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OVERVIEW OF OCCUPATIONAL HEALTH AND SAFETY IN TRANSPORTATION ACTIVITIES PT ANTAM (PT MEG CONTRACTOR PT ANTAM)

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Abstract

Occupational safety and health aim to create a safe and comfortable environment in carrying out activities or work. In PT ANTAM's bauxite transportation activities, there are still occupational safety and health risks. The purpose of this study was to determine the frequency rate, accident severity (Severity Rate), and Safe T Score in PT ANTAM's bauxite transportation activities. The research method used is a descriptive method, which is a research method that describes quantitative data according to the conditions in the field of bauxite transportation activities. The results of the study are (1) The results of the calculation of the frequency rate of 0 which indicate that there were no mining accidents in bauxite transportation activities in January-September 2019; (2) The result of the calculation of the severity rate (Severity Rate) of the accident is 0 which indicates the absence of the severity of the mining accidents that resulted in that month due to the absence of mining accidents that occurred in that month; (3) The results of the calculation of the safe T-score of 0 indicate the work accident control program does not show a significant change.

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1. Introduction

PT ANTAM, Tbk is a bauxite ore mining company in West Kalimantan. PT ANTAM, tbk is located in Tayan Hilir District, Sanggau Regency. PT ANTAM, Tbk applies the open cast mining method with a shovel and truck mining system. The stages of bauxite mining at PT ANTAM, Tbk consist of land clearing, Stripping topsoil and overburden, Digging, Loading, and Hauling Crude Bauxite (CBX), Stockyard ETO, washing, Stockyard EFO (exportable fine ore), and Export. PT ANTAM UBPB Kalbar has a contractor providing equipment, namely PT MEG. PT MEG provides transportation equipment and operators/drivers for bauxite transportation activities.

Transportation is the activity of moving or transporting bauxite ore deposits to stockpiles. The stages in transportation are trucks queuing at the loading point, then the transportation equipment is in the loading position, loading material, and transporting material to the stockpile(Kelvin et al., 2020). Transportation activities have the potential to cause work accidents. work accidents are defined as work-related events that can cause injury or illness (depending on the severity), death events, or events that can cause death (OHSAS, 2007). Many factors cause work accidents, including human error, environment, and machine error(Sihotang et al., 2019).

One of the efforts that can be made to minimize workplace accidents and improve the health and safety of mining workers while working is the management of Occupational Health and Safety (K3). OHS management is important in mining activities and needs to be considered by mining companies (Ardyanti et al., 2020). K3 management is a process of risk identification, evaluation, and tackling hazards in the workplace to reduce the risk of harm (Dimas et al., 2019). One of the OHS management that can be done by mining companies is to increase knowledge and increase supervision of OHS implementation by employees and mining workers. Knowledge improvement such as K3 training and K3 socialization. The socialization of the K3 program is expected to increase work productivity (Meilasari et al., 2021). In addition, an evaluation of the implementation of occupational safety and health (K3) also needs to be carried out (Enom et al., 2016). It aims to monitor and evaluate the risk of work accidents and control efforts.

To evaluate the risk of work accidents, it is necessary to calculate the frequency of work accidents (Frequency Rate), the severity of work accidents (Severity Rate), and the Safe T-Score. The FR calculation aims to find out how often work accidents occur in PT ANTAM's bauxite transportation activities. While the calculation of the severity of work accidents (Severity Rate) aims to find out how

severe the work accident at PT ANTAM is. Calculation of Safe T-Score is a statistical analysis to determine the performance of K3. Therefore, it is necessary to study the Frequency Rate (FR), Severity Rate (SR), and Safe T-Score in transportation activities. It is an early mitigation effort in minimizing the risk of work accidents in PT ANTAM's bauxite transportation activities.

2. Materials and Methods

The stages of the research carried out are as follows:

2.1. Literature review

Literature studies are carried out to collect references that can support research in the form of journals, theses, and other library sources.

2.2. Data collection

Research data consists of primary data and secondary data.

a. Primary data

Primary data in the form of:

a) Data on the number of hours worked for all employees

b) Work Accident Data

Data collection was carried out by observing in the field and conducting a documentation study of data about employees at the company PT ANTAM.

b. Secondary Data

The secondary data in this study is the coordinates of the IUP PT ANTAM

2.3. Processing and data analysis

Primary data and secondary data are then processed by calculating the value of Frequency Rate (FR), Severity Rate (SR) and Safe T score.

a. Frequency Rate (FR)

The frequency rate is the number of accidents for every one million human hours. The frequency rate is used to identify the number of victims of work accidents in a certain period per million workers. The calculation of the frequency rate (FR) for Loss Time Injury is the number of HWK injuries for every 1,000,000 working hours divided by the number of hours worked by all employees in that period (SNI 13-6618-2001). The calculation of the frequency level can be calculated by the following formula:

$$FR = \frac{X+Y+Z}{Q} \text{ x } 1{,}000{,}000 \quad \text{.....(1)}$$

Description:

X = Number of Minor Mining Accidents
Y = Number of Severe Mining Accidents
Z = Number of Fatality
T = Total Working Hours of All Employees

The Permenaker standard above in statistical calculations is by the ILO standard with the number 1,000,000, namely the number 1,000,000 = (50 weeks/year) x (40 hours/week) x 500 workers, so it can be said that the denominator figure of 1,000,000 is the same as the accident rate. per 500 (five hundred) workers(International Labour Organization, 2013).

The OSHA (Occupational Safety Health Administration) (OHSAS, 2007) version of the statistical calculation standard is 200,000 with the number 200.00 = (50 weeks/year) x (40 hours/week) x 100 workers, so it can be said that the denominator number 200,000 is the same as the number of accidents per 100 (one hundred) worker.

b. Severity Rate (SR)

The severity rate is the number of work accidents or lost working days due to work accidents for one million hours worked people (SNI 13-6618-2001, 2001). Severity rate calculation formula:

$$SR = \frac{W}{T} \text{ x } 1{,}000{,}000 \quad \text{.....(2)}$$

Description:

W = Lost Time Day

T = Total Working Hours of All Employees

c. Safe-T Score

The Safe T-Score is an indicator value to assess K3 performance. The formula for calculating the Safe T score is:

$$\text{Safe T Score} = \frac{H - I}{\sqrt{\frac{I}{1{,}000{,}000}}} \quad (3)$$

Description:

H = FR Current Month
I = FR Previous Month

The Safe T Score value indicates whether or not there has been a change in an event. The full interpretation of this score is as follows:

- Safe T-score between +2.00 to -2.00, meaning that the work accident control program did not show any significant change.
- If the safe T-score +2.00 means that the work accident control program has decreased.
- If the safe T-score of 2.00 means that the K3 program has improved or the OSH performance or there is something good that needs to be maintained (Sihotang et al.,).

The calculated data is then analyzed to find out whether there are efforts to improve control by the company in the event of a work accident

Pervious concrete consists of agglomeration of single-sized coarse aggregate covered with a thin cement paste layer of about 1.3 mm (Neville and Brooks, 2010). Based on ACI 522R-10 mix design for pervious concrete consists of: cement (270 - 415 kg), aggregate (1190 - 1480 kg), cement water

Pervious concrete consists of agglomeration of single-sized coarse aggregate covered with a thin cement paste layer of about 1.3 mm (Neville and Brooks, 2010). Based on ACI 522R-10 mix design for pervious concrete consists of: cement (270 - 415 kg), aggregate (1190 - 1480 kg), cement water factor (0.27 - 0.34), ratio of sand and gravel weight (0 to 1:1) by using chemical admixtures.

The addition of sand will reduce the pore content and increase the compressive strength. The use of non-sand concrete as a pavement material is very limited and has not been developed for certain applications. However, non-sand concrete has been widely used as a structural building material in Europe, Australia and the Middle East for more than 70 years (Macintosh et al., 1965, in Harber, 2005). The earliest use of pervious concrete occurred in England in 1852 with the construction of two dwelling houses and a sea grove 61 m long and 2.15 m wide (Francis, 1965, in Harber, 2005). The use of non-sanded concrete became much more widespread during the material shortage after World War II, for cast-in-place load-bearing walls for non-rise and multi-storey buildings.

The initial use of non-sand concrete was mainly for two-story structures, then it was developed for five-story buildings in the 1950s and continues to grow. In recent years, pervious concrete has been used as a load-bearing material in high-rise buildings of up to ten stories. The most remarkable use of pervious concrete was in Stuttgart, Germany where high-rise buildings were constructed using conventional

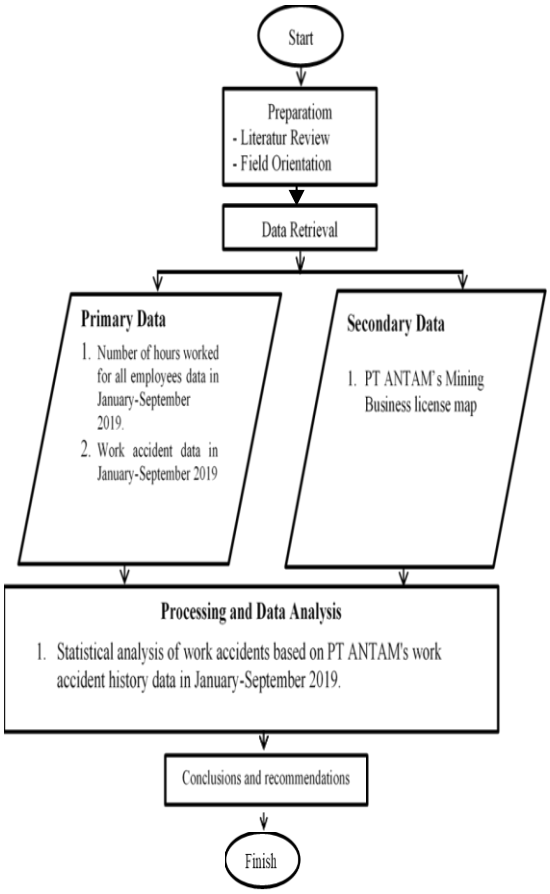

Fig 1. Research Flow Chart

3. Result and Discussion

3.1. Result

Table 1. Table of Work Accident Data PT ANTAM, tbk on transportation activities in January-September 2019

No	Month	Mine Accident			Number of Working Hours of Employees (T)	Lost Time Day (W)	Frequency Rate (FR)	Severity Rate (SR)
		Minor (X)	Severe (Y)	Fatality (Z)				
1.	January	0	0	0	129,291	0	0	0
2.	February	0	0	0	122,946	0	0	0
3.	March	0	0	0	154,923	0	0	0
4.	April	0	0	0	157,974	0	0	0
5.	May	0	0	0	166,607	0	0	0
6.	June	0	0	0	151,298	0	0	0
7.	July	0	0	0	208,010	0	0	0
8.	August	0	0	0	206,023	0	0	0
9.	September	0	0	0	211,694	0	0	0
	Total	**0**	**0**	**0**	**1,508,766**	**0**	**0**	**0**

Table 2. Safe T-Score Calculation Results for January-September 2019

No	Month Comparision	Safe T Score
1.	February-January	Undefined (No Accident)
2.	March-January	Undefined (No Accident)
3.	March-February	Undefined (No Accident)
4.	April-January	Undefined (No Accident)
5.	April-February	Undefined (No Accident)
6.	April-March	Undefined (No Accident)
7.	May-January	Undefined (No Accident)
8.	May-February	Undefined (No Accident)
9.	May-March	Undefined (No Accident)
10.	May-April	Undefined (No Accident)
11.	June-January	Undefined (No Accident)
12.	June-February	Undefined (No Accident)
13.	Juny-March	Undefined (No Accident)
14.	June-April	Undefined (No Accident)
15.	June-May	Undefined (No Accident)
16.	July-January	Undefined (No Accident)
17.	July-February	Undefined (No Accident)
18.	July-March	Undefined (No Accident)
19.	July-April	Undefined (No Accident)
20.	July-May	Undefined (No Accident)
21.	July-June	Undefined (No Accident)
16.	August-January	Undefined (No Accident)
17.	August-February	Undefined (No Accident)
18.	August-March	Undefined (No Accident)
19.	August-April	Undefined (No Accident)
20.	August-May	Undefined (No Accident)
21.	August-June	Undefined (No Accident)
22.	August-July	Undefined (No Accident)
23.	September-January	Undefined (No Accident)
24.	September-February	Undefined (No Accident)
25.	September-March	Undefined (No Accident)
26.	September-April	Undefined (No Accident)
27.	September-May	Undefined (No Accident)
28.	September-June	Undefined (No Accident)
29.	September-July	Undefined (No Accident)
30.	September-August	Undefined (No Accident)

a) Frequency Rate (FR)

Frequency Rate, which is the number of work accidents, aims to measure injuries due to mining accidents. The Frequency Rate (FR) of mining accidents in January-September 2019 is 0. It means that there were no mining accidents in that month. The results of the calculation of the frequency rate of mining accidents in January-September 2019 are as follows:

$$FR = \frac{(X+Y+Z)}{T} \text{ x } 1{,}000{,}000$$

$$FR = \frac{0}{0} \text{ x } 1{,}000{,}000 = 0$$

b) Severity Rate (SR)

The Severity Rate, a work accident severity number, aims to measure the severity of the accidents experienced in mining accidents. Based on the calculation results, the Severity Rate (SR) of mining accidents in January-September 2019 is 0. It indicates no severity of mining accidents that resulted in that month. Following are the results of the calculation of the Severity Rate of mining accidents in January-September 2019:

$$SR = \frac{W}{T} \text{ x } 1{,}000{,}000$$

$$SR = \frac{0}{0} \text{ x } 1{,}000{,}000 = 0$$

c) Safe T-Score

The calculated value of the safe T score is 0. The value of the Safe T score is in the range of +2.00 to -2.00. This value means that the work accident control program does not show significant changes. The following is an example of calculating the Safe T-Score from August to September:

$$\text{Safe T Score} = \frac{H - I}{\sqrt{\frac{I}{1{,}000{,}000}}}$$

$$\text{Safe T Score} = \frac{0 - 0}{0}$$

$$\text{Safe T Score} = 0$$

3.2. Discussion

There were no work accidents in the bauxite transportation activities of PT ANTAM, Tbk, in January-September 2019. It can be seen that there was no loss of working days for mining employees in January-September 2019. Based on the calculation results, it is known that the FR (frequency rate), SR (severity rate), and Safe T Score in January-September 2019 was 0. The mining company managed to achieve zero accidents in January-September 2019. The success of zero accidents is probably influenced by one of the factors, namely the environment. One example of environmental factors is the condition of the mine road/geometry of the mine road. Mining roads in the study area consist of one-way streets and two-way roads. Based on the results of the haul road geometry analysis at PT ANTAM, it is known that the road geometry meets the standards based on KEPMEN 1827 K; namely, the minimum haul road width is 12.005 m, the haul road width at the minimum bend is 13.34, and the haul road slope/grade is not more than 12%.

The success of zero accidents must be maintained by increasing occupational health and safety training for mining workers, especially for workers in the transportation area, increasing supervision of the implementation of occupational health and safety by mining workers, especially the use of personal protective equipment (PPE) while working. Rising routine inspections in the field to eliminate incidents that could result in negative impacts. For the emergence of an accident (mining accident) that results in employees' loss of working days.

4. Conclusion

The conclusions of this study are:

1. The frequency rate (FR) value in January-September 2019 is 0. It indicates no mining accidents and no injuries due to work in PT ANTAM's bauxite transportation activities.
2. The value of the accident severity rate (SR) in January-September 2019 is 0. This value means no mining accidents in transportation activities in that month, so the severity of the accidents produced did not exist.
3. The work accident control program in transportation activities shows no significant changes. It is based on the safe T score = 0.

5. Acknowledgment

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