Risk Management in Work Activities at Ammonia Plant Fertilizer Production Industry

Manajemen Risiko pada Aktivitas Pekerjaan di Plant Amonia Industri Produksi Pupuk

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ABSTRACT

Introduction: PT X is one of the companies in fertilizer production industry. There are two high-risk activities that endanger the safety and health of workers, namely supervision of welding and oil level checking in ammonia plant field of PT X. The purpose of this research was to apply risk management to the activities. **Method:** This research was a descriptive study which was carried out in observation using a cross sectional design. Variables in this study included hazard identification, basic risk analysis, risk control that has been done, existing risk analysis, and risk reduction assessment. The tools used for the data collection were observation sheets, interview guide sheets, and Job Safety Analysis sheets. Data that has been obtained through observation and interviews was processed using Fine (1971) semi quantitative technique. **Results:** The results of hazard identification were known to have as many as 6 potential hazards. The assessment results in the basic risk analysis showed that the initial risk level consisted of 3 risks with very high level, 2 risks with a substantial level and 1 risk with priority 3 level. After the risk control effort was applied, the results of the assessment in the existing risk analysis showed that the level of risk has decreased significantly. **Conclusion:** The value of risk reduction of each potential hazard results decreases by 95%, 88.89%, 85%, 93.33%, 66.67%, and 75%.

Keywords: ammonia plant, fertilizer production industry, risk management

ABSTRAK

Pendahuluan: *PT X di Gresik merupakan salah satu perusahaan yang bergerak di industri produksi pupuk. Terdapat dua aktivitas pekerjaan yang berisiko tinggi membahayakan keselamatan dan kesehatan pekerja yaitu pada bagian pengawasan aktivitas pengelasan dan pengecekan level oli di lapangan plant amonia PT X. Tujuan dari penelitian ini adalah untuk menerapkan manajemen risiko pada aktivitas pekerjaan bagian pengawasan aktivitas pengelasan dan pengecekan level oli di lapangan plant amonia PT X.* ***Metode:*** *Penelitian ini merupakan penelitian deskriptif yang dilaksanakan secara observasional dengan menggunakan rancang bangun cross sectional. Variabel dalam penelitian ini meliputi identifikasi bahaya, analisis basic risk, pengendalian risiko yang telah dilakukan, analisis existing risk, dan penilaian risk reduction. Alat yang digunakan untuk pengumpulan data adalah lembar observasi, lembar panduan wawancara, dan lembar Job Safety Analysis. Data yang telah diperoleh melalui observasi dan wawancara akan diolah dengan teknik semi kuantitatif Fine (1971) yang selanjutnya akan dijabarkan dalam bentuk narasi dan tabel.* ***Hasil:*** *Hasil dari identifikasi bahaya diketahui terdapat sebanyak 6 potensi bahaya. Penilaian pada analisis basic risk menunjukkan bahwa level risiko awal terdiri dari 3 risiko dengan level risiko very high, 2 risiko dengan level risiko substansial dan 1 risiko dengan level risiko Priority 3. Setelah dilakukan upaya pengendalian risiko, hasil penilaian pada analisis existing risk menunjukkan angka level risiko menurun secara signifikan.* ***Simpulan:*** *Penurunan level risiko setiap potensi bahaya menghasilkan nilai risk reduction sebesar 95%, 88,89%, 85%, 93,33%, 66,67%, dan 75%.*

Kata kunci: *industri produksi pupuk, manajemen risiko, plant amonia*

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INTRODUCTION

Indonesia is an agrarian country that is in the process of managing its natural resources so it cannot be separated from the use of fertilizers. According to the Ministry of Industry of the Republic of Indonesia, domestic fertilizer consumption through

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the year has increased. In Indonesia, there is one company engaged in the fertilizer production industry, PT X, located in Gresik, East Java, with a total of 8,931 employees. PT X has 2 plants that use ammonia as one of the raw materials for fertilizer production, one of which is the IA ammonia plant. Ammonia produced from the fertilizer production process can reach 1,105,000 tons/year. According to Apriani, Rizeki and Nugroho (2016), ammonia leakage to the environment that often arises in PT X's ammonia plant is caused by the age of usage, poor maintenance, setting errors, and damage on storage tank components that can pollute the work environment and the surrounding environment (settlement).

Ammonia has a characteristic that has a pungent odor, corrosive and very toxic even in low concentrations which causes it as a potential source of danger to the health of workers at PT X. Ammonia exposure to the worker's body will cause itching to burns if there is contact with the skin, eye irritation to eye damage, shortness of breath, poisoning, and even death (Salamah and Adriyani, 2018). Besides ammonia exposure, there are other hazards that can emerge during the production process. This case is supported by previous research from Nurmianto, Anita and Aulia (2018) regarding the identification of hazards in PT Petrokimia Gresik's ammonia work unit. The study has identified that there are 4 types of hazards namely physical, chemical, mechanical, and psychological hazards. From the results of the risk assessment, it was found that the hazards that had the highest risk value were physical (fire), noise, chemical (exposed to ammonia gas or liquid), and psychological hazards.

The production process at the IA ammonia plant of PT X consists of 14 work activities. However, there are two occupational activities which are at high risk of endangering the safety and health of workers, namely the supervision section of welding activities and checking the oil level in IA ammonia plant of PT X. In the supervision section, welding activities are quite dangerous because the welding process will certainly sprinkle fire. Oil level checking in the field is also a dangerous activity because the materials that intersect in the work (oil) are liquid so it is easily scattered and spilled, so that it can endanger workers.

These potential hazards will certainly cause work-related diseases and work accidents for workers in the supervision of oil level welding and checking activities in the IA ammonia plant field of PT X. According to the data from Ministry of Health in 2015, cases of occupational diseases between 2011-2014 had the highest number of 57,929 and cases of occupational accidents between 2011-2014 had the highest number of 35,917. East Java is one of the provinces with the highest number of occupational diseases and occupational accidents (Ministry of Health, 2015). Furthermore, according to Indonesia Statistics (BPS) data in 2016, there were 26.27% of Indonesia workers had health complaints (Statistics Indonesia, 2016). Therefore, to prevent occupational diseases and occupational accidents at ammonia plant of PT X, the company is required to provide occupational health and safety insurance for its workers.

The implementation of Occupational Safety and Health is an effort to create a safe and healthy workplace, so that it can reduce occupational diseases and occupational accidents which in turn can increase work productivity. In addition, companies need to take concrete steps to prevent this by implementing risk management. Risk management is an effort to manage hazards that have the potential to pose risks to occupational safety and health to prevent unwanted bad things that in a comprehensive, planned, structured and systematic manner (Ramli, 2010).

According to Tualeka (2015), the purpose of implementing risk management is to eliminate or reduce the risk of occupational diseases and occupational accidents. Risk management requires a stage of the process which includes the identification of potential hazards, risk assessment, risk control and evaluation of control means that have been implemented.

Based on the description of work activities in the supervision section of welding and oil level checking activities in IA ammonia plant field of PT X, therefore risk management is needed to control potential hazards and to monitor the control effort that has been implemented so that unwanted occupational accidents or unwanted occupational disease at any time in the work environment area of PT X IA ammonia plant can be avoided. The purpose of this study was to apply risk management and provide information related to risk management in the production process in the work activities of the supervision of welding and oil level checking in the field of IA ammonia plant of PT X. This research was expected to be taken into consideration in making policies in Health and Safety Environment department of the company and to develop an appropriate control program to reduce the level of risk to a minimum.

METHOD

Based on the way of collecting data, this research is observational because the data were obtained through observation and did not provide treatment for the research object during the research. This research was cross-sectional, because the analysis and data collection were done at one time. Meanwhile, based on the analysis system, this research was included in the descriptive study because it aimed to provide an objective picture without analyzing the relationship of variables.

The research method began with the study of literature and observations on the IA ammonia plant of PT X so that the problems can be identified and formulated. The data obtained was then processed by semi-quantitative technique using Fine (1971) method. The study was conducted in February 2019. This research has been completed with an ethical test with number 65/EA/KEPK/2019 for data collection.

The variables used in this study were hazard identification, basic risk analysis, risk control that has been done, existing risk analysis, and risk reduction assessment. The data collected was obtained from primary data and secondary data. Primary data were obtained through interviews with relevant parties and direct observation. Secondary data were obtained through company data that supports research.

This research began with direct observation of work activities supervision of welding and oil level checking in the PT X plant IA field. Furthermore, hazard identification was done using the Job Safety Analysis (JSA) method. Then, a risk analysis was done by assessing the level of possibilities, exposure and consequence to determine the basic risk at each step of work activities. Each possibilities, exposure, and consequence value was multiplied so that a risk level value would be obtained which determined whether the risk was acceptable or not.

Direct observation again was carried out again by observing risk control that has been implemented by the company including elimination control, substitution control, technical control, administrative control, and the use of personal protective equipment (PPE). Then, a risk assessment was done by assessing the level of possibilities, exposure, and consequence to determine the existing risk in each of these control efforts, as well as making a multiplication of each possibilities, exposure, and consequence value in each of the control so that the risk level values obtained could determine the risk. This was carried out to find out whether the risk has been lost or not. Each level of risk generated, whether basic risk level or existing risk level, was categorized into five risk level categories. Risk is acceptable if the risk value is below 20, 3rd priority risk if the risk value is between 20-70, substantial risk if the risk value is between 70-180, 1st priority risk if the risk value is 180-350, and very high risk if the risk value is more than 350. Furthermore, risk reduction was calculated by comparing the difference between the basic risk and the existing risk with the basic risk then multiplied by 100% in order to determine the significance of risk reduction after a control effort, and researchers will provide recommendations for controlling risks that have not been accepted.

RESULT

Hazard Identification

Hazard identification in IA ammonia plant of PT X was carried out using the Job Safety Analysis (JSA) technique. This Job Safety Analysis (JSA) technique was used to determine the potential hazards of work activities in the supervision of welding and oil level checking activities in the field. Based on the hazard identification process, 3 potential hazards were found in the welding monitoring section and 3 potential hazards in the oil level checking section. In the supervision of welding activities, there was a potential hazard of gas leakage, sparks of fire, and flame due to oil reaction of H2. Meanwhile, in the oil level checking

Figure 1. IA Ammonia plant of PT X Situation in February 2019

section, there is a potential hazard of being exposed to hot oil droplets, slippery floors, and flame due to oil reaction with H2.

The results of the identification of potential hazards were be used as a reference for conducting a risk analysis using semi quantitative assessment technique by Fine (1971). This assessment technique was carried out by assessing the level of possibilities, exposure, and consequence. Then, the results of the risk analysis were used in assessing the risk level to see the magnitude of the resulting risk level.

Basic Risk Analysis

Basic risk analysis was carried out to see the potential hazards before controlling efforts. In the work activities in the supervision section of welding activities, there were 3 potential hazards. In the potential for gas leakage: the likelihood was 6 (likely) because of the possible risk of gas leak 50:50 if the welding is not on target or to perforate the pipe, exposure was 3 (occasionally) because welding activities are usually carried out approximately 1 to 2 months, consequences was 50 (disaster) because when this welding activity takes place, the engine in the ammonia plant usually still works and if there is an error can be the cause of gas leakage. From the results of the multiplication of these 3 components, the risk level of basic risk was 900 (very high). In the potential of fire sparks: likelihood is 3 (unusual but possible) because of the likelihood of the risk of fire splashing on the workers' body by 50:50, exposure was 3 (occasionally) because welding is usually done approximately for 1 to 2 months, consequences were 15 (serious) because welding activities surely sparks fire. From the results of the multiplication of these 3 components, the risk level of basic risk was 135 (substantial). On the potential for flame due to reaction with H2: likelihood was 6 (likely) because there was a risk possibility of a flame due to reaction with H2 gas by 50:50, exposure was 3 (occasionally) because welding activities are usually carried out approximately for 1 to 2 months, consequence was 50 (disaster) because the welding activity usually sparks fire and if there is H2 or its coming with the wind, it can cause a big fire. From the results of the multiplication of these 3 components, the risk level of basic risk was 900 (very high).

Figure 2. Work Area Situation in February 2019

In the work activities of oil level checking section, there were 3 potential hazards. The potential of hot oil droplets exposure was: likelihood was 3 (unusual but possible) because the risk of being touched by oil production drops is not uncommon but has the possibility to occur, exposure was 10 (continuously) because the activity of checking the level of field oil is carried out continuously every day, consequence was 5 (important) because skin contact with hot oil can cause skin blisters and minor burns. From the results of the multiplication of these 3 components, the risk level of basic risk was 150 (substantial). On the potential hazard of slippery floors: the likelihood was 3 (unusual

Table 1. Result of Basic Risk Analysis of IA Ammonia Plant of PT X in February 2019

Activity	Potential Hazard	Risk	Basic Risk			
			L	E	C	RL
Supervision of welding activities	Potential gas leakage	Respiratory irritation and wildfire	6	3	50	900
Supervision of welding activities	Spattered fire	Minor burns and blindness	3	3	15	135
Supervision of welding activities	Potential for flame due to reaction with H2	Severe burns and death	6	3	50	900
Oil-level checking	Exposed to hot oil drops	Minor burns	3	10	5	150
Oil-level checking	Slippery floor	Slips and minor injuries	3	10	1	30
Oil-level checking	Potential for flames caused by oil reaction with H2	Severe burns and death	1	10	50	500

Note: L=Likelihood, E=Exposure, C=Consequence, RL=Risk Level

Table 2. Result of Existing Risk Analysis of IA Ammonia Plant of PT X in February 2019

Risk Control	Existing Risk				RR (%)
	L	E	C	RL	
Engineering: measurement of gas around the line/pipe, valve or environment around welding.	1	3	15	45	95
Administrative: put a safety line on the leak. Make a safety permit for to workers.					
PPE: use gloves and face shield when welding.	1	3	5	15	88.89
Engineering: the welding area is covered with asbestos so that sparks do not react with explosive gases. The area under the welding or floor is given water so that sparks die.	3	3	15	135	85
Administrative: move flammable material with minimum distance of 10 meters. Put the fire watcher ready in place.					
PPE: use gloves and safety shoes.	1	10	1	10	93.33
Administrative: doused with clean water.	1	10	1	10	66.67
PPE: use safety shoes.					
Engineering: checking explosive gases at the beginning of each shift in the system area.	0.5	10	25	75	75
Administrative: clean oil scattered on the floor as soon as possible					

Note: L=Likelihood, E=Exposure, C=Consequence, RL=Risk Level

but possible) because the risk of slippery floors is not uncommon but has the possibility to occur, exposure was 10 (continuously) due to field oil level checking activities that is carried out continuously every day, consequence was 1 (noticeable) because slippery floors can cause slipping and minor injuries. From the results of the multiplication of these 3 components, the risk level of basic risk was 30 (priority 3). In the potential hazard of a flame due to oil reaction with H2: the likelihood was 1 (remotely possible) because the risk of fire due to oil reaction with H2 is very unlikely to occur, exposure was 10 (continuously) because the checking activity of oil level in the field is carried out continuously every day, the consequence was 50 (disaster) due to fire caused by hot oil resulting from the work process of the engine which can react with H2 gas in the air and leads to severe burns and even death to workers. From the results of the multiplication of these 3 components, the risk level of basic risk was 500 (very high).

Existing Risk and Risk Reduction Analysis

Existing risk analysis was carried out to see the potential hazard after the control effort that has been applied. Similar to the calculation of basic risk level, the value of the likelihood, exposure and consequence components of each potential hazard were multiplied so that the value of the existing risk level obtained. The results of the existing risk analysis showed that the level of risk level decreased significantly after an effort was conducted to control risk by the management of IA ammonia plant of PT X. The decrease in risk level in the existing risk analysis occurred in the value of the likelihood component and consequence, while the exposure value was still constant. This is because the frequency of hazard exposure to workers is fixed value and does not change. The results of the analysis of existing risks obtained as many as 6 potential hazards categorized in various levels of risk. There were 2 potential hazards with a substantial risk level, the potential of a flame due to reaction with H2 and the potential hazard of a flame due to oil reaction with H2. In addition, there was 1 potential hazard with a 3rd priority risk level on the potential for gas leakage. In addition, there were also 3 potential for danger with an acceptable risk level, the potential for sparks from fire, hot oil droplets, and slippery floors.

From these results, the risk reduction value of each potential hazard in IA ammonia plant of PT X was calculated. Risk reduction assessment has an important role in knowing the extent to which risks have been minimized after risk control efforts have been made. Risk reduction assessment by comparing the difference between basic risk and existing risk with basic risk and then multiplied by 100%. The risk reduction value of each potential hazard was 95% on the potential for gas leakage, 88.89% on the potential for sparks, 85% on the potential for flame due to reaction with H2, 93.33% on the potential of hot oil droplets, 66.67 % on the potential hazard of slippery floors, and 75% on the potential hazard of a flame due to oil reacting with H2.

DISCUSSION

The work of the supervision section of welding activities is quite dangerous because according to Wulandari and Widajati (2017), the welding process will certainly sprinkle fire but welding locations that are not necessarily safe from hazardous chemicals will exacerbate the effects of potential hazards to occur. In addition, oil level checking in the field is also a dangerous activity because the materials that intersect in the work (oil) are liquid so it is easily scattered and spilled that can endanger workers. Furthermore, materials that are easy to react with other chemical compounds will exacerbate the effects of potential hazards that happened (Mardyaningsih and Leki, 2015). Therefore, risk management is needed to control potential hazards and to monitor the control effort that has been implemented so that unwanted occupational accidents or unwanted occupational disease at any time in the work environment area of IA ammonia plant of PT X.

Welding supervision work activities in ammonia plant IA has 3 potential hazards, there were potential for gas leakage, sprinkling of fire and flame due to reaction with H2. On basic risk, the potential for gas leakage had a risk level of 900 (very high). Potential leakage can occur when welding so that it can perforate the pipe because it cannot be ensured that the pipe is safe or still stores traces of gas (Anindyta, Julianto and Nugroho, 2017). Gas leakage that occur will cause fire and explosion (Suciati et al., 2018.). A potential hazards that causes fire and explosion in the ammonia industry is a raw material which is flammable natural gas and the process unit uses high temperature and high pressure (Ayu and Oginawati, 2016). CH4, H2, CO gas will burn easily when they are exposed to sparks. Meanwhile, when NH3 is inhaled, it can be bad for health. In a previous study by Firmansyah, Khambali, and Koerniasari (2019), as many as 57% of workers at the ammonia plant of PT Petrokimia Gresik had experienced respiratory problems with symptoms such as coughing, sore throat, shortness of breath and chest pain during work due to exposure to ammonia gas (NH3). So, risk control that can be done by a safety inspector is to check and measure the gas around the line/pipe, valve and the area around the welding with a distance of approximately 5 meters. In addition, the safety inspector applies a work permit system that provides a safety permit to the welding officer when the welding area is safe from flammable chemicals and installs a safety line around the welding area. This effort reduces the level of existing risk by 95% to a value of 45 (priority 3). The control recommendation given is to perform regular maintenance of gas detector devices because some of these tools are old and not suitable to be used. Briefings are carried out to inform any chemical hazards in the welding area and their safety and safety impacts. Sanctions are also provided for workers who do not apply work instructions correctly.

On basic risk, the potential for fire spills had a risk level of 135 (substantial). Sparks when exposed to hydrogen gas can cause a fire. Hydrogen gas has a relative density of 0.1 to air. Hydrogen is a gas that has combustible characteristic (Sari, Subekti and Mayangsari, 2018). According to Widyanto and Suprihanto (2017), the presence of hydrogen, oxygen in the atmosphere, and electrical equipment can trigger sparks. According to Rizka Pisceliya and Mindayani's (2018), research on welding workers at CV. Cahaya Tiga Putri obtained that as many as 100% of workers were exposed to welding sparks which caused 75% burns. In line with that, Putri's (2016) research on welding workers at PT Dok also stated that sparks are a danger that always accompany the welding process. When sparks hit the hands or limbs, it will cause minor injuries and can disrupt the process of welding work. So, risk control that should be done is that welders are required to use Personal Protective Equipment (PPE) in the form of gloves and face shield when welding. PPE can be done to prevent hazard exposure to workers (Martino, Rinawati and Rumita, 2015). Safety inspectors provide safety permits to the welding officer to ensure that the safety is met. This effort reduces the level of existing risk by 88.89% to a value of 15 (acceptable). The control recommendation given is to carry out briefings to inform the related chemical hazards in the welding area and the impact of security and safety. Sanctions are also provided for workers who do not apply work instructions correctly.

On basic risk, the potential for a flame due to reaction with H2 gas had a risk level of 900 (very high). So, risk management that should be carried out by the management is that the welding area should be covered with asbestos cloth so that sparks do not react with explosive gas or flammable gas.

The area under the welding or floor is given water so that sparks die. Administratively, flammable material should be moved with a minimum distance of 10 meters. In addition, the fire watcher must be ready in place. This effort reduces the level of existing risk by 85% to a value of 135 (substantial). The control recommendation given is that the safety inspector is advised to check the direction of the wind first when welding is carried out at high area. This is useful as an estimation of the fall of spark.

Oil level checking work activities in the field had 3 potential hazards, there were the potential of hot oil droplets being touched, slippery floors and fires. In basic risk, the potential to be touched by hot production oil droplets has a risk level of 150 (substantial). Oil or lubricant has a function to lubricate or reduce friction, increase efficiency, reduce engine wear and as engine coolant from heat arising from friction in the engine. Hot oil can cause skin damage. The mucosal response to the lubricant usually causes skin damage, skin irritation and skin fall out easily due to damage to hair roots (Olson, 2017). The risk control carried out by management is to use PPE gloves when checking oil and PPE safety shoes. According to Erdhianto (2017) in a previous study, on motor service work that intersects with hot oil, if it is not done carefully and does not use PPE in the form of gloves, it can cause worker's hands to blister and cause material losses. This effort reduces the level of existing risk by 93.33% to a value of 10 (acceptable). The recommended control recommendation is to conduct a tour and review once a week to check whether the control has been carried out effectively and efficiently by the safety officer.

On basic risk, the potential hazard of slippery floors had a risk level of 30 (priority 3). The surface of the floor can turn slippery when production oil is spilled and scattered. Slippery floors cause workers to slip and eventually fall. If they fall wrongly, it can cause pain in the legs and injury to other body parts. The risk management by management is that the oil scattered on the floor must be cleaned with water and safety shoes must be worn when working. This effort reduces the existing risk level by 66.67% to a value of 10 (acceptable). The recommended control is to conduct a tour & review once a week to check whether the control has been carried out effectively and efficiently by the safety officer.

On basic risk, the potential fire hazard due to oil reaction with H2 had a risk level of 500 (very high). Spilled oil which is still very hot have the possibility to react with loose H2. H2 gas is very flammable and will burn in the air over a very wide range of concentrations between volumes of 4% to 75% (Chitragar, V and N, 2016). According to previous studies from Karuniawati, Kurniawan and Denny (2018), bursts of hot oil cause flames which will cause fires. If overheating occurs, it can cause an explosion (Wicaksono, 2017). Risk control by the management is that safety inspectors are given the task of checking explosive gas at the beginning of each shift or 3 times a day in the area of the system and urges workers to see oil scattered to be cleaned immediately. This effort reduces the existing risk level by 75% to a value of 125 (substantial). The recommended control is the provision of a water source or faucet near IA ammonia plant as well as equipment such as a mop to make it easier for workers to directly clean oil spills to be discharged into the discharge stream.

The risk of work activities in the supervision of welding activities and checking the level of oil in the field at IA ammonia plant of PT X was 6 risks. Basic risk assessment results showed that the initial risk level consisted of 3 risks with a very high risk level, 2 risks with a substantial risk level and 1 risk with a 3rd priority risk level. A very high risk level are very closely related to the occurrence of fires in welding activities. According to Bantani, Herlina and Mariawati (2015), the type of welding work at ship repair also has the highest potential hazard based on the impact that can be caused, namely fire, sparks and smoke generated. Risks with very high risk levels are also caused by reactions between chemicals such as the reaction between hydrogen gas (H2) and the system of the gas leak or flammable gas or flammable chemicals in IA ammonia plant environment. The majority of Basic risk or initial risk was dominated by risk with a very high risk level. This is supported by Rindika, Anindita and Mayangsari's (2018) research in the Ammonia Unit I Process I of the Fertilizer Plant I Factory using Fault Tree Analysis obtaining that there were as many as 4 failures that affected the occurrence of fire.

The results of the existing risk assessment showed that out of 6 potential hazards which were categorized in various risk levels, there were 2 potential hazards with a substantial risk level, 1 potential hazard with a 3rd priority risk level and 3 potential hazards with an acceptable risk level. This risk reduction is inseparable from the serious management role in addressing occupational health and safety problems in IA ammonia plant. However, it should be noted that there are still hazards with a substantial level of risk that requires further treatment and researchers have provided control recommendations to reduce these risks.

Next, a risk reduction (RR) calculation was performed to see the magnitude of the decrease in value from basic risk to existing risk. The value of risk reduction also served to see the effectiveness and re-evaluate the control efforts that have been made, so that the company's Health and Safety Environment department can develop an appropriate control program to reduce the level of risk to a minimum. The risk reduction value of each potential hazard decreased by 95%, 88.89%, 85%, 93.33%, 66.67%, and 75%.

After knowing the value of risk reduction for each potential hazard, the next step was to provide control recommendations or risk control recommendations. These recommendations can be in the form of new control or improvements to previous risk control. The recommendation was returned again to the ability of the company or management to implement the recommended risk control recommendations.

CONCLUSION

Based on the hazards identification that have been done, as many as 6 potential hazards were obtained in the work of the supervision of welding activities and checking the oil level in IA ammonia plant of PT X. Basic risk assessment results show that the initial risk level consisted of 3 risks with a very high risk level, 2 risks with a substantial risk level and 1 risk with a 3rd priority risk level. After risk control have been done, the assessment results in the existing risk analysis show that the number of risk levels decrease significantly. Risk reduction (RR) for each potential hazard results decreases by 95% on the potential for gas leakage, 88.89% on the potential for sparks, 85% on the potential for flame due to reaction with H2, 93.33% on the potential for hot oil droplets, 66.67% on the potential hazard of slippery floors, and 75% on the potential hazard of a flame due to oil reaction with H2. Engineering control that should be conducted include: periodic maintenance of the gas detector and provide cleaning tools to clean the oil spills. In addition, administrative control also need to be conducted, such as: posting information about the national fire protection association (NFPA) rating of chemicals in each of these chemicals which will eventually help minimize the risk level that needs to be watched out.

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