



**Asia-Pacific  
Economic Cooperation**

**Advancing** Free Trade  
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# **Promoting Safety for Dangerous Goods Transportation in APEC Region**

Phuket, Thailand and Virtual (Hybrid) | 1 – 2 December 2022

**APEC Transportation Working Group**

June 2023





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## ABBREVIATIONS AND ACRONYMS

APEC	Asia-Pacific Economic Cooperation
APSN	APEC Port Services Network
ARV	Swedish Rescues Services Agency
CCC	Carriage of Cargo & Containers Committee
CIP	Container Inspection Program
COVID-19	Coronavirus disease
CSS	Code of Safe Practice for Cargo Stowage and Securing
CTU	Code of Practice for Packing of Cargo Transport Units
DGD	Dangerous Goods Declaration
DGPE	Dangerous Goods, Petroleum & Explosive
EOC	Emergency Operations Command
EPCSA	European Port Community Systems Association
GISIS	Global Integrated Shipping Information System
GPS	Global Ports Safety
IAEA	International Atomic Energy Agency
IBC	Intermediate Bulk Container
IMDG Code	International Maritime Dangerous Goods Code
IMO	International Maritime Organization
IPCSA	International Port Community Systems Association
LNG	Liquefied Natural Gas
MARPOL	International Convention for the Prevention of Pollution from Ships
MPWT	Ministry of Public Works and Transport
PAC	Powdered Activated Carbon
PAS	Sihanoukville Autonomous Port
PCS	Port Community Systems
PKA	Port Klang Authority
Port-MIS	Port Management Information System
PPAP	Phnom Penh Autonomous Port
PSC	Port State Control
PSHEMS	Port Safety, Health and Environment Management System
SAGT	South Asia Gateway Terminals
SLPA	Sri Lanka Ports Authority
SOLAS	International Convention for the Safety of Life at Sea
SP	Special Provision
ToT	Training of Trainers
UN	United Nations Organization
UNECE	United Nations Economic Commission for Europe
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change

## **EXECUTIVE SUMMARY**

In recent years, there have been reports of fires and explosions on board and in port areas. In all cases, the investigation reports indicate that dangerous goods are the most likely cause of the incidents.

Some accidents involving packaged dangerous goods arise from a need for knowledge of the applicable international regulations and the challenge of ensuring that all relevant people involved in ocean shipping must follow these regulations rigorously. Also, mis-declaration and non-declarations of dangerous goods can be identified as a factor.

Participants recalled that sustainable maritime connectivity and port development not only enhanced economic growth and regional integration but also contributed directly and indirectly to the achievement of UN Sustainable Development Goals 12, which aim to ensure sustainable consumption and production patterns by implementing efficient management of dangerous goods at the global, regional, and economy levels. Through, the participants also realized the seriousness of the economic, environmental, and social impacts of accidents involving dangerous goods. Through the sharing of accident cases, and shared the recognition that prevention is as important as an appropriate response to accidents.

Participants further recognized that various conventions and regulations, including the IMDG Code for safety in maritime transport and handling of dangerous goods in port areas of the International Maritime Organization (IMO), are the backbone of maritime safety and that the application of these measures and regulations contributes to a reduction in safety accidents.

Capacity-building activities, research analysis, and technical assistance for promoting dangerous goods safety in ports should continue. Participants emphasized that cooperation and partnership with all stakeholders, including member economies, international organizations, sub-regional institutions, research institutes, and the private sector, are essential for the implementation of safety management measures for dangerous goods in the Asia-Pacific region.

The Capacity Building Course on Promoting Safety for Dangerous Goods Transportation in the APEC Region including the workshop was held in Phuket and online on 1-2 December 2022. The Course was attended by a total of 53 participants from 11 APEC member economies namely China; Japan; Republic of Korea; Malaysia; Peru; the Philippines; Singapore; Chinese Taipei; Thailand; the United States; and Viet Nam and three Non-APEC economies namely Cambodia; Sri Lanka and France as well as representatives of relevant international organization, regional agencies, port authorities, universities, research institutes, professional associations, and private sector. There were 8 speakers from the IMO, UNESCAP, French Embassy, Korea Ports & Harbours Association, Korea Maritime and Ocean University, the K Consulting Company, and the Marine Department of Thailand.

To achieve the project's target goals, female participation as speakers and participants in the course has been encouraged based on the project's highest efficiency; therefore, the target is set to reach at least 40% of female participants and at least 30% of female speakers. The project has achieved a percentage of female speakers at 50% while the percentage of female participants is 27% lower than the target because the maritime administration is mostly male. The result of the project evaluation shown that 90% of participants improved their knowledge and expertise in managing dangerous goods management after taking the Course.

The 14 recommendations on Dangerous Goods Management were discussed during the workshop as follows:

1. Raise awareness of the existing international regulatory instruments and policies regarding the transport of dangerous goods, present measures currently being taken to

implement those international instruments, and how economies carry out their responsibilities as a Competent Authority (CA).

2. Follow up on the current work of the relevant organizations (e.g., UNECE, IMO) dealing with regulatory matters related to the transport of dangerous goods.
3. Create a program on additional capacity building (including training the trainers) to promote safety, emergency, response, and technical aspects concerning Dangerous Goods Transportation in the Asia-Pacific Region.
4. Provide Competent Authorities in the region to identify the difficulties encountered for the implementation and compliance of international regulations related to dangerous goods
5. Identify the respective roles, duties and responsibilities of each entity involved (i.e., Competent Authority, Port Authority, Shippers, terminal and other stakeholders) in transporting dangerous goods in port areas.
6. Competent Authority should constantly update the list of contact information of the offices designated as responsible for the safe carriage of dangerous goods, and this information should be circulated among member economies. In relation to maritime transport, the IMO document CCC 8/17/3 on the GISIS module on contact details should be observed.
7. Explore the possibility of using digitalization to improve the safety and efficiency of the processes in managing of dangerous goods in port areas and facilitating emergency response.
8. Provide a regional mechanism to facilitate the response and support to major incidents.
9. Provide a mechanism (e.g. global or regional) such as a repository for regular exchange of incidents information experiences and lessons learned in relation to incidents on Dangerous goods and related activities in port areas.
10. Establish a regional and regular meeting to be attended by Competent Authorities and relevant stakeholders to promote information exchange, best industry practices, including difficulties encountered in dealing with the dangerous goods chain of transport.
11. In terms of energy transition, it is recommended that all ports in the region become aware of and contribute to the new requirements in decarbonization to be prepared for potential incidents in relation to new alternative fuels.
12. Introduction and implementation of a systematic inspection program for imported and exported containers, based on a risk assessment methodology and control management, as well as the long-term experience in order to create a reliable system.
13. Coordinate with ESCAP to continue its cooperation on these issues through analytical work, capacity building and technical assistance and through establishing linkages with its inland transport connectivity work.
14. Invite IMO to observe this course's recommendation and continue its technical cooperation in the region, given dangerous goods management in port areas and new alternative fuels.



## INTRODUCTION

In recent years, the number of fire incidents on large vessels and in ports caused by dangerous goods has increased. In 2019, 40 incidents of cargo-related fires on board were reported, and later in 2020, the number increased and reached the highest rate in 4 years including the case of fire on board in the Port of Jacksonville, Florida. Moreover, there were huge explosions caused by dangerous goods in APEC's Port namely Tianjin Port (People's Republic of China) and Port Neches (United States) in 2015 and 2019 respectively. The impacts of the fire, explosions, and other emergencies not only affected lives, health, property, and economy but also harmed the environment. These accidents rose from an inadequacy of labor skills and knowledge of dangerous goods management, inefficient legal framework/regulation for dangerous goods transportation, as well as ineffective emergency response plans especially in APEC developing economies. The volume of dangerous goods shipment is continuously increasing every year, particularly during the COVID-19 outbreak. As shipping dangerous goods requires special and complex regulations, merging technology into the transport of dangerous goods is their compatibility with other important and vital parts of the process. Facing these challenges, Thailand proposed the Project on Promoting Safety for Dangerous Goods Transportation in APEC Region in the Maritime Expert Group, the APEC Transportation Working Group Meeting in 2021, with the aim of reviewing the trend of dangerous goods in the region and the standards of dangerous goods in maritime transportation, which mostly are hazardous substances in containers. The project offered participants, especially those from involving authorities and policymakers of the APEC member economies, with opportunities to gain a deep understanding through knowledge and best practice sharing, informative discussion, and case studies that could eventually help them to improve the dangerous goods management and plans in ports to be in line with the International Maritime Dangerous Goods Code (IMDG Code) as stipulated by the International Maritime Organization (IMO). This project has been organized successfully with support from Malaysia and Viet Nam as Co-sponsors.

In maritime transport, various types of cargo are considered and classified as dangerous due to their serious risks that can affect the ship, cause structural damage or fire on board, pose hazards to human health or lead to other dangerous situations, among the most severe effects, the heavy loss of life and property. The safe transport of dangerous goods and marine pollutants by sea is regulated by the IMDG Code, which is a mandatory instrument under the SOLAS Convention to which all APEC's member economies are signatories. The objective of the IMDG Code is to enhance the safe carriage of dangerous goods in packaged form while facilitating the free unrestricted movement of such goods, and the provisions contained therein, aim to prevent injury to persons or damage to ships and their cargo, and to avoid harm to the marine environment. Therefore, based on the mandatory requirements of the IMDG Code, the project promotes the safe handling, stowage, storage and transport of dangerous cargoes, including the hazards associated with different cargo classes and the measures used to mitigate risks.

## **OBJECTIVE**

The main objective of the Project was to assist and support all member economies in meeting their obligations to enhance safe handling, storage and transportation of dangerous goods as well as to achieve the APEC and TPTWG goals through a capacity building and activity. This project featured a review of trends and standards of dangerous goods in maritime, providing the APEC member economies and relevant officials, as well as all involved stakeholders, the necessary level of knowledge and understanding that could be applied and implemented, in compliance with the provisions of SOLAS Chapter VII and the IMDG Code. This will also help the region to improve the dangerous goods management and plan in APEC's ports complying with international standards in order to prevent and mitigate the impact of dangerous goods incident, ensuring secure transportation as well as sustainable growth of APEC through productive collaboration among economies.

Also, it is important to globally disseminate a holistic approach and the good industry practices regarding the safe management of dangerous cargoes, thus the project served as an international platform for the participants to present their experience on the management of dangerous goods from their ports, including identification of responsibilities over the existing processes and procedures relating to cargo storage, handling and loading.

## **PROJECT OVERVIEW AND HIGHLIGHT**

The organizing team, comprising co-sponsors and APEC Port Services Network (APSN) was responsible for giving comments on the details of the project. To match the Capacity Building Course topics and the expectations of participants, the Need Assessment was conducted by the organizing team to collect the opinions and requirements from the APEC member economies before designing the course based on their topics of interest including regulations/standards of dangerous goods, status of dangerous goods in ports, recommendations for risk mitigation, technology for dangerous goods management, etc.

The Capacity Building Course on Promoting Safety for Dangerous Goods Transportation in the APEC Region including the workshop was held in Phuket and online on 1-2 December 2022. The Course was attended by a total of 53 participants from 11 APEC member economies namely China; Japan; Republic of Korea; Malaysia; Peru; the Philippines; Singapore; Chinese Taipei; Thailand; the United States; and Viet Nam and three Non-APEC economies namely Cambodia, Sri Lanka and France as well as representatives of relevant international organization, regional agencies, port authorities, universities, research institutes, professional associations, and private sector. There were 8 speakers from the IMO, UNESCAP, French Embassy, Korea Ports & Harbours Association, Korea Maritime and Ocean University, the K Consulting Company, and the Marine Department of Thailand. The agenda of the Capacity Building is attached in Annex 1.

## **COURSE SUMMARY**

### **1. International Regulatory Framework for the Maritime Transport of Dangerous Goods with Special Focus on IMDG Code, and Other Related Cargo Instruments**

Mr. Alfredo Parroquín-Ophlson from the International Maritime Organization (IMO) presented on the United Nations (UN) Recommendations on the Transport of Dangerous Goods, which established minimum requirements for the transport of Dangerous goods by road, rail, air and sea regulated by the UN.

**UN Recommendations  
on the transport  
of Dangerous goods**  
(United Nations Model Regulations)

**Nowadays....**  
The transport of dangerous goods.....  
is regulated by the following five international instruments  
depending of the mode of transport to be used.

**ADR** European Agreement concerning the International Carriage of dangerous goods by **Road**.  
**ADN** European Agreement for the carriage of dangerous goods by **Inland Waters**.  
**RID** Regulations concerning the international carriage of dangerous goods by **Rail**.  
**IMDG** International **Maritime** Dangerous Goods (IMDG) Code (and **IMSBC Solid Bulk Cargoes**).  
**IATA / ICAO** Technical instructions for the transport of dangerous goods by **Air**



*These five regulations are very similar, also in their text structure.  
There exists mutual recognition of documents, packing or labels in order to facilitate multilodal transport.*

For the maritime sector, the IMDG Code was developed by the IMO, as an international code for the maritime transport of dangerous goods in packaged form, in order to enhance and harmonize safe carriage of dangerous goods and to prevent pollution to the environment including the stowage, segregation, packaging, classification, labeling, marking, and placarding of dangerous goods in packaged form.

The IMO is the UN specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. IMO's work supports the UN dangerous goods recommendations. The speaker also gave an overview of the IMO organization structure, IMO conventions and regulations. He mentioned about two committees working on maritime safety and environmental protection, which led to the International Convention for the Safety of Life at Sea (SOLAS) and the International Convention for the Prevention of Pollution from Ships (MARPOL).

The speaker explained about the Code of Practice for Packing of Cargo Transport Units (CTU) and the Code of Safe Practice for Cargo Stowage and Securing (CSS), which provide recommendatory bits of advice to those responsible, directly and indirectly, for packing, stowage, and securing of the cargo while preventing the problems and hazards arising from improper procedures. Additionally, he gave a practical view on how the IMO and the International Atomic Energy Agency (IAEA) cooperated to produce training materials, virtual and physical training course, for safe and efficient sea transport of the IMDG Code Class 7 (radioactive material) dangerous goods. The speaker presented two explosion incidents occurred at Asian ports namely Tianjin Port and the Port of Beirut where the fire caused the explosion of Ammonium Nitrate. The case of the Port of Beirut caused over 200 deaths, 7,000 injured with USD15 billion of property damage. Lastly, he gave out steps to access the Global Integrated Shipping Information System (GISIS) where the contact points of authorities for maritime assistance services, cargoes, and urgent report on harmful substances are shared.

## 2. Regional Perspective on the Safety of Dangerous Goods in the Port Area in the Asia-Pacific Region

Mr. Sooyeob Kim, Economic Affairs Officer, Transport Division, ESCAP mentioned that most ESCAP member countries rely heavily on maritime transport, and the Asia-Pacific region represents the largest portion of global seaborne trade, accounted for 59% unloading and 40% loading cargoes in global seaborne trade, making it essential for economic and social development. The maritime connectivity of ESCAP economies varies widely, especially in the Pacific region, compared to other member economies.

However, ESCAP member countries are exposed to various challenges such as lack of investment resources, digital divide, and rapid climate change, and it should be recognized that this requires strengthened cooperation and partnerships at the regional level. Most of the analytical research, capacity building and technical support are being carried out to achieve the goals and performance indicators of the five-year Regional Action Program (RAP), which is the top strategies and plan of Transport Division. The five-year regional action program is reviewed and updated through the Committee on Transport and three Working Groups including Rail, Road and Dry Ports held every two years. The maritime sector also aims to form a working group, and is currently responding to major issues we face through various researches, capacity building and regional dialogues.

ESCAP has adopted a five-year "Regional Action Program for Sustainable Transport Development in Asia and the Pacific", which addresses the three core pillars of the Sustainable Developing Goals: economic, environmental and social objectives. To achieve the three key objectives, ESCAP also has established seven working thematic areas, including maritime connectivity. This was not included in the last five-year plan.

In the maritime connectivity sector, the following two key activity areas were established:

The first one is "Supporting a systematic regional dialogue on sustainable and resilient maritime connectivity, including the promotion of the development of low- and zero-emissions green shipping for Asia and the Pacific in close partnership with global and regional actors and the shipping industry". The second one is "Assisting Small Island Developing States in Meeting Transport Challenges and Strengthening Resilience to Future Shocks"

During the five-year RAP period, ESCAP will work with all stakeholders to improve maritime connectivity in the ESCAP member countries, and ESCAP will especially focus on strengthening collaboration and partnership with all ESCAP member countries. ESCAP is conducting analytical works, capacity building, and technical support based on a comprehensive ESCAP's resolutions, and four maritime and port-related projects are underway to support ESCAP member countries. Improvement of safety management of dangerous goods in ports is not only selected as a performance indicator of RAP, but prevention of related accidents and proper response systems are also essential to improve safety in the shipping and port sector.

### 3. Policy Recommendations for the Safety Management of Dangerous Goods in Asia and Pacific

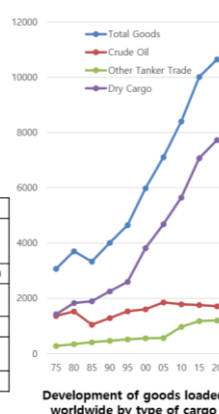
Professor Sohyun Jo from Korea Maritime and Oceans University introduced the study on policy recommendations for the safety management of dangerous goods in Asia and the Pacific to develop safe and effective dangerous goods management, education, and training programs at ports. The characteristic of dangerous goods are subject to transport, workplace, storage, consumer and environment protection regulations, to prevent accidents to persons, property or the environment, to other goods or to the means of transport employed (from UNECE).

#### 1.3 World Seaborne Trade

- The global shipments of DG gradually increasing
- Dry cargo has grown at CAGR of about 4%, Other tanker trade 3%, and Crude oil around 1% since 1975

World level	Loaded		Discharged				Balance	
	Volume (Millions of tons)	Annual growth rate(%)	Volume (Millions of tons)		Annual growth rate(%)	Volume (Millions of tons)		
			2015	2020		2015	2020	
Total Seaborne Trade	10013	10648	-3.8	9965	10631	-3.8	48	17
Crude Oil	1761	1761	-7.8	1910	1864	-7.9	-149	-1
Other Tanker trade	1178	1202	-7.7	1175	1222	-7.5	3	-20
Dry Cargo	7074	7730	-2.2	6879	7545	-2.2	195	185

Source: UNCTAD Handbook of Statistics 2021



The world seaborne trade including dry cargo has increased at about 4% and other tanker trade and crude oil have raised 3% and 1%. At the same time, dangerous goods have made up around 10% of all containerized shipments worldwide which is also increased. In the case of Korea, the dangerous goods transported by sea is accounted for 44% and the rest are carried by air. The Dangerous Goods Logistics Market is expected to grow by 6.8% CAGR during the forecast period of 2022-2030.

The study has shown that dangerous goods caused 30% of shipping incidents. Based on IMO data, there were 29 cases between the years 1996-2000 and 65 cases between the years 2006-2010. The speaker illustrated the case studies of dangerous goods incidents and implications for ports, including the Port of Beirut and Tianjin Port, which give similar lessons learned from chemicals being stored at an inappropriate place and time with lack of knowledge of worker who did not strictly follow the procedure and guidance. The case of fire accident on KMTC Hong Kong vessel was also mentioned as a study case where, the shipper did not notify the carrier about the dangerous goods at the time of booking, before the shipment, or even after the shipment. The explosion was caused by the decomposition reaction of calcium hypochlorite which generated a large volume of oxygen and expanded rapidly.

Over the years, the IMO has revised recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas for at least five times due to technological development and environmental changes. These recommendations are confined to dangerous goods which are in port area as part of the transport chain but may also apply to dangerous goods used in ports or in general storage facilities and are adopted to establish a standard legal framework to be prepared by governments to ensure safe transport and handling of dangerous goods in port area.

The speaker illustrated the best practices regarding dangerous goods management technology and system known as Port Management Information System (Port-MIS) developed by a Korea-based company called KLNET which its key benefits are improving the competitiveness of the logistics industry by establishing an information system suitable for the business environment and preventing accidents with better and more accurate dangerous goods information.

In addition, the speaker introduced the Korea Maritime Dangerous Goods Inspection & Research Institute (KOMDI) which is the inspection and research institute on dangerous goods issue. KOMDI performs dangerous goods inspection according to technical requirements and responsibilities under the IMDG Code. KOMDI also conducts training for workers involved in the manufacture, transport, loading, and handling of dangerous goods transported by ships. The improvement of safety for the transport of dangerous goods in response to developments in technology will be carried out by the KOMDI R&D.

The speaker updated the status concerning measures to improve the management of dangerous goods at port. There is a notable absence of standards for safety equipment and fire extinguishing equipment safety measures in the event of an accident involving packaged dangerous goods. According to the study, dangerous goods management regulatory reform is needed to establish an efficient management system for dangerous goods at port, adhering to the IMDG Code's Classification system wherever dangerous goods are loaded and stored. The other six measures are cooperation among dangerous goods management authorities, reinforcing the importance of training for dangerous goods handling at port, rational information flow for dangerous goods movement, dangerous goods storage and facility management, establishment of dangerous goods accident response system, and establishment of a port risk assessment and security management system. Lastly, the speaker concluded with overall recommendations emphasizing preventive actions necessary for improving the effectiveness of dangerous goods safety management among related authorities; ports, local

governments, the Coast Guard, the Ministry of Environment, and the National Fire Agency. Proper actions could be shaped into risk assessment support, educational curriculum, management manuals, or information system.

#### **4. Maritime Transport of Dangerous goods in Thailand**

Ms. Soontharee Pirom from the Marine Department of Thailand presented an overview of the structural maritime transport of dangerous goods in Thailand including the responsibilities of the Marine Department on the transportation sector consisting of ports, ships, seafarers, and cargoes. The main roles of the Marine Department are responsible for formulating the standards for ship transportation and dangerous goods packaging benchmarks grounded in international references as well as supervising and improving them. This led to the next part where she discussed laws and conventions, both on international and economy scales, pertaining to dangerous goods in maritime transportation. Some of the well-known codes including the IMDG, IMSB, IGC, as well as other related laws in Thailand covering land traffic and customs fields were also mentioned. For the legal aspect, the Marine Department imposes policies based on the framework of relevant standards earlier presented. Marine Department Announcement No.273/2553, for instance, contains criteria for permission to transport dangerous goods associated with the Navigation in the Thai Waters Act. The practical aspect, on the other hand, focuses on registration, training, examination, and certification for related parties including seafarers and port operators. Furthermore, Thailand has developed the Single Window which serves as a single submission of electronic documents by the traders. Lastly, she ended the presentation by sharing that the awareness and responsibility of those involved in the transport of dangerous goods create good practices for their transportation and could make a safe and clean marine environment for the next generation.

#### **5. Global Ports Safety in South and South East Asia: Dangerous Goods Management in Global Ports in The Context of Energy Transition**

Mr. Jean-Michel Dumaz gave an overview of the main ports in South and South East Asia which are ranking among the world's 50 largest ports, including Chittagong Port (Bangladesh), Tanjung Priok and Tanjung Perak Port (Indonesia), Port Klang and Tanjung Pelepas (Malaysia), Manila Port (the Philippines), Colombo Port (Sri Lanka), Singapore Port, Laem Chabang Port (Thailand) and Port of Ho-Chi-Minh City and Hai Phong (Viet Nam).

Almost 40% of Liquefied Natural Gas (LNG) trade moves through South China Sea and the record shows that about 4.7 trillion cubic feet of LNG passed through this route in 2016.

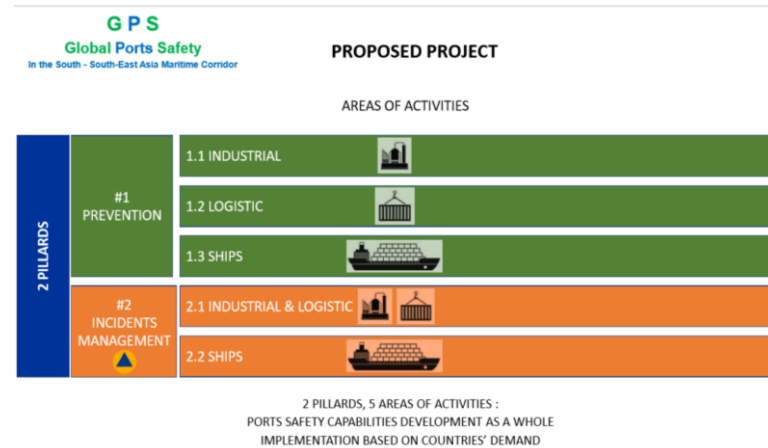
The growing trade flow, however, presents a huge challenge to related countries in terms of safety measures. The speaker remarked that the South China, Indochina, Indonesia and the Philippines remain the top loss hotspot in the past decade. This is driven by a number of factors including high level of local and international trade, congested ports and busy shipping lanes, older fleets, etc.

The speaker referred to fire and explosion accidents happening across Asia over the past years. One of the most fatal incidents occurred at Tianjin Port City, China, killing 173 lives and injuring about 800 people.

Moreover, he broadened the view on the energy transition by expressing concerns about the growing market of batteries which could relate to fire in container ships. Also, he explained new maritime fuel challenges linked to the Conference of the Parties of the UNFCCC (COP27). According to the conference, the IMO predicted a doubling of transport flows on the seas by 2050 while technical solutions for decarbonization have not yet

emerged. He mentioned on addressing some upsides including using ammonia as a fuel and potential routes for green hydrogen transport from Australia.

In the last part, he introduced the project on Global Ports Safety (GPS) consisting of two pillars; prevention and incidents management, and five areas of activities with the Dangerous goods being a focal point.



The project is divided into two parts;

Part A: capability building and expertise development through the Regional Training of Trainers (ToT) programs, incident response training, crisis management tabletop exercises, study tours and experts exchanges

Part B: regional network and equipment by developing a network of practitioners and public as well as private stakeholders aiming at facilitating trade and sharing of knowledge and best practices through event and digital platform known as ARIA industrial safety platform.

Action plans for driving these two parts are developed by the French Embassy and related parties to facilitate trade and share knowledge, lessons learned, and best practices.

## 6. Strategies for Applying Digital Technology to Improve the Safety Management of Dangerous Goods in the Ports

Ms. Kyeongrim Ahn, CEO of K Consulting, presented one of the challenges of dangerous goods management which is dispersed and unsystematic management body of dangerous goods leading to difficulties in solving problems during the incident occurs. She briefed on the IMDG Code and nine dangerous goods classes of as follows;

Class 1 Explosives

Class 2 Gases that are compressed, liquefied or dissolved under pressure

Class 3 Flammable liquids

Class 4 Flammable solids that may be spontaneously combustible or those which emit flammable gas

Class 5 Oxidizing agents or organic peroxides

Class 6 Toxic or infectious materials

Class 7 Radioactive materials

Class 8 Corrosive materials

Class 9 Other dangerous and non-classified materials

The contents of Dangerous Goods Declaration (DGD) were also mentioned including vessel voyage number, container number, name, description and technical name of each dangerous goods item, etc. The misdeclaration of DGD may be omission, but some shippers do this on purpose to avoid certain charges or to transport banned substances. Therefore, the



customs and port authorities, as well as shipping lines, impose heavy fines on shippers for misdeclaration of dangerous goods or attempting to transport them without declaring.

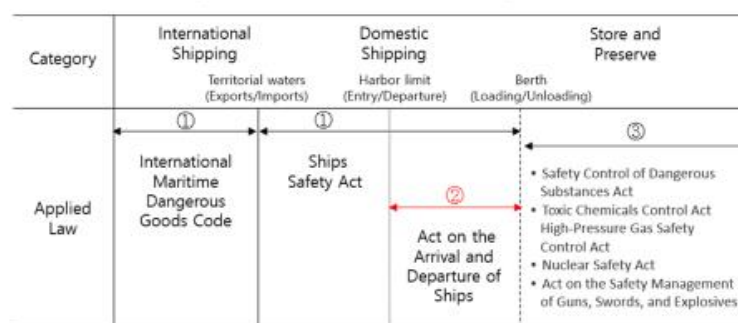
The speaker mentioned that the International Port Community Systems Association (IPCSEA) and the European Port Community Systems Association (EPCSEA) are focusing on the Port Community Systems (PCS) which encompasses exports, imports, transshipments, consolidations, hazardous cargo, and maritime statistics reporting. One of its key features includes the processing of dangerous goods. The declaration documents are being exchanged through electronic communication between public and private sector.

The other three cases are influential economies; China; Korea; and US with their highlighted management being described. The mandatory information required by Shanghai International Port Group (SIPG), for example, covers comprehensive aspects including safety precautions. Similarly, Korea's Dangerous Goods Container Identification System and Container Inspection Program (CIP) were presented to illustrate how they check whether the transporter of Dangerous goods complies with the IMO regulations. The speaker also illustrated how safety management of dangerous goods in ports should adopt the concept of Logistics 4.0. Drones, warehouse robots, autonomous self-driving trucks, autonomous ships, and an Electronic Data Interchange (EDI) format are among those mentioned in the newfangled logistical support systems. These alternatives would efficiently underpin the system focalizing on capturing-based monitoring and other involving risk management. Conclusively, she suggested in detail that advanced technologies are required for digitalization including blockchain, cloud and edge computing, etc. The goal-direction strategy and collaboration are two keys for organizations to fruitfully use those technologies.

## 7. Training Programme on Port Development and Management

Mr. Young Wong Kim, Korea Ports & Harbours Association, presented on the development of IMDG Code and mandatory coming into force in 2004. On the economy scale, regulations concerning dangerous goods in Korea were illustrated to show how related laws (Ship Safety Act, Marine Environment Management Act, and Act on the Arrival and Departure of Ships) be observed in shipping dangerous goods.

### DG Handling Process and Legislation of Korea



- ① Transporting DG: IMDG code, Packing, transporting and storing in accordance with the Ships Safety Act
- ② Loading and Unloading at Port Area: Compliance with the Act on the Arrival and Departure of Ships, establishing a self-safety management plan for reporting the import and unloading of dangerous goods, and implementing safety measures
- ③ Storing DG: Dangerous goods brought into the inland area of the port shall be stored, handled, and transported in accordance with domestic laws under the jurisdiction of each substance

He broadened the view by listing what kind of dangerous goods and acts each government agency oversees. The Ministry of Oceans and Fisheries, for instance, adopts the Act on the Arrival and Departure of Ships to be held accountable for maritime dangerous goods.

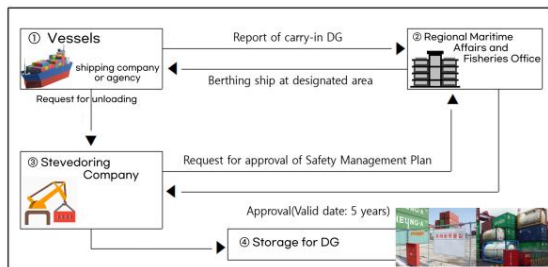


Types of DG	Name of the Act	The Ministry and Office concerned
Maritime Dangerous Goods	ACT ON THE ARRIVAL AND DEPARTURE OF SHIPS	Ministry of Oceans and Fisheries
Dangerous Goods (inflammable)	ACT ON THE SAFETY CONTROL OF HAZARDOUS SUBSTANCES	Ministry of Public Safety and Security
Toxic Chemical Substances	CHEMICAL CONTROL ACT	Ministry of Environment
High-Pressure Gas	HIGH-PRESSURE GAS SAFETY CONTROL ACT	Ministry of Trade, Industry and Energy
Explosives	ACT ON THE SAFETY MANAGEMENT OF GUNS, SWORDS, AND EXPLOSIVES	the National Police Agency
Radioactive Material	NUCLEAR SAFETY ACT	Nuclear Safety and Security Commission

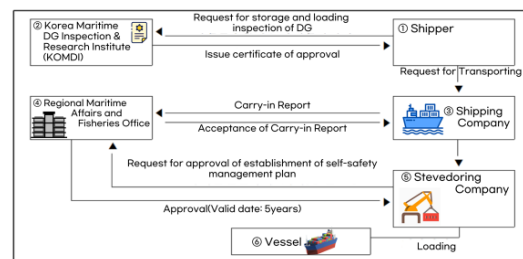
According to international standards, Korea has been carrying out mandatory training programs for all shore-side personnel involved with dangerous goods transport by sea.

The case of Korea's procedure for bringing dangerous goods into the port, both import and export, was illustrated in the pictures below:

The procedure for bringing dangerous goods into the port by shipping(import)



The procedure for bringing dangerous goods into the port by land (export)

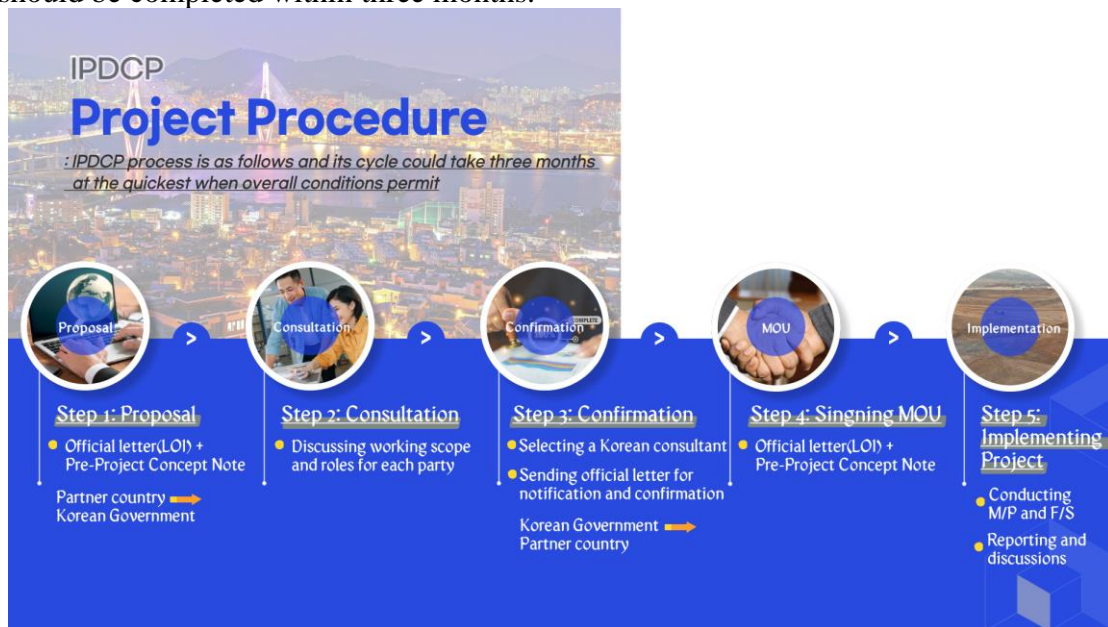


As for the import, shipping companies or agencies supervising vessels must coordinate with the Regional Maritime Affairs and Fisheries Office and stevedoring companies, the direct bridge to storage of dangerous goods, to properly report and request for unloading. Likewise, shippers responsible for export must correspond with shipping companies and Korea Maritime Dangerous goods Inspection & Research Institute (KOMDI) to request transporting and certificate of approval respectively. The stevedoring companies, with approval of the establishment of a self-safety management plan prepared, also serve at the end of the process before loading goods onto vessels.

The implementation and operation of the Container Inspection Program (CIP) system was mentioned. The system is being implemented at the container yards before importing dangerous goods from around the world by shipping prior to distributing across Korea by roads and rails. The Shipping Standards for Dangerous Goods and obligation for reporting unreported dangerous goods on board were amended due to the lesson learned from a chemical explosion incident in 2019 which significantly damaged the vessels of Korea Maine Transport Co. Ltd.

The speaker mentioned the International Port Development Cooperation Program (IPDCP) which was launched in 2008 to support the port development in IPDCP partner countries and eventually to be conducive to their economic development and grant program including the feasibility study and master plan for port development. He elaborated more on

the details of the five processes for IPDCP partner countries to submit their grant proposals which should be completed within three months.



This procedure is generally aimed at supporting port development in IPDCP partner countries and eventually being conducive to their economic development. Those supports could be shaped into a form of an engineering consultant or a fund ranging from USD0.6 to 0.8 million for one project. The practical Korea's support in the form of the Port Expert Workshop assists promoting advanced harbor infrastructure and construction technology in Korea and enhancing global networks among the IPDCP participating countries.

## 8. Best Practices of Dangerous Goods Management from Selected Asia-Pacific Economies

### 8.1 Handling of Dangerous Goods in Port Klang

Mr. Mohammad Shukur Aslam Bin Abdul from Port Klang Authority (PKA) introduced PKA by focusing on the legal acts it governs. He drew attention to PKA Guidelines for the handling of dangerous cargoes in the port area where imports, exports, and transshipment of dangerous goods regularly occur. He also brought up the other government agencies' acts and the global scale of relevant international instruments and guidelines including the IMDG Code. He also mentioned safety management and measures starting with the agency's set of rules, Kelang Port Authority (KPA) By-Laws (Amendment) 1989, shortened as KPA By-Laws. For the management part, he referred to nine classes of dangerous goods categorized by the IMO, in which PKA divided dangerous goods into three levels based on degree of hazard, and class one is considered the highest in terms of danger. He explained these three groups, along with KPA By-Laws, how PKA operates and regulates from pre-notification to the storage process.

**PORT KLANG**  
DANGEROUS GOODS HANDLING GROUP

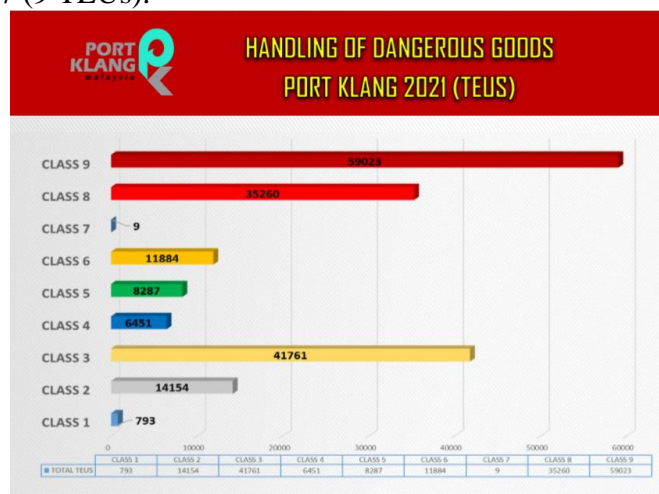
**KELANG PORT AUTHORITY BY LAWS (AMENDMENT) 1000**  P.K.A group means the group assigned by the authority to any dangerous goods specified in the first schedule or to any other goods

**PKA Group 1** – DG under this group can only be landed at such places and under such conditions as the authority may impose from time to time. Vessel conveying such DG, unless otherwise agreed by the authority, are prohibited from coming alongside any of the authority berth

**PKA Group 2** – Vessel conveying DG under this group may come alongside the authority berth but the DG must be in direct transit in the open from land to the vessel and vice versa and shall not be accepted into the authority warehouse unless agreed by the authority

**PKA Group 3** – DG under this group may be stored at such places as may be authorized by the authority depending on space availability and adequacy of preparatory facilities

All dangerous goods passing through Port Klang must be declared via electronic submission to the Authority within 48 hours with some reasonable exception, prior to the arrival of the vessel. The PKA allows loading and unloading of all nine classes of dangerous goods at the Port. In 2021, the total number of dangerous goods containers in Port Klang was 177, 622 TEUs. The highest number of dangerous goods containers was in Class 9 (59,023 TEUs), followed by Class 3 (41,761 TEUs). While the lowest number of dangerous goods containers was in Class 7 (9 TEUs).



## 8.2 Dangerous Goods Managements in Ports under the Port Authority of Thailand (PAT)

Mr. Saravuth Pinmuk, Chief of the Dangerous Cargo Control Section of the PAT, gave an overview of the PAT that it is responsible for managing five main ports in Thailand, namely Bangkok Port, Laem Chabang Port and three regional ports. According to the IMDG Code, ship owner or ship agent shall submit Dangerous Goods Declaration (DGD) via the electronics systems in advance with the specified period. According to the PAT's Regulations, Dangerous Goods are classified into three Groups as per the IMDG Code;

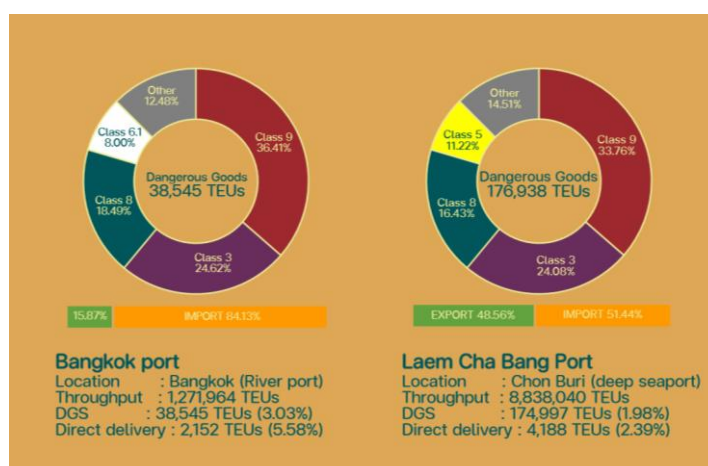
- Group 1 – Dangerous Goods prohibited to load, store, or discharge in the port area.
- Group 2 – Dangerous Goods allowed to discharge or load but prohibited to store in the port area.
- Group 3 – Dangerous Goods allowed to discharge, load and store in the port area.

Both Bangkok Port and Laem Chabang Port have issued safety regulations that categorized all Classes of Dangerous Goods into three groups and allow only low-risk dangerous goods to be stored in the specific warehouses and container yards with the fire prevention and environment protection system.



Bangkok Port allows Dangerous Goods Group 1, namely Class 1, 6.2, 7, Group 2, namely Class 2.1, 2.3, 3 (Flash Point below 10 C), 4.3, 5.1, 5.2 and Group 3 namely Class 2.2, 3, 4.1, 4.2, 6.1, 8, 9, while Laem Chabang Port allows Dangerous Goods Group 1, namely Class 6.2, 7, Group 2, namely Class 1, 2.3 and Group 3, namely Class 2.1, 2.2, 3, 4.1, 4.2, 4.3, 5.1, 5.2, 6.1, 8, 9.

In the fiscal year 2022, the total number of dangerous goods containers in Bangkok Port was 38,545 TEUs. The highest number of dangerous goods containers was in Class 9 (14,034 TEUs), followed by Class 3 (9,489 TEUs). While the lowest number of dangerous goods containers was in Class 6.1 (3,083 TEUs). Besides, the total number of dangerous goods containers in Laem Chabang Port was 174,938 TEUs. The highest number of dangerous goods containers was in Class 9 (59,734 TEUs), followed by Class 3 (42,606 TEUs).



Dangerous Goods Management in the two ports under the PAT started in 1991 after the serious accident caused by the massive explosion of dangerous goods in Bangkok Port.



The project on Handling of Safe Dangerous Goods was launched in cooperation with the Swedish Rescues Services Agency (ARV), which is consisted of the safe handling procedures of dangerous goods, program for incident and emergency prevention and preparedness. In 2003, the PAT implemented the Port Safety, Health and Environmental Management System (PSHEMS) and received the certification for promoting safety for dangerous goods management in Bangkok Port and Laem Chabang Port.

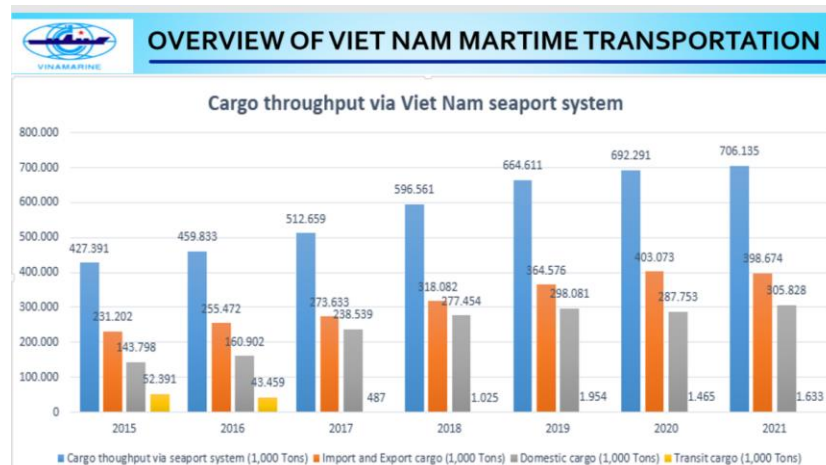
Compliance with Chapter 1.3 of the IMDG Code and Marine Department Announcements No. 209/2565, the PAT has defined the curriculum for training courses focused on both general awareness and function-specific topics for staffs, consumers, and emergency response units. The safety regulations and measures shall be upheld in accordance with standards. A schedule for inspections will be developed in due course. Dangerous Goods Control Officers will inspect all units involved in dangerous goods handling by using the dangerous goods inspection checklist.

Both Bangkok Port and Laem Chabang Port have set-up in-house emergency response teams. Trained personnel and emergency supplies are available at all times. In case of an emergency, the customers or stakeholders can contact the emergency call center via the internal hotline. Thanks to advanced technology, once an emergency occurs in Dangerous Goods Warehouses, IT systems will automatically alert the relevant operating units (either through sensor detection or pressing the emergency button).


The PAT intends to build an information network with both public and commercial sectors for risky items in the future. Through the application of technology, big data and blockchain will be introduced to improve emergency response and security management.

### 8.3 Safety for Dangerous Goods Transportation in Viet Nam

Ms. MAI Thị Ánh Tuyết, from the Viet Nam Maritime Administration, presented on the Viet Nam's seaport system which is applied into 45 ports and berths that are separated into five groups based on their locations across the 3,260-kilometer stretch of Viet Nam's coastline. She mentioned cargo throughput statistics at Viet Nam seaport which has been continuously increased from 2015-2021.



The speaker showed in detail, a delivery of dangerous goods by all modes of transport is noticeably involved with international and economy laws and conventions and shall be expected in compliance with the Circular 46/2017/TT-BGTVT of the Ministry of Transport and relevant decrees and laws being economy references of sea topics. The detail on Circular 46/2017/TT-BGTVT with its five chapters was mentioned on how transportation of Dangerous goods by sea-going vessels complies with global standards, including the SOLAS, IMDG, IMSBC, IBC, IGC, INF, and CTU regulations.



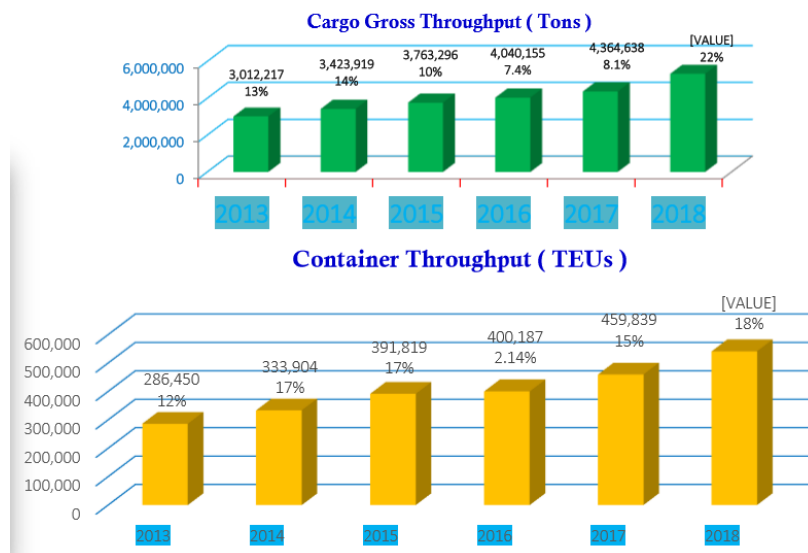
CURRENT SITUATION OF DGS MANAGEMENT IN VIET NAM					
All modes of transport used to move DGs					
	By sea	By inland water ways	By land	By rail	By air
Inter'l Con/Code	SOLAS, MARPOL IMDG, IMSBC, IBC, IGC, INF, CTU, Ems	AND	ADR (Europe)	RID	ICAO-TI
National legislation	Viet Nam Maritime Code (2015)	Inland waterway traffic law (2004, 2014)	Road traffic Law 2008	Railway Law June 16, 2017	Law on Civil Aviation of Vietnam 2006
	- Law on Environmental Protection 2014 Law on Occupational Safety and Hygiene 2015	- Law on Atomic Energy 2008 - Law on Chemicals 2018	Decree 42/2020/NĐ-CP: List of dangerous goods, transport of CP detailing the dangerous goods by road motor implementation of a vehicles and transport of dangerous number of articles of goods on inland waterways.	Decree 65/2018/NĐ-CP detailing the number of articles of the Law on Railways	
	Decree No. 58/2017/NĐ-CP regulates some articles of the Viet Nam Maritime Code on management of maritime	Decree 42/2020/NĐ-CP: List of dangerous goods, transport of CP detailing the dangerous goods by road motor implementation of a vehicles and transport of dangerous number of articles of goods on inland waterways.	Circular No. 37/2020/TT-BCT of the Ministry of Industry and Trade: stipulating the list of dangerous goods that must be packed in the process of transporting and transporting dangerous goods by road and rail motorized vehicles and inland waterways		Circular No. 42/2020/TT-BGTVT of the Minister of Transport Circular No. 18/2011/TT-BGTVT of the Minister of Transport
	Circular 46/2017/TT-BGTVT of the Ministry of Transport regulates the safety and prevention of environmental pollution caused by the transportation of DGs at sea				

There are advantages and disadvantages of the economy legislation as recommended by the IMO. Although economy legislation has been enacted regarding the IMDG Code, there is no mechanism to monitor or check its implementation. Specifically, there is no evidence of dangerous goods inspection. Despite being theatrically coordinated with the global benchmarks, many cases showed that shippers' lack of knowledge about handling of dangerous goods, packing, specifications, as well as labeling, and fail to comply with the regulations. Additionally, apart from typically understandable pros, some ports lack of training courses regarding dangerous goods and shipping lines companies' lack of facilities to print or issue special labels for dangerous goods and lack of training in handling dangerous goods.

The speaker also provided six key factors for dangerous goods management; mechanism in place to supervise or verify codes relating to dangerous goods, the necessity of developing comprehensive legal instruments/legislation on dangerous goods, the importance of coordination among agencies in the management of dangerous goods and also the handling and rescue activities, the importance of training and raising awareness on dangerous goods and rescue activities, frequent practice of simulation exercises in case of fire, toxic gas leakage, mass evacuation, environmental impact precaution and prevention, and international cooperation on Dangerous Goods Management.

#### 8.4 Best Practice of Dangerous Goods Management in Cambodia

Mr. Hong Sotheara expressed that apart from its economic strength, Cambodia positions itself as a superior location and serves as the important transport hub of the Maritime Silk Road and Asian Highway Network. Located in the rich and populous area of the Mekong Delta, it is the key node for ASEAN "connectivity", the Mekong Subregion Economic Cooperation, and other strategies, with stronger functions for receiving influence and transferring strategy. The statistics of cargo and container throughput of Cambodia showed the growing volume of cargo and container throughput which has continuously increased from 2013-2018.



The structure of the Ministry of Public Works and Transport (MPWT) was presented with Planning and Legislation Office serving as a relevant end party responsible for supervising waterway and maritime transport as well as ports in Cambodia. Most of the river ports in Cambodia are located within the Mekong River system, especially in the areas in and nearby Phnom Penh where the Mekong River, Bassac River, and Tonle Sap River join each other. The speaker focused on an individual scale which is the stock-listed Phnom Penh Autonomous Port (PPAP). In PPAP, dangerous goods are only permitted for imports not for exports. After being discharged from ships, all dangerous goods containers are placed at the container yard for a few days and transported by trucks to the cargo owner's destination. The number of dangerous goods cargos throughout PPAP per month is approximately 2 to 49 TEUs.

The Sihanoukville Autonomous Port (PAS) is the sole international and commercial deep seaport of the Kingdom of Cambodia. Likewise, its safety regulations and training programs for Dangerous goods were shown in detail. The storage process is craned out by adhering to numbers and symbols as defined in the IMDG Code (e.g., number 4 means the goods must be adequately separated 24 meters longitudinally by an intervening complete compartment). Additionally, the PAS's emergency preparation and response plan pay attention to strengthen coordination between masters of vessels, the PAS, and relevant parties observing an imminent or actual leakage, spillage, incident, or accident relating to Dangerous goods.

The five challenges of dangerous goods management are as follows:

1. the utilization of Dangerous Goods Management in Cambodia is still limited and at minimum level, it is due to insufficient of investment on the facilities for dangerous goods infrastructure in port area;
2. limitation of economy funding for investment on waterway infrastructures and port development;
3. lack of law, regulation, and technical guidelines to support on dangerous goods management and operations;
4. limitation of human resources persons, skills, knowledge, and experiences on dangerous goods management in Port Area;
5. limitation of financial support for legislation and guideline development and dangerous goods handling.

In conclusion, the speaker highlighted on safety in transportation, handling and storage of packaged dangerous goods in containers that must comply with the economy

regulation and IMDG Code including specific packaging, labeling, marking, segregation and documentation requirements. For dangerous goods transported in bulk by tanker vessels, the classification of dangerous goods also conforms to the economy regulations and the IMDG Code. Lastly, Safe transport by trucks shall comply with economy law.

### **8.5 Best Practices of Dangerous Goods (DGs) Management (Singapore)**

Mr. New Chee Wee, Principal Port Chemist (Hazardous Cargo Section), Maritime and Port Authority of Singapore (MPA), presented on the MPA's overview that it was established in order to develop Singapore as a leading global hub port and international maritime center (IMC). One of its main responsibilities is to enhance safety, security, and environmental protection in designated port areas.

Mr. New Chee Wee showed four fire incidents: two of them occurred in Tianjin and Beirut Ports, while the other two occurred on board of M.V. KOTA LUBAH and MV. MAERSK HONAM, involving Powdered Activated Carbon (PAC) and Sodium Dichloroisocyanurate. The fire incident on the vessel Maersk Honam, a Singapore's registered ship, resulted in the death of five crew members, which was caused by stowage issues and Sodium Dichloroisocyanurate.

A brief overview of Singapore's Dangerous Goods Management was presented in accordance with the MPA Dangerous Goods, Petroleum & Explosive (DGPE) Regulations 2005. Fully and seamlessly through an electronic submission system, all dangerous goods must be declared to the Authority based on the IMDG Code. For landward management, the MPA adopts an additional risk-based strategy on top of the Code requirements. The inspection part of dangerous goods was focused on which it carries out to sieve out non-declaration and misdeclarations of dangerous goods and the port states inspection procedure, which MPA conducts additional checks in compliance with IMDG carriage. Also, the inspection procedure called the Port State Control (PSC) which was illustrated as the storage condition at the yard was reviewed to dedicate storage yards for different dangerous goods with safety distance from other dangerous goods after the Tianjin incident. He explained more practical cases regarding how related parties cope with Dangerous goods incidents. The incident in serious cases involving Tier 2 or Tier 3 severities, occurring on the seaward side, the Port Master would activate and convene Emergency Operations Command (EOC) to manage the incident.

As Charcoal is a Dangerous goods (DG) classified under UN No. 1361 or 1362 as "CARBON", which is known by many other names, e.g., coconut shell, hardwood, shashi charcoal, the speaker also shared the recent IMO discussion under the Carriage of Cargo & Containers Committee (CCC) on charcoal as a dangerous good. There was feedback that the Special Provision (SP) was used in exempting the goods from the safety provisions of the Code when in fact those goods were later proven to be harmful.

### **8.6 IMDG HANDLING in Sri Lanka & Lessons Learnt**

Capt. Lakshi Wasantha, Senior Deputy Harbour Master, Sri Lanka Ports Authority presented on the IMDG handling in Sri Lanka. General imposing and implementing processes involve parties starting from the UN down to the Sri Lanka Ports Authority (SLPA), the focal point of the presentation. Its detailed process on dangerous goods documentation and local clearance was presented, including duties of Sri Lanka Customs, Marine Police, and SLPA Security serving at the end of the process.

The accidents in Sri Lanka and crossing Sri Lanka Water were explained to show severities and challenges; many of them happened due to the non/misdeclaration of dangerous goods. For example, the fire incident at Container Freight Station 01 is being suggested that the Authority should not solely depend on the declaration and always cross-



check with Cargo Manifest to confirm non/misdeclaration possibilities. Similarly, the case of the fire onboard of M.V MSC DANIELA and M.V. ZIM CHARLESTON also explained the consequence of undeclared dangerous goods.

In addition, a fire incident was caused by a missing crew member, shown in the case of the engine room of M.T. NEW DIAMOND Vessel, which fixed Co2 System was delayed in activating. Another fire incident at South Asia Gateway Terminals (SAGT) addressed a challenge regarding the difficulty of approaching the root of the fire due to high container stacking. The lessons learned are to purchase the piercing hydrogen and to have a centralized database to identify shippers, shipping lines, or originating countries linked to non/misdeclaration of dangerous goods containers. The other cause of incidents is chemical leakage as a result of substandard or faulty packing materials. For instance, the fire accident on the container vessel X-PRESS PEARL, caused by leaking of Nitric Acid, developed four recommendations, including a secondary port for refuge and sharing all details (the General Arrangement Plan, stowage plan with the IMDG cargo locations, firefighting arrangement plan, etc.) to parties involved before the arrival of Dangerous goods.

With the picture of the Beirut explosion incident serving as an epilogue, the speaker explained remedies for minimizing all mentioned incidents. One of these is the suggestion to use the Intermediate Bulk Container (IBC) tanks for dangerous goods by an independent third party. He showed comprehensive procedures for handling dangerous goods in all aspects, while becoming prepared for emergencies in the worst-case scenario.

## OUTPUTS AND OUTCOMES

The methodology will be mainly of the qualitative type, allowing for the evaluation of the Course's development. The following indicators were used to measure progress towards the Project is outcomes and outputs:

Table: Evaluation indicators for Project Outputs:

<b>Outputs</b>	<b>Target Goals</b>	<b>Achievement</b>
A two-day Hybrid Capacity Building Course	The minimum number of participating economies is 8	14 participating economies
	The minimum number of delegates both APEC and non-APEC is 25	61 delegates
	Percentage of male/female participants is 60/40	73/27
	Percentage of male/female speakers/experts is 70/30	50/50

The Course was attended by a total of 61 participants from 11 APEC economies, namely China; Japan; Korea; Malaysia; Peru; the Philippines; Singapore; Chinese Taipei, Thailand; the United States; and Viet Nam, in addition to 3 Non-APEC economies, namely Cambodia, Sri Lanka and France.

To achieve the project's target goals, female participation as speakers and participants in the Course has been encouraged based on the project's highest efficiency; therefore, the target is set to reach at least 40% of female participants and at least 30% of female speakers. The project has achieved a percentage of female speakers at 50% while the percentage of female participants is 27% lower than the target because the maritime administration mostly male.

Table: Evaluation indicators for Project Outcomes:

<b>Outcomes</b>	<b>Target Goals</b>	<b>Achievement</b>
Enhanced understanding and expertise in the management of dangerous goods	75% of participants gained an in-depth understanding of dangerous goods management, or became aware of its significance	90% of participants improved their knowledge and expertise in managing dangerous goods management after taking the Course
	25% of developing APEC economies report substantial knowledge increases.	63% of developing APEC economies report substantial knowledge increases
	30% women report substantial knowledge increase	64% women report substantial knowledge increase
Best practices on dangerous goods management	The number of best practices on dangerous goods in APEC, a minimum of 8 best practices from participating economies	8 best practices from participating economies

The APEC Project Evaluation Survey was established to cover the substance and relevance of the Course, overall organization, gender issue as well as overall impact and recommendations for improvements and/or future activities, which is attached in Annex 3. The results of the survey are as follows:

A total of 30 participants from Korea; Malaysia; the Philippines; Singapore, Thailand; and Viet Nam responded to the questionnaire. Referring to the World Bank Country classification by income, those economies represent the developing economies. The respondents are 19 male and 11 female.

After attending the course, 63% of the participants increased their substantial knowledge on dangerous goods management. The average of knowledge and skills for dangerous goods Management prior to participating in the Course is 23.3% and 16.7% are high and very high, respectively. Meanwhile, the knowledge and skills in the Dangerous Goods Management after participating raised to 60%, high, and 30% is very high.

About 60% of participants agree that this project was very relevant to them and their economy since the impacts of dangerous goods accidents will be a massive impact on their organization and economy in terms of business, health, and environment.

Moreover, 67% of the participants strongly agreed that the training objectives were clearly defined and gender issues were sufficiently addressed during implementation. An average of 77% of the participants coincided that the project achieved its intended objectives, well content organized and easy to follow, and the materials distributed were functional. Most of the participants accounting for 93%, highlighted the speakers and facilitator were very well prepared and knowledgeable about the dangerous goods. However, some participants requested more time for this Course as the content of dangerous goods is extensive.

The participants agree that this project is the platform for bringing together experts on safety assurance in the transport of dangerous goods from the International Maritime Organization (IMO), ESCAP, France, and Korea, with the main content of regional capacity building on promoting the safety management of dangerous goods in port areas in the Asia-

Pacific region. This will enhance knowledge and exchange experiences about dangerous goods from the APEC economies and Non-APEC economies. In addition, this project will assist the participants in applying dangerous goods recommendations for future work.

All participants have increased awareness of the importance of managing dangerous goods in order to prevent a severe accident on the carriage, especially at port. They also gained knowledge of the IMO conventions, especially the IMDG Code, national regulation and the Emergency and Contingency Response from other economies. One participant mentioned that the presentation and English skills were gained from this Course.

The participants will apply the project's content and knowledge gained from this Course in their work by developing regulations, relative strategies, policies, plans and Standard Operating Procedure (SOP), as well as organizing capacity building and training courses on Dangerous Goods Management. Moreover, they will also build on doing a scientific project on the management role of the maritime state management agency in the direction of dangerous goods at Inland Container Depots.

The suggestion for the project to the next activities is the collaborative approach with the International Organizing (e.g., IMO) to support each economy with technical assistance for managing the transportation of dangerous goods and continues coordination with economies to support each other with the implementation and development of the dangerous goods as well as conduct the next Capacity Building.

## CONCLUSIONS

In recent years, there have been reports of fires and explosions on board and in port areas. In all cases, the investigation reports indicate that dangerous goods are the most likely cause of the incidents.

Some accidents involving packaged dangerous goods arise from a need for knowledge of the applicable international regulations and the challenge of ensuring that all relevant people involved in ocean shipping must follow these regulations rigorously. Also, misdeclaration and non-declarations of dangerous goods can be identified as a factor.

Participants recalled that sustainable maritime connectivity and port development not only enhanced economic growth and regional integration but also contributed directly and indirectly to the achievement of UN Sustainable Development Goals 12, which aim to ensure sustainable consumption and production patterns by implementing efficient management of dangerous goods at the global, regional, and economy levels.

Through, the participants also realized the seriousness of the economic, environmental, and social impacts of accidents involving dangerous goods. Through the sharing of accident cases, and shared the recognition that prevention is as important as an appropriate response to accidents.

Participants further recognized that various conventions and regulations, including IMDG Code for safety in maritime transport and handling of dangerous goods in port areas of the International Maritime Organization (IMO), are the backbone of maritime safety and that the application of these measures and regulations contributes to a reduction in safety accidents.

The capacity-building activities, research analysis, and technical assistance for promoting dangerous goods safety in ports should continue. Participants emphasized that cooperation and partnership with all stakeholders, including member countries, international organizations, sub-regional institutions, research institutes, and the private sector, are essential for the implementation of safety management measures for dangerous goods in the Asia Pacific region.

General appreciation was expressed to economy and international experts who delivered presentations on promoting safety for dangerous goods in the Asia Pacific region and future policies of safe maritime transport.

The participants expressed their appreciation to the Port Authority of Thailand for organizing and hosting “The Promoting Safety for Dangerous Goods Transportation in the Asia-Pacific Region” and thanked the ESCAP for technically supporting this workshop.

## RECOMMENDATIONS

Taking into consideration the existing provisions as contained in the international instruments of transport, as well as the discussion and exchange of views of the participants, the following recommendations were discussed during the Workshop:

No.	Recommendations on Dangerous Goods Management
1.	Raise awareness of the existing international regulatory instruments and policies regarding the transport of dangerous goods, present measures currently being taken to implement those international instruments, and how economies carry out their responsibilities as a Competent Authority (CA).
2.	Follow up on the current work of the relevant organizations (e.g., UNECE, IMO) dealing with regulatory matters related to the transport of dangerous goods.
3.	Create a program on additional capacity building (including training the trainers) to promote safety, emergency, response, and technical aspects concerning Dangerous Goods Transportation in the Asia-Pacific Region.
4.	Provide Competent Authorities in the region to identify the difficulties encountered for the implementation and compliance of international regulations related to dangerous goods
5.	Identify the respective roles, duties and responsibilities of each entity involved (i.e., Competent Authority, Port Authority, Shippers, terminal and other stakeholders) in transporting dangerous goods in port areas. Revise and improve the internal procedures and processes of functions in place as necessary or existing policies of the various authorities such as Competent Authority, harbour masters, port state control, etc., and those should be stated and disseminated in an appropriate internal instrument (e.g., Department Order and Joint Policy Guidelines, and Notice). Compliance with related international instruments should be observed. The reorganization or specific assignment of dangerous goods related to shore-based personnel should be considered and communicated to all relevant stakeholders;
6.	The competent Authority should constantly update the list of contact information of the offices designated as responsible for the safe carriage of dangerous goods, and this information should be circulated among member economies. In relation to maritime transport, the IMO document CCC 8/17/3 on the GISIS module on contact details should be observed.
7.	Explore the possibility of using digitalization to improve safety and efficiency of the processes in managing of dangerous goods in port areas and facilitating emergency response.
8.	Provide a regional mechanism to facilitate the response and support to major incidents.
9.	Provide a mechanism (e.g. global or regional) such as a repository for regular exchange of incidents information experiences and lessons learned in relation to incidents on dangerous goods and related activities in port areas.

10.	Establish a regional and regular meeting to be attended by Competent Authorities and relevant stakeholders to promote information exchange, best industry practices, including difficulties encountered in dealing with the dangerous goods chain of transport.
11.	In terms of energy transition, it is recommended that all ports in the region become aware of and contribute to the new requirements in decarbonization to be prepared for potential incidents in relation to new alternative fuels. In this context, member economies are invited to follow and participate in the IMO discussions on New Alternative Fuels in the Sub-Committee of Carriage of cargoes and containers (September 2023)
12.	Introduction and implementation of a systematic inspection program for imported and exported containers, based on a risk assessment methodology and control management, as well as the long-term experience in order to create a reliable system.
13.	Coordinate with ESCAP to continue its cooperation on these issues through analytical work, capacity building and technical assistance and through establishing linkages with its inland transport connectivity work.
14.	Invite IMO to observe this Course's recommendation and continue its technical cooperation in the region, given dangerous goods management in port areas and new alternative fuels.

All speakers and participants in the course agreed upon the above conclusion and recommendations on 2 December 2022 in Phuket, Thailand.

## ANNEX 1: AGENDA OF THE CAPACITY BUILDING



**The Promoting Safety for Dangerous Goods Transportation  
in APEC Region  
1-2 December 2022  
At Grand Mercure Phuket Patong Hotel, Phuket, Thailand  
and online.**



<b>Time</b> <small>Thai Time (GMT+7)</small>	<b>Session</b>
<b>[Day 1] 1 December 2022</b>	
08:00-08:35	<b>Registration of participants</b>
08.35-09.00	<b>Opening Session</b>
09.00-10.30 Agenda 1	<b>Presentation on International regulatory framework for the maritime transport of dangerous goods (IMDG code)</b> by Mr. Alfredo Parroquín-Ohlson, Head of Cargoes Section and Technical Cooperation Coordination, Maritime Safety Division, IMO
10.30-11.00 Agenda 2	<b>Regional perspective on the safety of Dangerous Goods (Dangerous goods) in the port area in the Asia Pacific Region</b> by Mr. Sooyeob Kim, Economic Affairs Officer, ESCAP
11.00-11.10	- COFFEE BREAK -
11.10-11.55 Agenda 3	<b>Recommendation for the Safety of Dangerous Goods (DG) in the Port Area in the Asia Pacific Region</b> by Ms. Sohyun Jo, Division of Navigation Convergence Studies, Korea Maritime and Ocean University
11.55-12.45	-LUNCH-
12.45-13.15 Agenda 4	<b>Maritime Transport of Dangerous Goods in Thailand</b> by Ms. Soontharee Pirom, Chief of Environment Division, Marine Department
13.15-13.45 Agenda 5	<b>Proposed technical guideline/recommendation on Dangerous goods implementation</b> by Mr. DUMAZ Jean-Michel, Regional Civil Protection and Crisis Management Attaché, French Embassy in Thailand
13.45-14.15 Agenda 6	<b>Strategies for applying digital technology to improve the safety management of dangerous goods in the ports</b> by Ms. Kyeongrim Ahn, CEO of K Consulting
14.15-14.30	- COFFEE BREAK -
14.30-15.00 Agenda 7	<b>Training program on port development and management</b> by Mr. Young Wong Kim, Korea Ports & Harbours Association
15.00-16.00 Agenda 8	<b>Best practices of Dangerous goods management from selected Asia-Pacific economies (3 case studies, 20 Mins for each)</b> <ul style="list-style-type: none"> <li>• Malaysia</li> <li>• Thailand</li> <li>• Viet Nam</li> </ul>
17.30-21.00	<b>Welcome Dinner</b>

<b>[Day 2] 2 December 2022</b>	
09.00-10.20	<b>Best practices of Dangerous goods management from selected Asia-Pacific economies</b> <ul style="list-style-type: none"> <li>• Cambodia</li> <li>• Singapore</li> <li>• Sri Lanka</li> </ul>
10.20-10.40	- COFFEE BREAK -
10.40-12.00	<b>Workshop</b> participants will engage in group work (3-4 groups including virtual participants) to finalize the draft recommendations. The speakers will facilitate the group discussions and help finalize the conclusions
12.00-13.00	-LUNCH-
13.00-13.30	<b>Feedback from Group discussion</b> Rapporteur
13.30-14.00	<b>Conclusions and recommendations</b>