Emergency Response Mechanism and Improvement of Hazardous Chemicals Accidents in Qing Yang City

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Abstract. This paper analyzes the distribution of hazardous chemicals production enterprises and the construction of rescue teams. In order to further strengthen and perfect the emergency mechanism of hazardous chemicals in our city, the problems in the safety management of hazardous chemicals production enterprises in our city are analyzed, and related requirements are put forward, so as to reduce the occurrence of hazardous chemicals accidents and reduce the degree of hazards. It is also recommended that enterprises and governments establish a sound accident emergency response system, and use emergency plans, emergency resources, emergency command, and emergency response to build a safe emergency response platform for hazardous chemicals. In order to improve the accident emergency mechanism.

1. Introduction

Dangerous chemicals are a class of chemicals with flammable, explosive, toxic, harmful and corrosive characteristics. It plays an extremely important role in developing production, scientific research, changing the environment and improving people's lives. At the same time, Due to the dangers of hazardous chemicals. It is very likely to cause serious damage, casualties, and accidents such as environmental pollution and property loss. And if a security incident occurs, the consequences will be unimaginable. This accident is very likely to cause a serious accident with many casualties [1]. Therefore, it is very important to strengthen the safety management of hazardous chemicals. This places high demands on the management of hazardous chemicals. Safety management of hazardous chemicals is quite strict. Safety management of hazardous chemicals has different management methods for different chemicals. Therefore, not only do we need to supervise all aspects of management, but also we need extensive collaboration across disciplines, disciplines, and departments. This requires not only government departments to issue relevant laws and regulations and the establishment of relevant security inspection departments, but also the establishment of relevant work safety regulations by enterprises, and the assistance and supervision of people. In this way, the accident rate can be minimized and a comprehensive safety guarantee can be achieved.

The occurrence of dangerous chemical accidents has the characteristics of sudden and difficult to control, environmental pollution, serious damage, difficult rescue, and strong professionalism. China's chemical industry develops rapidly, but shorter development time. So, China's dangerous chemical safety accidents occur frequently, and the rescue is not timely, and there are certain problems in the emergency treatment of accidents. China's management of hazardous chemicals has long relied on laws...
and regulations for unilateral regulations, thus ignoring the importance of safety management and technology. Therefore, there are many problems in China's hazardous chemicals in terms of production safety management. This has led to many problems in China's hazardous chemicals in terms of production safety management. Therefore, the government of China should not only strengthen and improve laws and regulations, but also put forward clear requirements for safety production management. Only in this way can the accidents of hazardous chemicals be eliminated from the root [2].

The frequent occurrence of hazardous chemical accidents is a major test for China's accident emergency rescue. But China has many problems in this regard. For example, the rescue team is not sound, professionalism is not up to standard, The rescue materials are not complete. During the accident rescue process, the company cannot provide clear accident information and emergency rescue measures. This will cause great inconvenience to subsequent rescues. Therefore, China should establish a sound emergency rescue team to make the rescue team professional and efficient. Make the rescue process scientific and rational. Minimize the harm caused by accidents while saving lives and property. This requires the state to establish an emergency response platform while investing a lot of material resources and manpower. Enterprises should also establish emergency plans.

2. Analysis of the distribution status of hazardous chemical production enterprises in Qing yang

In Qing yang, there are fewer companies producing hazardous chemicals, but there are more companies using and operating chemical products. According to statistics, there are 25 hazardous chemical manufacturing enterprises and 113 operating enterprises in Qing yang City. Some of them are located in towns. Qing yang Petroleum and Chemical Corporation is the largest manufacturer in these companies. There are sixteen refinery production facilities here, they can process 3 million tons per year at a time. The main products are oil, fuel, chemical products, solid products, etc. The company processed 15.88 million tons of crude oil, which is the industrial enterprise with the largest production scale and the largest profits and taxes in Qingyang Revolutionary Old District during the 12th Five Year Plan Period. The second is located at the second oil transfer site of Changqing Oilfield in Qingcheng. Its mission is to export crude oil from northern Shaanxi and Longdong areas of Changqing Oilfield. It is the longest pipeline, the largest management area, and the most complicated geographical environment in Changqing Oilfield. The relatively geographical location also brought a lot of inconvenience to rescue work.

The following problems exist in the survey of hazardous chemical production enterprises in our city. First, the "Qingyang City Safe Production Work Responsibility List" clearly clarified the responsibilities of the hazardous chemical supervision and management department, but the following problems exist in the related departments and the comprehensive management of the county. The implementation of the main work is not clear. Second, that most of the hazardous chemical manufacturers in our city are private enterprises, their safety awareness is weak, their employees' cultural quality is low, and they have not been trained in safety systems. Without relevant professional knowledge or professional knowledge, they cannot delete be better Apply expertise and standards for security risk identification and assessment. Third, there is a shortage of supervisors at the two levels of security inspection departments in Qingyang City, which lack professional and technical personnel, large workload and wide range of comprehensive management, involving many departments, and incomplete supervision and inspection of comprehensive management. Fourth, Qingyang City has not yet established an enterprise big data platform based on the unified sharing and exchange of government data for the production, storage, use and operation of hazardous chemicals. From the investigation, we can know that the most private enterprises in Qingyang have inadequate production safety responsibility system, management systems and production operation procedures. Forms of giving and main responsibilities are not put in place. Responsibilities of key personnel, supervisors and safety managers are unclear. Although most companies have established a security management organization, they have failed to meet the relevant requirements. Although most enterprises have established security management agencies, they have failed to meet the relevant requirements and failed to play the role of management agencies. Enterprises generally have problems such as inadequate management of special operations,
inadequate implementation of management systems, inability of safety management personnel to meet relevant requirements, and low safety awareness and safety production concepts of employees. Emphasis on production and management, and underestimate safety are more prominent.

From the above survey, we can see that there is a huge potential safety hazard in the production enterprises of hazardous chemicals in Qingyang City. This requires Qingyang City not only to put forward higher requirements in the management of hazardous chemicals, but also to strengthen the construction of accident emergency mechanisms. The Chinese government should establish an emergency protection system for hazardous chemical accidents in Qingyang City.

3. Establish a sound emergency system
The establishment of an emergency system plays a guiding role in the emergency treatment of hazardous chemicals. The establishment of an emergency system can effectively control its development, reduce secondary hazards, and ensure the property and life safety of enterprises and the people to the greatest extent. The emergency system can be improved from four aspects: emergency plan, emergency resources, emergency command, and emergency response [4].

3.1. Emergency plan
The emergency plan is an important basis for emergency rescue work, and its role is very important. Therefore, in the process of preparing the plan, the plan should be more in line with the actual situation of the enterprise so that it fully reflects the use value, and strives for maximum results for rescue efforts. First, we should assess and analyze the risks of operating a business. Evaluate the company's production safety indicators and analyze its possible accidents and their degree of danger [5]. The plan should include the following aspects: basic principles and guidelines, the basic situation of the enterprise and the project, the coefficient of possible accidents and their hazards, the responsibilities and division of labor of emergency rescue agencies, emergency rescue steps and relevant regulations and requirements. Second, we carry out a detailed analysis of possible emergencies and make a reasonable emergency mechanism for them. The emergency actions are classified into different levels according to the degree of accident danger, the scope of influence, and the ability to control the situation in the unit, and corresponding plans are formulated. Third, we classify and summarize the types of accidents to achieve specific accidents and specific responses. And we refine the work in the accident to achieve the responsibility to the people, and statistics of materials and rescue personnel required for rescue. To achieve a unified schedule of specific accidents, specific personnel, specific materials. And the time required to complete the task. In emergency rescue, the task list is directly related to the resources in the resource schedule and plays a decisive role in the rescue work.

3.2. Emergency resources
Emergency resources play a very important role in the process of accident emergency and are an important guarantee for emergency rescue work. How to effectively integrate and utilize emergency rescue resources and quickly mobilize for rescue has become an important step in building an emergency rescue system.

Qingyang City should strengthen the construction of emergency professional teams. When an accident occurs, experts with rich experience and expertise should give opinions and suggestions on how to handle the accident. Therefore, the scope of professional teams should be expanded. Experts in a variety of disciplines, including chemical engineering, biochemistry, fire protection, environmental protection, and medical rescue, should be included in the emergency expert database. At the same time, a sound emergency resource database is established and the organization's material information is registered to enable rapid mobilization of materials in the event of an accident. The city should integrate existing emergency rescue teams and establish emergency linkage working mechanisms. At present, the city has 3 emergency command vehicles, 313 fire fighting vehicles, 4 rescue vehicles, 1 drone, and several sets of emergency and demolition tools. One municipal-level disaster relief material reserve has
been established. There is 1 fire-proof material reserve storehouse and 33 county-level disaster relief material storehouses.

3.3. Emergency Command
The emergency command is formed by multiple departments. The command department for unified rescue at the scene is the hub responsible for on-site emergency work. Performing effective emergency rescue decision-making such as performing on-site emergency command, coordination, disposal, and decision-making is the key to the emergency rescue process. The command department arranges the emergency rescue departments on the scene. Reasonable rescue work and efficient deployment and use of emergency resources are the key to effective rescue work. The emergency command department shall include the following departments: the emergency leadership group, the emergency management office, the on-site command group, the emergency coordination group, the on-site control group, the emergency expert group, and the afttreatment team.

![Diagram of Emergency Command Department]

Figure 1. The emergency command department shall include the following departments

3.4. Emergency Command
When an accident occurs, the enterprise should quickly set up an accident emergency rescue command center to classify the accident level and carry out rescue delete according to the accident emergency plan. When the hazard of the accident exceeds the controllable range of the enterprise, the enterprise must promptly report to the local government and ask for support, and the local government will conduct unified rescue arrangements to mobilize rescue efforts. According to the degree of accident hazard, the scope of influence and the ability to control the situation within the unit, the emergency operations are divided into three levels:

Three-level response The following conditions are met to initiate a three-level response:
1. Causing minor injuries to 3 people (excluding 3 people);
2. No casualties, but economic losses.

Secondary response The following conditions are met to initiate a secondary response:
1. Cause serious injuries (including poisoning) to 3 people (excluding 3 people) or minor injuries to 3-9 people;
2. This department considers it necessary to respond to production safety accidents.

Primary response The following conditions are met to initiate a first-level response:
A production safety accident would cause death (including missing), serious injury (poisoning) of more than 3 people (including 3 people), life safety of more than 3 people (including 3 people), or minor injury of more than 10 people (including 10 people) [7].
The necessary procedures such as emergency command, emergency response, resource allocation, emergency avoidance, and expansion of emergency shall be clarified in accordance with the dangerous situation and development situation of the accident. When the dangerous accident is effectively controlled, the danger is eliminated, the injured person is rescued in a timely manner, and the accident scene has been released, the emergency rescue leadership team announces the end of the emergency rescue work, and summarize the cause of the accident and the rescue process and submit a work summary report to the competent department.

4. Establish a scientific and practical emergency platform

In order to strengthen the management of dangerous chemicals and the emergency response mechanism of the city, an emergency response platform should be established, and the emergency response center should be set up by the municipal government. The emergency center should include the following departments: a hidden safety hazard investigation team, a emergency command team, a accident expert team, a rescue and rescue team.

The hidden safety hazards investigation team conducts safety inspections of the city's hazardous chemical companies. And according to the actual situation of the enterprise and the relevant national regulations, the hidden safety hazards investigation team provides safety guidance to the enterprise, and strengthens the company's security awareness to improve its security indicators. And let the enterprise formulate relevant emergency plans and submit them to the emergency center for review.

The emergency command team is the core of the emergency platform. When a major dangerous accident occurs in an enterprise, the emergency command team shall formulate and adjust the on-site emergency rescue work according to the development of different story situations. The emergency command team need to allocate emergency resources according to the needs of rescue work. According to the information collected at the site, verify the situation of the site to ensure the smooth flow of information between the sites. And when the emergency status meets the cancellation conditions, the emergency status is announced to be lifted, and aftercare is arranged [8]. Qingyang City Hazardous Chemicals Accident Emergency Headquarters shall, as needed, regularly organize training on emergency management of hazardous chemical supervisors to improve emergency management capabilities. All production safety supervision and management departments shall organize training on emergency management leaders and management personnel of enterprises in the production, operation, storage, and use of hazardous chemicals from time to time to enhance their emergency response capabilities.

The Accident Panel is composed of experts with experience and expertise. And experts provide opinions and suggestions on the handling of related accidents.

The rescue and rescue teams are composed of several departments, such as the government's civil affairs department, fire brigade, traffic police, police, medical treatment, and rescue teams. Under the unified leadership of the command team, arrange rescue work, traffic guidance, evacuation of surrounding people, and resettlement of affected people.

Establishing a scientific emergency platform can effectively improve the management of hazardous chemicals and accident emergency mechanisms in Qingyang.

5. Improving the company's ability to manage hazardous chemicals safely

Enterprises should consciously manage the safety of hazardous chemicals in accordance with the law. According to the "State Council's Decision on Further Strengthening Safe Production", the main basis for China's management of safe production of hazardous chemicals is the unified leadership of the government, relevant departments conduct supervision and inspection in accordance with the law. The enterprise must self-restrain, standardize production, consciously strengthen the production safety management capacity according to law, and establish a responsibility pressure transmission mechanism. People-oriented as the core, truth-seeking and pragmatic as the basis, layer-by-layer responsibility as the basis, and implement the safety production responsibility system. Due to the harmfulness of hazardous chemical accidents and the large social impact, the State re-enacted the Regulations on the
Safety Management of Dangerous Chemicals. Strengthening the safety management of hazardous chemicals in accordance with the law is not only the responsibility and obligation that should be fulfilled, but also the needs of the company's own production and development. Enterprises must comprehensively manage the safety management of hazardous chemicals, and realize the full-scale, comprehensive, whole-process, and comprehensive supervision and management of hazardous chemicals.

6. Conclusion
With the development of society, dangerous chemicals play a very important role in our daily life. However, the occurrence of hazardous chemical accidents has brought losses to the economic development of society and has caused serious harm to human living environment and health. Therefore, it is necessary to better establish and improve the emergency response mechanism for dangerous chemicals and strengthen the management capabilities of enterprises. Only in the case of double insurance can the harm caused by accidents be minimized. This article analyzes the distribution of hazardous chemicals and the construction of rescue teams on the premise of introducing a hazardous chemical accident emergency mechanism and perfection.

The main conclusions are as follows: first, Qingyang City has a wide range of hazardous chemicals, many types of hazardous chemicals are produced, and enterprises have certain shortcomings in the management of hazardous chemicals. This has laid a certain safety hazard to the occurrence of dangerous chemical accidents. Second, in order to improve the accident emergency mechanism of hazardous chemicals in Qingyang, the construction of the hazardous chemical rescue team should be strengthened to make the rescue team scientific and professional. When an accident occurs, experts with rich experience and expertise should give opinions and suggestions on how to handle the accident. Third, in order to strengthen the management of hazardous chemicals in Qingyang City and improve the emergency response mechanism, an emergency response system should be established. It can effectively control the development of its state of affairs, reduce secondary hazards, and protect the property and life safety of enterprises and the people to the greatest extent.

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References
[1] GUO Ying. Discussion on Safety Management of Dangerous Chemicals in Petrochemical Enterprises[J]. Chemical Enterprise Management, 2004, (14): 80-81.
[2] ZHANG Xin-hui. On Safety Management of Dangerous Chemicals in Enterprises [J]. China Science & Technology Panorama Magazine, 2014, (13): 217-218.
[3] GAO Jian-ming, ZENG Ming-rong. Current situation and measures of dangerous chemical safety in China[J]. Journal of Safety Science and Technology, 2005, 1(3): 53-53.
[4] LI Ding-bang, CHENG Zhen. Exploration on Transport Management of Dangerous Chemical and Emergency Response System [J]. China Safety Science Journal, 2006, 16(9): 70-71.
[5] WANG Xu-guang, WANGYin-jun. The safety management and control and emergency rescue of the dangerous chemicals[J]. ENGINEERING BLASTING, 2016, (02):
[6] CHANG Liu-shuan, ZHAO Yan-mei, YANG Li-mei. Medical service emergency rescue and preventive countermeasures for leakage accident of dangerous chemicals[J]. Journal of Logistics University of CAPF (Medical Sciences), 2013, (02).
[7] WANG Zhen-hua, WEN Tu. Analysis of emergency mechanism for hazardous chemical accidents [J]. Gulei Emergency rescue center gazette, 2014, (16): 89-100.
[8] SUN Ying, WANG Xiao. The Safety Evaluation Application of the Harbor Dangerous Goods Operation [J]. Industrial Safety and Environmental Protection, 2010, 36(5): 55-56.
[9] CHEN Fu-jin. Emergency Plan for Dangerous Goods Port Operations [J]. Management &
Technology of SME, 2010, (19): 35-35.

[10] CHEN Hong. Suggestions on Compulsory Insurance Liability for Storage and Transportation of Dangerous Goods in Inland Ports [J]. Transportation Enterprise Management, 20, 10, (11): 68-69.