

Conference Paper

Preparedness of the Emergency Response Team in Cilegon City for Industrial Disaster

Sony Maulana^{1,2} and Fatma Lestari¹¹Occupational Health and Safety Department, Faculty of Public Health, Universitas Indonesia, Jl. Margonda Raya, Beji, Pondok Cina, Kota Depok, Jawa Barat 16424, Indonesia²Staff of Jakarta Search and Rescue Office, National Search and Rescue Agency

Abstract

The purpose of this research is to conduct an evaluation on the preparedness of the emergency response team during the emergency response phase in the case of an industrial disaster causing technology failure in Cilegon city. Technology failure as a result of natural disaster, along with the resulting complex consequences, is known as industrial disaster. The research was conducted on the basis of interviews, focus group discussions, and a literature review. The research location was Cilegon city (with an administrative area of 17,550 ha), and the study focused on the potential of any natural disaster—including flooding, extreme weather, forest fires, landslides, earthquakes, tsunamis, or extreme wave and volcano eruptions—to cause catastrophic technology failure resulting in fires, explosions, oil spillages, or leakage of gas or toxic substances. In Cilegon city, there is a high probability of industrial disasters with an impact level of 5. Currently, Cilegon has approximately 84 industrial plants, the largest one being a petrochemical plant and manufacturer of chemicals, which is likely to produce hazardous and toxic materials. Industrial disaster response requires the competency and suitability of officers, facilities, and an incident command system led by local government, TNI, the police, Basarnas (the National Search and Rescue Agency in the Republic of Indonesia), domestic companies, and non-government organizations. A full review of the competencies, facilities, human resources, communication systems, and incident command system is necessary to ascertain whether a reliable response can be initiated in the case of industrial disasters, particularly those caused by chemical factors, in order to reduce the exposure of the people of Cilegon city to their effects.

Keywords: Cilegon city, natural disaster, technological failure, incident command system, contingency plan

Corresponding Author:

Fatma Lestari
fatma@ui.ac.id

Received: 15 May 2018

Accepted: 3 June 2018

Published: 19 June 2018

Publishing services provided by
Knowledge E

© Sony Maulana and Fatma Lestari. This article is distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use and redistribution provided that the original author and source are credited.

Selection and Peer-review under the responsibility of the ICOHS 2017 Conference Committee.

OPEN ACCESS

1. Introduction

Indonesia is a country with a high potential for disasters due to its geographical position between two continents (Asia and Australia) and its location between three tectonic plates, namely, the Indo–Australian plate, the Eurasian plate, and the Pacific plate. The Indonesian city most at risk of natural and non-natural disasters caused by technological failure is Cilegon, which is located in Banten Province (Health Crisis Center data, Ministry of Health in the Republic of Indonesia). For this reason, a cross-sectoral emergency response team (ERT) was established in Cilegon city, which includes representatives of the Indonesian National Armed Forces (TNI), the Indonesian National Police, the central government, non-ministerial government institutions, non-government organizations, and other private parties. The objective of the team is to cope with natural disasters likely to bring about the failure of industrial operations and likely to result in a high level of complexity in the emergency response phase. Such disasters are generally known as industrial disasters.

Cilegon is located at latitude $5^{\circ}52'24''$ – $6^{\circ}04'07''$ south and longitude $105^{\circ}54'05''$ – $106^{\circ}05'11''$ east. It is an administrative area of 17,550 ha and comprises all eight districts consisting of 43 urban village in total. The sea area around Cilegon city measures four nautical miles, or 7408 m. In a disaster risk assessment conducted by Cilegon City Disaster Management Agency, a high probability of natural disaster was predicted, including flooding and flash flooding, drought, extreme weather, earthquakes, tsunamis, landslides, forest fires, and extreme waves and coastal abrasion.

According to a 2016 report from the Environmental Agency In Cilegon City, there are 51 chemical and petrochemical companies in Cilegon city that are susceptible to industrial disaster. The industrial area is divided into three zones; the first zone is on the Industrial plan, the second zone is on a complex area of the plan, and the third is outside the complex area of the Industrial plan. Among the non-natural disasters that may arise due to technological failures are explosions, fires, poisoning due to leakage of hazardous and toxic pressurized gas, and dangerous chemical spills. In general, this potential risk has a negative impact on community life in Cilegon city and on its growth.

Cilegon Regional Disaster Management Agency (BPBD) was established under the Law of the Republic of Indonesia Concerning Disaster Management No. 24/2007 and was supplemented through local regulation No. 5 of 2014. In 2016, the BPBD drafted a 47-page contingency plan for dealing with industrial disaster arising from catastrophic technological failure.

To prepare the contingency plan, Cilegon's BPBD invited several agencies and organizations to meet, including the environmental agency, the fire brigade, the health service, Cilegon police, Military District Command 0623, Banten Search and Rescue Post, Cilegon city Red Cross, Taruna Siaga Bencana (Tagana), and the industrial emergency response team at Cilegon city.

However, the contingency plan was mainly focused on a simulated scenario outlined precisely in chapter IV, where a truck is transporting toxic and hazardous materials from Merak to Jakarta across railway lines. This scenario is only relevant to the potential threat associated with the transportation of poisonous and dangerous material, and is not focused on cases that may occur due to technological failure in industrial areas. Thus, no detailed plan exists regarding how the emergency response team in Cilegon city should deal with technological failure. This weakness must be addressed urgently, because the city of Cilegon faces a major industrial disaster risk triggered by natural disaster, and catastrophic technological failure could result. Preparedness initiatives are vitally important, especially for disasters, because these efforts are intended to increase the readiness and knowledge of staff and community members so that they can take all of the necessary safety measures in the event of a crisis [1].

The researcher expect that this study will aid in the introduction of an appropriate incident command system model in Cilegon city for industrial disaster emergency situations and provide further details on the competency standards that members of the ERT must have in the case of industrial disaster. An ERT is considered the most effective approach to dealing with industrial emergencies and minimizing the risk of casualties and losses. In Cilegon city's ERT, several groups and team members with varying levels of experience and different roles and responsibilities work together as a team [2] so that Cilegon city will able to mobilize its disaster response in the case of an industrial disaster.

2. Methods

This research was conducted based on interviews, a focus group discussion, and a literature review. The focus group discussion involved several representative agencies of the municipal government of Cilegon, including the regional planning agency (1 person), BPBD Cilegon City (1 person), the health office (1 person), social services (2 people), and the labor service (1 person). The interviews were conducted in other institutions and organizations, for example, Banten Search and Rescue Post (1 person), Cilegon City Red Cross (2 people), and private companies affiliated with Anyer Merak

Ciwandan Chemical Manufacturing Association (AMC CMA), namely, PT. X and PT. Y (2 people). The interviews were specifically conducted to establish the emergency response team's preparedness in the industrial area at Cilegon city, which is divided into three zones, namely, the Anyer Zone, the Merak Zone, and the Ciwandan Zone. The aim of the focus group discussion was to ascertain the readiness of the local government stakeholders, Banten Search and Rescue Post and Cilegon Red Cross, to tackle the emergency response phase of an industrial disaster. Finally, a literature review was conducted to identify international standards that could be used as guidelines to prepare the ERT for industrial disaster.

3. Results

3.1. The interview was conducted with PT. X and PT. Y to obtain answers to the questions outlined previously:

PT. X and PT. Y have emergency response team as company representative on industrial disaster, the task of PT. X's emergency response team is to carry out the task of applying technology failure in the company, as well as assist the process of handling technology failure in Ciwandan area while Emergency Response Team PT. Y perform the task of handling technology failures within the company and is expected to also be able to assist the handling of industrial disasters in the Merak region.

For the preparation of emergency response members Team PT. X and PT. Y in facing disaster Industrial PT. X and PT. Y have implemented training program to Emergency Response Team member, Industrial Disaster Simulation ever done by PT X while PT Y has never conducted Industrial Disaster simulation. PT. X and PT. Y knowing that there will be simulation of Asean industrial scale disaster with simulation location in Cilegon City region that is ARDEX (ASEAN Regional Disaster Emergency Response Simulation Exercise).

3.2. The focus group discussion included government agencies in Cilegon and other agencies and organizations (BPBD, Bappeda, Dinas Sosial, Dinas Kesehatan, Pos SAR Banten, and PMI Kota Cilegon), and the results were as follows:

Focus group discussion has been done with the correspondent of the City Government of Cilegon and other agencies or organizations (BPBD, Bappeda, Dinas Sosial, Dinas Kesehatan, Pos SAR Banten, PMI Kota Cilegon), while the results are Local Government

of Cilegon City already has ICS in Industrial disaster, with the understanding that Incident Commander may change, Emergency response Team under the control of Cilegon City is considered not able to cope with industrial disaster well so need the help from other party.

SAR Post Banten already has ICS in industrial disaster, and is incorporated in ICS Cilegon Municipal Government in the field of operation, Posa SAR Banten understand that Incident Commander cannot change because it is attached with the coordination function that tap on the Disaster Mitigation Agency of Cilegon City, Member of Post SAR Banten has not been able to cope with industrial disaster in Cilegon city.

PMI Kota Cilegon already has ICS in industrial disaster, and PMI Cilegon city is under the control of Cilegon City Disaster Management Agency in the Field of Operation, PMI Cilegon City gives certification that ICS cannot be changed and is absolute under the control of BPBD Cilegon City, PMI Cilegon also clarified that the Cilegon City PMI members had not been able to cope with the Industrial Disaster

3.3. To carry out the literature review, references were searched regarding the competencies of an ERT. For reference purposes, the researcher used the guidelines of the Singapore Civil Defense Force (SCDF) and the National Fire Protection Association (NFPA).

SCDF has a guidelines on the Company Emergency Response Team recognized by the Sinagapur State, the SCDF also has a guidelines on Hazmat Response.

Indonesia does not have a company response team guidelines to prepare standards for companies with potential industrial hazards, Indonesia also does not have a Hazmat Response guideline.

4. Discussion

The results indicate that an appropriate emergency response is a very important element of performing emergency response actions in industrial disasters. The regulation mandates state that in the event of an emergency phase, the ERT must be present immediately at the time of the disaster to deal with its adverse impacts in relation to victims to be evacuated or rescued, dealing with property, basic needs, protection of evacuees, and restoration of infrastructure and facilities. In this case, the researchers focused their review on activities regarding the rescue and evacuation of victims.

To ensure that a reliable and organized ICS is in place, Cilegon city is expected to conduct ICS familiarization, to devise procedures that can be easily understood and implemented, and to ensure that the ICS is a platform for collaboration and the sharing of knowledge at a global level. True empowerment of the ERT means, in essence, the freedom and ability to make informed decisions based on the available resources and expertise when responding to emergency situations [3].

It is clear from Cilegon's tsunami contingency plan in 2009 that the city is capable of dealing with natural disasters, and similar simulations were performed on a national scale on December 26, 2007. In the case of industrial disasters, however, there is an urgent requirement for new and safer contingency plans.

TABLE 1: Identity and characterization of hazardous/toxic waste [4].

Identity/properties	Quality/characteristics
Corrosiveness	Aqueous with a PH 2–12.5 or higher that corrodes steel.
Explosivity	Any waste that forms an explosive mixture, reacts, or explodes at 25°C in 1 atmosphere.
Flammability/ignitability	Any 60°C flammable liquid waste or non-liquid waste that can burn below 25°C in 1 atmosphere, produce fire with moisture absorption friction, or bring about spontaneous chemical changes and waste as oxidants.
Mutagenicity	Wastes that can cause deviations in the structure of DNA, or genetic mutations.
Pathogenicity	Wastes containing harmful and toxic microorganisms that can cause damage, disease, or death.
Reactivity	Unstable wastes that react violently when mixed with water and produce gas, steam, or toxic fumes containing cyanide or sulphide.

From Table 1 and a review of the mandate contained in Act No. 24/2007, it is evident that the ERT is required to conduct rescue and evacuation immediately, and that this should be the main priority in terms of individual and team safety.

The Occupational Safety and Health Administration (OSHA) and the Environmental Protection Agency of USA (EPA) have developed safety regulations (OSHA publications 29 CFR 1910.120 Hazardous waste Operations and Emergency Response Standards, 1989) that involve four levels of training [5]:

- A. First responder awareness;
- B. First responder operations;
- C. Hazardous material technician;
- D. Hazardous material specialist.

Standard No. 473 from the NFPA outlines the competence levels required by emergency response personnel dealing with incidents involving hazardous materials. However, Indonesia does not currently have capacity in hazmat emergency response, and there is potential danger if the ERT is relying on speed only, without being equipped with the specific competencies required to deal with industrial disaster.

5. Conclusion

From all of the aforementioned, it can be concluded that Cilegon city is at risk of industrial disaster, and as a result of the implementation of the local government regulations, the ICS will be used at all stages of disaster handling, especially during the emergency response phase. While the government-led Cilegon Regional Disaster Management Agency (BPBD) is already established as the coordination center, the agency's understanding of the ICS differs somewhat to the stakeholders' understanding. The former head of BPBD Cilegon city, in particular, was of the view that the ICS could be delegated to other agencies, but this is not the view of the stakeholders.

The Cilegon city emergency response team has been handling industrial disasters based on a split level concept, where the company itself is obliged to handle the impact of the industrial disaster at level I, and level II is the responsibility of the integrated ERT in Cilegon's industrial area, itself divided into three areas, namely, Anyer, Merak, and Ciwandan.

However, the ERT for industrial disaster has not been trained to the level of standard competency. This must be done on the basis of the national guidelines, with an emphasis on coordination and action in implementing emergency response. The aim of training is the acquisition of knowledge and skills with the goal of developing the necessary competencies [1].

6. Suggestions

It can be seen from the aforementioned problems that the role of regulation by the central government is vital in terms of industrial disaster, because industrial disaster typically involves both natural disaster and technological failure. Thus, Cilegon city government needs to make contingency plans for dealing with industrial disaster, and such plans will involve a clear ICS structure, a data analysis of the required facilities and infrastructure, and stakeholders' preparedness for the emergency response phase. Furthermore, rescuers must be trained based on existing standards to recognize the

potential danger of toxic and hazardous substances, and must be able to analyze the command structure, create safe zones, and carry out the appropriate medical treatment as quickly as possible.

Acknowledgments

We would like to express our gratitude to all who have facilitated this research, especially the Cilegon government and other agencies and organizations outside of local government. In addition, the research would not have been possible without the support of our lecturers, especially Professor Fatma Lestari and Ibu Indri Hapsari Susilowati, who patiently directed our work from start to finish.

References

- [1] Nazli, N. N., Sipon, S., and Radzi, H. M. (2013). Analysis of training needs in disaster preparedness. *PSYSOC*, vol. 140, no. 2014, pp. 576–580.
- [2] Mohammadfam, I., Bastani, S., Esaghi, M., et al. (2014). Evaluation of coordination of emergency response team through the social network analysis case study: Oil and gas refinery. *Safety and Health at Work*, vol. 6, no. 1, pp. 30–34.
- [3] Arain, F. (2015). Knowledge-based approach for sustainable disaster management: Empowering emergency response management team. *Procedia Engineering*, vol. 118, pp. 232–239.
- [4] Adeola, F. O. (2011). *Hazardous Wastes, Industrial Disasters, and Environmental Health Risk*, 27. New York, NY: Palgrave Macmillan.
- [5] Daniel, L., Karren, K. J., and Hafen, B. Q. (2003). *First Responder: A Skill Approach* (6th edition). New Jersey.