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Fire Risk Mitigation to Minimize the Impact of Explosions at the Pacitan Steam Power Plant

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Abstract
Background: Fire and explosion hazards remain major risks in steam power plant industries due to high-temperature operational systems and combustible materials. This study aimed to analyze fire risk mitigation implementation based on compliance with the Regulation of the Minister of Public Works Number 26 of 2008 concerning Fire Protection Systems. **Method:** This study used a descriptive qualitative approach conducted at the Pacitan Steam Power Plant, East Java, Indonesia. Data were collected through in-depth interviews, direct observation, and document review using triangulation techniques to ensure data validity. **Results:** The findings showed that several active fire protection components, including portable fire extinguishers and hydrants, complied with regulatory standards and functioned properly. However, deficiencies were identified in the fire alarm control panel system and maintenance of fire-resistant construction elements. Lack of routine maintenance potentially reduces the effectiveness of fire risk mitigation and emergency preparedness. **Conclusion:** Although most fire protection components were available and operational, several elements still did not fully comply with the Regulation of the Minister of Public Works Number 26 of 2008. Therefore, periodic maintenance, system monitoring, and emergency preparedness training are required to improve fire risk mitigation and minimize explosion impacts in steam power plant industries.

Kata Kunci
kesiapan menghadapi keadaan darurat, mitigasi risiko kebakaran, pembangkit listrik tenaga uap, sistem proteksi kebakaran

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Abstrak
Latar Belakang: Bahaya kebakaran dan ledakan tetap menjadi risiko utama di industri pembangkit listrik tenaga uap karena sistem operasional bersuhu tinggi dan material yang mudah terbakar. Studi ini bertujuan untuk menganalisis implementasi mitigasi risiko kebakaran berdasarkan kepatuhan terhadap Peraturan Menteri Pekerjaan Umum Nomor 26 Tahun 2008 tentang Sistem Proteksi Kebakaran. **Metode:** Studi ini menggunakan pendekatan kualitatif deskriptif yang dilakukan di Pembangkit Listrik Tenaga Uap Pacitan, Jawa Timur, Indonesia. Data dikumpulkan melalui wawancara mendalam, observasi langsung, dan tinjauan dokumen menggunakan teknik triangulasi untuk memastikan validitas data. **Hasil:** Temuan menunjukkan bahwa beberapa komponen proteksi kebakaran aktif, termasuk alat pemadam kebakaran portabel dan hidran, sesuai dengan standar peraturan dan berfungsi dengan baik. Namun, kekurangan diidentifikasi pada sistem panel kontrol alarm kebakaran dan pemeliharaan elemen konstruksi tahan api. Kurangnya pemeliharaan rutin berpotensi mengurangi efektivitas mitigasi risiko kebakaran dan kesiapsiagaan darurat. **Kesimpulan:** Meskipun sebagian besar komponen proteksi kebakaran tersedia dan beroperasi, beberapa elemen masih belum sepenuhnya sesuai dengan Peraturan Menteri Pekerjaan Umum Nomor 26 Tahun 2008. Oleh karena itu, pemeliharaan berkala, pemantauan sistem, dan pelatihan kesiapsiagaan darurat diperlukan untuk meningkatkan mitigasi risiko kebakaran dan meminimalkan dampak ledakan di industri pembangkit listrik tenaga uap.

INTRODUCTION

The explosion in the industrial area of steam power plants has become a global problem, because on August 11, 2016, an explosion occurred in the steam power plant area in Dangyang City, Hubei Province, China, due to a high-pressure steam pipe catching fire and exploding, the accident killed at least 22 people and injured four workers. The causal factors of the accident were analyzed to prevent similar disasters in the future (1), a violent steam-fired power plant explosion can break down the lignocellulosic structure of biomass, making it more conducive to ignition of fires in the blast area (2).

Steam-fired power plants are widely used in Indonesia, utilizing the heat energy from steam to turn turbine blades, which can then be used to generate electricity through a generator. One of the most important components of the steam-fired power plant system in Barru, and one that poses a high risk of explosion and fire, is the boiler (3).

Fire is a disaster caused by unwanted fire that can cause individual losses as well as losses to infrastructure such as factories, power plants, ports, and other infrastructure or facility (2). Law number 1 of 1970 states the general purpose of Occupational Safety and Health including to overcome fires that aim to protect workers, company assets, and the company environment which includes preventing, reducing and extinguishing fires, as well as providing means of escape when a fire occurs. Fires often originate from fire which in classical theory, namely the theory of the triangle of fire, is explained that the continuation of the flame process requires three main elements, namely elements of combustible materials (Fuel), Sufficient Oxygen (O2) from the air or from oxidizing materials, and heat (4).

Based on the Regulation of the Minister of Public Works Number 26 of 2008, it has been determined that the fire protection system can be seen in its suitability in the form of being implemented correctly and in Compliant with existing safety standards, then the magnitude of fire cases will be easier to overcome and minimize. Work accidents are influenced by, among others, the physical environment of employees unsafe conditions in the form of machines, equipment, unsafe materials, unsafe and uncomfortable work environments, dangerous work processes, dangerous nature and methods of work. In addition, unsafe actions also affect work accidents, namely human negligence, dangerous behavior, lack of knowledge, behavior, and skills (5).

Occupational Safety and Health has been regulated, but most companies still do not meet Occupationel Safety and Health standards. Employment Social Security Administration Agency data recorded 147,000 cases of work accidents in 2018. Of the total cases of work accidents, 4,678 cases (3.18%) resulted in disability and 2,515 (1.75%) resulted in death (6). In another study, it was found that there was an influence of the work environment on the occurrence of work accidents with a significant value = 0.008 <0.05 (7).

The work environment also has fire hazards and risks. Based on the report of the National Fire Protection Association (NFPA), out of a total of 22 major fire cases in the United States, there were four fires in wood manufacturing plants and paper mills that caused major losses (8). In the health sector specifically hospital sector, the results of a study conducted (9) found that the environment contributed to many accident at the xyz hospital in Indonesia.

Figure 1. Location of Pacitan Steam Power Plant, East Java, Indonesia. Source: Secondary Data, 2025

Pacitan is one of the areas used as a place to build a steam power plant by the State Electricity Company. The Pacitan steam power plant is one of the accelerated programs for the construction of a 10 MW steam power plant, where this project aims to meet the electricity needs in the East Java region, also support the Java-Bali electricity and generate electricity of more than 315 MW. The construction of this steam power plant will help the development of the southern cross-region. Therefore, the implementation of fire risk mitigation at the Pacitan steam power plant is very important.

Based on the above data, it is necessary to carry out fire risk mitigation to prevent, overcome, control explosions and fires according to the standards of the Minister of Public Works Regulation Number 26 of 2008 which can occur at any time and save company assets.

This study provides a practical contribution by evaluating fire risk mitigation implementation based on regulatory compliance in the steam power plant sector, which remains underexplored in Indonesian occupational safety studies.

METHOD

The method in this study is to use a qualitative descriptive research type to describe fire risk mitigation at the Pacitan steam power plant, using triangulation as a method of data validity and validity, with the determination of informants carried out as a whole, namely the fire safety commander, senior staff, and field staff. For technical triangulation, this study used interviews, observations and documentation reviews. The place and time of the study were conducted at the Pacitan steam power plant located on Pacitan-Trenggalek Street, Kilometer 55, Sukorejo Village, Sudimoro District, Pacitan Regency, East Java, Indonesia,

The research was conducted between September-December 2025.

The population in this study is the population used is all units at the Pacitan steam power plant, data collection using observation sheet measuring instruments, interviews, document reviews, with the indicators studied, namely passive fire protection systems [fire-resistant construction], active fire protection systems [fire detector systems, fire alarms, automatic sprinkler systems, hydrant systems, standpipe systems, light fire extinguishers], life-saving facilities [escape exit facilities, evacuation direction signs, emergency doors]. Data analysis and processing are carried out through a process to obtain the required data including primary data which is data collected independently for research purposes, namely interview data, observation data, and secondary data which is data owned by the Pacitan steam power plant company such as data related to light fire extinguishers, hydrants, sprinklers, and secondary data related to fire protection systems and fire risk mitigation at the Pacitan steam power plant, Pacitan Regency, East Java, Indonesia. Data validity using data source triangulation technique to test data research credibility.

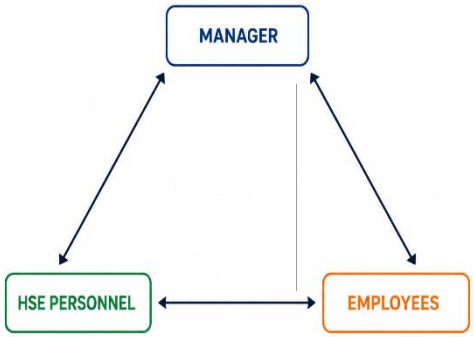

Figure 2. Source Triangulation at the Pacitan Coal-Fired Power Plant. Source: Primary Data, 2025

Data were analyzed using thematic content analysis by categorizing findings into active and passive fire protection system components. Source triangulation was conducted by comparing information obtained from Manager, Employees, and HSE Personnel. And an Ethics Test has been carried out with an Ethics Test Certificate Number 18/UNIDA/KIA-i/X/1447.

RESULT

Pacitan steam power plant has a fire protection system consisting of building utilities, access and water supply for fire fighting, supported by an active fire protection system in the form of a fire alarm system, light fire extinguishers, and hydrants, for a passive fire protection system in the form of fire-resistant construction.

The following are the results of the implementation analysis conducted by researchers to informants regarding the implementation of active fire systems and passive fire systems. From the results of the implementation analysis, it was found that the Pacitan steam power plant has a fire alarm and the sound of the fire alarm has a signal that meets the criteria based on the regulation of the Minister of Public Works number 26 of 2008 concerning the fire protection system. However, some of the systems implemented have slight damage to the fire panel control system which can be seen in [Table 1].

In Table 1. Pacitan steam power plant has a fire alarm in the factory area, namely the siren type, which has been spread at certain points in the steam power plant area.

Table 1. Results of Fire Risk Mitigation Implementation on Fire Alarm System Elements at the Pacitan Steam Power Plant

No	Requirements of the Minister of Public Works Regulation Number 26 of 2008	Actual Conditions	Compliant or Non-Compliant
1	Has a fire alarm	Fire alarm type sirens are placed at certain points.	Compliant
2	The sound of the fire alarm has a different sound signal than for other uses	The sound signal of the fire alarm is different from the sound signal used for other uses, the company uses sirens and loudspeakers or speakers	Compliant
3	The alarm condition is not damaged/technical error	Some systems that are implemented have a little damage in the fire panel control system	Non-Compliant

In **Table 1**. The sound of the fire alarm is distinguished from other sounds, namely using a siren and a loudspeaker or speaker to inform workers in the event of an emergency. For the alarm condition, some of the systems that are applied have slight damage to the fire panel control system, because this system often experiences damage which results in it not being able to operate automatically and must be run manually. So this element does not meet the criteria based on the Regulation of the Minister of Public Works Number 26 of 2008 concerning the Fire Protection System.

The malfunction of the fire panel control system may reduce early fire detection capability and delay emergency response. Previous studies emphasized that integrated alarm systems significantly improve evacuation efficiency and reduce fire-related losses.

The results of the implementation of light fire extinguishers listed in [Table 2.] show that the Pacitan Steam Power Plant has made maximum efforts in terms of implementing light fire extinguishers. So that this element has been in Compliant with the requirements of Minister of Public Works Regulation Number 26 of 2008.

The results of the implementation of light fire extinguishers listed in [Table 2.] show that the Pacitan Steam Power Plant has made maximum efforts in terms of implementing light fire extinguishers. So that this element has been in Compliant with the requirements of Minister of Public Works Regulation Number 26 of 2008.

The implementation of hydrants at the Pacitan steam power plant has been in accordance with the requirements, so that the Pacitan steam power plant has implemented hydrant requirements in accordance with the Requirements of the Minister of Public Works Regulation Number 26 of 2008 as stated in Table 3.

Table 2. Results of Fire Risk Mitigation Implementation on Light Fire Extinguisher Elements at the Pacitan Steam Power Plant

No	Requirements of the Minister of Public Works Regulation Number 26 of 2008	Actual Conditions	Compliant or Non-Compliant
1	Available facilities	Available facilities	Compliant
2	Light fire extinguishers	Light fire extinguishers	Compliant
3	There are 547 light fire extinguishers spread throughout the factory area (310 dry chemical light fire extinguishers, 150 co2 light fire extinguishers, 87 foam light fire extinguishers)	There are 547 light fire extinguishers spread throughout the factory area (310 dry chemical light fire extinguishers, 150 co2 light fire extinguishers, 87 foam light fire extinguishers)	Compliant
4	There is a classification of light fire extinguishers where fire extinguishers are proven to be effective and the relative extinguishing effectiveness attached to the light fire extinguishers. There is a classification of light fire extinguishers attached to the light fire extinguishers tube	There is a classification of light fire extinguishers where fire extinguishers are proven to be effective and the relative extinguishing effectiveness attached to the light fire extinguishers there is a classification of light fire extinguishers attached to the light fire extinguishers tube	Compliant
5	Light fire extinguishers are placed in a place that is visible to the eye, easy to reach, and ready to use. Light fire extinguishers are placed in a place that is easy to see, easy to reach, and ready to use	Light fire extinguishers are placed in a place that is visible to the eye, easy to reach, and ready to use. Light fire extinguishers are placed in a place that is easy to see, easy to reach, and ready to use	Compliant
6	The distance between the light fire extinguishers and the floor is ≥10 cm the lowest distance between the light fire extinguishers and the floor is less than 120 cm	The distance between the light fire extinguishers and the floor is ≥10 cm the lowest distance between the light fire extinguishers and the floor is less than 120 cm	Compliant
7	Operating instructions must be placed on the front of the light fire extinguishers and must be clearly visible operating instructions are placed on the front of the light fire extinguishers and must be clearly visible	Operating instructions must be placed on the front of the light fire extinguishers and must be clearly visible operating instructions are placed on the front of the light fire extinguishers and must be clearly visible	Compliant
8	Light fire extinguishers must have a label attached to provide information on the name of the manufacturer or its agent, mailing address and telephone number a manufacturing label containing the name of the manufacturer, address and telephone number is attached to the light fire extinguishers cylinder	Light fire extinguishers must have a label attached to provide information on the name of the manufacturer or its agent, mailing address and telephone number a manufacturing label containing the name of the manufacturer, address and telephone number is attached to the light fire extinguishers cylinder	Compliant
9	Light fire extinguishers is inspected manually or monitored electronically light fire extinguishers is inspected manually by the safety/hse team	Light fire extinguishers is inspected manually or monitored electronically light fire extinguishers is inspected manually by the safety/hse team	Compliant
10	Light fire extinguishers is inspected at intervals of approximately 30 days light fire extinguishers is inspected twice a month by the she team	Light fire extinguishers is inspected at intervals of approximately 30 days light fire extinguishers is inspected twice a month by the she team	Compliant
11	A file of all inspected light fire extinguishers (including corrective actions taken) is stored light fire extinguishers report archives are stored in the hse work unit	A file of all inspected light fire extinguishers (including corrective actions taken) is stored light fire extinguishers report archives are stored in the hse work unit	Compliant
12	Light fire extinguishers maintenance is carried out at a period of ≤ 1 year light fire extinguishers maintenance is carried out once a year by the supplier pt. Asta guna mandiri	Light fire extinguishers maintenance is carried out at a period of ≤ 1 year light fire extinguishers maintenance is carried out once a year by the supplier pt. Asta guna mandiri	Compliant
13	Each light fire extinguishers has a card or label that is firmly attached indicating the month and year of maintenance each light fire extinguishers has a label indicating the month and year of maintenance	Each light fire extinguishers has a card or label that is firmly attached indicating the month and year of maintenance each light fire extinguishers has a label indicating the month and year of maintenance	Compliant
14	On the maintenance label there is an identification of the officer who carried out the maintenance. The light fire extinguishers maintenance label contains an identification of the officer who carried out the maintenance	On the maintenance label there is an identification of the officer who carried out the maintenance. The light fire extinguishers maintenance label contains an identification of the officer who carried out the maintenance	Compliant

Table 3. Results of Fire Risk Mitigation Implementation on Hydrant Elements at the Pacitan Steam Power Plant

No	Requirements of the Minister of Public Works Regulation Number 26 of 2008	Actual Conditions	Compliant or Not Compliant
1	The hydrant cabinet is only used to store fire equipment. The hydrant cabinet contains nozzles, fire hoses, hydrant keys	The hydrant cabinet is only used to store fire equipment. The hydrant cabinet contains nozzles, fire hoses, hydrant keys	Compliant
2	Each hydrant cabinet is painted in a striking color Each hydrant cabinet is painted in a striking red	Each hydrant cabinet is painted in a striking color Each hydrant cabinet is painted in a striking red	Compliant
3	The hose connection and hydrant box must not be obstructed The hose connection and hydrant box are not obstructed	The hose connection and hydrant box must not be obstructed The hose connection and hydrant box are not obstructed	Compliant
4	The fire hose is attached and ready to use The hydrant hose is attached and ready to use	The fire hose is attached and ready to use The hydrant hose is attached and ready to use	Compliant
5	There are nozzles There are nozzles in the hydrant cabinet	There are nozzles There are nozzles in the hydrant cabinet	Compliant
6	There are yard hydrants There are 5 hydrants in the yard	There are yard hydrants There are 5 hydrants in the yard	Compliant
7	Yard hydrants are placed along the fire engine access path Yard hydrants are placed along the vehicle access path	Yard hydrants are placed along the fire engine access path Yard hydrants are placed along the vehicle access path	Compliant
8	The distance of hydrants along the fire engine access is ≤ 50 meters from the building The distance of hydrants along the fire engine access is 10 meters from the building	The distance of hydrants along the fire engine access is ≤ 50 meters from the building The distance of hydrants along the fire engine access is 10 meters from the building	Compliant
9	Yard hydrants have a minimum pressure of 3.5 bar Yard hydrant pressure 10.5 bar	Yard hydrants have a minimum pressure of 3.5 bar Yard hydrant pressure 10.5 bar	Compliant

Table 4. Results of the Implementation of Fire Risk Mitigation on Fire-Resistant Construction Elements at the Pacitan Steam Power Plant

No	Requirements of the Minister of Public Works Regulation Number 26 of 2008	Actual Conditions	Compliant or Non- Compliant
1	There are fire barriers to divide the building to prevent the spread of fire. There are fire barriers that divide the main room into 3 parts, namely the process unit, production unit, and transmission unit	There are fire barriers to divide the building to prevent the spread of fire. There are fire barriers that divide the main room into 3 parts, namely the process unit, production unit, and transmission unit	Compliant
2	There are fire doors There are fire doors at every means of exit	There are fire doors There are fire doors at every means of exit	Compliant
3	Maintenance of fire-resistant construction is carried out Maintenance of fire-resistant construction and fire-resistant doors is not carried out.	Maintenance of fire-resistant construction is carried out Maintenance of fire-resistant construction and fire-resistant doors is not carried out.	Non- Compliant
4	Fire doors must have automatic closing equipment. Fire doors can close automatically	Fire doors must have automatic closing equipment. Fire doors can close automatically	Compliant

The results of the implementation of the passive fire protection system in the form of fire-resistant construction in table 4. Shows that in terms of the fire barrier wall that divides the main room into 3 parts, namely the process unit, production unit, and transmission unit, it is appropriate. The Pacitan steam power plant also has fire-resistant doors at each exit and fire-resistant doors that can close automatically.

The inappropriate element is the failure to carry out fire-resistant construction maintenance due to construction problems. The Pacitan steam power plant already has walls that are considered to be strong enough to withstand fire, so if maintenance is to be carried out. The construction is indeed damaged and must be repaired immediately. Therefore, there is rarely any fire-resistant construction maintenance. So there needs to be a fire risk mitigation step by carrying out routine maintenance, checking fire-resistant sealants, by checking periodically for damage, leaks, and ensuring that the sealant still covers the gaps properly, to prevent explosions.

Figure 3. Fire-Resistant Construction at Pacitan Steam Power Plant, East Java, Indonesia. Source: Pacitan Steam Power Plant, 2025

This is not in accordance with the regulations referring to the Indonesian National Standard 03 – 1736 - 2000, a building must have building parts that can maintain the stability of the building structure at a certain level when a fire explosion occurs, which is in accordance with (a) the function of the building, (b) fire load, (c) fire intensity, (d) potential fire hazard, (e) height of the building, (f) proximity to other buildings, (g) active protection systems installed in the building, (h) area of the fire compartment, (i) fire extinguishing measures, (j) other supporting building elements, (k) evacuation of occupants (Indonesian National Standard, 2000).

DISCUSSION

In this element, the Pacitan steam power plant has not carried out maintenance on the fire-resistant construction and fire-resistant doors. So it can be seen that most of the components of the passive fire protection system function properly and in accordance with the requirements. Based on the source of the danger, several things that can cause a fire include air sources, namely oxygen and liquid oxygen storage; heat sources, namely gas engines, combustion turbines, steam turbines. Based on AS/NZS 4360:2004, the highest risk value for work safety on boiler machines in steam power plants obtained from the HAZOPS worksheet with a risk rating of very high is the first risk of excess temperature on the cyclone component, the second risk is excess temperature on the superheater component with the highest risk value for work safety on maintenance activities in the boiler obtained from the JSA worksheet, namely leaks in the safety valve during safety valve testing activities, which has the potential to cause fires and explosions (10).

Based on the Regulation of the Minister of Public Works Number 26 of 2008 concerning the Fire Protection System. According to (11), fire alarm errors contribute to an 11% increase in fire severity and cause losses, extinguishing can reduce 83% of deaths of residents per 1000 fires in residential areas, from 7.3 deaths per 1,000 fires to 1.3 deaths per 1,000 fires.

The causal factors of the accident in the steam power plant area in dangyang city, hubei province, china were analyzed to prevent similar disasters in the future, the results of the analysis showed that workers had carried out unsafe behavior in the power plant causing unsafe conditions, this was caused by three factors, namely inadequate staff safety knowledge, weak safety awareness, and poor safety habits.

Active fire protection systems and passive fire protection are very useful for fire control such as extinguishing small-scale fires using extinguishers, while on a large scale, hydrants can be used so that they can be widely accessible when extinguishing the fire.

The discrepancy related to the implementation of the fire protection system shows that efforts are needed to comply with existing regulations. The Pacitan steam power plant already has a fire protection unit in the form of a occupational safety and health unit that has been able to manage and operate the fire protection system, but has not implemented education and training related to fire emergencies in accordance with the regulation of the Minister of Public Works Number 20 of 2009, any improvement and increase in knowledge needs to be done to improve the quality (12).

According to (13) the knowledge and skills of hospital personnel have increased and changed significantly after the socialization and simulation of fire fighting training. In the study (7) showed that 85.71% of workers with a high school education background proved that knowledge and education regarding the application of fire protection systems are interrelated. Fire is a common hazard encountered in steam-powered power plants, caused by the production process. Fire is a type of disaster and requires special precautions to mitigate and prevent explosions through adequate prevention measures and emergency response systems within steam-powered power plants (14).

According to (15) mapping of fire extinguishers must be visible and accessible and periodic checks on the effectiveness of the fire extinguisher function are required by special operators. The implementation of emergency fire response can be one of the policies that must be implemented so that work runs smoothly, effectively and efficiently and avoids fires and prevents incidents that can be fatal or cause greater losses (16). Fire cases are one of the disasters that are increasing every year, one of the causes is the inadequate fire protection system and skills in using fire extinguishers (17). According to (18) mapping of fire extinguishers must be visible and accessible and periodic checks on the effectiveness of the fire extinguisher function are required by special operators. The implementation of emergency fire response can be one of the policies that must be implemented so that work runs smoothly, effectively and efficiently and avoids fires and prevents incidents that can be fatal or cause greater losses (16). Fire cases are one of the disasters that are increasing every year, one of the causes is the inadequate fire protection system and skills in using fire extinguishers (19).

Elements in the implementation of fire protection systems and occupational health and safety management systems, for example, procurement of fire protection facilities, determination of applicable legal requirements, fire-resistant construction, and other requirements, were not implemented and maintained. In addition, staff were not yet aware of the importance of occupational safety and health, as well as the importance of top management commitment, so that the safety culture was still minimal and poor. Emergency management is critical to ensuring the safety and well-being of staff in educational institutions (20), One of the efforts to reduce risk is by increasing awareness of the importance of occupational safety and health for workers in hospitals, which is also a top priority (21).

Communication and consultation in fire prevention in the form of coaching and training, are important elements in the fire protection system. This is because most of the causes of fire are human factors and humans also play an important role in efforts to overcome if a fire occurs (4). Stated that one of the factors that affects hydrant efficiency is sediment density as a manifestation of the absence of routine maintenance. The placement of hydrants must be in a strategic position to facilitate reach and must be checked regularly (22).

CONCLUSION

This study demonstrated that the implementation of fire risk mitigation at the Pacitan Steam Power Plant generally complied with regulatory standards, particularly in hydrant and portable fire extinguisher systems. However, deficiencies in alarm system maintenance and passive fire protection monitoring indicate the need for continuous inspection and system improvement. Strengthening maintenance programs and emergency preparedness training is essential to minimize explosion and fire impacts in industrial power plant environments.

Suggestions for companies should be carried out on control of fire protection system equipment that is no longer appropriate, and there needs to be training related to the operation of the fire protection system in order to minimize operational errors and so that human resources are more skilled, and carry out maintenance on fire-resistant construction as a measure to mitigate the risk of fire at the Pacitan steam-powered power plant.

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