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Hazard Identification in Coal Boiler with HAZOP Method at Pt. Charoen Pokphand Indonesia

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Abstract:- Charoen Pokphand Company is the one of the largest companys in Indonesia. At Charoen Pokphand company there are several critical areas in production, Feed mill area which is the core prosess on animal feed production, Warehouse area is a place to store raw materials before and after the production process. Production process on Charoen Pokphand company cannot be separated from Hazards and accident risk. Occupational Safety Program needed to reduce and control Hazard before accident happened. Boiler are important part of the process, and have a significant risk if the boiler failure and will impact on other process. Hazard Identification uses HAZOP method was chosen to reduce hazard, this method can review process or operations systematicly and can determine control in the process and reduce risk also. From this study has results of the risk asassment using Hazard and Operability Study Analysis (HAZOP) method, its found that there are 72 deviations which are categories in a 21 deviation are medium risk, 2 deviation high risk category *shown that red colour.*

Keywords:- *Accident;Hazard Operability Analysis; Risk Asassment;Charoen Pokphand; Risk Ranking Safety;*

I. INTRODUCTION (R: 31, G: 78, B: 121)

Charoen Pokphand Company, there are several critical areas in the production process, namely the Feedmill area which is the core of the animal feed production process and the Warehouse which is a place to store raw materials before and after the production process. In the feedmill area itself there is a series of production processes starting from intake, grinding, mixing, pellets and finally packing (packaging of finished materials). In various production processes, the process that has a high potential for danger is the boiler process which is to provide steam supply during production and sterilization in the pelleting process.

Boilers are an important process of the production, so that with accidents that have occurred and the importance of the boiler to identify hazards. Also considering the previous accidents experienced by other companies, explosions that have occurred include boiler explosions at PT. PN XI Rejosari in 2013 quoted from online news okezone.com, then the explosion at PT. SMART Sinar mas group in 2019 quoted from (Detik.com, 2019), then a boiler explosion also occurred at PT. Banyumas garments were quoted from (Kompas.com, 2021) which caused injuries and 1 person died. Based on this experience, it is very important to identify hazards in the Boiler Unit so that the incident does not happen again and can prevent explosions in the boiler unit.

Hazard identification can be done using the HAZOP method (Hazard Operability studies). The method was chosen because this method can review processes or operations systematically and can determine whether there are deviations in the process that can lead to unwanted consequences. This method is also more systematic in analyzing risks in a system where potential operating problems in a system can be identified by using the guide word that is already available in this method, so that it can find out when there is an abnormal process in a system. For example, the High deviation with the temperature parameter is Fire, and there are also other deviations such as utility failure, start up/down and reverse.

According to (OHSAS 18001, 2007) accident is an incident related to the workplace / company related to work. The work relationship here is one of the factors that cause accidents which are the result of the work done. Therefore, work accidents are related to 2 related problems, namely accidents that are a direct result of carrying out work and accidents that occur while doing work.

According to Henrich's theory (Kairupan., et al, 2019) says that 80% of work accidents are caused by unsafe actions. Humans as a factor causing accidents are often called human error. According to (Woods., et al, 2010) in his book entitled behind human error explains that human error is a category of potential causes for any unsatisfactory or successful event. In each process, the human element is unreliable and the solution to the problem of human error has a role to change people or roles in the system.

According to Standards Australia / New Zealand (AS/NZS 4360:1999, 2003) explains that risk is one of the possibilities of unexpected events that affect activities or objects. The risk can be measured in terms of consequence and likelihood. It can also be classified that risk is the possibility of a loss that can occur from the consequences of the activities carried out. To be able to reduce risk exposure, it can be done by Elimination, Substitution, Engineering Control, Administration and the use of personal protective equipment. Risk can be divided into several parts, including:

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A. Risk Type

Risks in a job in the workplace are divided into 2, namely:

- The first type is a risk that is difficult for company management to control. Such as the risk of fire due to electric current or fraud.
- The second type is the type that can be controlled by company management. This risk can arise when the company launches new products

According to (Soehatman Ramli, 2010) Risk is a combination of likelihood and consequence. Where Likelihood is the probability of an event in a certain time period when the risk arises. The calculation of probability that is often used is frequency. Consequence is the result of an event that is usually expressed as a loss from a risk. Therefore, the calculation of risk can be done by multiplying the likelihood value by the consequence.

Risk= Likelihood x Consequence

Where:

Likelihood = frequency of failure for a risk

Consequence = Consequences that arise from a risk.

In this research, the hazard identification method is used to determine the level of danger that exists in the process that is operating using the HAZOP (Hazard and Operability Study) method. HAZOP (Hazard and Operability Study) is a systematic, thorough, and structured method of hazard identification to identify various deviations that interfere with the process or operation and the risks contained in an equipment that can cause unexpected consequences, both for humans. , environment and existing plant/site facilities (CCPS, 1992). In other words, this method is a prevention effort, so that the ongoing process can run safely and smoothly. Before starting to work on HAZOP (Hazard and Operability Study), information is needed which includes Process Flow Diagrams (PFD), Process and Instrumentation Diagrams (P&IDs), details and equipment, and processes in the system.

HAZOP (Hazard and Operability Study) technique is also used to identify operating problems that can lead to production planning failures (Mannan M.S, 2015). The Guide Word developed by ICI is combined with relevant process parameters and applied to each point as shown in Table 1

Guide Word	Parameter	Deviation
No	Flow	No Flow
More	Pressure	High Pressure
As Well As	One Phase	Two Phase
Other Than	Operation	Maintenance

Table 1 Guide Words HAZOP

This method not only focused on safety issues,hazard identification (Hazard) for accident prevention and operation (Operability) which is useful for running processes smoothly so as to improve plant performance (Product quality, production rate, profit).

Worksheets HAZOP

Perusahaan :
Fasilitas :
Sesi :
Parameter :
Intensi :

Guide Word	Deviation	Cause	Coosequence	Safe Guards	S	L	RR	Recommendations	Action By

Table 2: Worksheet HAZOP

Risk is a combination of likelihood (Likelihood) and impact (Severity), based on data/attachment available at PT. Charoen Pokphand can be seen in the matrix in the Table.

PROBABILITY					CONSEQUENCE	DAMPAK TERHADAP MANUSIA	DAMPAK LINGKUNGAN	KERUGIAN COST
1A	1B	1C	1D	1E	1 (BERAT)	Meninggal ≥ 1 orang Cacat/ Kehilangan fungsi tubuh	Menimbulkan isu pencemaran dan berdampak pada masyarakat sekitar lokasi	Estimasi biaya yang diakibatkan kerugian ≥ Rp. 25 Jt Berhentinya produksi dan image perusahaan turun
2A	2B	2C	2D	2E	2 (SEDANG)	Cedera berat/rawat inap	Mencemari lingkungan kerja X ≥ 50% dari total area	Estimasi biaya yang diakibatkan kerugian ≥ Rp. 25 Jt dan image perusahaan turun
3A	3B	3C	3D	3E	3 (RINGAN)	Cedera ringan / kehilangan hari kerja ≥ 2 hari kerja	Mencemari lingkungan kerja 25 ≥ X < 50% dari total area	Estimasi biaya yang diakibatkan kerugian Rp. 5jt- Rp 25jt
4A	4B	4C	4D	4E	4 (SANGAT RINGAN)	Terjadinya Nearmiss Cedera tanpa kehilangan hari kerja	Terjadinya ceceran/ tumpahan	Tidak ada efek bagi kelancaran produksi, image perusahaan. Estimasi biaya yang diakibatkan kerugian < Rp. 5jt
A	B	C	D	E				
≥ 5kali dalam 1 tahun	4-5kali dalam 1 tahun	2-3 kali dalam 1 tahun	1 kali dalam 1 tahun	Tidak mungkin terjadi kecelakaan				

Table 3: Risk Matrix

II. METHOD

This research is equipped with steps from the completion stage in order to obtain conformity with the purpose of the analysis so that it can be understood systematically. The initial stage of this research is a survey to find out the real condition of the boiler operating system and its maintenance, then brainstorming is carried out to determine the critical point of using the boiler. This process also helps researchers to identify boiler components that have the potential to cause failure to make it easier for researchers to carry out risk identification survey and identification of accident data on the operation of the Boiler at PT. Charoen Pokphand to get the main problem, setting goals and benefits of research, which is related to the process of Boiler.

III. RESULTS AND CONCLUSION

Identification of hazard to analyze the possibility of failure that occurs based on HAZOP, From the results of the risk assessment using the Hazard and Operability Analysis (HAZOP) method, it is found that there are 72 deviations which are the mild risk category shown in green, 21 deviations with the medium risk category shown in yellow, and 2 deviations which is a high risk category, which is shown in red.

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