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Safety in Cleaning of Chemical Storage Tanks using Job Safety Analysis Methods

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Abstract:- In general, potential hazards in the chemical industry which can cause death include (1) fire, (2) explosion, (3) falling from a height, (4) working in confined spaces. Other problems related to working in confined spaces which often cause work incidents or accidents include not following limited work procedures, not identifying hazards, not assessing risks, not controlling risks, not using personal protective equipment, not testing toxic gases, no preparing work supervisors, not having competent workers in the area of limited space.

As is known together, confined spaces contain several good sources of danger originating from chemicals that contain poison and are flammable in the form of gases, vapors, fumes, dust and so on. In addition there are other hazards in the form of oxygen deficiency or conversely excessive oxygen levels, extreme temperatures, engulfment, or other physical risks that arise such as noise, wet / slippery surfaces and falling hard objects inside the limited space that can lead to workplace accidents up to the death of the workforce working in it.

Keyword:- *Cleaning, Storage Tanks, Chemical Industry.*

I. INTRODUCTION

In Indonesia, various industries have grown and developed, including the petrochemical, chemical, mining, chemical storage terminals and so on. Every activity in the industry has a potential hazard (hazard) that can cause risk (risk) to workers, contractors and guests who are in the factory environment.

The number of accidents that occur in the chemical industry, such as fire, explosion, environmental pollution, and lack of oxygen when doing work in confined spaces. 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 further with corrective actions aimed at the cause and with further preventive efforts the accident can be prevented and similar accidents do not recur.

Industrial accidents are generally caused by two main things, namely hazardous work behavior (unsafe human act) and dangerous conditions (unsafe condistions). Some research results show that human factors play an important role in the emergence of workplace accidents. A work accident can occur if there are various factors that trigger the workplace or the production process. Some experts indicate that workplace accidents will not occur on their own, but are triggered by one or more factors that can cause workplace accidents in an event.

Based on Law No. 1 of 1970 concerning Occupational Safety and Health (K3), every work activity requires to protect work safety for workers, other people and sources of production. The steps to implement, guide and evaluate Occupational Safety and Health must be carried out continuously to improve the quality of work results and elements of Occupational Safety and Health towards workers, work equipment and the work environment.

In general, potential hazards in the chemical industry which can cause death include (1) fire, (2) explosion, (3) falling from a height, (4) working in confined spaces. Other problems related to working in confined spaces which often cause work incidents or accidents include not following limited work procedures, not identifying hazards, not assessing risks, not controlling risks, not using personal protective equipment, not testing toxic gases, no preparing work supervisors, not having competent workers in the area of limited space.

As is known together, confined spaces contain several good sources of danger originating from chemicals that contain poison and are flammable in the form of gases, vapors, fumes, dust and so on. In addition there are other hazards in the form of oxygen deficiency or conversely excessive oxygen levels, extreme temperatures, engulfment, or other physical risks that arise such as noise, wet / slippery surfaces and falling hard objects inside the limited space that can lead to workplace accidents up to the death of the workforce working in it.

According to the Decree of the Director General of Manpower Development and Supervision No.113 / DJPKK / IX / 2006, the definition of limited space is that the room is quite large and has such a configuration that workers can enter and do work in it, have limited in and out access. As with tanks, ships, silos, storage areas, cabinets or other spaces that may have limited access), it is not designed for a workplace that is continuous or continuous in it. In working in confined spaces, one of them is cleaning chemical storage tanks. The chemical storage tank contains flammable chemicals, such as vinyl acetate, methanol, butyl acrylate, styrene monomer, and so on. Likewise other chemicals that are toxic (toxic), for example acrylonitril, formaldehyde, arsenic, cyanide.

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This paper presents work safety in cleaning chemical storage tanks, especially in the Chemical Industry. With the procedure for cleaning chemical storage tanks, it will reduce the risk of accidents.

II. METHODOLOGY

The study used the Qualitative Descriptive approach. Observation research techniques were carried out in the industrial area of tenant storage tanks. Depth Interview was conducted on industry experts and Focus Group Discussion (FGD)

III. RESULTS AND DISCUSSION

- *Safety Procedure in Cleaning Chemical Storage Tanks*

In the procedure, limited space must be clearly stated in safety measures. One of the activities of working limited space is "Cleaning of Chemical Storage Tanks". The steps that must be taken in cleaning chemical storage tanks are as follows:

(1) Perform hazard identification, using the Job Safety Analysys (JSA) method, which is a safety management technique that focuses on identifying hazards and controlling hazards related to the series of work or tasks to be carried out. This JSA focuses on the relationship between workers, assignments / jobs, equipment, and work environment.

(2) Making a work permit for a limited space, which includes:

a. job description
b. Job location
c. Date of work
d. Discharging storage tanks
e. The supporting pipe is removed
f. Valve closed
g. Cleaned the inside of the tank with water
h. Mounted blower
i. Turn off the electricity supply related to the tank to be cleaned
j. Isolate by installing Lockout Tagout
k. Prepare personal protective equipment for workers (eye googles, helmets, rubber gloves, rubber boots, full face mask) that will enter the tank
l. Check the oxygen level in the storage tank with a value of 19.5% - 23.5%
m. Check toxic levels in a storage tank with a value of 0 ppm
n. Check the level of low explosive limit in a storage tank with a value below the% threshold based on flammable material

(3) Workers and supervisors who will clean the tank must have knowledge about working in a limited space and already have a competency certificate from the Ministry of Manpower

(4) Prepare a light fire extinguisher

(5) Preparing stretchers, breathing apparatus / SCBA

(6) Prepare a rescue officer

(7) After cleaning the tank, make sure all workers leave the workspace and work equipment has been returned

(8) The officer authorized to inspect work results, if declared good, returns the equipment to the normal position

(9) Testing equipment

(10) If the results of the tests are all good, then the limited space work permit is declared completed and signed by the related parts, namely safety, maintenance, production, and terminal

IV. CONCLUSION

- Hazard identification and risk assessment must be carried out before starting work on cleaning chemical storage tanks to prevent accidents from occurring
- Human resources that are competent in the field of limited space must be prepared
- Examination of oxygen levels, toxic gases, and eclectic materials must be carried out before starting work on cleaning chemical storage tanks to prevent accidents

REFERENCES

[1]. Constitution No. 1, 1970 concerning Occupational Safety, issued by the President of the Republic of Indonesia
[2]. Constitution No. 13, 2003 concerning Manpower, issued by the President of the Republic of Indonesia
[3]. Decree of the Director General of Manpower Development and Supervision No. 113, 2006 concerning Guidelines and Technical Guidance for Limited Space K3 Officers, issued by the Minister of Manpower of the Republic of Indonesia
[4]. Presentation Materials for Confined Spaces, Arjuna AB, 2019
[5]. Minister of Manpower Decree No. 187, 1999 control of hazardous chemicals in the workplace, issued by the Minister of Manpower of the Republic of Indonesia