A Study of China’s Regulations and Standards Concerning Safety Risk Control of Dangerous Goods in Ports and Waterborne Transport

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Abstract: To find out the weaknesses of China in safety risk control of dangerous goods in ports and waterborne transport and give some suggestions on improvement, this paper explored relevant Chinese regulations and standards and compared some of them with foreign ones. Building on this, it made a comprehensive analysis of the regulations and standards in four aspects – control over major hazard installations, risk management, potential hazard inspection and elimination, and emergency management. After analyzing the requirements and operability of the regulations, this paper pointed out the disconnections and loopholes in the existing regulations and standards; besides, it gave some suggestions on strengthening safety risk control of dangerous goods in ports and waterborne transport and formulating and revising the regulations and standards concerning the four aspects. All these will be significant for defining China’s risk control and improving its management in ports and waterborne transport.

1. Introduction
With the rapid development of the national economy and the ever-growing consumer spending, there has been an annual increase in the demand and volume of transporting dangerous goods. In China, waterborne transport is a main way of shipping over ten thousand types of dangerous goods in nine categories, including explosives, compressed gases, flammable liquids, flammable solids, and oxidized, toxic and infectious, radioactive, corrosive and miscellaneous substances. An exploration into the existing regulations and standards concerning the safety risk control will help detect any weaknesses therein and strengthen relevant management and capacity.

| No. | Province   | Transport volume (million tons) |
|-----|------------|---------------------------------|
|     |            | 2015    | 2016    | 2017    | 2018    | 2019    |
| 1   | Hei Longjiang | 1.193   | 1.113   | 1.221   | 1.144   | 1.089   |
| 2   | He Bei      | 584.86  | 583.13  | 527.75  | 523.09  | 632.68  |
| 3   | Tian Jin    | 142.69  | 160.35  | 1178.61 | 170.86  | 154.07  |
| 4   | Shan Dong   | 234.67  | 237.47  | 285.30  | 115.22  | 188.8845|
2. Control over major hazard installations

The safety management requirements on hazardous areas, as specified in Seveso III, share similarities in recognition, assessment, registration and emergency with China’s management requirements on major hazardous installations. But the two differ from each other in terms of rating criterion, public participation, and decision-making. [1-3]

As for rating criterion, Seveso III regulates the quality of 48 hazardous substances and divides them into two categories – “lowly hazardous” and “highly hazardous”. But in China, the variety and threshold quantity of 78 hazardous substances are regulated, and the major hazardous installations at ports are divided into Level I, Level II, and Level III in a descending way according to the degree of hazard. In comparison, the China’s rating is more specific; therefore, it is more supportive of operation and regulation in work and more suitable for realities.

When it comes to public participation and decision-making, Seveso III specifies the requirements on public participation and decision-making. In addition, it defines the rules on the information that should be made available to people and the information about major hazardous installations that should be made public. China has the rules on information disclosure and social participation. Nonetheless, it does not specify the information or make clear the ways of public participation, nor does it offer the evidence of the regulations on actual operation. It is suggested that China should solve the problem through further legislation to gradually enhance public participation. [4]

3. Risk management

Safety risk in production is defined in the Chinese laws and regulations, where risk is classified into four levels – “major risk”, “high risk”, “average risk” and “low risk”, and the rating is based on the degree of accident. Opinions of the Central Party Committee and the State Council on Promoting the Reform and Development of Safety in Production makes it clear that a mechanism for risk rating control and prevention must be established, safety risk control must be reinforced, and the early warning of risk must be applied to key sectors, areas, and enterprises. Meanwhile, enterprises are required to assess risks and recognize hazards on a regular basis. The risk business in Provisional Measures for the Production Safety Risk Management in the Highway and Waterway Industries released by the Ministry of Transport of the People’s Republic of China covers the risk of waterway transportation and that of port operation. Moreover, the Measures specifies the requirements on the rating, recognition and assessment, management and control, registration, and supervision and management of risks.

But in the implementation, the regulations and standards lack clear evidence for risk rating and the basic standards like risk rating indexes and evaluation criteria, especially the ones for the dangerous goods in ports and waterborne transport. This has made it difficult for businesses to recognize, assess, prevent and control risks [5-7]. Enterprises lack guidance in recognizing safety risks, rating risks, planning risk control measures, conducting evaluation, and making continual improvement. Therefore, it is necessary to make some standards or guidelines to provide technical support for the rating-based risk control, such as Standards (or Guidelines) for the Classification and Rating of Risks in Ports and Waterborne Transport, Standards (or Guidelines) for the Recognition and Assessment of Risks in Ports...
and Waterborne Transport, and Standards (or Guidelines) for the Risk Control in Ports and Waterborne Transport.

4. Potential hazard inspection and elimination

Potential hazard inspection and elimination has been specified in the Chinese laws and regulations. For instance, Provisional Rules for the Inspection and Elimination of Safety Accidents and Potential Safety Hazards in Production defines the obligations of production and operation entities and set forth the requirements for supervision and management. Provisional Measures for Eliminating Potential Production Safety Hazards in the Highway and Waterway Industries released by the Ministry of Transport of the People’s Republic of China specifies the definition, rating, inspection and elimination, registration, supervision, and management of potential hazards. In Guidelines for Evaluating the Potential Hazards Causing Serious Accidents in the Operation of Dangerous Goods at Ports, five categories of potential hazards are defined to help the operators and the administrative departments of the ports with dangerous goods evaluate various potential hazards causing serious accidents in the operation of dangerous goods at ports. The evaluation measures are comprehensive and operable. [8-9]

Opinions of the Central Party Committee and the State Council on Promoting the Reform and Development of Safety in Production makes it clear that the following systems and mechanisms must be established: a prevention mechanism of rating-based risk control and the inspection and elimination of potential hazards, a system for inspecting and eliminating potential hazards, a system for reporting the elimination of major potential hazards to the departments supervising and managing production safety and to the worker representative meetings of enterprises, and a mechanism for supervising the elimination of potential hazards. Besides, the standards for rating, inspecting and eliminating potential safety accident hazards in production must be formulated. In accordance with Provisional Measures for Eliminating Potential Production Safety Hazards in the Highway and Waterway Industries, the guidelines for rating and evaluating major potential hazards in key sectors must be issued by the Ministry of Transport of the People’s Republic of China. The absence of the guidelines for evaluating potential hazards in waterborne transport and the targets for inspecting and eliminating potential accident hazards is against the relevant national regulations and policies and prevents us from meeting the requirements on the inspection and elimination of potential hazards in waterborne transport. It is suggested that Standards (or Guidelines) for Evaluating Potential Hazards Causing Serious Dangerous Goods Accidents in Waterborne Transport and Standards for Inspecting and Eliminating Potential Hazards Causing Serious Dangerous Goods Accidents in Ports and Waterborne Transport should be formulated to facilitate the inspection and elimination of potential hazards causing dangerous goods accidents in water transport.

5. Emergency management

In terms of the general requirements for emergency management, there are two main international regulations and guidelines by the UN – Recommendations on the Transport Of Dangerous Goods and Guidelines for Emergency Response to Accidents in the Transport of Hazardous Chemicals and Toxic Substances, which offer guidance for emergency response to dangerous goods. In China, Guidelines of Emergency Rescue for the Transport of Dangerous Goods, based on the above international standards and guidelines, provides guidance for the personnel working on transportation and production safety. Moreover, it offers evidence for the contingency plans, drill and training concerning emergency rescue for accidents in the transport of dangerous goods.

As for the emergency management of ships, Emergency Procedures For Ships Carrying Dangerous Goods (EmS) serves as an emergency guideline for ships carrying dangerous goods. The actual emergency procedures for ships in China are consistent with it because China is a contracting party of International Convention for Safety of Life at Sea (SOLAS) and International Convention for the Prevention of Pollution from Ships (MARPOL), strictly observes the effective SOLAS, MARPOL, International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM), and International Maritime Dangerous Goods (IMDG), and adopts them to the Chinese context.
Meanwhile, the requirements on the management of inland rivers are basically consistent with that of seas in China.

As far as the emergency management of ports is concerned, Port Law of the People’s Republic of China and Provisions of the People’s Republic of China for the Administration of Dangerous Cargoes at Ports define the obligations of the operators and administrative departments of ports in port emergencies. In practice, the emergency plans are the foundation of port emergency management. In case of a danger or accident involving dangerous goods at ports, the port operator would follow the emergency plans to take emergency actions, eliminate danger, control the spread of negative effects, and report it to the administrative departments in charge of the ports and relevant authorities. The national Guidelines for Enterprises to Develop Emergency Response Plan for Work Place Accidents (GB/T 29639-2013) plays a positive role in guiding enterprises to develop emergency response plans for accidents in workplace. Nevertheless, its contents are so general that its effect in facilitating the development of emergency response plans for dangerous cargoes at port is limited. According to an investigation into the actual work, the existing development of emergency response plans for dangerous cargoes at ports is not well-conceived, procedure-based, standardized or specified in terms of operation. Hence, it is suggested that Standards (or Guidelines) for Developing Emergency Response Plans for Dangerous Goods at Ports should be made. [10-13]

6. Conclusions
The analysis above shows the comparison of safety risk control of dangerous goods in 5 major aspects. The main regulations and standards from developed countries are more completed and comprehensive, while China has more detailed rules for easier law enforcement as China has more transport volume and consequent complicated conditions. To improve the management of safety risk control of dangerous goods in ports and waterborne transport, following suggestions are proposed:

(1)As for control over major hazard installations, it is suggested that major hazard installations should be specified through further legislation, public participation should be gradually enhanced, and the information rules that should be provided to people and the way the public participates in decision-making should be clearly defined.

(2)In terms of risk management, Standards (or Guidelines) for the Classification and Rating of the Risks in Port and Waterborne Transport, Standards (or Guidelines) for the Recognition and Assessment of the Risks in Port and Waterborne Transport, and Standards (or Guidelines) for the Risk Control in Port and Waterborne Transport should be formulated to provide technical support for the rating-based control over risks.

(3)As far as potential hazard inspection and elimination is concerned, Standards (or Guidelines) for Evaluating Potential Hazards Causing Serious Dangerous Goods Accidents in Waterborne Transport and Standards for Inspecting and Eliminating Potential Hazards Causing Serious Dangerous Goods Accidents in Ports and Waterborne Transport should be formulated to facilitate the inspection and elimination of potential hazards causing dangerous goods accidents in water transport.

(4)Emergency management. Standards (or Guidelines) for Developing Emergency Response Plans for Dangerous Goods at Ports should be made to specify and standardize the requirements on the development of emergency response plans for dangerous cargoes at ports.

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