

The Cause of Fire and Preventive Measures in Oil Depot

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Abstract:-With the development of the city, oil depot and service station of urban and surrounding areas are in a increasing number, modern facilities and corresponding fire protection plan are of faultiness, which often leads to fire accident. Making the perfect knowledge of corresponding fire protection plan is more pressing because of the physical and chemical properties of the products. So, it is necessary to strengthen establishment and implementation of the production safety regulation, to hardware modern construction and increasing fire rationalization deployment, to strengthen the supervision measures, minimizing the damage of chemical industry. Based on analysis of oil fire hazard, the paper finds out the main factors of fire, and puts forward the prevention measures and according to the relatives problem. To provide some references on improving the fire problem depot provides.

Keywords:-oil depot, fire, oil, combustible, mixture

I. INTRODUCTION

With the China's increasing of the oil production and consumption ratio, the fire safety hazards have a tendency to increase. The rapid development of the economy make the oil demand increased. Since 1993, China has become a net exporter of oil. The oil production increased, reserve expanded and all kinds of fire hazards increased. Especially, after 2000, the growth trend has emerged. The dangerous point is much in oil storage and transportation process, the storage of oil and gas are flammable and explosive mixture of hydrocarbons, there is a lot of fire danger, and the burning and explosions often occur together. For oil depot fire managers, oil depot fire is a top priority, once the oil depot fired, the consequence would be disastrous. So it is important to do well in the fire prevention and fire extinguishing work.

II. THE REASON TO OIL DEPOT FIRE

It is needed three conditions that combustible substances, oxidizing substance and ignition source.

Gasoline and diesel have lower flash point and explosion limit, volatile proliferation and high flammable. There are many kinds of oxidizing substances in production process. For oil depot, the oxygen in the air is a natural fire accident oxidant. The sources of ignition in fire accidents are mainly two types:

- (1) Static electricity caused fire. For example, the staff worn synthetic clothing, Ground does not fit the requirements and the velocity of loading and unloading and unloading oils is high.
- (2) Other sources of ignition caused fire. For example, smoking in the oil depot, calling in the Tank Farm, the metal equipment created spark by impact.

From the above, the fire is controlled by ignition source, because the combustible material and oxidant is not easy to control in the three conditions.

III. FIRE PREVENTION

A. Optimization design to avoid fire happened

In general layout, the design is optimized in Tank Farm, construction safety and process safety. The fire monitoring alarm system is installed in order to monitoring the disaster all-round and is automatically started the fire plan according to the situation.

The fire automatic monitoring and control system can improve the fire resistance of the oil depot, and make the oil and stuff safer. The design of the fire alarm system, fire control unit and fire communication and alarm system are taken a modular structure in order to facilitate expansion. The scattered large oil depot is decentralized controlled and centralized management by using the multiple fire control computer networks running.

B. Standard system, safety management

Responsibility system, safety management system and operating procedures are established and improved in order to constraint the human thought and behavior by rules and norm. First, leaders should focus on the rules, improve staff ideological work, conduct regular safety training, improve staff security awareness. Strengthening the management of the reservoir area, strict control of personnel, vehicles; strengthening the personnel management, strictly prevent the illegal operation, illegal command, control the miscellaneous personnel access; strengthen fire management, strictly enforce the system of banning fire.

C. Cut off the fire source

- a) Matches, lighters and other fire are not allowed to carry to the oil depot, oil storage areas and oil transceiver operation area. The flow of the source of fire and fire operations are strictly controlled.

- b) Fireworks are prohibited in oil depot. If the work must use an open fire, making sure to apply for approval of the relevant departments of the review, and taking safety precautions before hot work.
- c) Before the automobiles and tractor entered the depot, the arson hood must be loaded at exhaust nozzle. The engine is quenched after parking, overhaul of vehicles in the depot is prohibited, and starting engine is not allowed in the job process.
- d) When the railway locomotive come into the depot, the separation vehicle are hung, the gray box baffle is closed, the furnace is not cleaned and the locomotive must leave the non-operating district.
- e) Preventing metal to crash, and the nail shoes are not allowed to wear in the depot. The horses and mules are prohibited in the depot, because the horse and mules iron heel are easy to occur the spark. Using the metal tool and handing metal pail should be prevent the impact in order to occur the spark. The lighting protection device is installed by the rule.

D. The equipment of fire fighting is in good condition and reliable

Oil depot should have sufficient equipment of fire fighting. The fire-fighting equipment is much enough in depot, pumping stations, irrigation barrels, laboratories, loading docks and other places. And the fire site is installed in the right place with rescue equipment, such as buckets, shovels, axes. The fire engines and fire-fighting equipment are to be kept in good technical condition.

E. Prevent electrostatic

Electrostatic hazards lead the oil depot to fire and explosion, because the friction between the oil and other substances will cause static electricity in the transceiver, transmission and transfer the filling process.

- (一) Static grounding jumper is the most effective measures to eliminate static electricity hazards. Static grounding means that the device connecting with the earth to be equipotential through the metal wire and grounding. Jumper means the metal connect the devices with metal wires to be equipotential. The purpose of grounding and jumper are that, first, eliminating the electrostatic to avoid the fire caused by the accumulation. second, equipment is formed to equipotential by person to avoid the difference of electrostatic caused by the spark discharge.
- (二) The pipelines must be inserted below the oil surface or near the bottom of the tank when loading the oil to tank, tank truck and railroad tank truck.
- (三) The staff must wear anti-static clothing and anti-static during the operation.

F. Fire remedies

There are main four situations of fire in storage tank area:

- 1) The tank is fired in case of non-delivery and non-receiving. The tank is in positive pressure. The concentration of oil vapor is outside the explosive limit. The flame ejected from fuel orifice and breathing valve of the tank. The flame is blue and smokeless fire burning outside the tank. At this case, the sprinkler should not be opened, because spray causes the temperature decline in the tank, the oil vapor condensate to form negative pressure and make the tank inhaled a lot of air to lead to a negative pressure, tempering, flame into the tank. If it is not sure that the site of burning, the foam valve must be opened so that the foam covered with the oil surface, then the fire will slowly extinguished.
- 2) The oil is burning in the oil tank. As lacking of the oxygen, the combustion is not fully, the flame is black and bright. In this case, first, organizing forces to protect the other tanks from heat radiation by opening the spray valve. The cupping spray is opened in order to cooling the wall and opening fire foam valve to the tank to inject foam.
- 3) Tank top is ripped and the fire is fierce. In this case, the spray of the cupping neighboring tank is opened to make the wall cool and injected a large amount of foam to extinguish by opening foam valve.
- 4) The firepot burst. The tank cracked, the fire is burning in the tank and on the ground. In this case, the spray system is opened near the tank for cooling. Controlling the flame by fire fighting foam gun in order to the neighboring tank security, and extinguished the fire in the tank after the ground. In showed that the most vicious accident is burning after tank burst.

IV. CONCLUSIONS

Based on the data, the basic causes of the accident are mechanical failure(34.2%), collisions(26.8%), human factor(22.8%) and external factor(earthquake, lightning,16.2%). With science and technology and the improvement of the level of technology in the production, transportation, storage, equipment design and manufacturing defects and accidents is declining, the running management and the quality of the personnel due to human error caused by the oil spill has become a prominent factor. For the above four factors are responsible for the accident, the first two accidents are avoided or reduced the risk by sophisticated equipment, the third accident is tried to eliminate hidden danger by strengthen scientific management and personnel training, and the fourth species are much more difficult to control, and only through correct planning and site selection to avoid

In short, the oil depot fire remedy is a highly technical job. It need staff to master the professional knowledge and skills of the rescue, then the oil depot fire fighting and rescue will be successfully completed.

REFERENCES

- [1]. Kai Tang, Xilin Dong, Qiyun Guo. Research on China Petroleum and Chemical Fire Safety Countermeasure[J]. Journal of Chinese People's Armed Police Force Academy, 2007,23(10):44-47.
- [2]. Juanjuan Cui. Oil Depot Fire and Explosion Risk Analysis and Prevention[J]. Xinjiang Chemical, 2008,18(4): 55.
- [3]. Guangchen Guo, Wenlan Dong, Zhilian Zhang. The Oil Depots Design and Management[M]. Dongying: China University of Petroleum Press,2006.

- [4]. Yongming Xia. Oil Storage and Transportation of Environment Pollution Control[M]. Beijing: China Petrochemical Press, 1992.
- [5]. Jianrong Huang, Maosheng Liu, The Evaluation Methods of Depot Fire Safety Effects and Fire Fighting[J]. Fire Technique and Products Information, 2006, 13(12): 29-31.
- [6]. Erbang Hu. Practical Techniques and Methods of Environment Risk Assessment[M]. China Environmental Science Press, 2000.