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# Analysis of JHA and JSA at KIP 16 Bangka Ocean Mining Units PT Timah (Persero) Tbk Bangka Belitung Islands Province

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**Abstract.** This research discusses about safety and health occupational control in Bangka Ocean KIP Timah 16 Units using some risk management methods. The methods are Job Hazard Analysis (JHA) and Job Safety Analysis (JSA). Purpose of the research is to explain safety and health occupational in KIP Timah 16 Unit it is for get the improvement of productivity work, production, welfare and comfortability workers and achievement of zero accident. The type of the research is descriptive. There are two data had collected. They are primary and secondary data. Primary data get from interview with the employees and secondary data get from K3 documents in the enter company of PT. Timah UPLB and KIP 16. Based on result of research can get some conclusions. First, to use method JHA and JSA for identification and control occupational accident.

## 1. Introduction

PT Timah is a company that was developed on August 2, 1976 and it is a State-Owned Enterprise (BUMN) that participate in tin mining and has been listed in the Indonesia Stock Exchange since 1995.

In carrying out mining operations, not all process activities will always function easily. This is because there will be interactions between humans and mining equipment and material with the environment. This interaction is very risky and can cause work accident. According to Nugraha [1], the occurrence of work accidents is caused by 4 processes including the interrelated elements of production, it was people, equipment, material, environment (PEME) that interact to produce a product and service.

According to ILO (1989), work accidents can be caused by 3 (three) factors it was human factors, their work and the environment in the workplace. Human factors can be age, level of education and work experience. Job factors such as the form of shifts and types of work. Meanwhile, for environmental factors such as physical environment (lighting and noise), chemical environment and biological environmental factors.



Accident prevention function is to minimize accidents and losses. Accident prevention work is carried out after determining the cause of accidents in the production process so that made steps how to handle workplace accidents correctly. Control of workplace accidents can be done by several approaches including hazard approach, human approach, technical approach, administrative approach and management approach.

Based on data from workplace accidents in 2005 to 2017, there were 132 cases of accidents that occur in the PT. Timah (Persero) Tbk and this is high. The case consists of small accidents such as tripping, cuts and scratches, typically only causing minor injuries, so workers can keep working. Lost time accident is an accident of work requiring workers to be taken to the hospital and took a temporary break, resulting in loss of working time. some of the causes of accidents lost time accident is twisted, hit and pinched (to drop). While the accident is fatality accidents that can result in death. Details of the incident that occurred in work accidents PT. Timah (Persero) Tbk is 26.5% small accidents; 37.1% lost accident control and 36.4% died.

From the details of the accident data, it is proof of the lack of control and management of Occupational Safety and Health at PT. Timah (Persero) Tbk. So, the researchers were interested in analyzing JHA and JSA in Bangka Ocean KIP Timah 16 Units. Before, we have to know what is hazard, hazard is the potential for harm. In practical terms, a hazard often is associated with a condition or activity that, if left uncontrolled, can result in an injury or illness. To controlled, it is need safety [2]. Next, OSHA [2] explained too, job hazard analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. It focuses on the relationship between the worker, the task, the tools, and the work environment. Besides, Mohammadi [3] explained that job safety analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. They two have connection each other. The purpose of the study was to analyze Job Hazard Analysis (JHA) and Job Safety Analysis (JSA) in Bangka Ocean KIP Timah 16 Units.

## 2. Research Method

This research uses a descriptive method. The source of information is gotten from primary data and secondary data. Primary data is gotten from direct observation / field observation and interviews, while secondary data is gotten from library materials, articles, journals, documentation, company internal data and other supporting documents such as JHA and JSA.

## 3. Result

Based on the results of interviews conducted at Tin 16 KIP, the causes of accidents that often occur in KIP are as follows: careless / inaccurate at work, the amount of oil fluid that is scattered everywhere, do not use APD during work, there is no protective fence on rotating machines, place APD around rotating machines, the number of holes in the floor, tools that are scattered (irregular), don't understand how the machine works, not following the procedure, workplace is not safe, works not in their fields, lack of coordination, nonstandard tools.

### 3.1. Job Hazard Analysis (JHA) in KIP Timah 16

The JHA is an analysis and improvement process that can literally transform workplace safety. The JHA is a structured process that can discover the causes for the vast majority of workplace injuries and illnesses. Before carry out an analysis of the occupational hazards found in KIP 16, the first work that must be done is to make the steps for drafting JHA, including the following:

1. Form a JHA team, they are safety professionals, engineers, supervisors and workers.
2. Determine JHA priorities, it is occupations with the highest disease rates, jobs that have a potential level of serious injury, work where one simple human error can cause injury, work that is complex enough to have written instructions, jobs that significantly have technological change process or procedure.
3. involving workers.
4. Re-discuss the incident that happened before.

5. doing to review job.
6. there is a checklist, scale and priority setting for hazardous work.
7. Describe steps or tasks.
8. Involve workers who have an understanding about work, help minimize negligence so that the analysis is quality and people who get direct benefits.

After preparing the JHA steps, the next step is to identify the type of work, specific work, the danger of work and proper control. For more details, see Table 1:

**Table 1.** JHA in KIP 16

Type of work	Detail work	Danger	Control
digging tin ore using ladder	digging tin ore using a ladder which is controlled from the command room	<ul style="list-style-type: none"> <li>- Intermittent wire split</li> <li>- Ladder caught in a working hole</li> <li>- Ladder damage</li> </ul>	Monitor ship rotation speed regularly when excavating tin ore
the process of washing tin ore using a rotary filter, primary jig, secondary jig and sluice box	The work of separating tin ore from debasement minerals based on grain size and specific gravity using rotary filter, primary jig, secondary jig and sluice box	<p>The swivel filter is located on the 3rd floor and the potential hazards found in the swivel filter environment:</p> <ul style="list-style-type: none"> <li>- fall</li> <li>-Stumble</li> <li>- knock</li> <li>- Fall from a height</li> </ul> <p>The primary jig is located on the 2nd floor and the potential hazards found in the primary jig environment:</p> <ul style="list-style-type: none"> <li>- fall</li> <li>- knock</li> <li>-Stumble</li> </ul> <p>The secondary jig is located on the 1st floor, so the surface of the first floor is often inundated by seawater and potential hazards in the secondary jig environment:</p> <ul style="list-style-type: none"> <li>- fall</li> <li>- slipping</li> <li>- slip</li> <li>-Stumble</li> <li>- knock</li> <li>- Fall into the sea</li> <li>-Pinched</li> <li>- hit</li> </ul>	Using APD such as: safety shoes, safety helmet, buoys, general work gloves, body hardness, work clothes (coverall) and be careful in working

		<p>The sluice box is located on the 1st floor close to the secondary jig, the potential danger in the sluice box environment:</p>	
<p>Welding work</p>	<p>Work uses a power source (welding transformer)</p>	<ul style="list-style-type: none"> <li>- fall</li> <li>- slipping</li> <li>- slip</li> <li>-Stumble</li> <li>- knock</li> <li>- Fall into the sea</li> <li>- Affected by bursts of sparks from the welding machin</li> <li>-Bending</li> <li>-Rum</li> <li>-Hot</li> <li>-Burnt skin</li> <li>-Noisy</li> <li>-Damage to the eyes</li> <li>-Fatigue due to hot temperatures</li> </ul>	<p>Workers have to observe some sources of strains that are supplied to the welding machine and must use complete PPE such as:</p> <ul style="list-style-type: none"> <li>-Safety shoes</li> <li>-Glass glasses</li> <li>- Welding mask</li> <li>- Welding gloves</li> <li>- Welding work apron</li> <li>-Earplug</li> <li>-Fill</li> <li>-Working clothes (coverall)</li> </ul>
<p>work on monitoring and controlling machinery, such as ground pump machines, hydraulic machines and rudder propeller machines</p>	<p>control engine performance directly from the source</p>	<p>Potential hazards found in the ground pump engine environment:</p> <ul style="list-style-type: none"> <li>- Fast heat</li> <li>- Noisy</li> <li>-Pinched</li> <li>- knock</li> <li>- Hot exposure</li> </ul> <p>Potential hazards found in a hydraulic engine environment:</p> <ul style="list-style-type: none"> <li>- spinning</li> <li>- twisted</li> <li>- cut off</li> <li>-Pinched</li> <li>- knock</li> <li>- Noisy</li> </ul> <p>Potential hazards found in a rudder propeller engine environment:</p> <ul style="list-style-type: none"> <li>-Pinched</li> <li>- cut off</li> <li>- High heat pressure</li> <li>- twisted</li> <li>- knock</li> <li>- Noisy</li> <li>- Hot exposure</li> </ul>	<ul style="list-style-type: none"> <li>-Give safety on a planetary object</li> <li>- Install warning signs and so on</li> <li>-Use PPE such as: safety shoes, safety helmets, buoys, general work gloves, earplugs, dust masks, gas masks, work clothes (coverall) and be careful in working</li> </ul>

Work in limited space	Work carried out in narrow spaces such as pontoon repairs	Potential hazards found in a confined space environment: - Lack of oxygen and excess oxygen - Stuck on the way out - Flammable and explosive material - Toxic materials (gas, fume, steam) - Solid or liquid substances stored in it - Mechanical energy, electricity and heat	Use of special PPE such as: - General work gloves - Safety shoes - Respiratory equipment - Work clothes (coverall) - Earplug - Safety helmet - Google - Chemical gloves - Electric gloves - Fire resistant clothes
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### 3.2. Job Safety Analysis (JSA) in KIP Timah 16

NSC (2009, p. 240d) in Glenn [4] explained that JSA is an analytical process of developing safer job procedures and to the document that is developed as a result of the analysis. The methods used in JSA techniques include: observation (observation) method, discussion method (consultation), and review method. Before doing out an analysis to the work of the JSA, the steps that need to be taken are:

1. Choose the job to be analyzed.
2. Divide the work, which describes the sequence of work procedures.
3. Identify hazards in work steps, and identify various possibilities that have the potential for accidents.
4. Provide control to avoid accidents that have been identified in each step.

After preparing the steps of the JSA, the next step is to identify the type of work, potential hazards and recommended actions. For more details, it can be seen in Table 2.

**Table 2.** JSA in KIP 16

Type of work	Potential hazard	Recommended actions or procedures
digging tin ore using ladder	Personal: near miss-injury-fatality  Property: interrupted wire breaks and ladder broken  Environmental: sea water is cloudy, this can cause disruption of the activities of marine life so that it affects the difficulty of fishermen to find fish	- All workers must use PT standard safety equipment such as: safety shoes, safety helmet, buoys, general work gloves, body hardness, work clothes  - Perform induction safety 1 (one) time in a month  - Perform a meeting tool box 1) times a week  - Conduct PJSM (Pre Job Safety Meeting) before work  - Do safety talk every day
the process of washing tin ore using a rotary filter, primary jig,	Personal: near miss and personal injury  Property: damage to jig	- Training to improve skills in safety Perform daily maintenance

secondary jig and sluice box	components such as: rooster, bed, wire screen, afsluiter underwater, balance, eccentric, membrane and spigot handlebar	
	Environmental: sea water due to tailings from the washing process	
Welding work	Personal: personal injury	Using APD completely like:
	Property: damage to the welding machine	- Safety helmet
	Environmental: the environment around the welding area gets hot	- Safety shoes
		- Welding glasses
		- Welding mask
		- Welding gloves
		- Welding work apron
		- Earplug
		- Buoy
		- Work clothes (coverall)
work on monitoring and controlling machinery, such as ground pump machines, hydraulic machines and rudder propeller machines	Personal: near miss-injury-fatality	- Using PPE equipment
	Property: damage to the engine due to improperly controlled	- Installation of warning signs
	Environmental: o	- Installing rotating object safety
Work in limited space	Personal: fatallity	Use special safety equipment such as:
	Property: leak on the pontoon	- General work gloves
	Environmental: fire	- Safety shoes
		- Respiratory equipment
		- Work clothes (coverall)
		- Earplug
		- Safety helmet
		- Google
		- Chemical gloves
		- Electric gloves
		- Fire resistant clothes

The results of the JHA and JSA analysis obtained will be used as material references to develop the KIP Timah standard operational procedure (SOP). besides the results of this analysis should also show how the condition of JHA and JSA in KIP Timah.

#### 4. Conclusion

JHA is one of the risk management methods that identify all activities prior to the occurrence of hazards. The types of work in the KIP 16 was identified was the work of excavation, the washing process, the welding job, a job in charge of controlling the machinery and work in confined spaces. After identification, the control performed in accordance with the kinds of work. Additionally, hazard identification methods in KIP Timah 16 JSA is not yet realized.

JSA is one of the risk management methods that identify hazards at each work contained in the KIP Timah 16 JSA identified components include: personal, property and environmental based work processes. During this time the condition of the JSA in KIP Lead 16 is not yet realized, so that it impacts on the frequent occurrence of minor accident (minor accidents).

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