Association
ASRS	Aviation Safety Reporting System
BSC	British Safety Council
DOHSS	Directorate of Occupational Health and safety services
DPK	Dual Purpose Kerosene
EA	Environmental Audit
EIA	Environmental Impact Assessment
EH&S	Environmental Health and Safety
EMCA	Environmental Management and Coordination Act of 1999
HSE	Health Safety and Environment
HSEMS	Health Safety and Environment Management System
IEET	Institute of Energy and Environmental Technology
IK	Illuminating Kerosene
JKUAT	Jomo Kenyatta University of Agriculture and Technology
KPC	Kenya Pipeline Company Limited
KPRL	Kenya Petroleum Refineries Limited
MSP	Motor Spirit Premium

NEMA National Environmental Management Authority

NFPA National Fire Protection Association

NIOSH National Institute on Occupational Safety and Health

NMM Near Miss Management

NMIMS Near Miss Incident Management System

NMIMS Near Miss Management System

NMMT Near Miss Management Team

OSHA Occupational Safety and Health Association

OSHA 2007 Occupational Safety and Health Act 2007

OSH Occupational Safety and Health

PPE Personal Protective Equipment

RoSPA Royal Society for the Prevention of Accidents

SPSS Statistical Program for Social Sciences

WIBA Worker Injury Benefit Act

DEFINITION OF TERMS

Near miss- The Wharton study (Phimister *et al 2003*) defines near-miss as "an opportunity to improve environmental, health and safety practice based on a condition, or an incident with potential for more serious consequences".

A near-miss is an event, a sequence of events, or an observation of unusual occurrences that possess the potential for improving a system's operability by reducing the risk of upsets, some of which could eventually cause serious damage" (Bird & Germain,1996).

Incident- An incident is any unplanned event resulting in, or having the potential for, injury, illness, ill health, damage or other loss (Bird & Germain, 1996).An incident is any observable human activity sufficiently complete in itself to permit references and predictions to be made about the persons performing the act such as cleaning an unguarded machine, failing to wear Personal Protective Equipment (PPE), using compressed air on body, raising pressure or temperature unnecessarily. Any undesired or unexpected event that may result in accident or a near miss is an incident.

Hazard- Anything (including a work practice or procedure) that causes, or has the potential to cause, injury, harm or illness. An inherent physical or chemical characteristic that has the potential for causing harm to people, the environment, or property (Phimister *et al* ., 2003).

A hazard, according to OSHA (2007), is anything with the potential to cause personal injury or illness. In addition to injuring humans, a hazard poses potential of damage to property or the environment. While different agencies list safety hazards in different ways, commonly category classifications include: personal safety,

chemical hazards, biological situations, ergonomic issues and physical environment.

ABSTRACT

Near miss incident management systems have been developed and are implemented across a range of industries including the chemical/process, airline and rail, nuclear and medical disciplines. At the root of every incident, fatal or otherwise is a near miss that was ignored and not prevented. Near miss incidents often precede loss producing events but are largely ignored because nothing (no injury, damage or loss) happened. Employees may not be enlightened to report these close calls as there has been no disruption or loss in the form of injuries or property damage. Near miss incidences are often ignored by most stakeholders in the workplace and yet every major or fatal accident or incident originates from a near miss that was not prevented or controlled. This may lead to accidents which could impact negatively on KPC by denting its image globally, reducing customer confidence and exposure to litigations leading to colossal financial losses for KPC due to compensation of injured and also high premiums for insurance.Management of near miss incidences is directly proportional to the prevention of major incidences and accidents and therefore goes a long way to eliminate or minimize work place hazards and guarantee the safety of the workers with a direct bearing on the overall safety performance of the organization. In the oil industry, incident assessment is key to its very survival and profitability. The main objective of this study was to assess the near miss incident management system in KPC. The study was to establish how the NMIMS directly or indirectly affects the workplace safety of the organization. The study was done at the Kenya Pipeline Company Limited depots at Kipevu, Changamwe, Moi International Airport, Jomo Kenyatta International Airport, Nairobi, Nakuru, Eldoret and Kisumu. For this descriptive study, a non –probability sampling method was used to select a representative sample of the target population. Data collection in this research was through the use of structured questionnaires designed by the researcher. Questionnaires were distributed among the workers. Research gathering instruments such as structured questionnaires, structured interviews and document reviews were used. Analysis of the data collected was done using the statistical program for social sciences (SPSS). The independent variables included the near miss incident management system establishment and implementation, management commitment,

workers competence in near miss incident management system implementation, while the dependent variable was effective workplace safety in KPC. The study found that Near Miss Incident Management System leads to an effective workplace safety. It also established that an effective near miss incident Management system implementation is determined by the tone at the top (Management commitment) which needed improvement. It was hereby recommended that KPC should establish, implement and maintain a near miss incident management system which shall be a determinant to an effective workplace safety. Top Management commitment in KPC could be improved by the availing of resources for the establishment, implementation and maintenance of a Near Miss Incident Management System (NMIMS). As a long term measure, there is need to establish an integrated management system in KPC as a best practice. Resources should also be availed by the top management to ensure training and awareness creation of all workers at all levels on Near Miss Incident Management System (NMIMS).

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

A near miss is an incident that if not controlled at source could result in injury, illness, or damage to property or loss. At the root of every accident or incident, fatal or otherwise is a near miss that was ignored and not prevented. Near miss incidents often precede loss producing events but are largely ignored because nothing (no injury, damage or loss) happened. Employees may not be enlightened to report these close calls as there has been no disruption or loss in the form of injuries or property damage (Vassiliou *et.al*, 2009). Thus, many opportunities to prevent the accidents that the organizations have not yet had are lost. Near misses are often less obvious than accidents and are defined as having little if any immediate impact on individuals or processes. Despite their limited impact, near misses provide insight into potential accidents that could happen. Safety activities in most organizations are reactive and not proactive. Many organizations wait for losses to occur before taking steps to prevent an occurrence.

Organizations may suffer potential major, adverse conditions and business disruptions therefore addressing near misses timely and properly discourages major problems from flourishing (Jones *et al* 1999). It is important to note that even though investigations have shown that almost all major incidents had precursors with minor or no consequences not all minor incidents have the potential to cause a major incident.

1.1.1 Overview of Near Miss

A near miss is an unplanned event that did not result in injury, illness, or damage but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, fatality or damage; in other words, a miss that was nonetheless very near. A near miss is also any unplanned event or chain of events in which personal injury or damage to property, plant or equipment has only been avoided by choice or chance.

A broader definition which focuses not only on the negative side of near misses but also on their positive contribution to a system's operation describes a near miss as an event, a sequence of events, or an observation of unusual occurrence that possess the potential of improving a system's operability by reducing the risk of upsets some of which could eventually cause serious damage. A near miss is an opportunity to improve environmental, health and safety practice based on a condition, or an incident with potential for more serious consequence. Near miss is viewed as "improvement opportunities" which positive experiences are encouraging employees to report rather than to hide. It also includes all operational disturbances, some of which have the potential to cause serious damage while others are inconveniences that mainly cause inefficiencies. It not only captures events but also includes observation.

Although the label of 'human error' is commonly applied to an initiating event, a faulty process or system invariably permits or compounds the harm, and should be the focus of improvement. Other familiar terms for these events are a "close call", or in the case of moving objects, "near collision" or a near hit. According to (Lauver *et al* 2009) a near miss is defined as "anytime an employee felt that they were in an unsafe situation due to circumstances, equipment, or their own actions which had a

high probability of resulting in an injury, and only by good fortune did the employee remain uninjured". Near miss definitions vary and may even include incidents that result in damage or injuries but not death.

1.1.2 Monitoring Safety Performance

The Management of Health and Safety at Work Regulations emphasize the need to monitor performance. This may take place following the setting of health and safety policy, organizational development, risk assessment, establishment of the role of competent persons, or following the actual development of techniques of planning, measuring and reviewing performance.

At the organizational level, employers should be aware of their strengths and weaknesses in health and safety performance. They may be identified through various active forms of safety monitoring, such as safety inspections, sampling exercises and audits, and through reactive monitoring systems, such as the investigation of accidents and occupational ill-health, together with reactive analysis of accident and sickness absence returns. At task level, the implementation or otherwise of formally established safe systems of work, permit to work systems, in company codes of practice and method statements are an important indicator of performance. Reactive monitoring through feedback from training exercises, in particular, which are those which are aimed at increasing people's perception of risk, improving attitudes to safe working and generally raising the level of knowledge of hazards, will indicate whether there has been an improvement in performance or not.

The concept of 'competent persons', outlined in the Management of Health and Safety at Work Regulations, raises a number of important issues. The general

concept of ‘competence’ is based on skill, knowledge and experience, linked with the ability to discover defects and determine the consequences of such defects (Brazier *et al* .1962). In the designation of competent persons, however, not only do we need to consider the above factors, but also the system for monitoring and measuring their performance against agreed objectives. On the job performance monitoring should take into account the human decision making components of a job, in particular the potential for human error. There is need for job safety analysis leading to the formulation of job safety instructions, a review of current job design and/or an examination of the environmental factors surrounding the job.

1.1.3 Background of the Petroleum Industry

Petroleum is a naturally occurring liquid found in rock formations. It consists of a complex mixture of hydrocarbons of various molecular weights, plus other organic compounds. It is generally accepted that oil is formed mostly from the carbon rich remains of ancient plankton after exposure to heat and pressure in the Earth's crust over hundreds of millions of years. Over time, the decayed residue is covered by layers of mud and silt, sinking further down into the Earth’s crust and preserved there between hot and pressured layers, gradually transforming into oil reservoirs. Petroleum in an unrefined state has been utilized by humans for over 5000 years. Oil in general has been used since early human history to keep fires ablaze, and also for warfare. Its importance in the world economy evolved slowly, with whale oil used for lighting into the 19th century and wood and coal used for heating and cooking well into the 20thCentury. The Industrial Revolution generated an increasing need for energy which was fuelled mainly by coal, with other sources including whale oil. However, it was discovered that kerosene could be extracted from crude oil and used

as a light and heating fuel. Petroleum was in great demand, and by the twentieth century had become the most valuable commodity traded on the world markets (Vassiliou & Marius ,2009)..

The petroleum industry includes the processes of exploration, extraction, refining, transporting (often by oil tankers and pipelines), and marketing petroleum products. The largest volume products of the industry are fuel oil and gasoline (petrol). Petroleum (oil) is also the raw material for many chemical products, including pharmaceuticals, solvents, fertilizers, pesticides, and plastics. The industry is usually divided into three major components: upstream, midstream and downstream. Midstream operations are usually included in the downstream category.

The Kenya Pipeline Company (KPC) Limited is a state corporation wholly owned by the Government, incorporated on 6th September 1973 under the Companies Act CAP 486 of the Laws of Kenya. Commercial operations commenced in February 1978. Core mandate is to transport, store and dispense petroleum products safely and efficiently from Mombasa to the hinterland and the neighbouring countries through the pipeline network.

KPC services include but not limited to:-receiving, transporting, storing and delivering refined petroleum products such as Motor Spirit Premium (MSP), Automotive Gas Oil (AGO), Illuminating Kerosene (IK) and Jet A-1 (Aviation Turbine fuel).Other services include:-Laboratory testing services for quality certification. Back loading refined petroleum products from and to vessels, Transferring of refined petroleum products to oil marketers' depots, facilitating fuelling of aircrafts through the hydrant systems at Moi and Jomo Kenyatta

International Airports and Dispensing of refined petroleum products for local and export markets.

1.2 Statement of the problem

There had been several incidences in KPC and its environs that necessitated the study as indicated below:-

In 1982, a twenty million litres (20,000,000) of petro tank burnt down and petroleum transportation operations through the pipeline were down for two weeks. This was caused by a technician setting High level alarm on the tank pended the works and failed to inform the Operation team that was scheduled to receive petrol into the tank the same day. In 2011, a pipeline burst at Samburu caused a downtime of six hours amidst a spillage of 200,000 litres of product into the environment. The root cause was a failure by the inspection and testing team to identify a manufacturer's defect on the pipeline during installation which gave in due to age and pressure. The purpose of the study was to correlate how the Near Miss Incident Management System affects an effective workplace safety in KPC (KPC Incident Reports)

1.3 Objectives

1.3.1 Main Objective

The objective of this study was to assess the near miss incident management system in KPC. The purpose of the study was to assess the existence of near miss management system, the extent of workers involvement in its implementation and the Management commitment to the system establishment and implementation. This was to guarantee the safety of the workers, environment, stakeholders and accrued profits.

1.3.2 Specific Objectives

The specific objectives were:-

1. To determine the extent to which Near Miss Incident Management System establishment and its implementation affects the workplace safety in KPC.
2. To establish the extent to which management commitment to Near Miss Incident Management system for effective workplace safety in the organization.
3. To determine the extent of workers competence in Near Miss Incident Management Process for effective workplace safety in KPC.

1.4 Research Questions

The research answered the following questions:-

1. To what extent does the Near Miss Incident Management System establishment and its implementation affect the effectiveness of workplace safety in KPC?
2. To what extent does the management commitment to Near Miss Incident Management system affect the workplace safety in the organization?
3. What is the extent of workers' competence in Near Miss Incident Management Process for effective workplace safety in KPC?

1.5 Hypothesis

H_o1: Near miss incident management system at KPC does not lead to an effective workplace safety.

1.6 Justification of the study

There had been several incidences in KPC and its environs that necessitated the study. The need to assess how KPC manage the near miss incidences which are the root cause for other accidents if not controlled justified the study. Every major accident is preceded by several red flags (warnings) or near misses which were ignored or not addressed comprehensively. The consequences of the major incident or accident may be but not limited to injury of the workers, death of the workers, permanent disability to the workers, litigations in the courts in search for compensation, losses to the company in terms of medical costs, compensation and dented image to the customers which may result to loss of business.

The survivors of the Sinai Tragedy of September 2012 during which over 100 lives were lost went to court seeking for compensation by KPC. Workplace incidences if not effectively managed and timely eliminated or controlled can cause serious losses to the organizations, stakeholders and even the country. On the other hand, an effective near miss management system in the workplace will be a business strategy for every company in the industry. (Phimister *et.al*, 2000).

An effective near miss incident management system in any organization is important in that it ensures among other benefits such as low man hours lost due to machine stoppage during accident management, low pay on insurance as a result of claims from those injured, low medication costs during rehabilitation of workers and improved workers confidence in the management systems.

1.7 Study scope

The study was done at the Kenya Pipeline Company Limited depots at Kipevu, Changamwe, Moi International Airport, Jomo Kenyatta International Airport, Nairobi, Nakuru, Eldoret and Kisumu. which deal with receipt, storage transportation of refined petroleum products (White Oils) such as diesel (AGO), premium (MSP) and Dual purpose Kerosene(DPK) through a multiproduct pipeline and dispensing of the same into trucks to be transported by road and rail to final destination.

1.8 Study Limitations

Some of the challenges encountered during the study included but not limited to:-

- The depots were widely apart and this posed a challenge in data collection.

- Some of the respondents did not give back their questionnaires even after efforts to follow up and this resulted in a 60% response rate.
- Some of the information given by the respondents may not be factual and this caused error during analysis.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter on literature related to the assessment of near miss incident management system (NMIMS) in oil industry. It focuses on NMIMS which includes but not limited to NMMT in the industry, the role of regulatory agencies in reduction of accidents. Management commitment is essential in enhancing safety culture, workers competence, work environment, workers involvement and acceptable programs in near miss management systems, near miss management policy. The chapter involved locating and extracting vital relevant information from existing literature, integrate this information to develop a comprehensive basis for the study and to evaluate such information regarding their strengths and limitation with regard to the current study.

2.2Theoretical Review of the study

The following theorems to analogize more on the near miss incidents were used in the research.

2.2.1 Heinrich Domino Theory

Heinrich was an assistant superintendent in the engineering and inspection division of Travelers Insurance Company in Hartford (Heinrich, 2002). For his book, he reviewed 75,000 injury and illness cases – 12,000 from insurance records and 63,000 from plant managers as well as actuarial and engineering reports. The book introduces 10 “axioms of industrial safety,” the first of which states: “The occurrence of an injury invariably results from a completed sequence of factors one factor being the accident itself.” That sums up Heinrich’s domino theory. He believed for an

accident to occur, five factors must be present which are; Ancestry and social environment, Fault of person, unsafe act or mechanical or physical hazard, the accident and the injury

"Unsafe act or mechanical or physical hazard" lines up with Heinrich's third, and arguably most controversial, axiom: "The unsafe acts of persons are responsible for the majority of accidents." According to Heinrich, 88 percent of accidents are caused by unsafe acts of persons and 10 percent by unsafe machines (with 2 percent being unavoidable or acts of God).From the "safety pyramid", which was further developed by Frank E. Bird based on his 1969 study of industrial accidents (Bird and Germain, 1996). He concluded that out of 300 near misses, there shall be 29 minor incidences causing minor injuries which require first aid for intervention and 1 major incident which may be fatal or cause major injury such as impairment. Therefore, if the near misses can be reduced, chances of the major incident shall also be remote or drastically reduced.(Phimister *et.al*,2000)

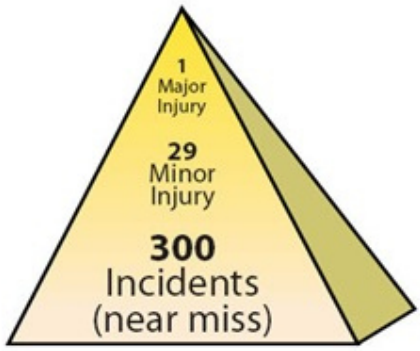

Figure 2.1: The Safety Pyramid, study of industrial accidents,1969

Essentially, injury data capture the unfortunate individuals. To illustrate this, Lauver cited Heinrich's (1931) finding that for every 300 unsafe acts, 29 minor injuries occur and one major injury occurs (Lauver *et al*, 2009).

2.2.2 James Reason Theory

According to James Reason (1990), unsafe culture is more likely to be involved in the causation of organizational rather than individual accidents. It is the pervasive nature of culture that makes it uniquely suitable for creating and sustaining the co-linear gaps in defenses-in-depth through which an accident trajectory has to pass. It is argued that a safe culture is an informed culture and this, in turn, depends upon creating an effective reporting culture that is underpinned by a just culture in which the line between acceptable and unacceptable behavior is clearly drawn and understood.

Although there is no universally accepted definition of safety culture, there can be little doubt that it is a concept whose time has come. The high level of concern with organizational culture in the world of hazardous technologies poses both a challenge and an opportunity for those academics involved in the safety related sciences. We need to develop a clearer theoretical understanding of these organizational issues to create a principled basis for more effective culture enhancing practices.

According to Utah (1983) safety culture captures essentials such as shared values (what is important) and beliefs (how things work) that interact with an organization's structures and control systems to produce behavioral norms (the way we do things around here)'. The result of these many layers of defense is to make these systems

largely proof against single failures, either human or technical. For an accident to occur in such a system, it requires the unlikely combination of several different factors to penetrate the many protective layers and to allow hazards to come into damaging contact with plant, personnel and the environment.

2.2.3 The Ice Berg Theory

According to this theory, workplace incidences and accidents cost an organization in terms of compensation payments but more costs are the indirect costs of the same. It is a calculation method developed to estimate the indirect costs of an incident or accident in the workplace. Assuming the cost of an accident is shillings 10,000.Associated costs which include but not limited to investigations, loss in productivity, equipment downtime is five times the accident cost which will be shillings 50,000. The replacement costs such as overtime, new employee, re-training will be shillings 10,000. The real cost of this accident shall be shillings 70,000 which is seven times the cost of the accident. Therefore in the Iceberg Theory, the initial cost of an accident is only the tip of what it really costs an organization.

2.3 Near Miss Management System in other Organizations

Near Miss Incident Management System (NMIMS) concept had been in existence for long in the Oil and Gas industry. In Vivo Energy, Kenya, the NMIMS was elaborate in the Health, Safety, Environment and Security Department headed by a director. Every employee has been trained on the Near Miss Incident Management Process. (Vivo Energy HSE report (2014).

In Kenya Petroleum Refineries Limited (KPRL), Mombasa, the NMIMS was in the Health, Safety and Environment Management System (HSEMS) with policy and standard operating procedures. Employees with exemplary performance in identifying, reporting and controlling near miss incidents in the organization are recognized and rewarded by the Management on quarterly basis. (KPRL,HSE report (2015)

2.4 Near Miss Incident Management System

For every accident that takes place, there are a large number of near miss incidents. Incidents that involve no injury or property damage but could have done it should still be reported and investigated to find the root cause and prevent a close call becoming a reality. The investigation may well highlight weaknesses that are likely to be of interest to other companies and services and it will be important to ensure that the details are circulated as widely as possible. General safety warnings are circulated within the company and other service circulars, thus strengthening procedures across the industry.

It should be noted that, if a serious incident occurred and it was subsequently discovered that there had been an earlier similar near miss incident that had not been reported, the consequences could be more severe. It is, therefore, important for near misses to be reported. Although it takes some time to fully develop a system, a well-designed near-miss management structure should have the following components: A near miss Management Oversight Team at the corporate or headquarters level, a near miss Management Team at site level, a well-defined near miss process with principles defined at the corporate level, an electronic near miss incident management system to report, analyse and track near misses. An audit system to

check the effectiveness of the near-miss practices, identifying weaknesses and strengths of all steps and training programs for all workers (Phimister *et al* 2000).According to the Wharton Risk Centres' near miss study, conducted in 2000, an effective NMIMS must cover the entire range of operations and must contain the essential components of seven steps, as in the near miss management process.

2.5 Near miss management Process

This is a seven step process aimed at implementing the NMIMS. These steps include Identification, Disclosure (Reporting), Prioritization and Distribution, Identification of Causes (Causal analysis), Elimination and Control, Dissemination and Resolution (Tracking) (Phimister *et al*., 2000).

2.5.1 Identification

Identification is the first step of the process where an individual recognizes an incident or a condition as a "near miss". To execute this step successfully there must be a clear definition of a near miss, and the means to ensure that every employee in the organization knows this definition at all times. This calls for sensitization of all employees in the organization which should be facilitated and driven by the Management or their representative and the workers' representatives. These sensitization campaigns should be done by the HSE committees using such tools as group discussions, tool box talks, brochures and films. As the employees become aware on how to identify near miss incidents, they shall be equipped to own and be part and parcel of this worthy course. Establishing a culture sensitive to the Near Miss concept is critical for successful implementation of a Near miss incident management system and takes time and effort to develop. Identification of current

and potential problems can be encouraged by recognizing and rewarding observant workers and by publicizing identified problems as well as the actions taken to address them (Phimister *et al*., 2000).

2.5.2 Reporting or Disclosure

A recognized near miss has only limited value even to the one who identified it, unless it is reported for appropriate measures to be taken to prevent its recurrence. Once a near-miss is identified it must be disclosed, preferably in a written form. This can be done either by the worker who identified the near miss or by a supervisor to whom a near-miss is reported verbally who may resolve this worker's problem or bring it to the attention of others.

Having a clear and simple procedure for reporting would encourage this process and would increase the probability of reporting most near miss observations. Reporting should be made very simple to encourage every employee who observes or experiences a near miss to fill-out a report without spending much time and effort. It is important to capture as many Near Misses as possible even though not all of them may have the same importance. The objective of near miss disclosure is to ensure that all identified near misses are reported (Bridges, 2000).

The reporting system must be accessible or "user friendly", as well. Reporting systems should be empowering for all. There are instances where workers suspected a hazard or problem but stayed silent because they did not have access to data that could provide objective support or justify their feelings (Mahler and Casamayou, 2009). And, in some cases, low-level workers who know of problems may not have

enough clearance to submit a report; thus, serious information may not be recorded or communicated to decision makers.

An organization's intent, or motivation, for requiring injury and near-miss reporting influences worker participation. Workers that fear punishment, retribution, or criticism are likely to remain silent (Mahler & Casamayou, 2009; Rose, 2004). Fortunately, research suggests that there are ways to encourage employee participation. A shift towards an organizational culture that allows workers to feel like reporting is an opportunity rather than a self-sacrificing event can increase reporting organizational safety (Hofmann *et al*, 1998; Morris *et al*, 2000). Other ways to effect positive change toward injury and near miss reporting is to ensure anonymity or re-direct accountability to an outside agency.

2.4.2.1 Why employees do not report near miss incidences

Reporting near misses is critical to the health and safety of all employees, and can ensure that day-to-day operations meet applicable safety requirements.

Most often, an employee avoids reporting a near miss out of fear of blame or repercussion. As an employer, it is your responsibility to create a workplace culture that prioritizes safety. Whenever possible, employees should be encouraged to report unsafe work conditions. They should be reminded that doing so protects both them and their co-workers.

People don't like to admit mistakes, especially if that mistake is broadcast to an entire company to maintain their reputation. Workers may fear that owning up to a near miss will lead co-workers to see them as weak or accident-prone. It is important

for employers to appreciate and acknowledge those who do report near misses. Doing so can help improve a business' safety culture.

There are some instances where an employee may not even understand a near miss took place. When that happens, the incident goes unreported and the issue persists, creating an unsafe work environment. Education is key to recognizing near misses. Complicated near miss reporting methods are the bane of workplace safety. If a system is too complex, more often than not, employees will just ignore it altogether. Establish a reporting system that is clear and straightforward. Train workers on the system and remind them periodically to take advantage of it.

Employees may not see the benefit of reporting a near miss, especially if there's nothing tangible in it for them. Offering small incentives such as company recognition, gift cards, can increase the likelihood that an employee will report a near miss. (HSE Guidance on Regulations, (1995)

2.5.3 Prioritization and Distribution

This is the ranking of near misses according to the severity of the consequence they may cause in case they occurred to allocate appropriate time, expertise and resources to follow up on the incident. Prioritization is a very critical step in establishing an effective near miss incident management system since this step determines, out of the large number of Near-Miss reports, which ones will require and to what extent the attention of the limited resources of the organization. Prioritization is important for a near miss program with a high number of reports in which case most near misses shall be investigated by the reporter and/or the supervisor. High priority near misses should have a separate distribution channel from the low priority ones to ensure appropriate trafficking of the report for prompt attention. The characteristics for high

priority near misses include but not limited to:-Expertise beyond the worker's capabilities is required to investigate the incident, Similarity of the incident to previous incidences or trends hence requiring the same attention, Incident with significant potential for major loss, cost to mitigate and environmental damage (Phimister *et al.*, 2000).

2.5.4 Identification of Causes (Causal Analysis)

Once a near miss is reported based on the given priority the reporter, a supervisor or a group of experts related to the subject matter should identify the root cause(s) or the underlying factors that enable the incident or unsafe condition and come-up with actions(s) to eliminate the recurrence of this or similar incidents (Peace,1992).

Clearly priority given to a particular near miss plays an important role in the follow-up activities (Eckes,2000). If the reported incident is labelled as "high priority", it may require a rather thorough causal analysis such as identification of root-causes to help tackle the problem at the basic level. This is accomplished through a HSE committee in an organization. Recurrence of similar incidents indicates that implemented solutions have not been satisfactory. Over time, due to repeating events of similar nature, the priority of new near misses will become higher with each report.

2.5.5 Elimination and Control

According to (Suokas *et al*, 1993), once near misses are identified, they should be controlled from recurrence by elimination or minimizing them. This is the determination of the corrective actions that remedy the causes of potential accident. The corrective action may be to eliminate or minimize near misses, manage the near

miss incidence and deter it from recurrence and to alert all stakeholders in the organization of the hazard such as through signs or alarm. The existing standard operating procedures in the organization should be changed to account for the hazard.

The employees should be sensitized on the control measures for the specific near miss corrective action. This acts as a learning point. The identified corrective action should not be a source of new incidents. The hierarchy of control should be adopted with the last option for appropriate and adequate personal protective equipment for all the workers (Dowell, 1997).

2.5.6 Dissemination

This is the channelling of the identified corrective actions to the respective implementers. It also involves informing the targeted audience on the decision made. This involves the use of all the necessary resources (human and financial) to implement the corrective actions.

2.5.7 Resolution and Review

This is the step where all actions are completed including follow up with the proper departments and personnel. It is at this step that one needs to identify and track all open actions and pursue with the right people for their closure. These activities may involve:-Reviewing or auditing the corrective actions upon completion to ensure that they were objective, Updating the near miss report if deviations from the action were implemented and feedback to the reporter and others on the completion and closure of the incident given. (Phimister *et al.*, 2000).

2.6 Near miss management policy and reinforcement

To ensure that safety is consistently given priority in decision making, the responsibilities of each member of the organization from top management to individual must be spelled out in the safety and health program. But merely assigning responsibility does not suffice since each person must be held accountable for his/her safety performance, and each individual assigned such responsibilities must be given adequate authority and resources to meet them (DeJoy, 1985).

Control systems to ensure that responsibilities are being met must therefore be in place. To achieve this objective, some companies require that the recordable injury rate for each supervisor be factored into annual review and promotion decisions, while others use a formal tracking system that allows supervisors with good safety records to earn bonuses (DeJoy, 1985).

Employees must also be held accountable for complying with safety policies and procedures. The company's overall program should contain a disciplinary component that is clearly expressed, and employees who violate safety procedures should be subject to disciplinary action. The program should establish a hierarchy of disciplinary measures, beginning with verbal and written warnings and proceeding to formal meetings.

2.7Management Commitment to Safety

Near Miss Incident management is a very powerful tool for identifying system weaknesses. It engages all employees who are intimately familiar with daily operations, therefore, it can easily detect potential problems on a timely basis. But, there are several important issues that have to be recognized and addressed to

effectively integrate near-miss management into corporate governance. These include, management support and encouragement, ensuring a uniform and seamless operation across all businesses and having a seamless and efficient system for handling near misses as well as accidents. An effective and efficient implementation of a near miss incident management system requires the full support of all levels of management. This goes beyond just management approval. There must be active involvement. It is important to continuously follow-up on system progress, encourage reporting, reward participation, and most importantly lead by example.

The near miss concept applies to all operations. Most of the time issues that are identified at one location equally apply to other areas as well. Sharing problems, solutions and lessons learned greatly enhances the value of a near miss system. Near miss recognition and reporting should become part of a corporate culture. If employees are sensitized to notice problems or conditions that can become a source of problems, and if their concerns are properly addressed, the result would not only reduce Environment Health and Safety (EH&S) concerns but also would significantly improve operational efficiency.

A common trend running through the recent literature is the importance of management commitment in guaranteeing work site safety. Authors writing in the trade literature and in academic publications agree that the starting point for any programme designed to foster safety in industries is the commitment of management to safety and health. This means that management must consider worker protection the company's top priority and be willing to spend time and money on programme development, safety equipment, and employee training. One of the best ways management can demonstrate its commitment to safety is the development of a

comprehensive, written safety and health programme that is performance oriented and general enough to cover the complete range of projects conducted by the organization. This document should establish and communicate a clear goal for the programme and define objectives for meeting that goal. To unequivocally demonstrate its commitment, top management must actively participate and be "visible" during programme implementation. Copies of the document outlining the program should be distributed to all employees. The written information should include the basics of personal protective equipment, the proper use of tools, safe work practices and company policies.

The written program should also outline procedures for formally evaluating or auditing the occupational safety and health program's success at least once a year. A written, site-specific safety plan should also be kept at each work site. At a minimum, this plan should include information on safety responsibilities, emergency procedures, and provisions for hazard communication, accident prevention, inspections, grounded electrical systems, record keeping, personal protective equipment, and housekeeping (Boden, 1984).

Workers' adequate knowledge, skill and ability to their work, especially toward risks and dangers in their work and near miss management, may minimize accidents. These competencies can be enhanced through training and appropriate workers selection which is a management responsibility. Workers competence was enhanced through training in Malaysia and it was noted to have reduced the rate of accidents from twenty five persons per week to about five persons per week (Dedobbeleer and Beland, 1991).

2.8 Enforcement by Regulatory Agencies

National Environment Management Authority (NEMA) as a regulatory authority ensure that all operations in KPC have scheduled Environmental Impact Assessment/Environmental Audit (EIA / EA) on regular basis. Other statutory bodies such as Directorate of Occupational Safety and Health Services (DOSHS) also ensure compliance of the workers safety regulations by the organization. This was evident in KPC through the audit reports to the statutory bodies by the organization.

2.9 Conceptual Framework

The independent variables included the near miss management system establishment and implementation, management commitment to Near Miss Incident Management System and workers competence in the implementation of near miss incident management process while the dependent variable is effective workplace safety in the organization.

Independent Variables **Dependent Variable**

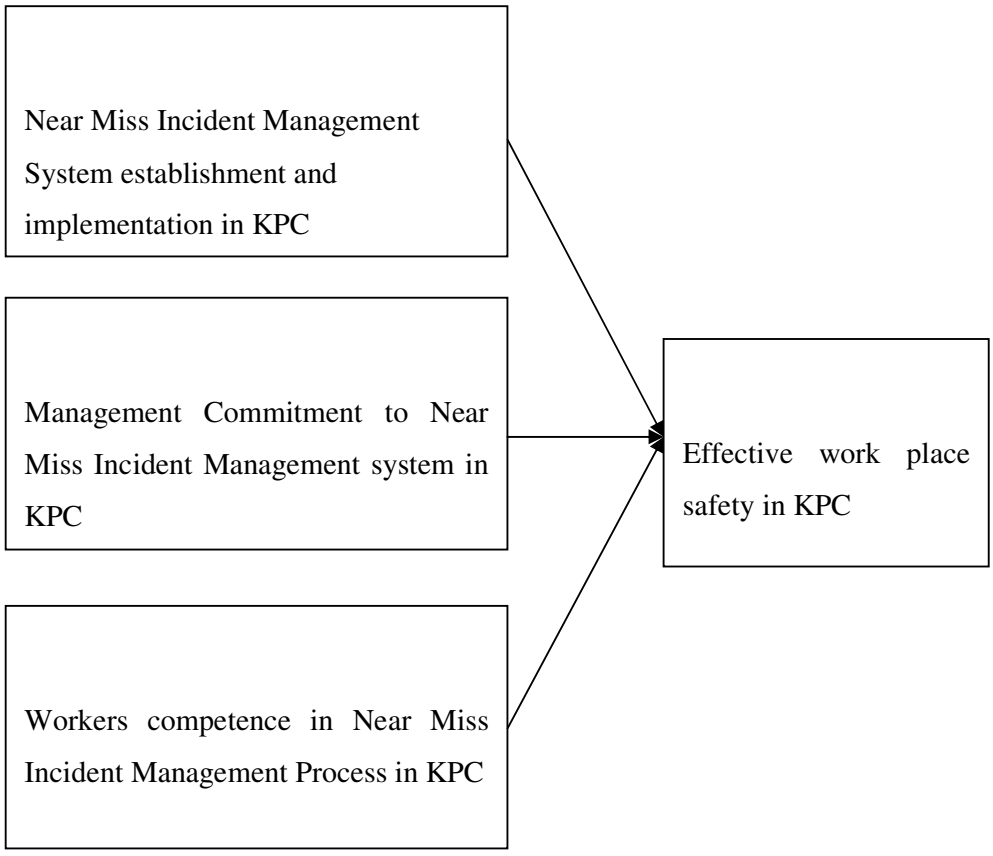

Figure 2 .2: Conceptual Framework

2.10 How Near Miss Management determines an effective workplace Safety

Near misses are often pre-cursors and valuable warning signs of existing safety problems (Mahler & Casamayou, 2009). "A near miss by luck is no different to a mid-air collision from an organizational failure view point and hence the reaction to the two should be identical" (Rose, 2004,).

Documenting near-misses can provide a truer picture of workplace hazards (Krause *et al* , 2010). Injury reports alone are often unreliable because of the many barriers that complicate employee reporting (Azaroff *et al* , 2002). Krause et al . (2010) found that an organization's number of near-miss events was positively correlated with its injury rate. Likewise, (Lauver *et al* . 2009) emphasized that the reporting of near-misses are a critical concern for organizations because they account for such a large portion of unsafe acts.

At the 2000 Engineering and Operations Conference Line Workers Roundtable, those present recommended capturing near-miss data as a way to improve their existing safety programs (Morris and Moore, 2000).Consequently, the American Public Power Association (APPA) collected a selection of near-miss forms and policies to help members start programs of their own. The APPA recognized that near-miss reporting can help focus safety training and provide a foundation for worker "tailgate talks" (American Public Power Association, 2010.). Furthermore, the collection authors noted that using a near-miss form is an excellent way to reinforce the group's safety culture and promote organizational learning.

A safety program that includes clear accident and incident reporting requirements, incorporates trend analysis, and encourages open discussion which enhances the

overall safety of an organization (Rogers Commission, 1986). A strong organizational safety culture is correlated with safer working environments (Columbia Accident Investigation Board, 2003). Reason (1990) noted that a healthy safety culture should focus on reporting and learning, rather than assigning blame. The goal of any organization's incident reporting and investigation system should be to support corporate safety measures that come from lessons learned (Rose, 2004). Accurate accident and incident reporting can help organizations decide where to focus resources to make cultural changes for safety (Krause and Russell, 1994). When employees believe their supervisors value safety they are more likely to report occupational injuries and illnesses and participate in investigations (Lauver *et al* ., 2009). Supervisor support for safety behaviour and a safety culture often results in a positive change in employee attitude towards safety (Littlejohn, *et al* and Lukic, 2010).Injury and near-miss analyses allow organizations to assemble key information related to employee safety. This is a prerequisite for the process that allows organizational and individual learning to occur; workers must have access to data and acknowledge that results or outcomes are unsatisfactory (Mahler and Casamayou, 2009).Once employees or managers acknowledge this, change can begin through informal processes like casual communication and adjustments in expectations and norms.

Incident and near miss data is used in the decision making process by organizations when they make formal policy, equipment, and training changes. Often, data analyses indicate problem areas and identify systems that need improvement (Columbia Accident Investigation Board, 2003; Krause & Russell, 1994). Monitoring minor accidents and near-misses allows organizations to adjust safety

policies and procedures and possibly prevent future incidents (Lauver *et al* ., 2009). Actually, making policy, rule and standard operating procedure changes based on injury and accident data is recognized as one of the first steps towards organizational learning (Mahler & Casamayou, 2009).

Injury and near-miss reporting can help organizations evaluate the current state of operations and changes in policy, training and equipment, as well as individual and team performance. Measuring performance can help organizations determine whether safety efforts are having the desired outcome (Petersen, 1998). Certain programs can be used to assess an organization's present safety environment and even provide insight to trends through past or historical event analysis. (Earnest, 2000) emphasized the value of measuring before and after the fact performances. This provides a means to hold managers or workers accountable for injury and loss experienced after a policy or procedure change. It also gives organizations a way to measure the effectiveness of the change.

Injury and near miss reporting is an essential part of an organization's risk management plan. Past accident and injury statistics help identify high risk processes or behaviours and the frequency and severity of these events helps managers set priorities for action. After new safety measures and policies are developed and put in place, the final step is monitoring the results. Importantly, the changes that stem from injury and near miss data analysis should result in better safety and financial security for employees, as well as improved productivity and cost savings for employers (Drexel School of Public Health).

Often, when organizations recognize unsatisfactory results, they strive to produce more favourable outcomes. Frequently, these types of changes carry a financial impact; organizations can use injury and near-miss data to aid in budgeting and resource allocation. Organizations can use injury and near-miss data to bolster support for changes in staffing and equipment, and to promote investments in training, incident prevention, technology, physical fitness, and recruiting (TriData Corporation, 2004).Injury and near-miss data can also be used to educate researchers, industry, and the public. Feedback from analysis contributes to equipment modifications by manufacturers and changes in professional standards. For instance, changes in fire fighter protective ensembles, self-contained breathing apparatus design and standards of use, closed cab apparatus, and advanced restraint systems have all been improved as a result of injury information sharing (TriData Corporation, 2004).

Occupational health researchers can benefit from organizational injury and near-miss data collection. NIOSH recognizes that all federal agencies can benefit from increasing coordination and information exchange (Madsen, 2009) found that fatal accident experiences in mines had a significant and measureable impact on worker safety because they prompted changes in government mine safety laws and regulations. Public officials and stakeholders can be persuaded to modify their expectations, change municipal requirements, and support budget items when they are educated about the nature of an organization's safety or health problem, possible solutions, and resources needed (Levy, 1996). Alternatively, if statistics are not available to describe a safety problem and its consequences, stakeholders and

officials are likely to invest in solving other, more immediate problems (Mahler & Casamayou, 2009).

2.11 Legal Framework on Safety in Kenya

Workplace health and safety is governed by a system of laws, regulations and codes which set out the responsibilities of employers and workers to ensure that health and safety are maintained at work and also the environmental is conducive. These include OSHA of 2007, EMCA of 1999 and NEMA of 2003.These are enforced by the government agencies.

Occupational Safety and Health Act (OSHA) 2007section 13 states that every worker has a duty to report to the supervisor, any situation which he has reason to believe would present a hazard (near miss) and which he cannot correct and also to report to his supervisor any accident or injury that arises in the course of or in connection with his work. A worker who contravenes the provisions of this section commits an offence and shall, on conviction, be liable to a fine not exceeding fifty thousand shillings or to imprisonment for a term not exceeding three months or to both.

Occupational Safety and Health Act (OSHA) 2007section 21 states an employer or shall notify the area occupational safety and health officer of any hazard, accident, dangerous occurrence, or occupational poisoning which has occurred at the workplace. Where an accident in a workplace causes non-fatal injuries to a person therein, the employer shall send to the area occupational safety and health officer, a written notice of the accident in the prescribed form within seven days of the occurrence of the accident.

Work Injury Benefit Act (WIBA) ensures that every worker has a right of appropriate compensation in case of injury at the work place. Also the employer has a duty to ensure the health and safety of the worker at the work place before engagement, during engagement and after engagement through medical surveillance as per the OSHA2007.

The Health and Safety committee rules of 2004 (The legal notice number 31) task the employer to form the Health and Safety committee to set good examples of safe and healthy work practices; monitor compliance with safety and health rules in their respective departments or units; participate in the training of workers in matters related to health and safety; carry out any others activities necessary for the promotion of occupational safety, health and welfare in the workplace; and provide written recommendations to the occupier on areas and issues requiring action following inspections carried out under these Rules.

NEMA a regulatory authority in the NEMA Act 2003 ensures that every worker and in principle every member of the public is entitled to a clean and healthy environment as well as a duty to safe guard and enhance the same environment so as not to be a causal agent for near miss.

CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

This chapter describes the research design, target population of the study, size of the population, data collection, piloting and testing, ethical consideration and data analysis methods.

3.2 Research Design

The research design that was used in this study was descriptive and empirical research with largely qualitative findings. The research involved carrying out a case study in KPC. The case study research design generally entailed describing a unit in details. It was intensive, descriptive and holistic analysis of an entity (Oso & Onen, 2005).

The choice of the case study was due to the fact that a near miss in the work place in the oil industry is the next major or fatal accident if it is not properly and promptly managed and may affect the overall performance of the organization. A case study also provided flexibility during the thesis.

3.3 Study Site (Area)

The study was done at the Kenya Pipeline Company Limited depots at Kipevu, Changamwe, Moi International Airport, Jomo Kenyatta International Airport, Nairobi, Nakuru, Eldoret and Kisumu as shown in the figure 3.1.

Figure 3.1: Layout of the Kenya Pipeline Company Limited in Kenya

Key	Description
PS1	Pump Station 1 located at Changamwe, Mombasa (Depot)
PS12	Pump Station 12 located at Airport, Mombasa (Depot)
PS14	Pump Station 14 located at Kipevu, Mombasa (Depot)
PS2	Pump Station 2 located at Samburu, Kwale
PS3	Pump Station 3 located at Maungu, TaitaTaveta
PS4	Pump Station 4 located at Manyani,TaitaTaveta
PS5	Pump Station 5 located at MtitoAndei, Makueni

PS6	Pump Station 6 located at Makindu, Makueni
PS7	Pump Station 7 located at Sultan Hamud, Makueni
PS8	Pump Station 8 located at Konza, Makueni
PS9	Pump Station 9 located at Jomo Kenyatta Airport, Nairobi (Depot)
PS10	Pump Station 10 located at Industrial Area, Nairobi (Depot)
PS22	Pump Station 22 located at MaaiMahiu
PS23	Pump Station 23 located at Naivasha
PS 24	Pump Station 24 located at Nakuru
PS25	Pump Station 25 located at Nakuru (Depot)
PS26	Pump Station 26 located at Mau Summit
PS27	Pump Station 27 located at Eldoret (Depot)
PS28	Pump Station 28 located at Kisumu (Depot)

3.4 Target Population of the study

The target population was 883 employees consisting of 600 workers (Support staff), 250 supervisors and 33 Management in KPC Depots**.** The response rate was 60% leading to a target population of 281 consisting of 192 workers (Subordinate staff), 79 supervisors and 10 management staff)

3.5 Sample size of the study

The size of the sample population was determined by the following formula.

$$n = \frac{Z^2pqN}{Z^2p.q+ (N-1)}$$

$$n = \frac{Z^2pqN}{Z^2p.q+ (N-1)}$$

Where: $n_{= the}$ desired sample size (in case of finite population)

Z = Confidence level at 95% at 1.96

p = acceptance error of 0.5

q=1-p

e=Statistical significance set=0.05

N=the sample size of workers in KPC Depots as at September 2013(Kothari, 2011).

Therefore; the sample size (n)

$$n= \frac{(1.96)^2 (.5) (.5) (883)}{(1.96)^2 (.5) (.5) + (883-1) (0.05)^2}$$

$$= \frac{848}{3.1654}$$

= 267.9

= 268

Allowing 5% for any loss of questionnaires =13

= 281 consisting of 192 workers (Subordinate staff), 79 supervisors and 10 management staff)

3.6 Data Collection Instruments

The researcher used questionnaires, interviews, checklists and document review as the main instruments for collecting data. The selection of these instruments was guided by the nature of data to be collected, the time available as well as by the objective of the study. The researcher was mainly concerned with opinions, skills, knowledge and attitude of workers in the oil industry on near miss incident management system, such information could only be best collected through the use of questionnaires, interviews, checklists and document reviews (Touliatos & Compton, 1988; Bell, 1993).

3.7 Pilot testing

After constructing the questionnaire, the researcher tried it out on a small sample of the population in KPC so as to find out the integrity of the instruments used and whether the questions were objective, whether the wording was clear, whether the set questions provoked a response and finally whether there was any researcher bias. There was no further review of the questionnaires after the pilot test.

3.8 Ethical consideration

All respondents in this study had detailed information about the purpose, aim and objectives of the study through the questionnaire. The purpose of this was to ensure that all respondents participating were aware and willing to be involved in the study. A copy of the proposal was presented to the Research Committee of IEET Department, Jomo Kenyatta University for approval. Approval was also sought from KPC Management to conduct the study which was granted as per appendix three of this report.

3.9 Data Analysis

Questionnaires were collected and data was analysed using SPSS 13.0 statistical software. Descriptive and inferential statistics was also used to analyze data and summarized in chi-square and regression to test the null hypothesis. The data was analyzed and results displayed in the form of Figures, charts and tables with mean and standard deviation. After checking the significance of the variables at various confidence levels, conclusions were made and appropriate recommendations to the Management of the organization for possible implementation.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

The data was analysed systematically by focusing on the study objective: To assess the near miss incident management system in Kenya Pipeline Company Limited. The findings were presented as a report of the questions answered by the respondents.

4.2 Response Rate

A total of 281 questionnaires were administered but 167 were fully filled and returned while 114 were not returned. This represented a response rate of 60% the respondents included the management, supervisors and workers in the organization.

From the data, the analysis focused on the subordinate staff with a response rate of 49% followed by the supervisors at 33% and lastly the management at 18% rate.

This followed the normal distribution curve although only 82 out of a possible 192 workers (subordinate staff) responded to the questionnaire due to the study limitations discussed in chapter one.

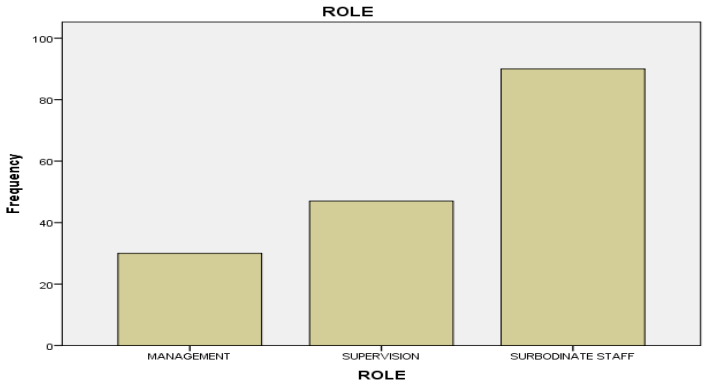

Figure 4.1: Response rate in the organization

4.3 Age of Employees

The age of the employees between 31 – 40 years had a high frequency rate of 80, followed by the category of 41- 50 with a frequency of 57, 20 -30 years with a frequency of 20 and lastly 50 – 70 years with a frequency of 10. The majority of the employees were at a better productive age and therefore could give better results if they were actively involved in Near miss incident management system establishment and implementation through training.

To determine the age of the employees in the organization, which comprised management, supervisors and workers as illustrated in the table below.

Table 4.1: Age of Employees

Years	Frequency	Percent	Cumulative percent
20 – 30	20	12	12.0
31- 40	80	47.9	59.9
41 – 50	57	34.1	94.0
50 – 70	10	6.0	100
Total	167	100	

4.4 Education Level of employees

47.9% of the employees had a tertiary education (college level) with a frequency of 80 followed by university level with a frequency of 77 and lastly secondary level with a frequency of 10.

Therefore the employees were in a position to be competent enough to deliver on Near miss incident management system establishment and implementation in case they were trained on NMIMS. Some of the employees had their tertiary education on the HSE discipline while others were trained on HSE which included NMIMS while in the organization. But majority were yet to be trained on NMIMS.

To determine the literacy level of the employees. The findings were as shown in the table below

Table 4.2: Education level of employees

	Frequency	Percent	Cumulative percent
Secondary	10	6.0	6.0
Tertiary college	80	47.9	53.9
University level	77	46.1	100
Total	167		

4.5 Years worked at KPC

Majority of the employees had worked in the company within a period of 11-20 years with a frequency of 80, followed by a range of 0- 10 years with a frequency of 60, 21- 30 years with a frequency of 17 and within a range of above 30 years with a frequency of 10.Therefore 47.9% of the employees had worked long and could deliver on Near miss incident management system establishment and implementation given a chance due to their long years of experience. However continuous training was necessary to enhance their competence.

The number of years the employees had worked in the company was as outlined in the table below.

Table 4.3: Years worked in KPC

	Frequency	Percent	Cumulative percent
0 – 10	60	35.9	35.9
11 – 20	80	47.9	83.8
21 – 30	17	10.2	94.0
Above30	10	6.0	100
Total	167	100	

4.6 Identification of Near Miss

76% of employees at a 127 frequency were able to identify a near miss incident compared to 18% who could not and 6% who were not sure at 30 and 10 frequency rate respectively. This meant that it was necessary to involve the employees in the NMIMP as majority were in a position to identify a near miss incident.

The employees 'ability to identify a near miss incident in the organisation was illustrated in the figure below.

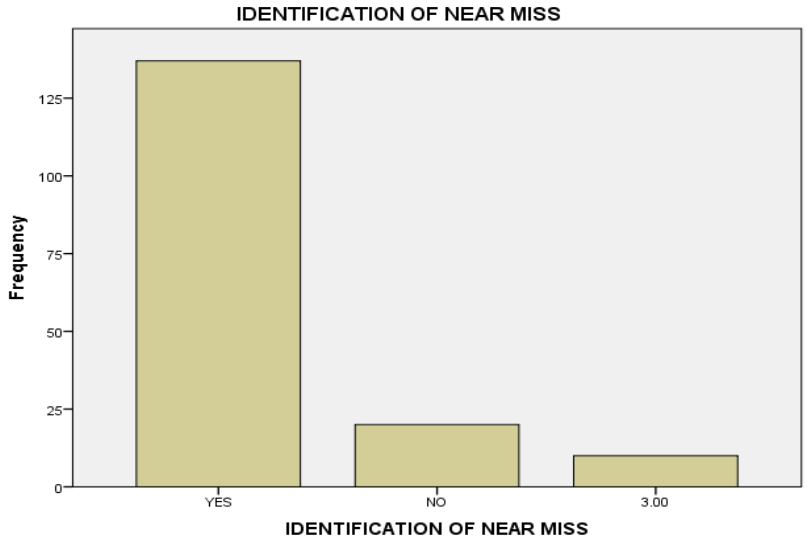

Figure 4.2: Identification of near miss

4.7 Near Miss incidents Management system in KPC

The Near Miss Incident Management System, a guide to report near miss incidents with the potential to cause injury or property damage. To prevent consequences that could be severe, it was important for near miss incidents to be identified, reported and mitigated in the organization. This item covered the entire range of operations in the KPC.

The organization had an informal near miss incident management system with a 65% respondents clearly indicating that KPC adopted the system. The situation on the ground was such that near miss incident management system was embedded in the other incidences and therefore it was not expressly established, implemented and maintained as a standalone.

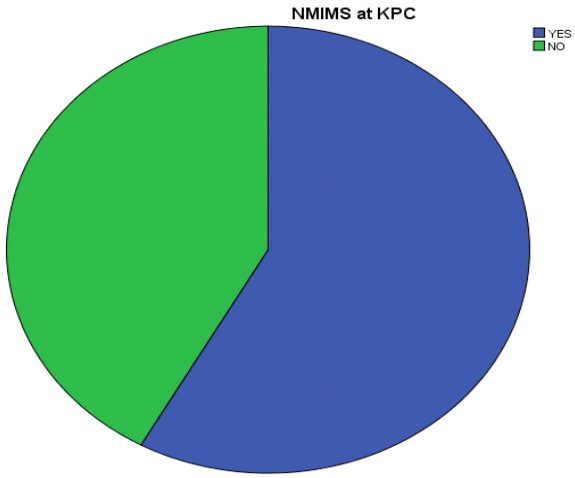

Figure 4.3: Near miss incident management system in KPC

4.8 Integration of Near miss with other systems

There was no integration of the near miss with other systems in the organization with a high response rate at 59% of the respondents confirmed there was no integration while 35% of the respondents said it was in existent and 6% were not sure of the integration of the near miss with other management system. However, NMIMS was not a standalone in the organization but was embedded in other management systems.

To determine the extent to which near miss incident management system was integrated with other systems in the organization, data was as per the figure below.

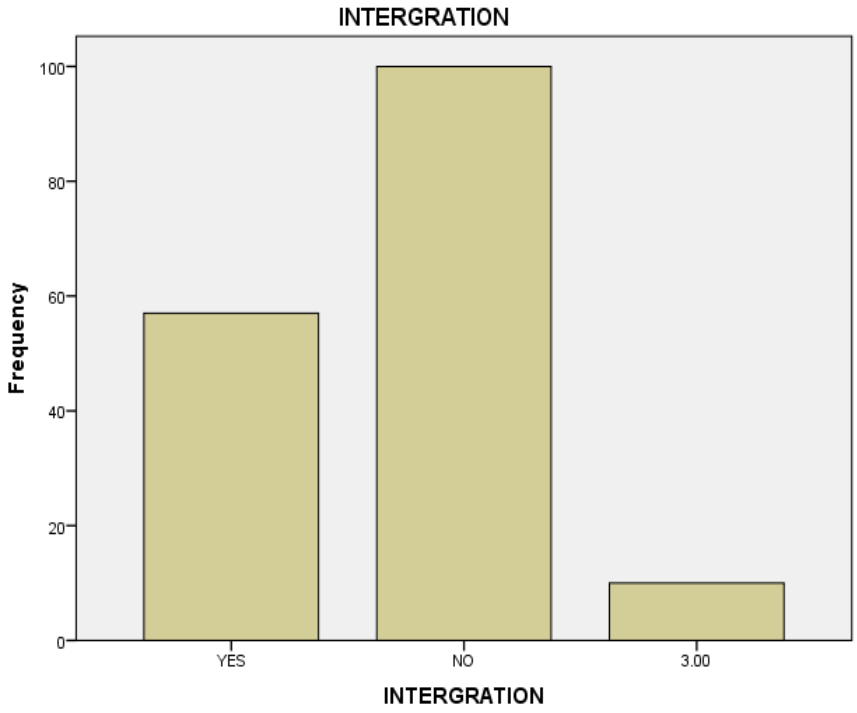

Figure 4.4: Integration of Near Miss Incident Management System with other systems

4.9 Type of Integrated Near Miss system

The type of integrated system used in KPC was a single system at 71% frequency while the separate system at 29% rate. The system combined Near Miss with other incidences such as personnel injury and oil spillage. Single and separate integration system were considered as illustrated in the figure below

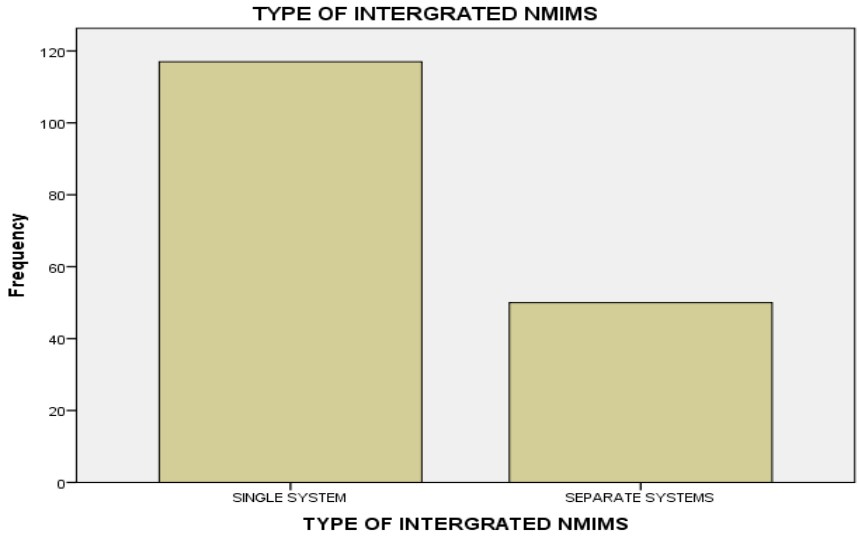

Figure 4.5: Type of Integrated Near Miss Incident Management System

4.10 Training of Near Miss in KPC

There was no near miss training as 87% of respondents indicated that the training did not take place followed by 13% of them agreed that it took place. Other HSE sensitization to staff took place during which near miss was briefly covered but there was no formal training or sensitization entirely on near miss incidences. This was the responsibility of the top management to avail resources and have a dedicated training on NMIMS for all employees as a sign of top management commitment to safety.

To find out whether the organization carried out training on near miss to all its employees, the findings were as shown below.

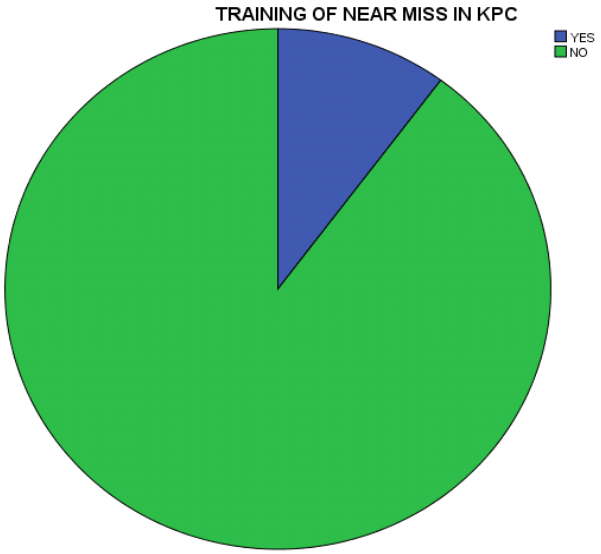

Figure 4.6: Training of Near Miss Incident Management System in KPC

4.11 Health, Safety and Environment policy in KPC

There was a health, safety and environment policy in the organization since 94% respondents were in agreement. The duly signed policy by the Managing Director had been displayed at strategic points within the organization and was also accessible by all employees online.

The findings were as shown in the Figure below

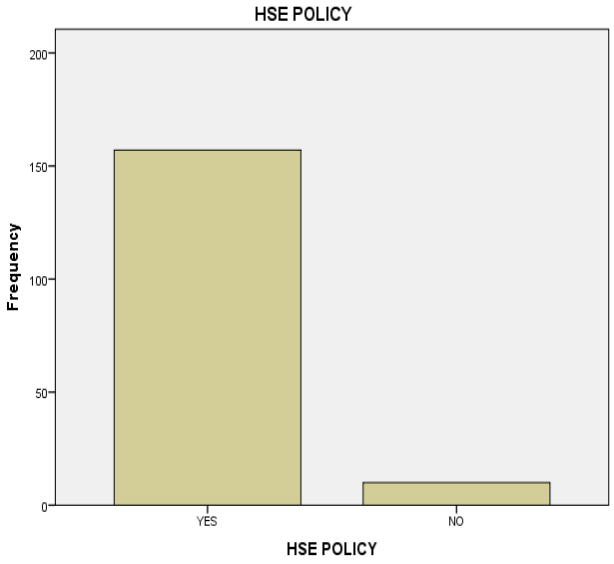

Figure 4.7: Health, Safety and Environment policy in KPC.

The table below illustrated the frequency of the employees in terms of the health, safety and environment policy in the organisation. The policy stated that the KPC top management was committed to eliminate accidents among other incidences and therefore near miss incidences were not comprehensively covered in the policy.

Table 4.4: Health, Safety and Environment policy

	Frequency	Percent	Cumulative percent
Yes	157	94.0	94.0
No	10	6.0	100.0
Total	167	100	

4.12 Safety Briefs

Majority of the employees did not understand safety briefs with respect to near miss incidences in the organisation with 71.9% saying no at a frequency of 120.The safety briefs were done by the technical staff only who are a 25% minority and hence the non-technical staff did not understand them.

To find out whether the employees understood safety briefs in terms of near miss incidents in the organisation, the data was used as shown below.

Table 4.5: Safety briefs

	Frequency	Percent	Cumulative Percent
Yes	47	28.1	28.1
No	120	71.9	100
Total	167	100	

4.13 Last near miss reported

The most current report on near miss by employees was in the last three months with 40.1% at a frequency of 67 followed by one month with 35.9% at a frequency of 60 and finally last six months with 24% at a frequency of 40. This was due to the fact that the near miss process was not privy to most employees due to inadequate training of employees on near miss incidences and also the employees' fear of victimization.

To find out whether a near miss incident was reported within a period of six months, the table below was used.

Table 4.6: Last Near Miss reported

	Frequency	Percent	Cumulative percent
Last one month	60	35. 9	35. 9
Last three months	67	40.1	76
Last six months	40	24.0	100
Total	167		

4.14 Action taken upon reporting of near miss incident

Employees were in agreement that action was taken when a near miss incident was reported with 51% response at a frequency of 85 and 42% on the no side and 7% not sure of any action taken. The action taken was a correction to fix the hazard, a corrective action to eliminate a potential hazard or a preventive action to prevent recurrence of the hazard. The findings were as illustrated in the figure below.

Figure 4.8: Action taken upon reporting near miss incident

4.15 System of reporting occurrence of near miss Incident

Most employees agreed that there was a system of reporting a near miss incident in KPC, with 88% at a frequency of 147 for yes and a 12% at a frequency of 20 on the negative. The near miss incident was being reported in a preliminary incident report booklet by the employees or their supervisors. It was reported among other incidences such as equipment damage, oil spillage and personnel injury.

To check for the availability of a system to report near miss incidents, it was as illustrated in the chart below.

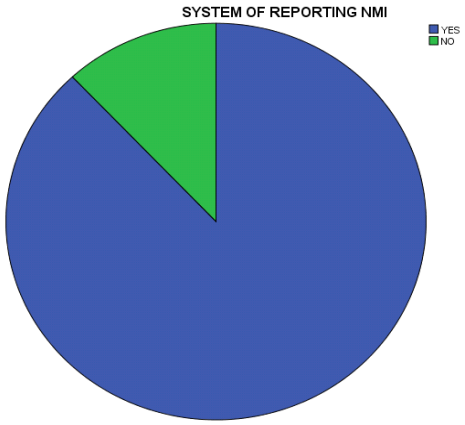

Figure 4.9: System of reporting Near Miss Incident

4.16 Awareness of any near miss incident monitoring system at KPC

Employees were in agreement that there was no monitoring system of near miss incidences in the firm with 58.1% at a frequency of 97 for no and a 41.8% at a frequency of 70 for yes.

To find out whether the workers in KPC were aware of a near miss monitoring system, the findings were as outlined below.

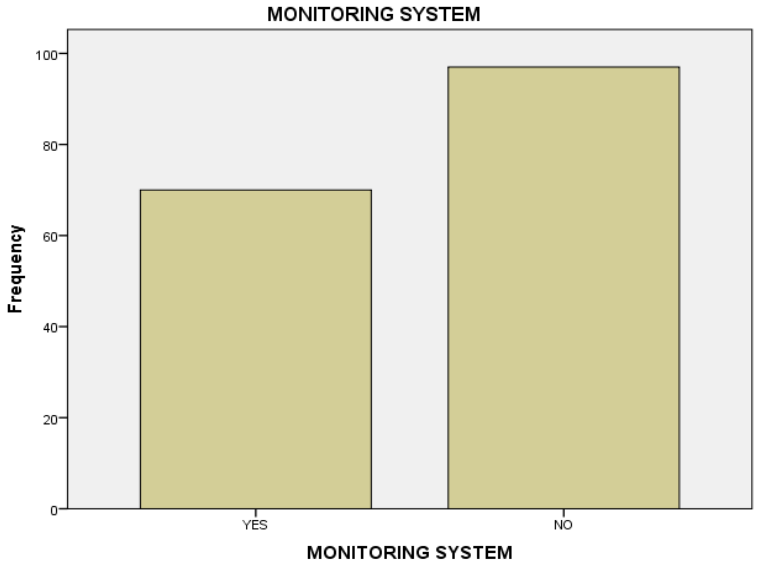

Figure 4.10: Awareness of any near miss incident monitoring system at KPC

There were periodic HSE audits which were conducted as scheduled and data analysed to give the trends of the incidents.

Table 4.7: Awareness of any near miss incident monitoring system at KPC

	Frequency	Percent	Cumulative percent
Yes	70	41. 9	41.9
No	97	58.1	100
Total	167	100	

4.17 Near miss management process

The organization did not have a near miss management process with 70.6% for no at 118 frequency and 29.4% yes at a frequency of 45. The near miss management process was not a standalone as the incidents were being reported among others in a preliminary incident report booklet by the employees or their supervisors.

To find out if the organization had a near miss management process, the data was as outlined below.

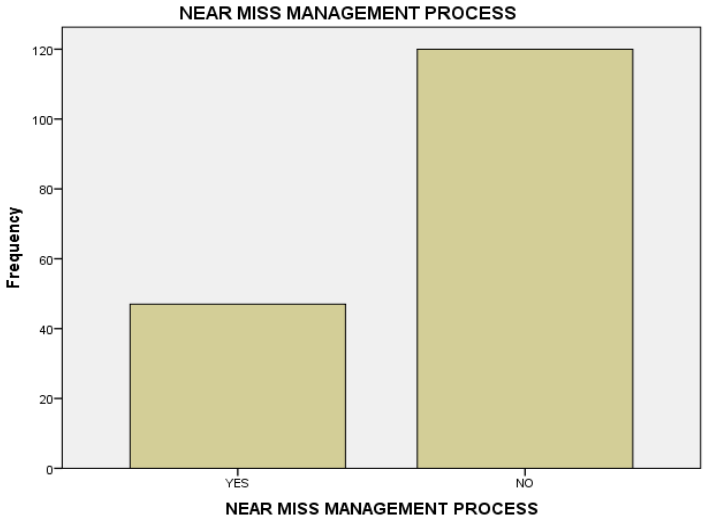

Figure 4.11: Near miss management process

4.18 Near miss management policy

There was no near miss management policy in the organization at a frequency of 118(70.6%) of the employees on no and frequency 45(29.4%) on yes. The near miss management policy was to be established in the Near Miss Incident Management System by the top management. The organization did not have a NMIMS policy but was in the process of establishing an Integrated Management System which included Health Safety and Environment Management System.

The findings were as shown in the figure below.

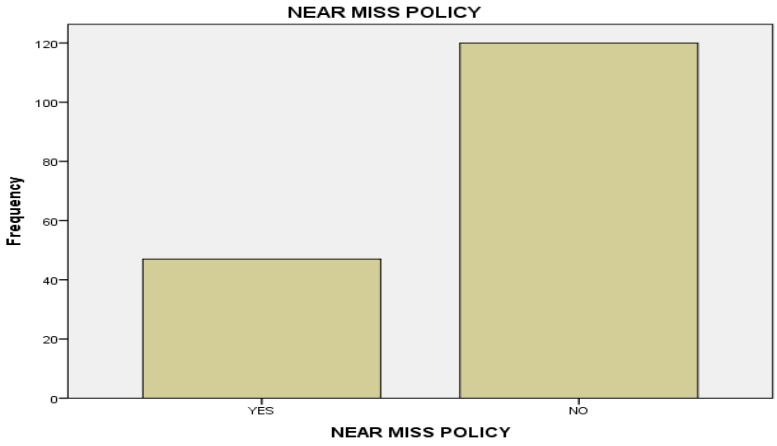

Figure 4.12: Near Miss Management Policy

4.19 Audit of the near miss management process

There was no audit of near miss in KPC with a frequency of 110(66%) for no and yes at a frequency of 57(34%). There were periodic HSE audits which were conducted as scheduled and data analysed to give the trends of the incidents.

The findings were as shown in the figure below.

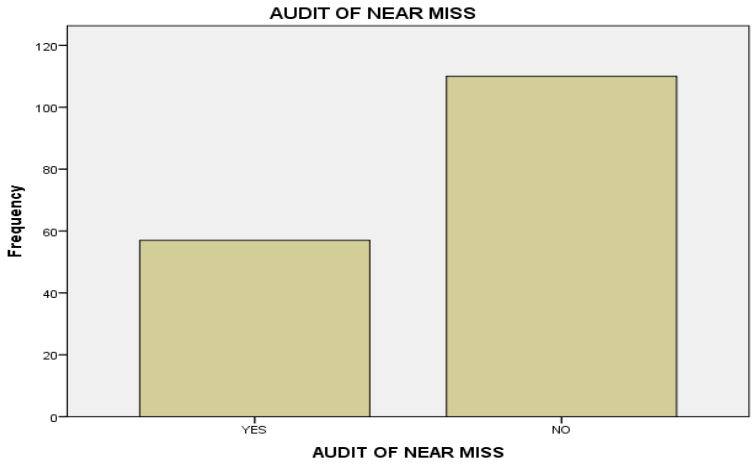

Figure 4.13: Audit of the Near Miss Management process

4.20 Reward System for near miss reporting

The absence of a reward and recognition system for near miss reporting was registered by employees with 93.8% at 150 frequency saying no and 6.2% on the affirmative at a frequency of 17. The company did not have any reward and recognition system in terms of incentives for the staff who actively participated in the near miss management process. This was a top management responsibility as a sign of management commitment.

The findings were as shown in the figure below.

Figure 4.14: Reward system for Near Miss reporting

4.21 Training on near miss management system

There was no comprehensive training on near miss incident management system at all levels in the organisation at a frequency of 140(83.8%) for no respondents and the rest at 27 (16.2%) frequency for yes. Other HSE sensitization to staff such as basic fire fighting, incident reporting and investigation took place during which near miss incident management was briefly covered but there was no formal training or sensitization entirely on Near miss incidences.

The findings were as shown in the figure below.

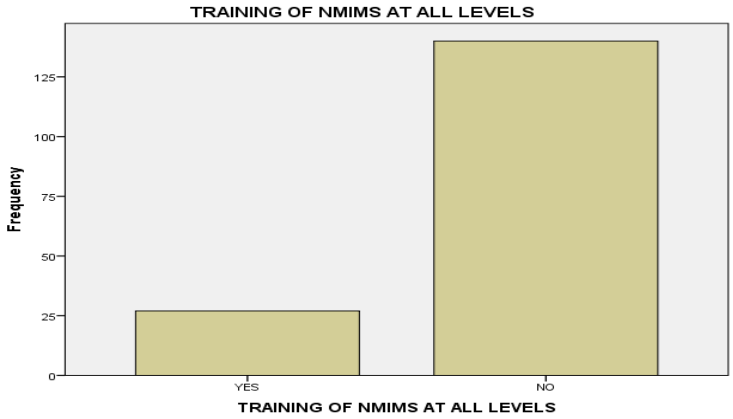

Figure 4.15: Training of NMIMS at all levels in the organisation

4.22 Understanding of role and responsibility in implementation of near miss management process in KPC

Most workers did not understand their role and responsibility in the implementation of the NMIMS process in the organization with a frequency of 120(71.9%) for no and yes at a frequency of 47(28.1%).The allocation of employee role and responsibility on near miss management process was the mandate of top management.

The findings were as outlined in the figure below.

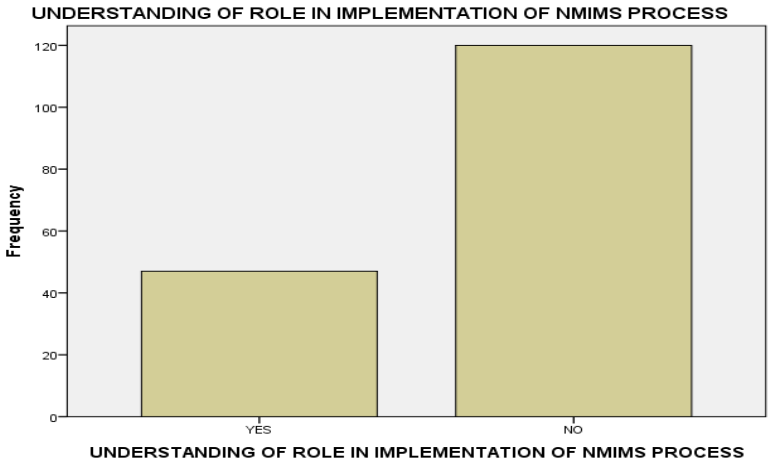

Figure 4.16: Understanding of role in implementation of NMIMS process.

4.23 Determination of hypothesis

Taking all factors into account (Health, safety and environment policy in KPC, health briefs before commencing work, near miss management and near miss policy formulated by management) constant at zero, workplace safety was 0.977. The findings presented also showed that taking all other independent variables at 0.001, a unit increase in health, safety and environment policy led to an increase in 0.143 on workplace safety, a unit increase in health briefs before commencing work at 0.016, a unit increase in near miss management at 0.148 and a unit decrease in near miss policy formulated by management at -0.071.This inferred that near miss management policy, followed by health, safety and environment policy, health briefs before commencing work and lastly by near miss policy formulated by management influenced effective workplace safety.

Table 4.8a: Coefficient of Determination

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.977	.206		4.735	.000
	HEALTH, SAFETY AND ENVIRONMENT (HSE) POLICY IN KPC	.143	.082	.134	1.736	.084
	HEALTHY BRIEFS BEFORE COMMENCING WORK	.016	.071	.018	.230	.818
	NEAR MISS MANAGEMENT	.148	.076	.152	1.942	.054
	NEAR MISS POLICY FORMULATED BY MGT	-.071	.071	-.079	-1.006	.316

From the Pearson chi square analysis at $X(1) = 4.93$ and the probability, $p = 0.026$ this showed that there was statistically significant association between the near miss management and near miss implementation roles and responsibilities for an effective workplace safety in KPC. Since $p = 0.026$ and therefore less than 0.05 and there is statistical significance, therefore the null hypothesis is rejected. Thus near miss incident management system led to an effective workplace safety in KPC.

Table 4.8b: Pearson Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.930[a]	1	.026		
Continuity Correction[b]	4.116	1	.042		
Likelihood Ratio	4.740	1	.029		
Fisher's Exact Test				.035	.023
Linear-by-Linear Association	4.900	1	.027		
N of Valid Cases	167				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.20.

b. Computed only for a 2x2 table

4.24 Results Reliability

Reliability is the ability of a research instrument to consistently measure characteristics of interest over time. It is the degree to which a research instrument yields consistent results or data after repeated trials. If a researcher administers a test to a subject twice and gets the same score on the second administration as the first test, then there is reliability of the instrument (Mugenda & Mugenda, 1999). From the thesis, the response rate of 60% due to the limitations stated in chapter one was reliable but for consistency, dependability or stability of the results similar research could be done in future to test the reliability of the results.

CHAPTER FIVE

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

- The study found that Near Miss Incident Management System leads to an effective workplace safety.
- The near miss incident management system in the organization was embedded in the other incidences and therefore there was no well-established and implemented near miss incident management system which should have a near miss incident management policy, procedures and relevant records.
- It also established that an effective near miss incident management for an effective work place safety is determined by the top Management commitment (tone at the top).
- Reward and recognition of near miss incident reporters through incentives and other recognition mechanisms was not evident with 93.8% of respondents confirming. This caused the workers to have low morale in reporting of the near miss incidences and this had a direct outcome of major incidences.
- Training and awareness creation on near miss incidences among workers was also lacking (with 83.8%on the affirmative) and this led to many of them being unable to identify, report, control and review of the incidences as per the research.
- Although majority of workers were in a position to identify a near miss, reporting and mitigation measures to control the same was lacking due to their fear of victimization.

- Also the workers did not understand their roles and responsibilities in NMIMS well.
- Near miss management policy, health, safety and environment policy, health briefs before commencing work and near miss incident management policy formulated by management influenced effective workplace safety.
- Although other HSE sensitization to staff such as basic fire fighting, incident reporting and investigation took place during which near miss incident management was briefly covered, there was no formal training or sensitization entirely on Near miss incidences.
- Monitoring and evaluation of incidences was evident through periodic HSE audits which were conducted as scheduled and data analysed to give the trends of the incidents. Rarely the audits included near miss incidences.
- The safety briefs were done by the technical staff and hence the non-technical staff did not understand them.
- There was no near miss management policy in the organization

5.2 Recommendations

- KPC should establish, implement and maintain a near miss incident management system which shall be a determinant for an effective workplace safety. The NMIMS should have the near miss management policy.
- Top Management commitment in KPC could be improved by availing resources for the establishment, implementation and maintenance of a Near Miss Incident Management System (NMIMS).

- Reward and recognition system including giving of incentives to employees who identify report and control near miss incidents should be implemented as an evidence for top management commitment.
- As a long term measure, there is need to establish an integrated management system in KPC as a best practice.
- Resources should also be availed by the top management to ensure training and awareness creation of all workers at all levels on Near Miss Incident Management System (NMIMS).This will give all the workers a leverage to identify, report and mitigate the incidences and this shall reduce the major incidences which could impact negatively on KPC by denting its image globally, reducing customer confidence and exposure to litigations leading to colossal financial losses for KPC due to compensation of injured and also high premiums for insurance.
- Reporting of near miss incident should be encouraged by acknowledgement and recognition. There should be a formal reward system for the worker(s) who identifies and reports most near miss incidences through an incentive. It is important to note that the worker who identifies a near miss and the one who reports it does not have to be the same for example if someone complains to his or her supervisor about a problematic situation the supervisor who may resolve this persons problem or bring it to the attention of others can also report it as a near miss (Van der schaaf *et al*, 1991).
- Establishing a system that captures all near misses regardless of their impact is important. Equally important is establishing effective prioritizing systems.
- All employees need clear guidelines on near miss management process to be able to recognize all the near misses that are likely to cause major problems.

- Monitoring and evaluation of incidences through audits should be expanded to cover near miss incidences.
- Employees at all levels should be sensitized on their roles and responsibilities in the implementation of Near Miss Incident Management System.

5.3 Suggestions for further research

It is hereby suggested that further research should be carried out in the oil marketing organizations in the country on the assessment of their Near Miss Incident Management system and its effects on workplace safety. Assessment of Near Miss incident Management System in KPC should be carried out further to test the reliability of the results.

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APPENDICES

Appendix i: Research Questionnaire

RESEARCH QUESTIONNAIRE

I am undertaking a research for my masters of science in Occupational Safety and Health at the Jomo Kenyatta University of Agriculture and Technology (JKUAT) on the assessment of Near Miss Incident Management System in Kenya Pipeline Company Limited (KPC).

I am going to administer a short questionnaire to you on this subject. I confirm that the information you give will be treated with utmost confidentiality and will only be used for the purpose of this research.

Kindly fill in the questionnaire correctly by ticking in the appropriate space or box.

1. Age bracket 20-30years ( ) 31- 40 years ( ) 41-50 years( )over 50 years ( )

2. How many years have you worked in KPC?

0 -10 years( ) 11 – 20 years ( ) 21 -30 years( ) over 30 years ( )

3. Highest level of education.

Primary ( ) Secondary ( ) Tertiary college ( ) University level ( )

4.Your role in the organization

Management ( )

Supervision ( )

Worker ( )

Others –please state……....

5. Do you understand the term near miss incident? Yes ( ) No ( )

6. Have you ever undertaken any Near Miss incident training in KPC? Yes ( ) No ( )

7. If the answer to question no. 6 is yes, was the training of help to you? Yes ( ) No( )

8. Do you understand your role in the implementation of Near Miss Management process in KPC? Yes ( ) No ( )

9. Is there a Near Miss Incident Management System in KPC? Yes( ) No( )

10. Is the Near Miss Incident Management System integrated with other systems in the organization?

Yes( ) No( ) Do not know ( )

11. What type of integrated Near Miss Incident Management System is in your organization?

A single system for all near miss and accident incidents, ( )

Two separate (parallel) systems for each one: near-misses and accidents ( )

12. Is there a Health, Safety and Environment (HSE) policy in KPC?

Yes ( ) No ( ) Not sure ( )

13. Are there any safety briefs given to you before commencing any works on a daily basis?

Yes ( ) No ( ) Not Applicable ( )

14. Are you able to identify a near miss in your work place? Yes ( ) No ( ) Not Sure ( )

15. If your answer to 14. Above is yes, when did you last identify and report a near miss?

Last one week ( ) Last one month ( ) Last three months ( ) Last six months ( )

16. Was there any action taken to close out the near miss? Yes ( ) No ( )

17. Do you have a system of reporting any occurrence of near miss incidence or accidents on site? Yes ( ) No ( )

18. What are some of the challenges that may be encountered while reporting near miss in KPC?.....

19. Are you aware of any near miss incident monitoring in KPC? Yes ( ) No( )

20. Is there any signage information on near miss at the work place? Yes ( ) No ( )

21. Recommend on any improvement to Near Miss incident Management in KPC.....

22. Does KPC have a Near Miss Management Process? Yes ( ) No () Not sure ( )

23. Has the top Management formulated a Near Miss Management policy Yes( ) No( )

24. Does the top Management audit the Near Miss Management process as required by regulations? Yes ( ) No ( )

25. Does the top Management reward compliance to the Near Miss Management process at all levels? Yes ( ) No ( )

26. Does the top Management train workers on Near Miss Management process at all levels in KPC? Yes ( ) No ( )

Thank you for Your Participation

Appendix ii: Request for Authority to Collect Data

Isaac M Mbuvi

P O BOX 93231

Mombasa

14/05/14

The Human Resources Manager

Kenya Pipeline Co. Ltd

P.O BOX 73442

Nairobi.

Dear sir,

RE: REQUEST TO COLLECT DATA FOR THESIS RESEARCH

Iam currently pursuing an MSC degree on Occupational Safety and Health at JKUAT. Iam doing a research on the role of Near Miss Incident Management System on the safety performance of KPC.

At the root of most accidents and incidents is a near miss that was not controlled and hence the need for the research.

I kindly request to be allowed to collect data on the same from staff to help in analysis and conclusion of research. I shall treat the data with utmost confidentiality.

Attached herewith is the questionnaire.

Yours faithfully

Isaac M Mbuvi

Attachments

CC: Chief Engineer Health Safety and Environment

Appendix iii: Approval to Collect Data

KENYA PIPELINE COMPANY LIMITED

KENPIPE PLAZA,
SERKOI ROAD,
OFF HAILE SELASSIE ROAD,
INDUSTRIAL AREA,
NAIROBI, KENYA.
P.O.Box 73442 - 00200,
TELEPHONE: 254-20-2606520
TELEFAX: 254-20-6004018/3540222
E-mail: info@kpc.co.ke

Staff/Mbuvi/3156(108)

22nd May 2014

Mr. Isaac Mbuvi
KPC Limited
PS 1
MOMBASA

KENYA PIPELINE Co. LTD.
RECEIVED
26 MAY 2014
CHIEF ENGINEER (HSE)

Thro' CE (HSE),

Dear Mr. Mbuvi,

RE: REQUEST TO COLLECT DATA FOR THESIS RESEARCH

Reference is made to your letter dated 14th May 2014 on the above subject.

We are pleased to inform you that Management has approved your request to carry out research on **'The role of Near Miss Incident Management System on the Safety Performance of KPC'.**

You will be required to treat all information collected with utmost confidentiality and submit a copy of the final research paper to KPC.

We wish you all the best.

Yours Sincerely,

for

H. L. LENAIROSHI
FOR: MANAGING DIRECTOR
SsI/