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The Work Place Initiative: Health, Safety and Wellbeing Regarding COVID-19

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The Work Place Initiative: Health, Safety and Wellbeing Regarding COVID-19

EDITOR:

Dr. Rico Januar Sitorus, S.KM, M.Kes (Epid)
Dr. Haerawati Idris S.KM, M.Kes
Indah Purnama Sari, S.KM, M.KM
Inoy Trisnainy, S.KM, M.KL
Feranita Utama, S.KM., M.Kes
Fenny Etrawati, S.KM., M.KM
Ima Fransiska, S.Sos

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Inoy Trisnainy, S.KM, M.KL

Feranita Utama, S.KM., M.Kes

Fenny Etrawati, S.KM., M.KM

Ima Fransiska, S.Sos

PREFACE

On behalf of the organizing committee, I am delighted to welcome you to the 3nd Sriwijaya International Conference on public Health (SICPH 2021) during 21th october 2021 at Palembang South Sumatera, Indonesia. The SICPH 2021 is international conference organized by Faculty of Public Health, Sriwijaya University (UNSRI). I would like to extend my warmest welcome to all the participant of The SICPH 2021 under the theme ***"The Impact of Climate Change on Infectious Disease Transmission".***

The SICPH 2021 consists of keynote sessions from well known expert speakers in the field of public health, and academic paper sessions (oral presentations) who are coming from several region. This conference seeks to bring together academics, public health professionals, researchers, scientists, students and health stakeholders from a wide range of disciplines to present their latest research experience and further development in all areas of public health. We hoped that this conference will be usefull platform for researchers to present their finding in the areas on multidisciplinary realted to public health and health system issues.

This conference will provide opportunities to exchange ideas, knowledge, and development of the latest research among the participants. We will publish the paper as output from the SICPH 2021 in proceeding book with ISBN and selected paper will be published in Jurnal ilmu kesehatan masyarakat- SINTA 3 (a nationally-accredited journal). The SICPH 2021 is being attended by about 50 participants. I hope you enjoy the conference.

With regard to considerable conference agenda, we greatly appreciate any support and sponshorship derived from any govermental as well as private institutions for the success of the conference. Great appreciation is also handed to organizing committe of the conference for any voluntarily effort that bring to the succes of the conference.

The conference committee expresses its gratitude towards all the keynote speakers, authors, reviewers, and participanst for the great contribution to enssure the succes of this event. Finnally, I sincerely thank all the members of the organizing committee who have worked hard to prepare this conference.

Palembang, October 2021

Chair,

Anita Camelia, SKM., MKKK.

PREFACE

First of all, let us thank God, the Almighty, who has given His grace and guidance so that the 3rd Sriwijaya International Conference of Public Health (SICPH) with the theme of The Workplace Initiative: Health, Safety and Wellbeing Regarding Covid:19 can be held successfully. I welcome all of you to this seminar which has received great attention not only from university, but also other communities to submit papers to be presented in this seminar. I express my highest gratitude and appreciation the presenters.

The conference is divided in two session, the first session is speeches and the second session is round table discussion. In the first session, the invited keynote speakers were Prof. Dr. Tan Malaka, MOH, DrPH, SpOk, HIU (A Professor from Medical Faculty Universitas Sriwijaya), Prof. Dr. Retneswari Masilamani (University Tunku Abdul Rahman, Malaysia), Prof.Dr.Joselito L. Gapaz MD, M.PH(University of the Philippines) and Prof. Dr Tjandra Yoga Aditama, MHA,DTM&H, DTCE,SpP(C).FIRS (Professor from Griffith University, Australia)

Of course, this conference activity would not have succeeded without the support of all parties involved, as well as the presence of all participants in all regions in Indonesia and internationally. I especially thank to all the organizing committees for their hard work, perseverance, and patience in preparing and organizing this conference so that it can go well, smoothly and successfully.

Finally, through this conference let us extend the network and cooperation among all stakeholders of the public health sector, especially in Indonesia and in the world in general, to build a better public health world in Indonesia

Thank you for participating in this conference.

Dean of Public Health Faculty,

Universitas Sriwijaya

Dr. Misnaniarti, S.K.M, M.K.M

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ANALYSIS OF OCCUPATIONAL HEALTH AND SAFETY REQUIREMENTS FROM FUEL DAILY STORAGE TANK FIRES AT DIESEL POWER PLANT X

Maududi Farabi
Department of Manpower of Bangka Belitung Province
Komplek Kantor Pemerintahan Provinsi Kepulauan Bangka Belitung, Air Itam, Pangkalpinang, Indonesia
Corresponding email: maududif@gmail.com

ABSTRACT

Diesel Power Plants (PLTD) are still the mainstay of power generation sources in various regions, including at the industrial sector. The PLTD load increase will encourage an increase in the quantity of fuel per unit time. The use of fuel for the use of diesel engines can also be a potential hazard for workers and the public, especially related to the potential fire hazard. This study aims to analyze the causes of fires in the fuel daily storage tank at PLTD X. This study is a case study that examines and evaluates qualitatively the application of Occupational Health and Safety (OHS) requirements related to the occurrence of daily fuel storage tank fires compared to several national regulations and international standards, including (1) Regulation of the Minister of Manpower RI (Permenaker) No. 37 of 2016, (2) Permenaker No. 38 of 2016, (3) Permenaker No. 12 of 2015, (4) Permenaker No. 4 of 1980, (5) Kepmenaker No. 186 and 187 of 1999, (6) API 650, (7) PUIL. Lesson learned and recommendations based on research results that the generator exhaust pipe must be isolated and able to prevent a maximum temperature of 70 ^{o}C, the daily fuel storage tank genset must be equipped with bund walls, bonding, grounding, not placed directly on the top of the generator engine, and able to accommodate fuel for 8 hours of operation. It is also necessary to clean and check the tank prior to filling to ensure there is no leakage from the fuel.

Keywords: *diesel power plant safety, fuel storage tank safety, fuel storage tank fire*

ABSTRAK

Pembangkit Listrik Tenaga Diesel (PLTD) masih menjadi andalan sumber pembangkitan listrik di berbagai daerah termasuk pasa sektor industri. Pertambahan beban PLTD akan mendorong pertambahan kuantitas bahan bakar per satuan waktu. Penggunaan bahan bakar untuk penggunaan mesin diesel juga dapat menjadi potensi bahaya bagi pekerja dan masyarakat terutama terkait dengan pontensi bahaya kebakaran. Penelitian ini bertujuan untuk menganalisis penyebab kebakaran pada *fuel daily storage tank* di PLTD X. Kajian ini merupakan *case study* yang menelaah dan mengevaluasi secara kualitatif penerapan syarat-syarat K3 terkait kejadian kebakaran *fuel daily storage tank* dibandingkan dengan beberapa regulasi nasional dan standar internasional antara lain (1) Peraturan Menteri Ketenagakerjaan (Permenaker) No. 37 Tahun 2016, (2) Permenaker No. 38 Tahun 2016, (3) Permenaker No. 12 Tahun 2015, (4) Permenaker No. 4 Tahun 1980, (5) Kepmenaker No. 186 dan 187 tahun 1999, (6) API 650, (7) PUIL. *Lesson learn* dan rekomendasi berdasarkan hasil penelitian bahwa pipa *exhaust* genset harus tersalut dan mampu mencegah suhu maksimal 70 ^{o}C, *fuel daily storage tank* genset harus dilengkapi dengan *bund wall*, *bonding*, *grounding*, tidak ditempatkan secara langsung di bagian atas mesin genset, serta mampu untuk menampung bahan bakar untuk operasional 8 jam. Pembersihan dan pengecekan tangki sebelum pengisian terkait untuk memastikan ada tidaknya kebocoran dari bahan bakar juga perlu dilakukan.

Kata Kunci: K3 PLTD, K3 tangki bahan bakar, kebakaran tangki bahan bakar

Introduction

Electrical energy is a form of energy that is widely used by humans. Electricity is a form of clean energy and easy to manage. Electrical energy can be converted into mechanical energy such as electric motors, pump driving motors, drilling machines, fan motors, and compressor driving motors. Electrical energy can be transmitted (transferred) to distant places and is not possible for other forms of energy. The history of electricity begins with the theory of the atom and its structure. A complete and balanced or neutral atom must have the same number of protons and electrons. The attractive force between protons and electrons towards the nucleus is equal to the centrifugal force experienced by electrons. In this state the protons and electrons can be viewed as a spring in a relaxed state, neither compressed nor stretched. Electricity is the energy possessed by valence electrons that shift from their position or moving valence electrons. Electricity is a condition when the valence electrons shift from the atom. Electricity can be defined as a form of energy due to unbalanced atomic conditions. There are three ways to shift the valence electrons from an atom, namely (1) mechanical, chemical, and magnetic. The prime mover is a machine, vehicle or device that serves to provide a thrust to the valence electrons in order to obtain electrical energy. Combustion motors and turbines, are generally used as the main propulsion engine to produce electrical energy with great power.(1)

Electricity generation is mostly done by rotating a synchronous generator so that electric power is obtained with a three-phase alternating voltage. The mechanical energy needed to rotate the synchronous generator is obtained from the generator driving engine or commonly called the prime mover. Generator drive engines that are widely used in practice, namely: diesel engines, steam turbines, water turbines and gas turbines. The engines that drive this generator get energy from (1) the fuel combustion process (thermal engines), (2) waterfalls (water turbines). The engine driving the generator converts primary energy into mechanical energy driving the generator. The process of converting primary energy into mechanical energy creates by-products in the form of waste and noise that need to be controlled so as not to cause environmental problems. In terms of technical economy, the largest component of the cost of providing electricity is the cost of generation, particularly the cost of fuel. Various techniques to reduce fuel costs continue to develop, both in terms of individual generating units and in terms of integrated power system operations. The electricity generation process is the process of converting primary energy (fuel or hydropower potential) into mechanical energy driving a generator, wherein this mechanical energy is converted into electrical energy by a generator. The power center is a place where

the electricity generation process is carried out, generally there are (1) primary energy installations (fuel installations or hydropower installations), (2) generator-driven engine installations, (3) cooling installations, (4) electrical installations. The generator driving engine installation is an installation that functions to convert primary energy into mechanical energy driving a generator, it can be a steam boiler, steam turbine, diesel engine, gas turbine, or water turbine.(2)

Diesel Power Plants (PLTD) have sizes ranging from 40 kW to tens of MW. PLTD generally uses to turn on electricity in new areas and are generally used to power electricity in new areas with a capacity of 40 kW to tens of MW. PLTD is not economical to supply more than 100 MW of electricity because there are so many units. The largest PLTD unit on the market is around 12.5 MW.(2)

Technological advances and the development of a region, will encourage greater consumption of electrical energy. PLTD is still the mainstay of electricity generation in various regions. The limitations of PLTD are generally related to the use of non-renewable fuels and the potential for environmental pollution, both air pollution and noise pollution. In the PLTD unit, the increase in load will encourage an increase in the quantity of fuel per unit time which will increase the cost increase per unit time. (3)

The use of fuel for the use of diesel engines can also be a potential hazard for workers and the public, especially related to the potential fire hazard. Although hydrocarbon tank fires are relatively rare accidents. However, it can have unforeseen consequences for the installation, the environment and the health of workers and the surrounding community.(4)

Advances in industrial safety are one accident at a time.(5) The significant tank fire accident that has occurred recently, (6) is not only large-scale damage to the surroundings, along with the implications of potential environmental problems, but also the need to prevent similar accidents. (7,8)

This study aims to analyze the causes of fires in the daily fuel storage tank at PLTD X and examine the application of safety requirements based on several national regulations and international standards, including (1) Regulation of the Minister of Manpower (Permenaker) No. 37 of 2016, (2) Permenaker No. 38 of 2016, (3) Permenaker No. 12 of 2015, (4) Permenaker No. 4 of 1980, (5) Decree of the Minister of Manpower (Kepmenaker) No. 186 and 187 of 1999, (6) American Petroleum Institute (API) 650, (7) General Electrical Installation Requirements (PUIL).

Method

This study is a case study that examines and evaluates qualitatively the application of Occupational Health and Safety (OHS) requirements related to the occurrence of a fire in one of the daily fuel storage tanks at a PLTD on 11 December 2015 compared to several national regulations and international standards, including (1) Regulation of the Minister of Manpower (Permenaker) No. 37 of 2016, (2) Permenaker No. 38 of 2016, (3) Permenaker No. 12 of 2015, (4) Permenaker No. 4 of 1980, (5) Kepmenaker No. 186 and 187 of 1999, (6) API 650, (7) PUIL. This study aims to describe events, examine impacts, causal factors and OHS requirements that have not been met. This study was conducted from November to December 2020. This study uses secondary data from accident reports as stipulated in the Regulation of the Minister of Manpower Number 3 of 1998, results of fire inspections from local labor inspectors and results of in-depth interviews. Informants in this study consisted of company management, OHS officers, and labor inspectors.

Results

Based on the fire inspection report from the local Labor Inspector regarding the implementation of the Regulation of the Minister of Manpower Number 3 of 1998 regarding the procedures for reporting and inspection of accidents, on Thursday, December 17 2015, obtained a chronology, the impact and losses incurred, as well as the factors causing fires in fuel daily storage tank at PLTD X on 11 December 2015 as follows:

11:00 AM : generator operator conducts routine inspection once an hour, 7 (seven) generator units out of a total of 9 (nine) generator units are operating as normal.

11:15 AM : Main office workers, technicians, and security personnel prepare to leave for Friday prayers. The generation room is guarded by 6 (six) shift operators 1 (one) all of whom are workers from outsourcing companies.

11:25 AM : The exhaust pipe (which is covered with a heat-absorbing layer of fiber rope) on the Mirrlees brand 9 (nine) generator unit with a capacity of 4 MW which is located at the very end of the generation room is on fire.

11:30 AM : The fire on the exhaust pipe of the Mirrlees 4 MW generator spread to the daily fuel storage tank with a capacity of 500 liters which is located above the acceleration section of the

generator. The operator started to turn off the generator units 9, 8, and 7 at a radius of less than 5 meters from the hotspot.

11:35 AM : Operators begins to extinguish the fire with the existing Light Fire Extinguisher (APAR).

11:40 AM : The officers coordinated and asked for help from the local fire department.

12:10 AM : Officers from the fire fighting unit arrived and helped extinguish the fire at the fuel daily storage tank genset unit 9 (nine).

12:30 AM : The fire at the fuel daily storage tank genset unit 9 (nine) was successfully extinguished.

Based on in-depth interviews with OHS officers and company management as well as fire inspection reports from local Labor Inspectors regarding the implementation of the Minister of Manpower Regulation Number 3 of 1998 concerning procedures for reporting and inspection of accidents, on Thursday 17 December 2015, information on the factors of the fire incident was obtained on the daily fuel storage tank at PLTD X on December 11, 2015 are as follows: (1) Repair of the exhaust pipe of the unit 9 (nine) exhaust generator has not been completed, leaving some of the exhaust pipe uncoated; (2) fuel daily storage tank genset unit 9 is in a position above the genset equipment due to limited generation space; (3) fuel daily storage tank genset unit 9 has not been equipped with a bund wall to accommodate potential leaks and liquid discharge in the tank; (4) Cleaning and checking of the tank has not been carried out to ensure that there is no leakage of fuel; (5) The fuel capacity of the daily fuel storage tank generator is not yet capable of operating for 8 hours, so manual filling of fuel from the main tank fuel is carried out more frequently; (6) The generator exhaust gas line has not been able to prevent a maximum temperature of 70 ^{o}C; (7) Oil spills from the daily fuel storage tank intersect with the exhaust pipe of the unit 9 (nine) generator which is in operation and in a partially coated condition so that the exhaust pipe temperature is more than 70 ^{0}C causing heat exposure from the generator exhaust pipe, diesel fuel, and air in the room. generation triggers fires and fires occur;

The impacts and losses resulting from the fire incident at the daily fuel storage tank at PLTD X on December 11, 2015 are as follows: (1) Discontinuation of unit 9 generator operation for 6 (six) months. In addition, generator units 8 and 7 must also be stopped from supplying electricity for 12 (twelve) hours. (2) Several parts of the Mirrlees brand 9 (nine) acceleration generator unit with a capacity of 4 MW located at the very end of the generation room were damaged. (3) Damage to the daily fuel storage tank genset unit 9 (nine) with a capacity of 500 liters and cannot be reconditioned. (4) Damage to the exhaust pipe and fuel supply pipe on the genset unit 9 (nine). (5) Damage to the roof of the generation area, especially the roof above the fuel daily storage tank genset unit 9 (nine). (6) Genset unit 9 (nine)

must be repaired and cleaned. (7) New procurement for fuel daily storage tank genset unit 9 (nine). (8) Engineering for adding over flow pipes to all fuel daily storage tanks. (9) Examination and audit of the company's internal. (10) Panic from the surrounding community. (11) Investigation of the local police. (12) Local Labor Inspection and Inspection. (13) Request for confirmation and information from Non-Governmental Organizations (NGOs). (14) Reports from the local mass media can affect the company's image

Discussion

Several OHS regulations which are implementing regulations of Law Number 1 of 1970 concerning work safety and other standards related to the occurrence of fires at the daily fuel storage tank at PLTD X on 11 December 2015 are as: (1) Regulation of the Minister of Manpower Number 37 of 2016 concerning Pressure Vessels and Storage Tanks Safety (9); (2) Regulation of the Minister of Manpower Number 38 of 2016 concerning Power and Production Equipment Safety (10); (3) Regulation of the Minister of Manpower Number 12 of 2015 concerning Electricity in the Workplace Safety (11); (4) Regulation of the Minister of Manpower Number 4 of 1980 concerning Requirements for Installation and Maintenance of Portable Fire Extinguishers (12); (5) Decree of the Minister of Manpower No. 186/1999 on Fire Fighting Units in the Workplace (13); (6) Decree of the Minister of Manpower Number 187 of 1999 concerning Control of Hazardous Chemicals in the Workplace (14); (7) American Petroleum Institute (API) Standard 650, Eleventh Edition, 2007 (15); (8) General Requirements for Electrical Installation (PUIL) 2000. (16)

OHS requirements related to the use of tanks, generators, and efforts to prevent fire prevention in the workplace include: (1) Materials, construction, and tank equipment must be strong enough (Article 23 of the Minister of Manpower No. 37 of 2016). (2) Each tank must be equipped with a safety device. Tanks containing flammable liquids must be equipped (article 24 of the Minister of Manpower No. 37 of 2016): 1) Name plate (Name Plate); 2) Safety pipe; 3) Volume or weight indicators; 4) Temperature gauge; 5) Filling and discharging valves; 6) Manhole / inspection hole; 7) Lightning distribution and earthing device; 8) Appropriate fire fighting means; 9) Other equipment for inspection and maintenance. (3) The location where the tank is located must be installed with fire hazard signs, smoking bans, prohibition of carrying matches, other fire tools, and prohibition of carrying equipment that can cause explosions or fires (Article 27 of the Minister of Manpower No. 37 of 2016). (4) Filling the tank must be

carried out in stages (1) cleaning and checking, (2) drying, (3) filling (Article 29 of the Minister of Manpower No. 37 of 2016). (5) Cleaning and checking are carried out to ensure that there is no rust or cracks and dirt on flammable materials (Article 30 of the Minister of Manpower Regulation No. 37 of 2016). (6) The installation of the tank above the floor must have a strong foundation and construction to withstand the load of the tank when it is fully filled (Articles 56 and 57 of the Minister of Manpower Regulation No. 37 of 2016). (7) The floor of the tank must be able to withstand the infiltration of tank fluids (article 56 of the Minister of Manpower No. 37 of 2016).

(8) The tank must be surrounded by a bund wall that is able to hold and accommodate 80% of the liquid content in the tank for the installation of 1 (one) tank and 60% of the liquid content for the installation of 2 to 4 tanks (article 58 of the Minister of Manpower No. 37 of 2016). (9) Every use, maintenance, repair, and modification of the tank must be inspected and/or tested (article 68 of the Minister of Manpower No. 37 of 2016) (10) Installation, maintenance, repair, modification and filling of tanks must be carried out by safety technicians in the field of Pressure Vessels and Storage Tanks (Article 59 of the Minister of Manpower Regulation No. 37 of 2016). (11) The fuel capacity of the generator set is at least capable of operating for 8 hours (PUIL 2000 (5.5.1.1.)). (12) The generator fuel line must be protected from heat and mechanics (PUIL 2000 (5.5.1.1.)). (13) The exhaust pipe must be lined so that the maximum temperature is 70 ^{o}C (PUIL 2000 (5.5.1.1.)). (14) Repair of generator sets and their components must be in a non-operating condition (Regulation of the Minister of Manpower Number 38 of 2016 concerning Power and Production Equipment Safety). (15) Conduct periodic inspections every 1 (one) year and periodic tests every 5 (five) years on the generators used by the Mechanical Specialist Labor Inspector or OHS Expert Mechanical specialist from the OHS Service Company (PJK3) in the field of testing that has been officially appointed by RI Ministry of Manpower in accordance with the provisions of article 3 paragraph (1) letter c. Act. No. 01 of 1970 jo. Permenaker Number 38 of 2016.

(16) Provide and inform workers of the Material Safety Data Sheet (LDKB) / Safety Data Sheet (SDS) for Hazardous Chemicals in the workplace and place the LDKB / SDS in strategic places that are easy to read and know by workers in accordance with the provisions Article 3 paragraph (1) letter h of the Law. No. 01 of 1970 jo. Article 3 letter a, article 4, and article 6 of the Minister of Manpower Decree no. Kep-187/MEN/1999. In the global harmonization system for chemical classification and labeling (GHS) of the United Nations, safety data sheets or safety data sheets (SDS) and labels are part of harmonization of chemical hazard communications. Information that must be included in the chemical

label is (1) chemical identity, (2) hazard pictograms, (3) danger signal words (danger) and warning (warning), (4) hazard statements, (5) precautionary statements , (6) identity of producers, suppliers, and/or importers. The elements in the safety data sheet (SDS) are (1) the identity of the compound (single or mixed), (2) the hazard identity, (3) the composition/information about the constituent materials, (4) first aid measures in an accident (P3K), (5) fire fighting measures, (6) countermeasures in case of spills and leaks, (7) handling and storage, (8) exposure control/personal protection, (9) physical and chemical properties, (10) stability and reactivity , (11) toxicological information, (12) ecological information, (13) waste disposal, (14) transport information, (15) regulatory information, (16) other information. (17)

(17) Installing a label on the fuel daily storage tank in accordance with the provisions of Article 3 paragraph (1) letter h of the Law. No. 01 of 1970 jo. Article 3 letter a, article 5 and article 6 of the Minister of Manpower Decree no. Kep-187/MEN/1999. (18) Establish a Fire Management Unit in the workplace consisting of: 1) OHS Expert (AK3) Fire Specialist; 2) Coordinator of the Fire Fighting Unit for each work unit/each work shift; 3) Fire Fighting Team, for each work unit/each work shift; and 4) Fire Role Officer in each work unit and work shift. All personnel of the Fire Management Unit must be equipped with safety certification and a legitimacy card from the Director of PNK3 of the Ministry of Manpower R.I. in accordance with the provisions of Article 3 paragraph (1) letter b of the Law. No. 1 of 1970 jo. Article 1, article 2 paragraph (2) letter d, article 5, and article 6 of the Minister of Manpower Decree no. Kep-186/MEN/1999 concerning Fire Fighting Units in the Workplace.

(19) Provide fire detection facilities, fire alarms, fire extinguishing facilities and evacuation facilities in accordance with the provisions of Article 3 paragraph (1) letter b of the Law. No. 01 of 1970 jo. Article 2 paragraph (2) letter b Kepmenaker No. Kep-186/MEN/1999. (20) Provide means of controlling the spread of smoke, heat and gas fires in accordance with the provisions of Article 3 paragraph (1) letter b of the Law. No. 01 of 1970 jo. Article 2 paragraph (2) letter c Kepmenaker No. Kep-186/MEN/1999. (21) Organize periodic fire fighting exercises and rehearsals in accordance with the provisions of Article 3 paragraph (1) letter b of the Law. No. 01 of 1970 jo. Article 2 paragraph (2) letter e Kepmenaker No. Kep-186/MEN/1999. (22) Make a Fire Emergency Management Plan Book in accordance with the provisions of article 2 of the Minister of Manpower Decree no. Kep.186/MEN/1999 concerning Fire Fighting Units in the Workplace, which contains: 1) Information on sources of potential fire hazards and ways to prevent them; 2) Type, method of maintenance and use of fire protection

facilities in the workplace; 3) Procedures for carrying out work related to fire hazard prevention; 4) Procedures for dealing with fire emergencies.

(23) Conduct periodic tests every 1 (one) year and periodic inspections every 1 (one) year on the Fire Fighting Installation in the company on the Fire Specialist Labor Inspector or OHS Expert specialist from the OHS Service Company (PJK3) in the appropriate field of testing with the provisions of Article 3 paragraph (1) letter b of the Law. No. 01 of 1970 jo. Article 2 paragraph (2) letter b Kepmenaker No. Kep-186/MEN/1999 jo. Article 57 paragraphs (1) and (2) of the Minister of Manpower No. 02 of 1983. (24) Providing Portable Fire Extinguisher Facilities (APAR) by procuring, type, quantity, placement, maintenance, and testing of APAR in accordance with the provisions of Permenaker No. Per.04/MEN/1980. The APAR provided will be periodically inspected every 6 (six) months and every 12 (twelve) months and will be periodically tested every 5 (five) years. APAR dry chemical type (Dry Chemical Flour) will be refilled every 1 (one) year. The placement of fire extinguishers from one another shall not exceed 15 meters. The fire extinguisher installation height shall not exceed 125 cm from the floor base.

OSH requirements that have not been met related to the fire at the daily fuel storage tank at PLTD X on December 11, 2015, include: 1) The tank is not equipped with: (1) name plate, (2) temperature gauge; (3) fill valve, (4) earth; 2) Cleaning and checking of the tank has not been carried out to ensure that there should be no rust or cracks and dirt on flammable materials; 3) The floor of the tank has not been able to withstand the infiltration of the tank liquid; 4) The tank is not equipped with a bund wall; 5) The tank has not been inspected and tested for safety; 6) Tank filler operators have not been equipped with Safety Technician certification and license in the field of Pressure Vessels and Storage Tanks; 7) The fuel capacity in the daily fuel storage tank generator is not yet capable of operating for 8 hours; 8) The generator exhaust pipe has not been able to prevent a maximum temperature of 70 ^{o}C; 9) Repair of the exhaust pipe of the generator set has not been completed and the condition of the generator is still operating; 10) The generator set has not been inspected and tested for safety; 11) fuel daily storage tank genset has not been equipped with SDS and Label; 12) There is no fire officer as yet in the Decree of the Minister of Manpower No. 186 of 1999;

Conclusion

Lessons learned and recommendations based on research results that: (1) the tank must be equipped with: 1) name plate, 2) temperature gauge; 3) fill valve, 4) grounding, 5) bonding. (2) cleaning

and checking of the tank must be carried out to ensure that there should be no rust or cracks and impurities of combustible materials. (3) the tank floor must be able to withstand the infiltration of the tank liquid. (4) The tank must be equipped with a bund wall not placed directly on the top of the generator engine. (5) Tanks must be inspected and tested for safety before use and after repairs and modifications are made. It is also necessary to clean and check the tank prior to filling to ensure there is no leakage from the fuel. (6) Tank filler operators must be equipped with Safety Technician certification and license in the field of Pressure Vessels and Storage Tanks. (7) The fuel capacity in the daily fuel storage tank generator must be able to operate for 8 hours. (8) The generator exhaust pipe must be able to prevent a maximum temperature of 70 ^{o}C. (9) Repair of the exhaust pipe of the generator set must be completed when the generator is not operating. (10) The generator must be inspected and tested for safety. (11) fuel daily storage tank genset must be equipped with SDS and Label. (12) Immediately provided fire officers as required by the Decree of the Minister of Manpower No. 186 of 1999.

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Conflict of Interest

The authors declare that have no conflict of interest in this study.

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