

Study on the Inadequacies and Strategies of Dangerous Chemicals Transport in China

Quan-min Bu, Yong-ning Cai, and Xing Tong

Abstract With the rapid economic development in China, more and more dangerous chemicals are transported in roads, and more transport accidents are found. Therefore, based on current situation of China's road transportation of dangerous chemicals and experience from western nations, the author proposes safety management measures which are suitable for road transportation of dangerous chemicals in China, with intention of reducing accidents of dangerous chemicals road transportation and resulting loss of life and property.

Keywords Countermeasures • Dangerous chemicals • Present situation • Transport

1 Introduction

With the rapid development of Chinese industry, the use and application of hazardous chemicals become more and more widespread, which leads to larger road transport volume of hazardous chemicals. The transport of a large number of dangerous chemicals causes a moving source of hazard, transportation security administration becomes increasingly difficult, and transport accident of dangerous chemicals occurs frequently. For example, an explosion occurred at Yanru highway in Yanling county of Zhuzhou city, 20 persons died and 2 persons were injured.

Q. Bu (✉)

Public Security and Management Department, Jiangsu Police Institute, Nanjing, China
e-mail: qmbu@sina.com

Y. Cai

School of Government, Nanjing University, Nanjing, China

X. Tong

Center for Social Risk and Public Crisis Management of Nanjing University, Nanjing, China

A oil tanker spilled at Yanjiang highway in Huangfu district of Guangzhou city on June 29, 2012, the leaked solvent oil caused explosion and fire, resulting the death of 20 persons and injury of 31 person. On July 14, 2012, a heavy vehicle containing sulfates crashed with another car at No. 318 National Road in Nanling county of Wuhu city, causing the death of 5 persons and injury of 1 person . . . These road transportation accidents of hazardous chemicals not only seriously endanger the safety of people's lives and property, but also pollute the environment and cause serious social influence. In this regard, we must strengthen the study on countermeasures for safe road transportation of hazardous chemicals, so as to avoid or reduce road transportation accidents of dangerous chemicals.

2 Status of Road Transport of Dangerous Chemicals

In recent years, supervision and management of road transportation of hazardous chemicals has been strengthened in China, and certain achievements have been made. But because of various reasons, many transportation accidents still occur. Through investigation and research in the past 1.5 years, current situation of China's road transport of dangerous chemicals is summarized as follows:

2.1 Poor Condition in Transport Enterprises

Transport enterprises' condition plays a decisive role in road transportation of hazardous chemicals, but many transport enterprises don't have corresponding qualifications, their equipments and technologies are also backward.

2.1.1 Lack of Corresponding Qualifications

On one hand, because China's legal system in road transport industry is not sound, the requirements for qualifications of road transport enterprises of dangerous chemicals are not in place. On the other hand, there is a provision that "Only those transport enterprises with corresponding qualifications can be engaged in e road transportation of dangerous chemicals", but corresponding punishment measures are not available. Driven by economic interests, many transportation enterprises without necessary qualification handle the business through a variety of ways, and many companies choose them to save transportation cost. Therefore, the market is full of transport enterprises which are in lack of necessary qualifications (Zong-feng Zou and Bao-quan Zhang 2011). These companies only pay attention to economic interests, they are not responsible, and ignore relevant standards, which cause great threat to safe road transport of hazardous chemicals.

2.1.2 Small Scale and Low Degree of Specialization

Although those transportation enterprises of hazardous chemicals have met the relevant requirements set by the Ministry of Transport, many affiliated businesses can be found in the market, few of them can handle a large number and variety of hazardous chemicals. At present, many enterprises handle the transport of their own hazardous chemicals, this lead to low degree of specialization.

2.1.3 Poor Technical Status of Transport Vehicle

Technical condition of transport vehicle has direct impact on transport safety. Good safety performance of transport vehicle is a key factor of ensuring the safety of the road transport (Leonelli et al. 2010). Few of Chinese transport enterprises of hazardous chemicals have specialized transportation vehicles, the technical level of their vehicle equipment is low, many ordinary vehicles are used in the transport process, which is not in line with relevant standards and specifications.

2.2 Low Quality Practitioners

2.2.1 Practitioners' Lack Basic Professional Knowledge and Skill

Many practitioners have poor understanding of basic professional knowledge and skills of dangerous chemicals, some of them even have little common sense, undocumented appointment is common. They don't know how to deal with transport accident of dangerous chemicals and avoid its deterioration in a timely manner.

2.2.2 Practitioners' Weak Legal Awareness

Overload, fatigue driving, drunk driving, over speed driving, illegal transportation are common phenomena.

2.3 Unsound Supervision and Management

2.3.1 Unsound Supervision and Management by the Government and Other Relevant Departments

Laws and Regulations Concerning Highway Transportation Management of Dangerous Chemicals Is Not Perfect

Although the central government and relevant departments have issued some provisions and regulations about road transportation of hazardous chemicals, the

penalties for illegal behaviors are not serious, as a result, some enterprises and individuals without necessary qualifications risk carrying dangerous chemicals due to their blind pursuit of economic interests.

Week Review and Supervision on Qualifications of Relevant Transport Enterprises and Individuals

Industry management departments should ensure strict management on qualification of transport operators, technical conditions of transport vehicles and qualifications of practitioners. Business qualification is operating permit for road transport of dangerous chemicals, it is the step for ensuring safe road transportation of hazardous chemicals, while personnel management is also the key to safe road transportation.

Rescue Personnel's Ability of Dealing Dangerous Chemical Accident Is Not Good

Although in recent years, fire and traffic police forces have enhanced their abilities significantly, current emergency disposal mechanism is not scientific and professional. Generally, after the accident, security police forces firstly arrive to control the situation, but they have a poor understanding of dangerous chemicals and their chemical properties, so their countermeasures fail to reduce damage.

Exchange and Cooperation Between Different Government Departments are Not Smooth, the Division of Responsibilities Is Not Clear

Up to now, there is no a national regulatory agency of road transportation of dangerous chemicals in China, there are many relevant government departments, overlapping responsibilities and unclear division of responsibilities are serious issues.

2.3.2 Supervision and Management of Transport Enterprises

Weak Safety Consciousness and Emphasis on Economic Interests

Because road transportation of hazardous chemicals is expensive, in order to pursue economic benefits, many transport enterprises without necessary permits still risk carrying out dangerous chemicals, overloading is common, which increase the possibility of accident in highway transportation of dangerous chemicals.

Backward Safety Management Methods, Lack of Staff Education, Supervision and Punishment Mechanism

Many transport enterprises pay little attention to ex ante safety education, and training of accident prevention and emergency rescue knowledge. They are in lack of professional management personnel, effective organizational structure and management system, as well as corresponding operating procedures (Raj and Pritchard 2010). At present, the majority of driver, escort personnel, handling personnel and other employees in the field generally have low academic level and cultural level, they get little relevant training, together with the lack of a supervision and punishment mechanism, reactionary's technical quality and safety awareness are poor.

Lack of Source Management and Dynamic Supervision on Technical Condition of Transport Vehicles

Many hazardous chemicals transporters are not able to monitor technical condition of vehicles, and ensure strict maintenance and inspection (Qiang Liu 2010). Their operational conditions, handling equipments and safety facilities are terrible. Some of them conduct illegal modification on dangerous chemical container or transport vehicles, and use unqualified containers or vehicles. This greatly increases the possibility of dangerous chemicals leakage.

3 Countermeasures for Road Transportation of Hazardous Chemicals

At present, monitoring and management on road transport of dangerous chemicals in the United States, Canada, Germany and other developed countries, and relevant laws and regulations and intelligent information technology are relatively mature. Based on actual conditions in China's road transport of dangerous chemicals, and advanced technology and management experience from developed countries, countermeasures are proposed as follows:

3.1 Establishment and Improvement of Relevant Legal System, and Strengthening Law Enforcement and Supervision

Road transportation of hazardous chemicals involves complex technologies and high security requirements, relevant departments should develop special rules and regulations based on the actual situation of road transport of dangerous chemicals.

On one hand, it is necessary to establish and improve responsibility system of transportation safety, improve safe operation process and post responsibility system. On the other hand, technical files of transport vehicles and driver safety management information system need to be established and improved, mandatory and regular inspection and maintenance of transport vehicles and equipments, as well as dynamic management should be in place (Gumus 2002). At the same time, highway transportation law enforcement and transportation safety management should be combined, it is important to strengthen law enforcement and supervision, stop undocumented appointment and other illegal activities, and resolutely prevent unqualified vehicles and personnel from being engaged in road transportation of hazardous chemicals, so as to guarantee transport safety and a standardized market.

3.2 Strengthening Propaganda and Education, Enhancing Safety Consciousness of the Full

The quality of transportation workers is the key to strengthening safety management of hazardous chemicals transportation. Therefore, strengthening safety education on transportation workers, improving practioners' abilities of emergency response and their safety awareness are crucial. Therefore, we should fully recognize the importance and urgency of strengthening management on road transport of dangerous chemicals strengthen sense of responsibility, sense of mission and sense of urgency, strengthen education on transportation practitioners (Pengyu Liao et al. 2012). TV reports and safety knowledge competition can be used to enhance practioners' security awareness. Meanwhile, legal persons and managers of transport enterprises need more education and great sense of responsibility; so that they can avoid unqualified transport and a sound prevention mechanism is in place.

3.3 Strengthening Training and Improving Quality of Personnel

Chemicals has a wide range of variety and different performance, each dangerous chemicals has different operation specification and protection requirements, so all relevant practioners need professional training before obtaining corresponding qualifications and working in the industry. A strict examination system of driving license should be in place to effectively avoid hidden danger in road transport of dangerous chemicals. At the same time, in driving training, psychological training and driving code of ethics need to be taken into account, in order to cultivate good psychological quality, driving habit, occupation morality and contingency disposal capacity among drivers. Qualifications of drivers require periodical review to ensure

the drivers' professional quality, while transporters have to provide internal training based on characteristics of all kinds of dangerous chemicals and operation rules, thus enhancing staff's quality.

3.4 Strengthening Market Access and Source Control, Establishing and Improving Safety Responsibility System

Firstly, industry management departments should strengthen market access and source management. Prevent unqualified enterprises and personnel from doing the business. With the regard to the management of transporter qualifications, the German approach is worth learning from. In Germany, enterprises that apply for being engaged in road transport of dangerous chemicals need 9,000 euro in their bank account as the starting funds which are frozen. And additional 5,000 euro is needed for the second car. Increasing the initial margin can prevent transporter from being unable to pay fine (Oggero et al. 2011). Thus, in access conditions of transporters of hazardous chemicals, certain margin is necessary, and it increases with more transport vehicles. In addition, performance and technical condition of vehicles, loading and unloading machine and tools shall be reported in accordance with the provisions set by relevant departments, regular inspection on qualifications of transporter and technical condition of transport vehicles is also a must. At the same time, responsible persons of transporter need to regard "safety" as one of their objectives, and establish system of safety responsibility.

3.5 Strengthening Concurrent Management and Supervision of Transport Process

Real-time monitoring and strict supervision are needed in the whole process of dangerous chemicals transport, while ensuring that drivers strictly abide by all relevant regulations and avoid fatigue driving. Transporters of hazardous chemicals shall make sure that all transport vehicles are equipped with protection and rescue equipments, driving recorder, GPS satellite positioning system. At the same time, specifications and performance index of driving recorder and positioning system need uniform provisions to facilitate management and supervision.

3.6 Construction of a National Transportation Information Platform

The information platform of hazardous chemicals transport can provide information on conditions of transporter, transport vehicle and practioners, in this way. Unqualified transporters will go out of business.

3.7 Establishing and Improving Transport Emergency Mechanism

Suitable locations can be chosen for the establishment of unload of hazardous chemicals according to actual situation. Emergency plan for road transportation accident of hazardous chemicals shall also be in place, emergency rescue technology and information support system further need improvement, high-quality team of emergency rescue and emergency rescue mechanism of rapid response are also necessary to improve the ability of crisis management and reduce loss caused by road transportation accidents of dangerous chemicals, as well as protect people's life and property to largest degree.

3.8 Establish a Unified Management Mechanism, Clarifying Scope of Responsibilities of Various Departments, Strengthen Communication, Coordination and Cooperation

The government shall set up a special organization for unified management of road transportation of hazardous chemicals. In many western countries, there are specialized institutions for management of road transportation of hazardous chemicals. For example, the highway transportation management institution in Germany is a semi-official association, as a national industry management organization in Germany; it is composed of Germany transporters and employers. Any enterprises which want to be engaged in transport of dangerous chemicals need to become the members of the organization so as to obtain transport qualification. Through this system, all German transporters of dangerous chemicals are under the unified management system. In the UK, the transport department is responsible for vehicle management and management of drivers; the police are only responsible for highway safety enforcement (Chervin and Bodman 2010). Our country is vast in territory, with great demand for dangerous chemicals transportation and complex transport lines, various functional departments should strengthen coordination and cooperation, enhance the linkage and unified management.

4 Conclusion

Safe road transportation of hazardous chemicals involves many factors, so we must formulate corresponding countermeasures, strengthen safety inspection of vehicle, stop the operation of unqualified vehicles, strengthen safety education and training on all practioners and enhance their sense of responsibility. Government

departments should strengthen exchanges and interaction. At the same time, an emergency system for road transportation of hazardous chemicals needs to be established and improved, so that rapid disposal is possible in case of transportation accident of dangerous chemicals, and avoid or reduce caused by the accident.

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