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Effectiveness of the Near Miss Safety Program Relative to the Total Number of Recordable Accidents in a Manufacturing Facility

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**EFFECTIVENESS OF THE NEAR MISS SAFETY PROGRAM RELATIVE TO
THE TOTAL NUMBER OF RECORDABLE ACCIDENTS IN A
MANUFACTURING FACILITY**

A Research Paper

Presented to

The Faculty of the Department of STEM Educational and Professional Studies

Old Dominion University

In Partial Fulfillment of the Requirements of
The Degree of Masters of Science in Occupational and Technical Studies

BY
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August 2014

APPROVAL PAGE

This research paper was prepared by Kristen Templeton, under the direction of Dr. John Ritz, in SEPS 636, Problems in Occupational/Technical Education. It is submitted in partial fulfillment of the requirements for the Degree of Masters of Science in Occupational and Technical Studies.

Dr. John M. Ritz
Advisor

Date

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CHAPTER I

INTRODUCTION

Safety is considered a top priority in many manufacturing organizations and environments. Within a manufacturing work environment, there are several contributing factors that can determine the extent in which safe work practices are being implemented and performed. These factors include, but are not limited to, work instructions that identify how to safely perform the task, proper tools and equipment for the task, personal protective equipment needed for each particular task, adequate training, management support and supervision, strong communication, and personal attitudes and behaviors toward safety. These factors are critical to establishing, supporting, and maintaining a safe work environment. However, management support and supervision, strong communication, and personal attitudes and behaviors toward safety have been the most important factors of focus at Delta Star, Inc.

There are many actions that can be taken to improve management support and supervision, strong communication, and personal attitudes and behaviors toward safety in the workplace. These three essential factors must all be improved upon in order to enhance workplace safety and reduce accidents beginning with management support and supervision. If employees perceive that management does not support safety then employees will, unfortunately, have a poor attitude toward safety. It is very common for management to have the “production first” attitude as opposed to the “safety first” attitude which can also negatively portray the importance of workplace and employee safety. According to Smith (2013) “nearly 1,000 EHS professionals responded to the 2013 National Safety Survey. Most said that safety has improved at their organization in the past year, but many admitted the safety versus production argument is ongoing and

some shared truly horrifying stories of workplace violence and bullying” (p. 28). Here is a sample of what some respondents said when asked: “What is the most frequent complaint you hear from employees about your organization’s safety and health program?”

- Our managers care more about product than safety.
- The foremen of the company still push and drive with disregard to safety. The foremen are not held accountable for poor safety performance.
- Management does not follow safety programs.
- They identify a hazard and it does not get fixed in a timely manner.
- Some safety rules make the job more difficult.
- Lack of consistency in policies vs. procedures.
- Inconsistent messages and an overwhelming number of corporate (global) “one size fits all” procedures.
- The people enacting rules and regulations have never gotten their hands dirty.
- We don’t know what happens to folks that are poor performers in relation to safety.
- Management does not really listen to the employees.

Therefore, it is critical for management to visually and verbally demonstrate their support for workplace safety. By doing so, management can observe how employees perform specific tasks. If employees are not properly performing the task safely, management can communicate and train employees on the proper techniques to perform the task safely. If employees continue to perform the job in an unsafe manner, management can proceed

with disciplinary actions. Management must enforce and proactively support workplace safety in order for attitudes and behaviors toward safety to change.

Aside from management support and supervision and strong communication, employees must also be given an opportunity to become involved with workplace safety. The employees are exposed to safe and unsafe practices within the work environment every day, much more so than any management personnel who do not directly work in a specific production area or department. Thus, it is important to give employees an opportunity to identify safety hazards and make suggestions on ways to improve safety in the work environment. Without employee input, personal attitudes and behaviors toward safety may not improve. If personal attitudes and behaviors toward safety do not improve, accident reduction may be temporary or may not be achieved at all.

STATEMENT OF PROBLEM

The problem of this study was to determine if the implementation of the Near Miss safety program at Delta Star, Inc. reduced the number of recordable accidents.

RESEARCH OBJECTIVES

The objectives of this study were to answer four questions concerning the effectiveness of the Near Miss safety program relative to the total number of recordable accidents at Delta Star, Inc.

RO₁: Does the implementation of the Near Miss program enhance employee safety education?

RO₂: Does the implementation of the Near Miss program improve employee morale?

RO₃: Does the implementation of the Near Miss program reduce the total number of recordable accidents?

RO₄: Does the implementation of the Near Miss program promote safety awareness resulting in accident prevention?

BACKGROUND AND SIGNIFICANCE

According to the National Bureau of Labor Statistics (2014), “the electrical equipment, appliance, and component manufacturing subsector is part of the manufacturing sector. Industries in the Electrical Equipment, Appliance, and Component Manufacturing subsector manufacture products that generate, distribute and use electrical power” (p. 1). Electrical Equipment Manufacturing establishments, such as Delta Star, Inc., make transformers. Thus, it is critical that a proactive, healthy, and safe environment exist in the workplace.

The National Bureau of Labor Statistics (2014, p. 3) defines an injury or illness to be “work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition.” In 2012, the national total number, or incident rate, of recordable cases per 100 full-time workers in the Electrical Equipment Manufacturing establishments was 5.2. The incident rate of injuries and illnesses may be computed from the following formula:

$$(\text{Number of injuries and illnesses} \times 200,000) / \text{Employee hours worked} = \text{Incident rate}$$

The 200,000 hours in the formula represents the equivalent of 100 employees working 40 hours per week, 50 weeks per year, and provides the standard base for the incident rate (National Bureau of Labor Statistics, 2014). Delta Star, Inc. measures safety

performance by reporting OSHA recordable accident rates using this formula. These rates have fluctuated over the past few years. However, most recently, there was an increase in the total number of recordable accidents from 2012 to 2013. The total incident rate for Delta Star, Inc. in 2012 was 7.5, which is higher than the national average for that same year, and increased to 10.8 in 2013. Thus, it was imperative that Delta Star, Inc. develop and introduce a proactive safety process such as the Near Miss safety program.

According to OSHA (2014, p. 1),

Near miss reporting and investigation allows you to identify and control hazards before they cause a more serious accident. Accident investigations are a tool for uncovering hazards that either were missed earlier or have managed to slip out of the controls planned for them. It is useful only when done with the aim of discovering every contributing factor to the accident to “foolproof” the condition or activity and prevent future occurrences. In other words, the objective is to identify root causes, not to primarily set blame.

The introduction and implementation of the Near Miss safety program at Delta Star, Inc. shall include these characteristics in order to achieve success and accomplish the research objectives of enhancing employee safety, improving employee morale, reducing the total number of accidents, and promoting safety awareness and accident prevention.

LIMITATIONS

For the purpose of this study, the Near Miss safety program, which focuses on employee identification of safety hazards and promotion of accident prevention, was analyzed. The limitations of the study were as follows:

1. The results of the study were limited to the Delta Star, Inc. facility in Lynchburg, Virginia.
2. The study relied on the number of near miss incidents reported by Delta Star, Inc. employees.
3. Participation in the Near Miss safety program was not mandatory, but employees were highly encouraged to report all near miss incidents.
4. Near Miss incidents and recordable accidents were tracked over a six month period.
5. The recordable accident rate for the six months prior to implementation of the Near Miss safety program was used as a baseline.

ASSUMPTIONS

The assumptions that were assumed to be true and correct for this study were as follows:

1. The implementation of the Near Miss safety program would reduce the number of recordable accidents at Delta Star, Inc.
2. The reduction in the number of recordable accidents would indicate that the Near Miss safety program was successful.

3. The success of the Near Miss safety program would further indicate that the program enhanced employee safety education, improved employee morale, and successfully promoted safety awareness and accident prevention.

PROCEDURES

In an effort to proactively support safety and reduce accidents, a Near Miss safety program was introduced to the personnel at Delta Star, Inc. The Near Miss safety program was designed to promote employee involvement and positive attitudes toward safety. Management, production supervisors, and employees were trained on the purpose and use of the program. This training included identification of a near miss incident, review of the work instruction and form used to record a near miss incident, and the location of all near miss stations where employees can access the work instruction and form in the event of a near miss incident. Data from Delta Star, Inc., the proposed source of this study, were used in this study. The total number of recordable accidents was tracked over a one year period, six months prior to the implementation of the Near Miss safety program and six months following the implementation of the Near Miss safety program. The researcher, the Safety and Environmental Specialist of Delta Star, Inc., collected and analyzed all near miss reports and recordable accidents. The researcher then compared the near miss data to the number of recordable accidents that occurred six months prior to the implementation of the Near Miss safety program as well as six months after the implementation of the program. Data were checked against the baseline established from the number of recordable accidents that occurred in the first six months. These data enabled the researcher to determine if a reduction in recordable accidents occurred.

In addition to the data collection and review used to determine the effectiveness of the Near Miss safety program in reducing the total number of accidents, the researcher conducted an employee survey with production employees, supervisors, and management to elicit opinions regarding safety and the implementation of the Near Miss safety program.

The Near Miss safety program serves as a communication tool for employees to report safety hazards, identify the root causes, and make corrective action suggestions. Analyzing the near miss incidents reported by employees enabled the researcher to determine the level of employee engagement and awareness of safety and accident prevention. The employee survey enabled researcher to determine the level of improvement in employee morale, employee engagement, and awareness of safety.

DEFINITION OF TERMS

The following terms were defined to clarify this research:

Incident – “Unplanned event that effects the completion of a task or activity” (OSHA, 2014, p. 1).

Incident Rate (IR) – “Number of recordable incidents per 100 employees per year (200,000 hours) divided by the total number of hours worked” (National Labor Statistics, 2014, p. 1).

Near Miss – “An unplanned event that did not result in injury or illness but had the potential to do so” (OSHA, 2014, p. 1).

OSHA (Occupational Safety and Health Administration) – Federal agency responsible for setting and enforcing standards for workplace safety. OSHA ensures the compliance of the standards and also provides support to employers through training, education, and assistance.

Recordable Accident – “Work-related injury or illness that requires treatment beyond basic first aid. Recordable accidents can include death, injuries resulting in loss of consciousness, and injuries diagnosed by a health care professional such as: lost time accidents, restricted accidents, or severe injuries or illness” (OSHA, 2014, p. 1).

OVERVIEW

In Chapter I, the researcher identified the need for reducing recordable accidents. The Near Miss safety program was established and implemented as a resource and tool for employers and employees to use to reduce recordable accidents. The relationship between the implementation of the Near Miss safety program and the number of recordable accidents that occurred following the implementation was the subject of this study.

Chapter II, Review of Literature, will support the need to lower recordable accidents, establish an employee-based accident prevention safety program as an effective tool to reduce recordable accidents, and support the need to investigate the relationship between the Near Miss safety program and recordable accidents. Chapter III, Methods and Procedures, will review the methods and techniques of data collection. Chapter IV, Findings, will present the analysis of the data. Chapter V, Summary, Conclusions, and Recommendations, will provide a summary of the research process,

report of the research goals, and report a prediction of what the research findings mean to future needs of safety programs.

CHAPTER II

REVIEW OF LITERATURE

“From 2006 through 2011 the occupational fatality rate per 100,000 employees has remained relatively stationary, ranging from 3.9 to 3.5, and strategies to reduce the number of fatalities and the fatality rate have made little progress” (Manuele, 2013, p. 51). This means that despite the lack of significant increase in the number of fatalities and the fatality rate over the past several years, proactive measures to reduce or prevent accidents have not been successful. Based on this evidence, it is imperative that accident prevention is brought to the forefront in the workplace. Accident reduction and prevention methods must be critiqued and analyzed prior to implementation in the workplace to ensure that the process is applicable to the work environment and has the potential to be successful. This chapter will review literature regarding the importance of accident prevention, methods of improving the safety culture and employee morale, and the significance of implementing a near miss safety program within the workplace.

ACCIDENT PREVENTION

Accident prevention is an extremely important topic of discussion and should be a prime focus among all employees in the workplace. According to Manuele (2013, p. 53):

Bringing the necessary attention to serious injury and fatality prevention will require enormous culture changes as well as recognition of how deeply some deterring premises are embedded in many companies. The following are several innovations to consider and add to the list:

- The premise that OSHA-related incidence rates are accurate measures of serious injury and fatality potential must be dislodged.
- The belief that unsafe acts of workers are the principal causes of occupational incidents must be uprooted and dislodged.
- The broadly held assumption that reducing the frequency of less-than-serious injuries will result in an equivalent reduction in serious injuries must be dislodged.
- Risk assessments must be recognized and established as the core of an operational risk management system.
- Prevention through design concepts must be instituted as an element within an operational risk management system.
- Businesses must understand the ongoing transition concerning the prevention of human error, which directs prevention efforts to the design of the work system and work methods.
- Management of change/prejob planning must be a separate and emphasized element within an operational risk management system.
- Incident investigations must be improved so that shortcomings in management systems related to serious injury and fatality potential can be identified and addressed.
- Internally published operational risk management systems must be revised in relation to the foregoing.

Improving on these methods will help reduce injuries at all severity levels. Accident reduction and prevention must be highly emphasized, supported, and implemented among

all levels in the workplace. Without the emphasis, support, and implementation among all employees in the workplace, accident reduction and prevention will likely suffer.

SAFETY CULTURE AND EMPLOYEE PARTICIPATION

An organization's safety culture is critical to the success of accident reduction and prevention. Implementation of proactive safety programs such as the near miss safety program and enhancing employee morale is important. According to Manuele (2013, p. 53):

It will take a major educational undertaking to convince management, and subsequently all personnel, that achieving low OSHA incident rates does not indicate that controls are adequate with respect to serious injury and fatality potentials. For more than 40 years, low OSHA incident rates have been overemphasized, resulting in competition within companies and among companies within an industry group. When achieving low OSHA incidence rates is deeply embedded within an entity's culture, uprooting and dislodging it will be a challenging, long-term effort. A culture change is not a one-time activity. It is a long journey that must engage all members of an organization. In the culture change process, safety professionals must make the case that priority attention be given to recognizing and avoiding hazardous situations with serious injury potential. This approach must be tailored to the given entity's needs and opportunities. For example, consider these three potential courses of action.

- Collect all incident investigation reports for a 3-year period, then select those that describe situations for which, under slightly different circumstances, the

results could have been a more serious injury or fatality. This process could lead to analyses of operations in which the incidents occurred and advance the idea that serious injury potential needs special consideration.

- Request a report of all workers' compensation claims valued at \$25,000 or more for 3 years. Why this level? In the author's experience, a \$25,000 cut-off level returns 6% to 8% of the total number of claims and 60% to 80% of total claim values.
- Engage employees in an information gathering system that continuously reports on hazardous situations with serious injury potential. The system should include near-misses that could have resulted in serious consequences under slightly different circumstances. To succeed, the company must understand that employees who are encouraged to provide input are recognized as valuable resources because of their extensive knowledge about how work is performed. Also, they must be respected for their knowledge and skills. Feedback on employee input is a must.

The courses of action mentioned above are viable methods a safety professional can use to positively change the safety culture in the workplace. For the purpose of this study, the number of recordable accidents will be compared to the number of near miss incidents reported over a one year time period to determine if the number of accidents has been reduced. This study will also analyze and address the improvement of employee morale and education.

EMPLOYEE PARTICIPATION AND MANAGEMENT SUPPORT

The implementation of a near miss safety program has the potential to reduce accidents, improve employee morale and education, and promote a safe work environment. However, professionals implementing the program must ensure that the program is applicable and adaptable to the specific work environment. According to Oktem (2002, p. 4):

Investigation of major accidents adds new data and shows that for every major accident there are several preceding minor accidents with limited impact and near-miss incidents with little or no significant damage. Therefore, it has been recognized that by focusing on minor incidents it is possible to reduce the probability of having major accidents.

Focusing on minor incidents via the near miss safety program will improve safety education and promote a reduction in the total number of accidents. Oktem (2002, p. 5) states that there are eight steps to an effective near-miss process which include:

1. Identification – 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 across a facility knows this definition at all times.
2. Disclosure (Reporting) – Once a near miss is identified it must be disclosed, preferable in a written form. This can be done either by the person who identified the near miss or by a supervisor to whom a near

miss is reported verbally. Having a clear and simple procedure for reporting would encourage this process and would increase the probability of reporting most near miss observations.

3. **Prioritization** – Once the incident is reported it needs to be prioritized. This very critical step determines the path to be followed in the subsequent steps; the level of attention that will be given to the incident, the depth of analysis that will be performed in finding causes, the amount of resources that will be dedicated to finding and implementing solutions, and the extent to which the information about this incident will be disseminated.
4. **Distribution** – Based on the priority and the nature of a near miss, the information is distributed to the people who would be analyzing the cause of incidents. For low priority, straight forward items this may be the reporter or his/her supervisor. If potential security of quality issues are detected, the information may be forwarded to other departments. If a seemingly simple near miss happens too often, it may increase its priority requiring more resources to be dedicated to the following steps.
5. **Identification of Causes** – This step includes identification of both direct and root causes of a near miss. During implementation this step can be as simple as the reporter inputting his/her ideas for what the causes are. On the other hand, for highest priority near misses, a committee may form to do a full blown root cause analysis.
6. **Solution Identification** – The most important feature of this step is looking for a solution for each identified cause. Sometimes, several causes can be

correct with a single solution. In others there may not be a feasible, effective solution, hence a less ideal corrective action may need to be taken.

7. Dissemination – Once solutions are identified the information should be communicated to the people who will execute these decisions assuming they have not been part of the solution identification process. This step also includes an important intermediate function, which, if overlooked, can stall the system: Obtaining permission from the manager with resources to implement the solutions.
8. Resolution (Tracking) – Once solutions are identified and implementers are informed, it is important to track all suggested changes to ensure that they are properly executed. Also, when all the changes are completed, for future encouragement purposes, the reporter of the near miss should be informed of the results from his/her identification of a given near miss.

In addition to these eight steps to developing a near miss safety program, safety professionals must ensure the program is designed to overcome barriers such as peer pressure, lack of recognition, fear of retaliation or punishment, etc. To overcome the barriers, one good starting point is Peterson's (1993) six criteria of safety excellence. "These can be used as a filter to determine the appropriateness of action. They must be in place to achieve safety success" (Williamsen, 2013, p. 49). Williamsen states the criteria as:

- Top management is visibly committed to the process.
- Middle management is actively involved in the program.

- Supervisor performance is focused.
- Hourly employees are actively participating.
- System is flexible to accommodate site culture.
- System is perceived as positive by the hourly workforce.

The steps to developing and implementing a near miss safety program and the existence of the six criteria of safety excellence as mentioned above are critical determinants to the success of the program. This study will analyze the steps Delta Star, Inc. used to implement the near miss safety program and determine if the program has reduced the number of accidents, improved employee education, and enhanced employee morale.

ACCIDENT AND ANALYSIS STUDY

According to Wachter and Yorio (2013), a study was conducted regarding the implementation of safety management practices and worker engagement for reducing and preventing accidents. They detail the components and results of the study as:

The overall research objective was to theoretically and empirically develop the ideas around a system of safety management practices (ten practices were elaborated), to test their relationship with objective safety statistics (such as accident rates), and to explore how these practices work to achieve positive safety results (accident prevention) through worker engagement. Data were collected using safety manager, supervisor and employee surveys designed to assess and link safety management system practices, employee perceptions resulting from existing practices, and safety performance outcomes. Results of the study

indicate the following: there is a significant negative relationship between the presence of ten individual safety practices, as well as the composite of these practices, with accident rates; there is a significant negative relationship between the level of safety-focused worker emotional and cognitive engagement with accident rates; safety management systems and worker engagement levels can be used individually to predict accident rates; safety management systems can be used to predict worker engagement levels; and worker engagement levels act as mediators between the safety management system and safety performance outcomes (such as accident rates). Even though the presence of safety management system practices is linked with incident reduction and may represent a necessary first-step in accident prevention, safety performance may also depend on mediation by safety-focused cognitive and emotional engagement by workers. Thus, when organizations invest in a safety management system approach to reducing/preventing accidents and improving safety performance, they should also be concerned about winning over the minds and hearts of their workers through human performance-based safety management systems designed to promote and enhance worker engagement. (p. 118)

Based on the research findings described above, safety management programs are encouraged to serve as a positive method for improving safety in the workplace. It is important to note that supplemental methods must be included in the implementation of a safety management program to engage employees to participate in workplace safety. Once employees are engaged, safety education and morale, as well as accident reduction and prevention, can be successfully achieved.

SUMMARY

This chapter discussed various literature regarding the importance of a near miss safety program used to reduce and prevent workplace accidents and injuries. Safety incidents were discussed as tools to measure safety performance. The research defined what a strong, successful near miss safety program should include. The research also discussed the importance of a positive safety culture and accident prevention within the workplace. The conclusion of the chapter is that when a positive safety culture is developed, employees can embrace and participate in a proactive safety program, such as the near miss safety program, designed to reduce accidents, improve employee education, and enhance employee morale. Chapter III will discuss the methods and procedures of data collection used in this study.

CHAPTER III

METHODS AND PROCEDURES

This chapter discusses the methods and procedures that were used in this study to collect and analyze data specifically pertaining to the effectiveness of the Near Miss safety program relating to recordable accidents at Delta Star, Inc. over one year and employee attitudes and perceptions toward safety. The discussion will include a description of the population studied, the research variables, instruments used to record data, a description of the data collected, how the data were analyzed, and a summary.

POPULATION

This study focused on Delta Star, Inc., a manufacturing company located in Lynchburg, Virginia. It is a unionized facility with a strong working relationship between the union and management personnel. The organization is comprised of 350 hourly and salary employees combined. Prior to the implementation of the Near Miss safety program, Delta Star, Inc. had not previously implemented or utilized a safety program designed to focus on accident prevention. The safety history at this facility has shown incident rates above average as compared to industry standards. The incident rate at this facility in 2011 was 5.5 as compared to the industry standard of 4.5 and 7.5 in 2012 as compared to the industry standard of 5.2 for that same year. In addition to the focus on incident rates among the entire population of the facility, a safety survey was distributed to the production employee population which included: 223 hourly employees, ten supervisors, and three production management personnel.

RESEARCH VARIABLES

The variables that were measured in this study were safety incident rates, employee safety education and morale, near miss incident reports, and the type of program used. The Near Miss safety program implemented at Delta Star, Inc. was the independent variable. Incident rates, employee safety education and morale, and near miss incident reports were the dependent variables. The incident rates were tracked and compared to the implementation date of the Near Miss safety program.

INSTRUMENT DESIGN

Delta Star, Inc. reported recordable incident data on their OSHA 300 log that is required to be kept by law. In addition, Delta Star, Inc. also reported total estimated hours worked by hourly and salary personnel each month. Together, these were used to calculate Delta Star, Inc.'s recordable incident rates. The Safety and Environmental Specialist, also the researcher in this project, provided recordable incident data and the date of implementation of the Near Miss safety program. The Environmental, Health and Safety Manager approved the use of this and other safety data, such as the near miss reports, for the study.

Production employee perception of Delta Star's safety program were also gathered through the use of a short survey, found in Appendix A, that utilized a Likert scale for determining levels of agreement to a given statement. The survey was comprised of fifteen questions that requested participants to answer based on how they felt about Delta Star, Inc.'s safety program. The statements covered employee attitudes and perceptions about safety, commitment to safety, the safety of the equipment and

processes, etc. The development of the survey questions came from feedback received by the Environmental, Health and Safety Manager and the Safety and Environmental Specialist from production employees, safety committee members, supervisors, and management regarding the effectiveness of the safety program. As shown in Table 1, participants were asked to respond by selecting one of the following Likert-type responses: strongly agree, agree, no opinion, disagree, or strongly disagree.

Table 1

<i>Explanation of Likert Survey Scores</i>	
Likert Response	Score Level
Strongly Agree	5
Agree	4
No Opinion	3
Disagree	2
Strongly Disagree	1

METHODS OF DATA COLLECTION

Methods of data collection in this study included: collection and calculation of recordable incidents six months prior to the implementation of the Near Miss safety program and six months after the implementation of the program, collection and calculation of near miss incidents, and collection and calculation of survey responses to the survey. The recordable incidents were completed by supervisors and submitted to the Safety mailbox. These incidents were collected, recorded, and calculated electronically by the Environmental, Health, and Safety Manager. The near miss incidents were completed by production employees and submitted to the Safety mailbox. These incidents were collected, recorded, and calculated electronically by the Safety and

Environmental Specialist. The safety surveys were distributed via hard copy and returned to the Safety mailbox. The results from the surveys were collected and recorded electronically by the Safety and Environmental Specialist.

DATA ANALYSIS

The relationship between safety incident rates and implementation of the Near Miss safety program was compared using historical data. This was completed by calculating and analyzing the number of recordable accidents six months prior to the implementation of the new program and six months after the new program was implemented. The data from the safety program survey for Delta Star, Inc. were calculated to demonstrate the overall perception and attitude of the safety program. The data from the safety program survey for Delta Star, Inc. were calculated and statistically analyzed using the mean score for each question which is a measure of central tendency.

SUMMARY

This chapter discussed the methods and procedures used for instrument design, data collection, and analysis during the study. The population of the study is a manufacturing facility comprised of 350 hourly and salary employees combined. The research variables measured in this study were safety incident rates, employee safety education and morale, and near miss incident reports. Safety incident rates and near miss incident reports will be collected, recorded, and analyzed in this study. A survey with Likert-type responses was developed to analyze employee safety education and morale. For the purpose of this study, 223 production employees, ten supervisors, and three production management personnel received the survey. The responses received will be

collected, analyzed, and recorded electronically. The next chapter, Chapter IV, will discuss the findings of the research study. In this chapter data will be statistically analyzed and used to compile the results.

CHAPTER IV

FINDINGS

The purpose of this study was to determine if the implementation of the Near Miss safety program at Delta Star, Inc. reduced the number of recordable industrial accidents. This study also analyzed the perception of employee education and morale regarding safety. This chapter reports the findings. Findings are presented through a descriptive analysis.

FACILITY DATA

Delta Star, Inc. is a manufacturing facility comprised of approximately 223 hourly production employees and 127 salary personnel – some of whom are production management personnel. Safety has always been a top priority at Delta Star, Inc., but it may not have always gotten the focus that was needed. Delta Star Inc.'s recordable accident rates have fluctuated over the years and have even been higher than the industry standard in the past. In 2011, Delta Star, Inc.'s recordable accident rate was 5.9 compared to the industry average of 4.5. In 2012, Delta Star, Inc.'s recordable accident rate was 7.5 compared to the industry average of 5.2.

Findings of Delta Star, Inc. Safety Survey

The following section is a summary of the safety survey responses for Delta Star, Inc. At the time of the survey distribution, 223 hourly employees, 10 supervisors, and three production management personnel received the survey ($N = 236$). Thirteen percent, ($n = 32$), of the employees who received the survey responded and returned the

completed survey to the Safety mailbox which included 23 hourly employees and nine supervisors/production management personnel.

Enhance Employee Safety Education

Survey Questions 1, 2, and 4 relate to Research Objective 1. The mean score for Question 1, regarding the company's primary focus being on safety, was 3.20 among production employees and 4.10 among production management and supervisors. The mean score for Question 2, regarding the importance of the focus on potential unsafe conditions and unsafe behaviors, was 3.90 among production employees and 4.30 among production management and supervisors. The mean score for Question 4, regarding the improvement of employee safety education and morale because of the implementation of the Near Miss safety program, was 3.70 among production employees and 3.56 among production management and supervisors. The overall mean score for these questions was 3.80 indicating agreement that the implementation of the Near Miss program has enhanced employee safety education.

Improve Employee Morale

Survey Questions 4, 12, 13, 14, and 15 relate to Research Objective 2. The mean score for Question 4, regarding the improvement of employee safety education and morale because of the implementation of the Near Miss safety program, was 3.70 among production employees and 3.56 among production management and supervisors. The mean score for Question 12, regarding employee expectations toward safety, was 4.00 among production employees and 4.20 among production management and supervisors. The mean score for Question 13, regarding the encouragement for employees to provide

feedback and suggestions related to safety, was 4.00 among production employees and 4.60 among production management and supervisors. The mean score for Question 14, regarding the recognition for good safety performance, was 3.10 among production employees and 3.90 among production management and supervisors. The mean score for Question 15, regarding employees being held accountable for poor safety performance, was 3.20 among production employees and 3.40 among production management and supervisors. The overall mean score for these questions was 3.77 indicating agreement that the implementation of the Near Miss program has improved employee morale.

Reduce Total Number of Recordable Accidents

In September 2013, Delta Star, Inc. implemented a Near Miss safety program geared toward proactively identifying potential safety hazards and reducing the number of recordable accidents. During the six months prior to the implementation of the Near Miss safety program, Delta Star, Inc. had 25 recordable accidents. During the six months after the implementation of the Near Miss safety program, there were nine recordable accidents and three near miss incidents reported which resulted in a 64 percent reduction. Survey Question 3 relates to Research Objective 3. The mean score for Question 3, regarding the improvement of safety based on the training program, was 3.20 among production employees and 4.20 among production management and supervisors. The overall mean score for this question was 3.70 indicating agree that the implementation of the Near Miss program has reduced the total number of recordable accidents. Based on the data collected, the number of recordable accidents has decreased since the implementation of the Near Miss safety program. See Figure 1 which illustrates the number of recordable accidents six months prior to the implementation of the Near Miss

safety program and six months after the implementation of the Near Miss safety program.

Figure 1 also illustrates the number of near miss incidents reported after the implementation of the program.

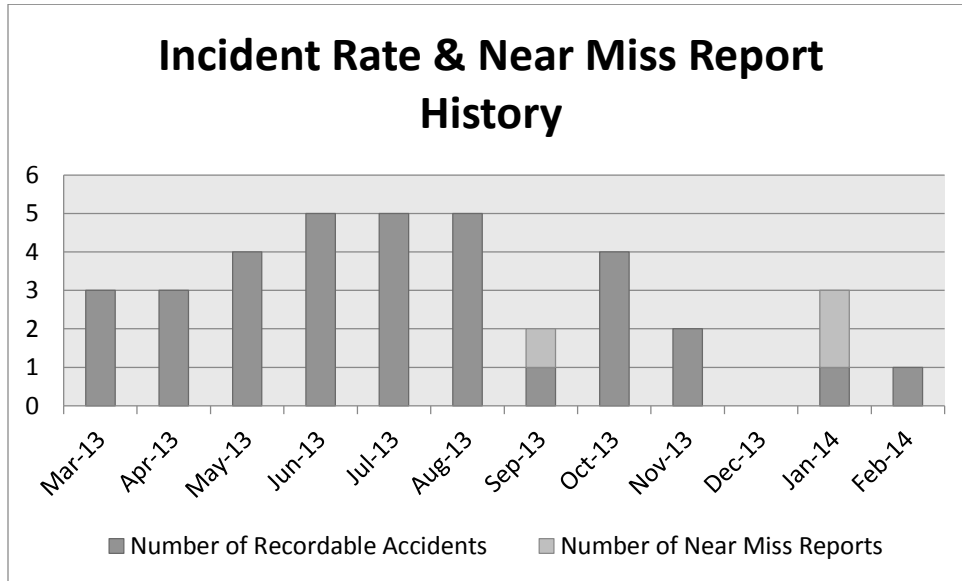


Figure 1. Delta Star, Inc. Incident Rate and Near Miss Report History

Note. No data is shown for December 2013 because there were no accidents and no near miss incidents reported.

Promote Safety Awareness Resulting in Accident Prevention

Survey Questions 5, 6, 7, 8, 9, 10, and 11 relate to Research Objective 4. The mean score for Question 5, regarding the commitment to safety among the management team, was 2.80 among production employees and 4.00 among production management and supervisors. The mean score for Question 6, regarding the commitment to safety among supervisors, was 2.40 among production employees and 4.00 among production management and supervisors. The mean score for Question 7, regarding the commitment other co-workers have to safety, was 2.50 among production employees and 3.40 among production management and supervisors. The mean score for Question 8, regarding

employee feelings toward being open and honest about safe or unsafe conditions, was 3.10 among production employees and 4.30 among production management and supervisors. The mean score for Question 9, regarding the need for more focus on safety, was 4.00 among production employees and 3.30 among production management and supervisors. The mean score for Question 10, regarding the safety of processes and equipment, was 2.40 among production employees and 3.60 among production management and supervisors. The mean score for Question 11, regarding the comprehension of hazards associated with employees' jobs, was 2.40 among production employees and 3.60 among production management and supervisors. The overall mean score for these questions was 3.77 indicating agreement that the implementation of the Near Miss program has promoted safety awareness resulting in accident prevention. See Table 2 for a summary of the survey questions.

Table 2
Delta Star, Inc. Safety Survey Results

Statement	Production Employee	Production Management/Supervisor
1. Our company's primary focus is safety above all else.	3.20	4.10
2. A focus on potential unsafe conditions is as important as focusing on unsafe behaviors.	3.90	4.30
3. Our training program is the reason safety has improved in this facility.	3.20	4.20
4. The implementation of the Near Miss safety program has improved and enhance employee safety education and morale.	3.70	3.56
5. Our management team is committed to safety.	2.80	4.00
6. Our supervisors are committed to safety.	2.40	4.00
7. Employees feel that co-workers are committed to safety.	2.50	3.40

8. I feel that employees can be open and honest about safe or unsafe conditions.	3.10	4.30
9. We need more focus on safety.	4.00	3.30
10. Our processes and equipment are safe.	2.40	3.60
11. Our employees understand all the hazards associated with their jobs.	2.80	3.20
12. Employees are expected to act safety and follow all safety procedures and policies.	4.00	4.20
13. Employees are encouraged to provide feedback and suggestions related to safety.	4.00	4.60
14. Employees are recognized for good safety performance.	3.10	3.90
15. Employees are held accountable for poor safety performance.	3.20	3.40

SUMMARY

This chapter presented historical incident rate data, safety program highlights, and results from a safety survey for Delta Star, Inc. Six months prior to the implementation of the Near Miss safety program, Delta Star, Inc. had 25 recordable accidents. Six months following the implementation of the Near Miss safety program, Delta Star, Inc. had nine recordable accidents, which resulted in a 64 percent reduction, and three near miss incidents reported. In addition to the recordable accident and near miss incident data, the safety survey, which consisted of 15 statements, related to the safety program at Delta Star, Inc. It was distributed to 223 hourly employees, ten supervisors, and three production management personnel. Thirteen percent, ($n = 32$), of the employees who received the survey responded and returned the completed survey. Most of the responses from the supervisors and/or production management personnel were agree or strongly agree and most responses from the hourly production employees were no opinion or

disagree. Chapter V will summarize the report and will draw conclusions based on the data collected.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

This chapter contains a summary of the research report including an analysis of the research objectives. This chapter also focuses on conclusions drawn from the data collected and recommendations to utilize the findings. The recommendations provided suggest future applications and ideas for implementation relative to the safety program at Delta Star, Inc.

SUMMARY

The purpose of this study was to determine if the implementation of the Near Miss safety program at Delta Star, Inc. reduced the number of recordable accidents. The research objectives of this study focused on the effectiveness of the Near Miss safety program relative to the total number of recordable accidents at Delta Star, Inc. and the opinions of production employees and management personnel toward the safety program collected via the safety survey. The research objectives for this study were:

RO₁: Does the implementation of the Near Miss program enhance employee safety education?

RO₂: Does the implementation of the Near Miss program improve employee morale?

RO₃: Does the implementation of the Near Miss program reduce the total number of recordable accidents?

RO₄: Does the implementation of the Near Miss program promote safety awareness resulting in accident prevention?

The majority of the research conducted previously demonstrates the benefits of proactive safety programs and the importance of employee involvement and participation. However, it is difficult to find studies that show how employee participation and input actually result in a lower OSHA recordable incident rate. There are many methods available to track the safety records of organizations including: number of recordable incidents, incident rate, worker's compensation costs, restricted workdays, lost workdays, severity rate, and more. This study was limited due to the fact that the only data utilized were OSHA recordable incidents which track injuries beyond basic first aid and a safety survey.

Three key points were gathered from a review of literature on safety programs. First, accident reduction and prevention must be highly emphasized, supported, and implemented among all levels in the workplace. Without the emphasis, support, and implementation among all employees in the workplace, accident reduction and prevention will likely suffer (Manuele, 2013). Second, an organization's safety culture is critical to the success of accident reduction and prevention. Implementation of proactive safety programs such as the Near Miss safety program and enhancing employee morale is important (Manuele, 2013). Lastly, the implementation of a Near Miss safety program has the potential to reduce accidents, improve employee morale and education, and promote a safe work environment. However, professionals implementing a safety program must ensure that the program is applicable and adaptable to the specific work environment (Oktem, 2002).

OSHA recordable incident histories were collected from Delta Star, Inc. Delta Star, Inc. also provided safety program information via discussion with the

Environmental, Health and Safety Manager and participated in the safety survey. Thirteen percent, ($n = 32$), of the employees who received the survey completed and returned it. The information provided about the Near Miss safety program was compared on a timeline basis with the number of accidents over a one year time period. The data were collected from supervisors/management personnel and hourly employees and recorded electronically by the Environmental, Health and Safety Manager and the Safety and Environmental Specialist.

CONCLUSIONS

To answer the research problem, the following conclusions were made.

RO1: Does the implementation of the Near Miss program enhance employee safety education?

The data provided by Delta Star, Inc. demonstrates agreement that the implementation of the Near Miss program has enhanced employee safety education. Based on feedback received from the completed surveys, the mean score among production employees regarding the enhancement of employee safety education based on the implementation of the Near Miss program, was 3.70 and 3.56 from production management/supervisors. The overall mean score was 3.65. In addition, there has been a 64 percent reduction in the number of recordable accidents when compared to accident rates prior to the program's implementation. The decrease in the number of accidents may not be fully attributed to employee safety education, but there is evidence that something has changed in the behavior of the employees to suggest a safer work environment and enhanced education.

RO₂: Does the implementation of the Near Miss program improve employee morale?

The data provided by Delta Star, Inc. demonstrates agreement that the implementation of the Near Miss program has improved employee morale. Based on feedback received from the completed surveys, the mean score among production employees regarding the improvement of employee morale based on the implementation of the Near Miss program was 3.70 and 3.56 from production management/supervisors. The overall mean score was 3.65. Twelve hourly employees and four supervisors/production management personnel agreed that “the implementation of the Near Miss safety program has enhanced employee safety education and morale.” Fifteen hourly employees disagreed or strongly disagreed that “our management or supervisors are committed to safety”, while eight supervisors and/or production management personnel agreed that management and/or supervisors are committed to safety.

RO₃: Does the implementation of the Near Miss program reduce the total number of recordable accidents?

Since the implementation of the Near Miss program, Delta Star, Inc. has seen a 64 percent reduction in the total number of recordable accidents. During the six months prior to the implementation of the Near Miss safety program, Delta Star, Inc. had 25 recordable accidents. During the six months following the implementation of the Near Miss safety program, Delta Star, Inc. had nine recordable accidents and three near miss incidents. Based on the data, the implementation of the Near Miss safety program has reduced the total number of recordable accidents. Other contributing factors may

include, but are not limited to, increased participation, increased communication, and increased supervisor involvement.

RO4: Does the implementation of the Near Miss program promote safety awareness resulting in accident prevention?

The design of the Near Miss program is to promote safety awareness, identify safety hazards, and focus on accident prevention. Based on the data collected, there has been a 64 percent reduction in the number of recordable accidents and some employee participation in the Near Miss safety program. This evidence suggests that the program has had some effect on the promotion of safety awareness and accident prevention. However, the mean score among production employees who returned the safety survey regarding Question 10, about the safety of Delta Star, Inc.'s processes and equipment was, 2.40 and 3.60 among production management/supervisors. Twelve of the hourly employees who responded to this statement disagreed that Delta Star, Inc.'s processes and equipment are safe. The mean score among production employees who returned the safety survey regarding Question 11 on employee comprehension of hazards associated with their jobs was 2.80 and 3.20 among production management/supervisors. Ten of the hourly employees who responded to this statement disagreed that employees understand all the hazards associated with their jobs. Based on the data obtained and calculated, the mean score for these statements was 3.00 which demonstrates uncertainty to this question. However, additional focus on improving the safety of the processes and equipment and education of hazards and safety awareness among all employees at Delta Star, Inc. may be considered.

The conclusions of these questions and research objectives are based on a thirteen percent response rate. The low response rate should be considered when reviewing and interpreting these results. Additional consideration should also be placed on future research and methods of improvement within this organization and workforce members.

RECOMMENDATIONS

For Delta Star, Inc. to sustain low accident rates and encourage employee participation in the Near Miss program, it is recommended that the company adopt a comprehensive, effective program that will transform the current workplace culture into a healthier, more proactive one. The program would also prepare each facility to achieve OSHA Voluntary Protection Programs (VPP) status. According to Bennett and Deitch (2007, p. 24):

OSHA's Voluntary Protection Programs (VPP) recognize and partner with worksites that demonstrate excellence in safety and health. VPP participants develop and implement systems to effectively identify, evaluate, prevent, and control occupational hazards to prevent employee injury and illness. The four cornerstones of VPP include management commitment and employee involvement, workplace analysis, hazard prevention and control, and training. The benefits of the VPP include:

- Third-party validation of a site's safety and health processes.
- No penalty inspection
- Recognition
- Competitive advantage
- Higher employee morale

- Removal from OSHA's programmed inspection list
- Cooperative environment between labor, management and OSHA

Implementing a similar program would encourage and promote the participation and involvement among all employees. The Near Miss program could be combined with a program such as VPP to provide a solid foundation to promote safety in the workplace and prevent accidents at Delta Star, Inc. Additional topics for further research to improve workplace safety include the identification of methods to improve employee learning about safe practices and the development of educational strategies that will encourage employee participation.

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Appendix A

Effectiveness of Delta Star’s Safety Program: Employee Survey

Purpose: The purpose of this study is to collect opinions of Delta Star employees related to the quality and effectiveness of the safety program. This study explores the attitudes, opinions, and education toward safety in the work environment among Delta Star employees.

Directions: Please carefully read each statement and check the box under the item that best fits your agreement or disagreement to the statement. Upon completion, please submit your survey to the Safety mailbox. All surveys will be processed confidentially.

Please check the appropriate category that corresponds with your position at Delta Star:

_____ **Production Management/Supervisor** _____ **Production employee**

Statement	Strongly Agree	Agree	No Opinion	Disagree	Strongly Disagree
1. Our company’s primary focus is safety above all else.					
2. A focus on potential unsafe conditions is as important as focusing on unsafe behaviors.					
3. Our training program is the reason safety has improved in this facility.					
4. The implementation of the Near Miss safety program has improved and enhance employee safety education and morale.					
5. Our management team is committed to safety.					
6. Our supervisors are committed to safety.					
7. Employees feel that co-workers are committed to safety.					
8. I feel that employees can be open and honest about safe or unsafe conditions.					
9. We need more focus on safety.					
10. Our processes and equipment are safe.					
11. Our employees understand all the hazards associated with their					

jobs.					
12. Employees are expected to act safety and follow all safety procedures and policies.					
13. Employees are encouraged to provide feedback and suggestions related to safety.					
14. Employees are recognized for good safety performance.					
15. Employees are held accountable for poor safety performance.					

Cover Letter

Cover Letter
May 15, 2014

Dear Delta Star Employees,

I invite you to take part in a survey being conducted by Delta Star, Inc. to seek your views on the quality of our safety program.

The survey is being conducted to collect feedback from production management personnel and hourly factory employees regarding their views of Delta Star, Inc.'s safety program. The survey outcomes play an important role in the further development, design, implementation, and enhancement of employee safety programs, training, education, and morale at Delta Star, Inc.

Your feedback counts. Your response will help shape important safety decisions at Delta Star, Inc. The survey should take no more than 10 minutes to complete.

Please note that your response is private and anonymous. Individual responses will not be able to be traced back to you. Survey responses will not be linked with other administrative records.

Participation in this survey is highly valued, but voluntary. You are free to withdraw consent at any time. We will protect your anonymity of your response. There will be minimal risks to participants. No personal information will be collected, surveys will be collected anonymously, and responses will be reported in aggregate. There is no direct benefit to participants. There may be potential benefits to the safety of the workers if the Near Miss safety program enhances employee education and morale, reduces the number of recordable accidents, and promotes safety awareness and accident prevention. If you wish to complete the survey, please place responses in the Safety mailbox no later than May 31, 2014.

If you have any questions about this survey or would like further information, please contact Kristen Templeton at ktempleton@deltastar.com or (434)845-0921.

Thank you for considering your involvement in this survey.

Warm Regards,

Kristen Templeton
Safety and Environmental Specialist