

## Analysis of Potential Hazards Using the HIRADC Approach and Methods Job Safety Analysis on The Practical Process at The Department of Environmental Health

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### ABSTRACT

The Physics, Industrial Sanitation, and Occupational Safety Laboratory, also known to be the Health Department's Workshop Environment at the Ministry of Health Jakarta II Health Polytechnic, is part of the laboratory standards established through the Decree of the Minister of Health Number: HK.03.05/IV/14354.I/2010 concerning Health Personnel Education Laboratory Standards. To keep up with service standards or Standard Operating Procedures (SOP) in a laboratory and follow the Occupational Health and Safety management system following PP No. 50 of 2012 concerning the Implementation of Occupational Safety and Health Management Systems, the supporting facilities and infrastructure therefore require more effective and efficient attention. The objective of this study is to implement the Job Safety Analysis (JSA) and the HIRADC method to evaluate potential health and safety hazards at the Jakarta II Health Polytechnic Workshop. The result based on analysis and discussion using the JSA approach of the risk level research at the Department of Environmental Health workshop showed that 11% had a high-risk level, 28% had a medium-risk level, and 61% had a low-risk level. The highest risk is in the practical work of making slabs and testing insecticides for open joints using fogging and insecticides. The control provided is based on a control hierarchy, and it entails providing enough complete PPE in accordance with the risk of hazard and supervising the use of PPE during preparation and until the practicum process is complete.

**Keywords :** JSA, HIRADC, Risk Management and Educational Workshop.

### I. INTRODUCTION

In accordance with Law Number 20 of 2003, that relates to the National Education System, national education helps develop ability and mold the country's

dignified, civilized character toto make life in the country more intelligent and to improve human resources. The objective of education is to help students reach their full potential as people who have

a strong sense of faith in and devotion to God Almighty, a noble character, and other qualities such as being healthy, knowledgeable, capable, creative, independent, and becoming democratic and responsible citizens [1].

As in Andreas' research [2] in support of the law, the learning process of each campus is also required to make policies that lead to the implementation of Occupational Safety and Health in accordance with Law 1/1970 [3] explicitly as the implementation of Occupational Safety and Health in the the Implementation of Occupational Safety and Health Management Systems since 1996 through Permenaker No.05 / Men / 1996, and Government Regulations, so that the risk of work accidents can be narrowed or zero risk, both related to management, as well as fire hazards, earthquakes [4].

The Physics, Industrial Sanitation, and Occupational Safety Laboratories, or what are known as workshops in the Department of Environmental Health at the Health Polytechnic, are located at the Jakarta II Ministry of Health Polytechnic in accordance with laboratory standards by the Decree of the Minister of Health Number: HK.03.05/IV/14354.I/2010 concerning Health Personnel Education Laboratory standards. The purpose of this workshop is to assist the courses Soil Sanitation and Waste Management, Industrial Physics and K3 courses, Entomology or Vector, and Water and Liquid Waste Sanitation [5]. In order to comply with service standards or Standard Operating Procedures (SOP) in a laboratory and in accordance with the Occupational Safety and Health management system by Government Regulation No. 50 of 2012 concerning the Implementation of Occupational Safety and Health Management Systems, it is necessary to give supporting facilities and infrastructure more effective and efficient attention [6]. Because it is closely tied to efforts to prevent and control hazards, which are used to establish occupational safety and health objectives and plans, HIRADC is a crucial component of the occupational safety and health management system. Based on

Government Regulation No. 50 of 2012 concerning Implementation of Occupational Safety and Health Systems, the Indonesian government issued the Occupational Safety and Health Management System, which is mandated to be implemented by various industries[7].

To make sure that current Occupational Health and Safety plans run smoothly, on schedule, and yield benefits, there is a need to step up the implementation of occupational health and safety by enhancing occupational health and safety management and developing standard operating procedures (SOP) for a number of mining activities [8].

One method that can be used in every work process is Job Safety Analysis (JSA), namely a safety management technique that focuses on identifying hazards and preventing hazards related to the series of work or tasks to be carried out. In accordance with research by Andung et al. [9], accomplishing a zero accident rate is essential to managing occupational safety and health methods that can be used to reduce and eliminate occupational risks. One such approach is the use of job safety analysis (JSA), which is a safety management technique that identifies potential hazards with low classification and high classification.

This is consistent with Ilmansyah, et al.'s method of study [8]. To prevent work accidents, namely by using Job Safety Analysis (JSA) as a problem-solving tool employed in direct observation, zero accidents is an essential aspect of occupational Health and Safety management. It occurs by identifying potential hazards and work accidents in activities and Unloading Fuel Oil. This is in line with the research method used by zero accident is a crucial component of occupational Health and Safety management, and it can be achieved by detecting potential risks and work accidents in activities and Unloading Fuel Oil, as well as by using Job Safety Analysis (JSA) as a tool for problem-solving during direct observation.

Following the research objective, which was to concentrate more on discussing the potential dangers so that occupational Health and Safety risks can be

identified, and can assess each level. risks, so they can provide action solutions to control these risks[10], researchers have observed that there is a high probability of potential and types of danger in each process, carried out at the Department of Environmental Health workshop [11]. Occupational safety and health is something that must be considered when in a workshop, therefore students must already understand what Occupational Safety and Health is and Standart Operational Procedure (SOP) when carrying out practice[12].

## II. METHODS AND MATERIAL

The Department of Environmental Health workshop at the Health Polytechnic used a descriptive study strategy to describe a number of variables related to occupational health and safety issues. According to Ramli [13], risk control from potential technical and human risks, namely identification through

questionnaires, is based on this. Researchers then examine potential technical hazards utilizing initial identification using the JSA approach. According to Sugiyono, researchers do it utilizing interview techniques to increase its effectiveness. An interview guide is used as a tool to react to a series of questions posed or written remarks made to respondents when gathering research data through interviews.

There were 364 people in all who were research subjects, including 347 students and 17 lecturers and instructors. The Slovin algorithm was used to calculate the results, which were 190 respondents made up of 17 lecturers and instructors and 173 students, with an error rate of 5% [14]. The results of the questionnaire are primary data from the Head of the Environmental Health Department, Instructors, and Lecturers, as well as students who have completed practical in Vector, Industrial Physics, Soil Sanitation and Waste Management , and Water and Waste Sanitation Courses Liquid, because the course is approximately

**Table 1** Table of identified hazards

Potential Work Accidents Identified	Preventive Actions
Sparks when cutting iron during slab making/casting practices	Wear PPE properly and correctly, such as googles and masks
Work accidents when cutting metal result in body parts being injured, scratched or cut, causing permanent disability	Use nitrile gloves PPE regularly
Inhaling chemicals when making a solution of H <sub>2</sub> S <sub>0</sub> 4N and AgNO <sub>3</sub> as a catalyist	Additional ventilation, using masks and respirators, routine medical check up checks for lecturers and instructors in the laboratory every 6 months or 1 year
Work accidents when pouring solutions and heating which result in gas/chemical inhalation, fainting, shortness of breath, nausea and dizziness	Adequate ventilation, using latex gloves, masks and carrying chemicals in containers or baskets, cleaning up spilled chemical raw materials immediately, routine medical check up checks for lecturers and instructors in the laboratory every 6 months or 1 year
When heating using a spirit lamp it can cause burns to the body	When working according to SOP, wear PPE properly and correctly such as using latex gloves, cloth gloves
Stabbed, fallen, and slipped while practicing surveying nuisance fly populations and mosquito vector populations using fly traps	Wearing PPE properly and properly such as shoes, and gloves, and working on the floor in a dry state

Continued Table 1

Potential Work Accidents Identified	Preventive Actions
Get hit by broken glass preparations if you fall	Wear shoes and gloves
Falls, burns, splashes with insecticide solutions, splashes in the eyes, inhalation, insecticide poisons are swallowed and ingested during the practice of fumigation/fogging with machine fogging and insecticides	Wear PPE properly and correctly, use nitrile gloves, goggles, masks and respirators, shoes, routine medical check up checks for lecturers and instructors in the laboratory every 6 months or 1 year. Prepare milk to sterilize when dizzy, nauseous, or shaking due to swallowing insecticide poison
Hands are cut which causes injury or permanent disability when cutting PVC pipes using a hacksaw/machine	Use nitrile gloves PPE regularly
Parts of the hands/body parts are perforated which causes injury or permanent disability when drilling holes in pipes using a drill	Use nitrile gloves PPE regularly
Some body parts were hit by drilling machines when making septic tanks, and absorption holes, especially the feet and hands	Use safety shoes, boots, gloves, given training in using drill tools
Some body parts are affected Machine augers when making percolation holes, when cutting PVC pipes, causing body parts to be injured, cut or permanently disabled	Use safety shoes, boots, gloves, given training in their use Machine augers
The heat from the oven causes damage to skin tissue if exposed to it when drying filter paper during airborne dust sampling practices	Use PPE, gloves
Heat in the sample field environment and loud noise when carrying out practice in the outdoor Noise measurement field	Use earplugs, hat
Glare, blur on the eyes when practicing with lighting measurement practice testing with luxmeter	Wear PPE properly and correctly
Falling, being impaled on stakes made of bamboo, becoming dehydrated from being in the sun, being bitten by insects	Use gloves, lotions like Autan, hats

### III. RESULTS AND DISCUSSION

Based on the results of observations and interviews at workshops with students, lecturers, and instructors and then examined further using the JSA method, the focus of work and potential work accidents can be identified as seen in Table 1. Been detected using the

Job Safety Analysis (JSA) method and examined by methodist It will be simpler to serve as the basis of information for top management's discussion of corrective action and minimizing the hazards of these risks by making prevention of them a priority by assessing and scoring risks in the hopes that the level of risk will be known. Table 2 displays the findings of

Continued Table 1

Potential Work Accidents Identified	Preventive Actions
Falling, being impaled on stakes made of bamboo, becoming dehydrated from being in the sun, being bitten by insects	Use gloves, lotions like Autan, hats
Wounds are cut and cut during sanitary practices and processing waste and making compost	Use latex gloves, shoes
During the burning process, the briquette material produces smoke which causes sore eyes, shortness of breath, bruising	Adding some ventilation, using masks and respirators, googles, there are routine medical check up checks for lecturers and instructors in the laboratory every 6 months or 1 year

Table 2. Risk Assessment

Potential Work Accidents Identified	Types of hazards	Risk Assessment		
		Probability Level (Likelihood)	Severity Level (Severity)	Risk Score
Sparks when cutting iron during slab making/casting practices	MECHANICAL HAZARD	3	4	12
Work accidents when cutting metal result in body parts being injured, scratched or cut, causing permanent disability	MECHANICAL HAZARD	4	2	8
Inhaling chemicals when making a solution of H <sub>2</sub> SO <sub>4</sub> N and AgNO <sub>3</sub> as a catalyst	CHEMICAL HAZARD	4	1	4
Work accidents when pouring solutions and heating which result in gas/chemical inhalation, fainting, shortness of breath, nausea and dizziness	CHEMICAL HAZARD	4	1	4
When heating using a spirit lamp it can cause burns to the body	MECHANICAL HAZARD	4	1	4
Get hit by broken glass preparations if you fall	FALL HAZARD	3	3	9
Stabbed, fallen and slipped while practicing surveying nuisance fly populations and mosquito vector populations using fly traps	MECHANICAL HAZARD	3	3	9

Continued Table 2

Potential Work Accidents Identified	Types of hazards	Risk Assessment		
		Probability Level (Likelihood)	Severity Level (Severity)	Risk Score
Stabbed, fallen and slipped while practicing surveying nuisance fly populations and mosquito vector populations using fly traps	MECHANICAL HAZARD	3	3	9
Falls, burns, splashes with insecticide solutions, splashes in the eyes, inhalation, insecticide poisons are swallowed and ingested during the practice of fumigation/fogging with machines fogging and insecticides	FALL HAZARD DAN CHEMICAL HAZARD	4	3	12
Hands are cut which causes injury or permanent disability when cutting PVC pipes using a hacksaw/machine	MECHANICAL HAZARD	4	1	4
Parts of the hands/body parts are perforated which causes injury or permanent disability when drilling holes in pipes using a drill	MECHANICAL HAZARD	4	1	4
Some body parts were hit by drilling machines when making septic tanks, and absorption holes, especially the feet and hands	MECHANICAL HAZARD	4	1	4
Some body parts are hit by machine augers when making percolation holes, when cutting PVC pipes, causing body parts to be injured, cut or permanently disabled.	MECHANICAL HAZARD	4	1	4
The heat from the oven causes damage to skin tissue if exposed to it when drying filter paper during airborne dust sampling practices	PHYSICAL HAZARD	1	1	1
The heat in the sample field environment and the noise when carrying out outdoor noise measurement practice in the field	PHYSICAL HAZARD	3	3	9
Glare, blur on the eyes when practicing with lighting measurement practice testing with luxmeter	PHYSICAL HAZARD	3	3	9

Continued Table 2

Potential Work Accidents Identified	Types of hazards	Risk Assessment		
		Probability Level (Likelihood)	Severity Level (Severity)	Risk Score
Falling, being impaled on stakes made of bamboo, becoming dehydrated from being in the sun, being bitten by insects	FALL HAZARD, BIOLOGICAL HAZARD	4	1	4
Wounds are cut and cut during sanitary practices and processing waste and making compost	PHYSICAL HAZARD	4	1	4
During the burning process, the briquette material produces smoke which causes sore eyes, shortness of breath, bruising	CHEMICAL HAZARD	4	1	4

the risk analysis. Because it falls under the high-risk level category (Red), immediate and intensive preventative action must be taken as a matter of priority. Once the high-risk level can be managed and periodic evaluations are conducted to see if there are any changes for improvement, the risk is classified as medium risk level (Yellow). taken preventative action.

#### IV. CONCLUSION

Based on the analysis and discussion of research findings using the JSA approach, risk assessment at the Environmental Health Department workshop revealed that 2 (11%) had a high-risk level, 5 (28%) had a medium-risk level, and 11 (61%) had a low-risk level. The highest was discovered during the practical task of creating slabs and putting pesticides through their paces for open grazing utilizing fogging and insecticides. The control suggestions made are based on the control hierarchy, specifically the provision of adequate, complete PPE in accordance with the risk of hazard and the supervision of PPE use during training until the practicum process is over. If students, lecturers, and instructors are aware of the need to take action to prevent work accidents in order to lower the number of accidents and the level of high risk, then Occupational Safety and Health in the Environmental

Health Department workshop will be realized. As a training facility, Jakarta II Ministry of Health Health Polytechnic plays a crucial role in the implementation of its Tridharma activities focused on the Occupational Safety and Health component by training and producing future health worker graduates. In order to improve efforts by conducting Occupational Safety and Health training for Human Resources directly related to workshop activities, which provide knowledge about the dangers and risks to prevent work-related accidents, support from facilities and infrastructure is required from the institution's leadership as the policy holder.

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