

PAPER • OPEN ACCESS

Risk Analysis of Occupational Accidents and Occupational Diseases Using the JSA (Job Safety Analysis) Method

To cite this article: Aulia Ishak *et al* 2020 *IOP Conf. Ser.: Mater. Sci. Eng.* **1003** 012077

View the [article online](#) for updates and enhancements.

Risk Analysis of Occupational Accidents and Occupational Diseases Using the JSA (Job Safety Analysis) Method

Aulia Ishak¹, Buchari², Asfriyati³ and Bagas Nainggolan⁴

^{1,2,4} Industrial Engineering Department, Engineering Faculty, Universitas Sumatera Utara Medan, Sumatera Utara 20155, Indonesia

³Public Health Faculty, Universitas Sumatera Utara, Medan, Indonesia

E-mail: bagasnainggolan4@gmail.com aulia.ishak@usu.ac.id

Abstract. PT. Pamapersada Nusantara was established as a company engaged in the coal mining contracting business which was later also trusted to work on gold, quarry, limestone, clinker, dam construction and road construction. Many problems that occur at PT. Pamapersada Nusantara TCM District, which are: Factory layout and irregular flow patterns, technologies that are still operated manually, risk of work accidents and occupational diseases. From these problems one problem is taken, namely the risk of work accidents and occupational diseases to be appointed as a special task and discussed and sought solutions to the problem. Based on data, it is known that most often occurs in the Plant Department, therefore prevention is needed. We use the JSA (Job Safety Analysis) method to analyze the identification and prevention of activities at the reception station sorting section. Job Safety Analysis is a method of analyzing hazards / potential hazards at each work step or work procedure and determining recommendations for improvement or how to prevent hazards so that work can be carried out safely. The purpose of this study was to assess the risk of work for workplace accidents on the employees of PT. Pamapersada Nusantara uses Job Safety Analysis (JSA).

1. Introduction

According to the World Bank, Indonesia is one of the important countries in the mining sector. This is indicated by the fact that Indonesia is the 2nd largest tin producing country in the world, the 4th largest copper, the 5th largest nickel, the 7th largest gold, and the 8th largest coal production in the world. Geologically, the territory of Indonesia has the potential for vast coal deposits. But only concentrated in certain tertiary basins. The coal resources in Sumatra and Kalimantan Island have a very large amount, with the percentage of 46.68% and 52.67% of the total coal resources in Indonesia, while the remaining 0.65% is in Java, Sulawesi and Papua.

The development of the coal mining industry must be supported by an increase in the protection of the Occupational Health and Safety of its workers. This is based on the fact that the coal mining industry, both open pit mine and underground, has a high level of risk of work accidents and is one of the highest risk jobs in the world. [2]

We can avoid work accidents by knowing and knowing various potential hazards in the work environment. We will eliminate various potential hazards to eliminate the risk of accidents. Work accidents do not happen by accident, but there is a reason. Because there is a cause, the cause of the accident must be investigated and discovered, so that later on with corrective actions that are shown to the cause and with further preventive measures can be prevented and similar accidents do not recur



[1]. On the off chance that the consequences of QC tests can't satisfy the acknowledgment models, the aftereffects of examination of the entire arrangement of the estimations on that day must be eliminated or should be re-dissected, and an incomplete or full re-approval of the strategy considered [8].

2. Theoretical Background

The most popular and most frequently used hazard analysis in a work environment that can be used to prevent work accidents is to use the Job Safety Analysis (JSA) method. Job Safety Analysis (JSA) is a method for analyzing potential hazards that analyzes potential hazards contained in work systems and procedures as well as people as workers, and is able to provide recommendations for improvements or ways to prevent work accidents at work. [3] the forms of work provided responsible for this process create the safest, most efficient picture of each form of work provided. The occupational safety analysis body makes a structured strategy in preventing work accidents by introducing hazards, evaluating and controlling risks [6]

Work accident is an accident related to work in a company. Work relations here can mean that accidents are caused by work or when carrying out work. [4] Work accident is an accident of a person or group in order to carry out work in an industrial or company environment. Work accidents usually arise as a combination of several factors, such as equipment, work environment, and the workers themselves. In a factory sometimes there are machines that are not good, such as not equipped with adequate safety equipment, then these conditions can be a source of risk. [5]

Some unsafe behaviors that often cause harm to workers or have the potential to be harmed as an indirect cause of work accidents that are often found in mining activities: [7, 9, 10]

- Operate equipment at an improper speed
- Operate the equipment without orders
- Using inappropriate equipment
- Use equipment that has been damaged or defective
- Failed to warn workers and equipment
- Do not use personal protective equipment
- Working in an incorrect or unsafe position
- Playing, playing, joking
- Alcohol consumption
- Consumption of drugs

PT. Pamapersada Nusantara was established as a company engaged in the coal mining contracting business which was later also trusted to work on gold, quarry, limestone, clinker, dam construction and road construction. At this time, PT. Pamapersada Nusantara is working on many mining projects spread throughout Indonesia. In terms of share ownership, PT. Pamapersada Nusantara 98.99% owned by PT. United Tractors, Tbk and about the remaining 2% are owned by PT. United Tractors Pandu Engineering.

Each process, coal mining activities in the working area of PT. Pamapersada Nusantara Brothers involve machines and heavy equipment that can create a potential hazard for workers. These potential hazards are very possible to trigger workplace accidents that will harm workers and the company. Accidents due to work are accidents that occur due to work or when carrying out work. Work accidents can be caused by two factors, namely human actions that do not meet work safety (unsafe act) or unsafe conditions of the environment (unsafe conditions).

3. Research Methodology

This type of research is a kind of descriptive survey research that describes the process of analyzing work safety in the process of a job and explaining the position of the variables studied as well as the relationship between one variable with another variable. From field observation data in 2019 at PT.

Pamapersada Nusantara accident frequency is most common in the Plant department which deals with the maintenance of all damaged heavy units.

4. Result

From research on Job Risk Assessment with Job Safety Analysis (JSA) on Work Accident Rates for PT. Pamapersada Nusantara, there are several steps in making JSA (Job Safety Analysis)

4.1. Choosing a Job to Analyze

The work chosen for analysis is the work in the plant department. In this department the mechanics carry out maintenance activities of heavy units that require maintenance or repairs if they are damaged. The work that will be chosen is the heavy service unit work, namely High Dump.

4.2. Describe Work

The work elements of a high dump service unit can be described as follows:

- Mechanically prepare equipment
- Mechanical washing unit
- Mechanically park the unit at the workshop
- Mechanical oil dispensing unit
- Mechanically replace the air cleaner unit
- Mechanically change the oil filter
- Mechanism of filling oil in the unit components
- Mechanical running unit and perform performance tests
- Mechanics restore tools and equipment

4.3. Identifying Hazards

The next step in developing JSA is the identification of all hazards involved with each step. Identification is carried out on hazards originating from the workplace environment, work equipment, machinery, materials, related to work procedures. Potential hazards that can occur in the activities in the plant department in the High Dump service unit work are:

- Mechanically prepare equipment. Dangers that can arise in these activities are equipment members are affected by the equipment and injury due to poor posture
- Mechanical washing of unit weight. Dangers that can arise in these activities are mechanical slip from the unit, mechanical bursts of water
- Mechanically park the unit at the workshop. Dangers that can arise in these activities are another mechanic was hit by an HD unit and HD units move or be operated by others
- Mechanically remove oil from the unit. Dangers that can arise in these activities are mechanical oil sprays out, oli was scattered on the workshop floor and mechanical head formed components
- Mechanically replace the air cleaner unit HD. Dangers that can arise in these activities are mechanics dropped from the HD unit
- Mechanically replace the HD unit oil filter. Dangers that can arise in these activities are mechanics dropped from the HD unit
- Mechanical oil filling in HD component components. Dangers that can arise in these activities are oli scattered to the workshop floor
- The mechanics of running the unit and conducting a Performance Test. Dangers that can arise in these activities are another mechanic was hit by an HD unit
- Mechanical restore of equipment. Dangers that can arise in these activities are mechanical overwritten equipment carried and njury due to incorrect posture

4.4. Finding Solutions

The final step in Job Safety Analysis is to develop a solution in the form of a rescue, efficient work procedure to prevent accidents and fatigue due to work. The main point of job safety analysis is to prevent accidents by anticipating and eliminating and controlling existing hazards. The solution for the reception station sorting section namely:

- Mechanically prepare equipment. The solutions that can be provided are mechanics carry out lifting equipment with a maximum load of 18kg / person and perform lifting and lowering equipment together and slowly
- Mechanical washing of unit weight. The solutions that can be provided are do watering the area to be stepped on from the mud, point the canon at the dirty unit and carrying the canon with 2 hands
- Mechanically park the unit at the workshop. The solutions that can be provided are do parking cues by 1 person spotter, communicate via radio and turn off the unit energy or starting switch in the off condition
- Mechanically remove oil from the unit. The solutions that can be provided are remove the drain plug slowly and use oil reservoirs
- Mechanically replace the air cleaner unit HD. The solutions that can be provided are go up or down the unit ladder by one step
- Mechanically replace the HD unit oil filter. Dangers that can arise in these activities are use the stairs for a high position
- Mechanical oil filling in HD component components. Dangers that can arise in these activities are use normal pressure on the oil gun when filling oil
- The mechanics of running the unit and conducting a Performance Test. Dangers that can arise in these activities are give a horn signal 1 time when running unit, 3 times when backing
- Mechanical restore of equipment. Dangers that can arise in these activities are lift tools with a maximum load of 18kg / person

5. Discussion

From this study it is known that the level of risk of accidents due to work and occupational diseases can be reduced by applying the JSA (Job Safety Analysis) method. Every job that has a risk of causing work accidents or work-related diseases is addressed by providing solutions to reduce the risk of the work.

6. Conclusion

The results of this study are described in the following points:

- Prevention of occupational health and safety hazards (K3) is done by using Job Safety Analysis (JSA)
- Occupational Health and Safety (K3) hazards can be minimized by having a Job Safety Analysis (JSA) as a guide in carrying out work at PT. Pamapersada Nusantara.
- Advice that can be given to companies based on this research is
- The company provides tools to lift equipment to be used
- The company provides safety shoes and safety helmets to the mechanics to avoid the effects of injury
- Making regional boundaries while the work is being done
- Do a briefing to the mechanic before the work will be done

Acknowledgements

The author would like to thank all participant who have provided data in completing this journal.

References

- [1] Sema'mur 2009 *Higiene Perusahaan dan Kesehatan Kerja (HIPERKES)* Jakarta
- [2] Ollii-Kamil 1996 *Kesehatan dan Keelamatan Kerja* (Bandung: ITB)
- [3] Ramli S 2010 *Manajemen Resiko dan Perspektif K3 OHS Risk Management* (Jakarta: Dian Rakyat)
- [4] Djati I 2006 *Bagaimana Mencapai Zero Accident di Perusahaan* Jakarta: UI Press
- [5] Siahaan H 2009 *Manajemen Resiko Pada Perusahaan dan Birokrasi* (Jakarta: PT. Alex Media Komputindo)
- [6] Cipto T 2010 Analisis Potensi Bahaya Dengan Menggunakan Metode Job Safety Analysis (JSA) Pada Bagian Produksi Di PT. PP. Lonsum Indonesia Tbk
- [7] Suryani AD 2013 *Pre Cure*
- [8] Indrayanto G 2018 Recent development of quality control methods for herbal derived drug preparations *Natural Product Communications* **13**(12)
- [9] Buchari *et al* 2018 *AIP Conference Proceedings* **1977** (1) 020008
- [10] Aulia Ishak *et al* 2019 *IOP Conf. Ser.: Mater. Sci. Eng.* **505** 012019