



A comprehensive holistic approach to enhance safety and address the carriage of undeclared, misdeclared and other non-compliant dangerous goods

A white paper by National Cargo Bureau



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## Executive Summary

An increasing number of containership incidents are being caused by poorly stowed, undeclared or misdeclared dangerous cargoes. Nine major containership fires were reported in 2019 resulting in tragic loss of life, significant damage to vessels and cargoes, and a range of other associated consequences. The increasing number of containers being carried coupled with the trend for larger containerships is exacerbating and concentrating this risk.

The National Cargo Bureau's Container Inspection Safety Initiative revealed an alarming number of containers carried by sea include misdeclared cargoes that represent a serious safety risk to crew, vessel and the environment. This is hard to ignore.

Reasons are varied and include the difficulty of supply chain stakeholders complying with a myriad of regulations; a poor understanding of what constitutes a dangerous cargo and what is required to transport it; the increasing complexity of multi-modal supply chains; carriers and ports restricting or refusing to move or receive certain dangerous cargoes; varied internal company challenges; and the continuing threat of bad actors.

The National Cargo Bureau is calling for urgent reform and offers a way forward for enhancing industry-wide compliance and safety. It recommends a comprehensive, holistic dangerous goods program that sets a high, minimum bar for achieving regulatory compliance requiring a robust internal safety culture with strong management backing.



## The issue

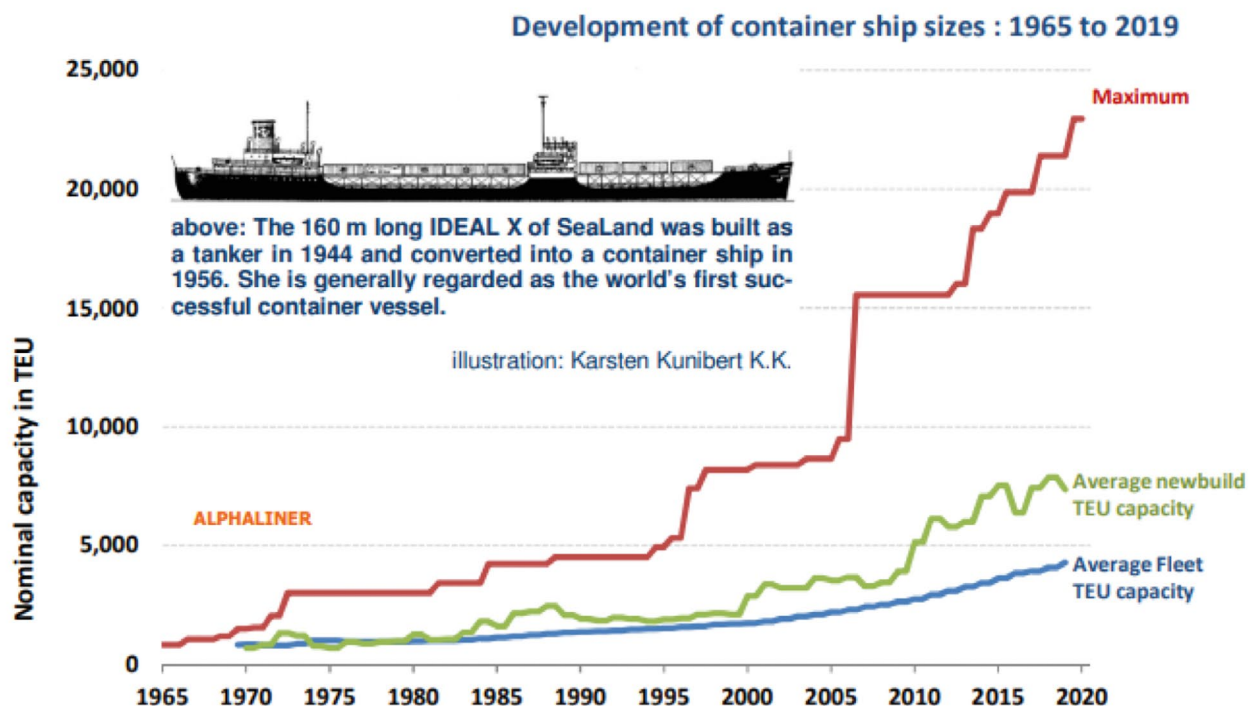
Undeclared or misdeclared dangerous goods (DG) cargoes are responsible for an increasing number of containership incidents. In 2019 alone, nine major cargo vessel fires were recorded and statistics<sup>1</sup> show that it is the larger vessels that are most affected. Tragically, many of these fires resulted in loss of life as well as significant damage to the vessel and cargo.

Statistics from the TT Club – a leading provider of insurance for the international transport and logistics sector – suggest that, on average, a containership is involved in a major fire every 60 days.

Aside from the human impact and damage to hull and cargo, other consequences include environmental damage and resulting remediation costs; salvage and wreck removal; disruption to schedules and operations; loss of earnings by carriers, shippers, and/or receivers; increased insurance premiums; years of litigation with multiple actors involved; potential criminal or civil penalties and fines; damage to customer relationships; loss of market share; and ultimately damage to a company's brand and reputation.

Containerships are getting bigger. Individual carrying capacity has increased more than 1500% since the late 1960s and the largest vessels now have capacity to carry more than 23,000 TEU (twenty-foot equivalent unit).

More containers on board equates to a greater chance of a vessel being exposed to an undeclared or misdeclared DG cargo. And larger ships carrying more cargo represents a greater accumulation of risk as evidenced by incidents such as the **Maersk Honam**.



1. Cefor NoMIS database

## Containership fire: Maersk Honam

The Ultra Large Container Carrier (ULCC) Maersk Honam with a capacity of 15,266 TEU caught fire on 6 March 2018 while in the Arabian Sea approximately 900 nautical miles southeast of Salalah, Oman. 27 crew were on board and 7,860 containers were stowed.

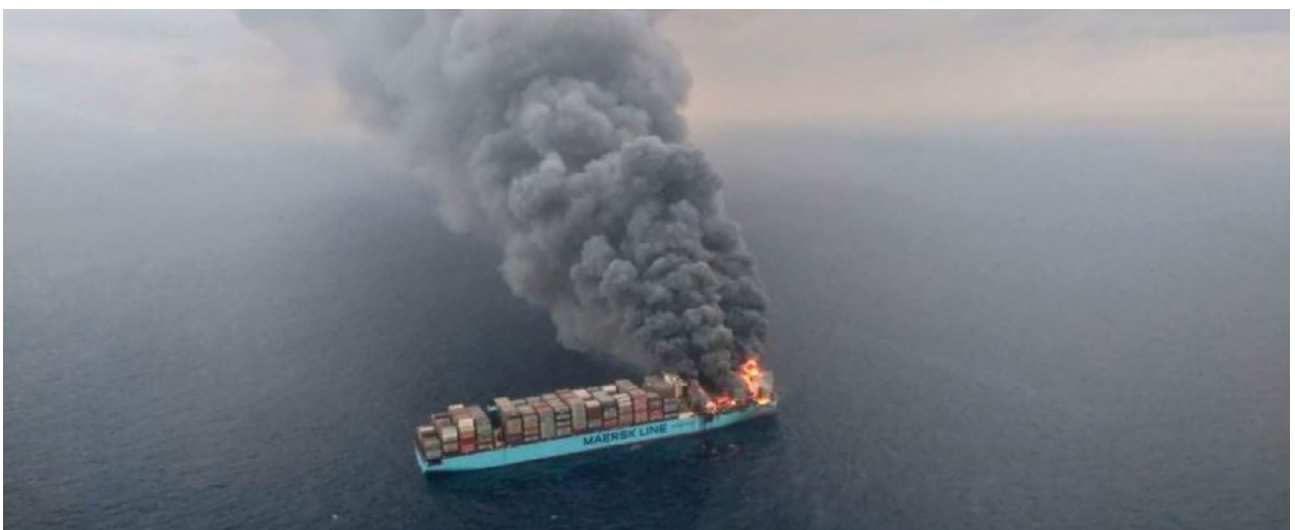
Tragically, five crew members lost their lives and the vessel itself and all cargo forward of the superstructure was severely damaged.

It took about five weeks to finally bring the fire under control and a further two weeks before the vessel could be towed to Jebel Ali, a port of refuge, to unload the unaffected cargo.

Salvage security was reportedly set at 42.5% (CIF) value of cargo and the general average deposit was 11.5% of cargo value. The first intact containers were not released for three months. Total cost of repairs to the vessel alone were reported to be \$30 million.

According to the International Union of Marine Insurance (IUMI), the cargo damage is likely to be the largest general average loss in history, but the outcome will probably not be known for years.

The cause of the fire has not been determined, but it is suspected that undeclared or misdeclared DG cargo was involved.



# The growing spread of undeclared and misdeclared DG cargo



Routine container inspections show a high degree of non-compliance with declared DG containers including an excessive incidence of poor stowage and securing.

Last year, NCB conducted 32,387 DG container (dry and tank) inspections in the USA and found that 7.9% of these units (equating to 2,569 containers) were non-compliant due to poor stowage/securing; misdeclared cargo or other related issues.

NCB recently spearheaded a [Container Inspection Safety Initiative \(CISI\)](#) involving the inspection of 500 containers from participating carriers. These inspections included DG and non-DG import loads from Latin America, Europe, Asia and Middle East as well as export loads involving shippers that had not previously been exposed to container inspections. The objective of this initiative was to quantify the level of danger that exists on every voyage caused by misdeclared or insufficiently secured cargoes. It is intended that this will act as a catalyst for increased container inspections

globally, increased safety awareness and regulatory compliance of shippers, freight consolidators and export container packers; and ultimately a reduction in shipboard incidents due to non-compliance with DG regulations.

55% of inspected containers failed to comply including 43% for poor securing of cargo within the container. Approximately 6.5% of the DG containers contained DG cargoes that had been misdeclared. Interestingly, for DG containers exported from the USA, the failure rate was 38% which, when compared to the annual average of 7.9% for regular inspections, may be a strong indication that shippers and consolidators are more likely to comply with applicable regulations if there is a reasonable chance their shipment will be inspected.

Startlingly, 2.5% of inspected imported DG containers were found to include misdeclared cargoes that represented a serious risk to crew, vessel and the environment.

When extrapolated to the 5.4million<sup>2</sup> DG containers shipped annually, the potential risk to life, vessel, cargo and the environment is unacceptably high and hard to ignore.

One common example (pictured) is where flammable liquids are misdeclared as “limited quantities”. DG cargoes declared and shipped as limited quantities are packaged in small quantities and, therefore, are not required to comply with the stowage and segregation requirements and restrictions applicable to larger quantities.

Misdeclaring flammable liquids as “limited quantities” could lead to improper stowage or segregation next to other incompatible goods, ignition sources or unprotected spaces which could significantly increase the risk of fire on board the vessel.

Over the past three years, NCB also conducted 3,286 DG compliance reviews on board container vessels on behalf of vessel operators. Of these reviews, 24% were noted with some type of stowage or segregation error including those related to regulatory requirements and/or the vessel's document of compliance. 71% of these reviews also uncovered discrepancies on the vessel's dangerous cargo manifest such as missing stowage positions or emergency response information, incorrect proper shipping name or identification number, or missing signatures to signify that the dangerous cargo manifest had been reviewed and found correct.

The levels of non-compliance observed indicate a system ripe for the type of disasters the industry has experienced over the last several years. This will continue unless a comprehensive holistic approach is adopted by the industry to attack the root of the problem and minimize non-compliance by all supply chain participants.



2. Comments submitted to IMO by the International Cargo Handling Coordination Association (ICHCA) in July 2017

# Reviewing the causes

## Regulations and compliance

Regulations governing the transportation of dangerous goods were developed to protect life, property and the environment. They impose specific obligations and requirements for all supply chain participants. Each participant must rely on the others to fulfil their obligations or overall supply chain safety will be compromised.

However, trade continues to grow both in terms of volume and reach; and demands for faster, just-in-time deliveries have created complex supply chains requiring more interdependency amongst participants and has resulted, in many cases, in a lack of visibility.

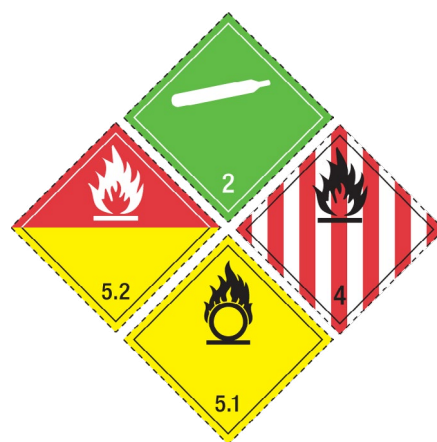
In this environment, many shippers are finding it challenging to keep pace with the regulations – especially those who view DG compliance as simply a regulatory mandate rather than an integral part of their safety culture. Many organisations offer insufficient training resulting in inadequate knowledge surrounding industry regulations and, as a consequence, standards are low. The increasing adoption of e-commerce is also creating potential for non-compliant dangerous goods as many of these new types of shipper have limited knowledge of the applicable regulations – or simply don't realize the items they are moving are regulated as dangerous goods.

A lack of harmonization between modes of transportation, international regulations such as the International Maritime Dangerous Goods (IMDG) Code, and the multitude of national dangerous goods regulatory requirements are creating additional confusion and the potential for gaps in compliance. Additionally, enforcement of domestic and international regulations is being hampered by governmental hurdles and lack of resources in many countries.

## Limiting the movement of dangerous goods

Inadvertently, shipping lines themselves are amplifying the risk of misdeclarations when they ban or limit the carriage of certain dangerous goods - calcium hypochlorite is an example. This oxidizing agent is designated as a Class 5.1 oxidizer under the IMDG Code and has been implicated in several high-profile container vessel fires over the years. However, continued high demand for this product has led to instances where calcium hypochlorite has been misdeclared as calcium chloride, bleaching powder, disinfectant, chloride of lime or chlorinated lime so it can continue to be transported.

Port restrictions can also lead to misdeclaration. Many ports drastically tightened their dangerous goods guidelines after the Tianjin DG incident in August 2015<sup>3</sup> with some even prohibiting dangerous goods from being accepted. One major shipping line, using a search engine designed to screen cargo bookings to pick up potentially undeclared dangerous goods or other suspicious cargo using synonyms or other key words, reported a significant increase in the number of possible hits in 2015 which was partially attributed to the "Tianjin Effect".



3. According to various media reports, investigators in that case found more than 11,300 tons of DG stored illegally at a warehouse located at the port of Tianjin. The contents consisted of more than 40 different hazardous chemicals including 800 tons of ammonium nitrate, at least 700 tons of Sodium Cyanide and 290 tons of nitrocellulose, a highly combustible product which had reportedly been stored incorrectly and auto-ignited. The resulting blasts killed 165 people, injured 798 and caused over \$1Billion in economic losses.



## Reviewing the causes continued

### Vessel sharing

The proliferation of vessel sharing agreements and carrier alliances means that operators who follow best practices and utilize sophisticated tools are still exposed to other carriers that may not adhere to the same standards. Vessels are only as safe as the weakest link, and in today's environment, cargoes from all shipping lines will, at some point, be transported by another carrier. Individual vessel owners or operators involved in a carrier alliance or vessel sharing agreement may also maintain their own restrictions and prohibitions on carriage of specific DG cargoes, adding a further layer of complexity and required coordination.

### Complex supply chains

The increasing complexity of supply chains have encouraged some carriers to widen their offering to include full, in-house, door to door solutions comprising freight forwarding, warehousing, consolidation, intermodal, trucking and other logistics services in addition to ocean transportation. Associated growing pains can lead to DG compliance getting lost in the increasing complexities of the business. Additional commercial pressures and the faster pace at which cargoes are expected to move has reduced the turn time for review and acceptance of DG shipments at every stage of transportation.

### Internal pressures

Most, if not all, container vessel operators have developed processes and procedures for the review, approval, acceptance and carriage of dangerous goods. However, management support, resources, tools, processes/procedures and training can vary greatly and may not be in line with industry best practice.

Problematic areas for carriers may include siloed corporate structures that foster a lack of clarity around "ownership" of DG compliance; or reliance on manual systems or multiple "legacy" systems for compliance, booking or terminal operations that are not compatible or do not capture all required DG information; or undisciplined "cut-off" times leading to potential issues with verification of DG information, correct or complete DG documentation, or proper vessel stowage and segregation of DG cargoes.

Some carriers have not instituted a robust DG container inspection program. Others may rely too heavily on DG software to achieve proper stowage and segregation of DG cargo on board vessels. This software may not be updated in a timely manner; or it may not consider specific stowage provisions or the vessel's Document of Compliance, leading to errors particularly in cases where the vessel planners have not been adequately trained.




# Recommendations


Because of the clear and present risk to safety of life, vessels, cargoes and the environment caused by undeclared, misdeclared and non-compliant dangerous goods, we strongly recommend a comprehensive, holistic and coordinated industry approach to address these pressing issues.


Industry best practice, including the integration of digital tools and physical processes as well as analysis of collective data, should be embraced to enable efficiency, manage costs and allow for the best utilization of resources.


National Cargo Bureau recognizes that container vessel operators bear a disproportionate level of the risk associated with the carriage of non-compliant dangerous goods and has developed the following list of recommendations to assist shipping lines with this issue; emphasizing specific actions to be considered in developing a holistic solution to mitigate the increasing risk profile of transporting dangerous goods.


 **Establish a corporate culture for DG compliance.** A key premise to establishing a robust culture is creating an awareness of the importance and responsibility for all employees to comply with applicable regulations and company policies. This requires company management's commitment to DG regulatory compliance including resources, backing, execution and authority for DG employees tasked with functional implementation.

A corporate DG policy should be developed which clearly delineates functions and responsibilities for each business unit and employee roles related to acceptance and handling of DG cargo; reinforcing best practices and fostering rigorous DG compliance and training.


 **Establish a Dangerous Goods department** with full authority, and backing from senior management, on all matters concerning acceptance and transport of DG shipments. This dedicated DG department should receive thorough training in the requirements of IMDG Chapter 1.3 as well as all applicable local requirements, periodically supplemented with refresher training to take account of changes in regulations and practice.

 **Establish a compliant DG training program** that includes mandatory general awareness training for shore-based personnel throughout the company, where applicable, with function specific training where necessary. This should go beyond just "checking the box" and include training that ensures employees can apply the necessary regulatory knowledge to their specific job function.

 **Establish disciplined "cut-off" times** for booking and acceptance of DG cargo for receipt of final, certified and signed DG shipping papers / DG declarations; and for physical receipt of DG containers. Disciplined "cut-off" times allow for adequate time to review DG for acceptance (including by consortium/slot charter partners), resolve any discrepancies, and approve the information offered as well as provide sufficient time for container inspections, proper planning and terminal staging for loading DG to assigned positions on the vessel. No DG cargo should be accepted after established "cut-off" times without express approval of the DG department.


 **Incorporate integrated digital tools** that automate critical compliance functions. This would include a tool to screen initial booking data and subsequent documentation such as dangerous goods declarations and bill of lading shipping instructions for "key" words or phrases to detect undeclared or misdeclared dangerous goods before cargo is accepted; a tool to automatically check booking data for DG compliance with international regulatory requirements under the IMDG Code (and domestic or local requirements where applicable); as well as a centralized portal for validation of data elements against specific port restrictions, in-house restrictions and partner restrictions for vessel sharing agreements.

There should be a process in place for the regulatory updating of any software systems or tools used in the DG booking or approval process. It is also critical for online booking systems to have fields designed to capture all DG data elements, particularly when the system is used to automatically populate dangerous cargo manifests provided to the vessel.


 **Establish a DG documentation process** that requires certified and signed DG shipping papers to be in hand, reviewed for acceptance and validated against approved booking information before shipments are loaded to a vessel. This would include review of preliminary and final Hazmat shipping papers or DG declarations for regulatory compliance and comparing Bill of Lading or Shipping Instruction information against approved booking information and shipping papers to ensure consistency of information provided and to capture any misdeclared cargoes.




## Recommendations continued


 **Establish a DG planning process** that is strictly controlled. Planners should only plan and load shipments included on a load list approved by the DG department. Any changes to the load list or stowage plan should be approved by the DG department.


DG stowage & segregation checks should be incorporated into an automated planning tool. However, these checks should not substitute for a properly trained planner's knowledge to ensure all stowage and segregation requirements are accounted for in accordance with national and international regulations (where applicable) and the vessel's Document of Compliance. In addition, a process involving "4 eye" checks should be developed to confirm proper stowage and segregation.

 **Adopt a risk-based strategy for stowage of dangerous goods** that enhances safety on board container ships. This strategy would not replace the SOLAS and IMDG requirements for stowage and segregation, and should complement, but not substitute ship operators' existing measures for the carriage of properly declared dangerous goods. Considerations for risk-based stowage should include actions required in the event of serious incidents such as fire, toxic gas leakage or explosions involving dangerous goods.<sup>4</sup>


 **Establish a receiving in-gate process for DG cargo** that incorporates a centralized data base to provide automatic display of correct container marking and placarding during inspection and review of DG cargo at the gate to avoid errors, increase compliance and speed of the in-gate process. In-gate process should include a physical external inspection of containers for damage, signs of leakage and proper placards and marks.

Container placards and marks should be reviewed against booking information to ensure they match. Any container that does not match booking information, documentation or that does not pass physical external inspection should be placed on hold; responsible parties advised; and deficiencies rectified before cargo is accepted.

 **Establish a DG container inspection program** to validate integrity and ensure proper marking and placarding of the container; to ensure compatibility and proper securing of cargo stuffed in the container; and to check, where possible, for proper package labelling and marks, the existence of damage, leaks or spills or potential undeclared cargo. A risk-based matrix should be considered to determine type hazards, location, and numbers of containers to target for inspection. Inspection procedures and a common, centralized data base accepted by industry should be utilized to provide a minimum standard of quality control, capture inspection information for analysis and ensure efficient use of resources.

 **Establish a vessel inspection process for DG cargo** that fosters good communications between vessel, terminal planners and assigned shipping line planner during loading operations. DG stowage plan should be reviewed prior to commencement of operations, during loading to review for any updates and upon completion to ensure final stowage and segregation complies with applicable requirements.

Physical loading operations should be monitored to ensure containers are stowed in assigned positions and/or to approve alternate positions as necessary. Planners and the DG department should be alerted to any changes and the dangerous cargo manifest updated accordingly. The dangerous cargo manifest should be reviewed, any discrepancies corrected, and final manifest signed to acknowledge correctness by designated vessel personnel.

 **Create one common, centralized DG data base** that the industry can access and update on an ongoing basis. This data base should include details that can be analyzed to determine trends, improve standards and better target resources to address recurrent issues and their root causes.

Valuable data points may be derived from DG incident information produced by CINS members; booking rejection details and confirmed undeclared or misdeclared DG cargo hits resulting from cargo screening or other integrated digital compliance tools; including discrepancies discovered during DG container inspections and "4 eye" vessel stowage checks.

Outcomes may include a "Trusted Shippers" list for reduced inspections; a target list of repeat offenders for follow-up and increased scrutiny; more detailed training for identified employee functions, or continual updating of targeting matrices for container inspections.

4. Strategy developed and promoted by CINS, a Liner industry association that captures operational cargo related accidents and incidents reported by Members with all relevant information entered into the CINS database. The data is analysed, with trends identified and measures developed to prevent future incidents. All Shipping Lines are encouraged to join.

## Conclusion

Undeclared, misdeclared and poorly stowed dangerous goods cargoes represent a serious risk to life, property and the environment.

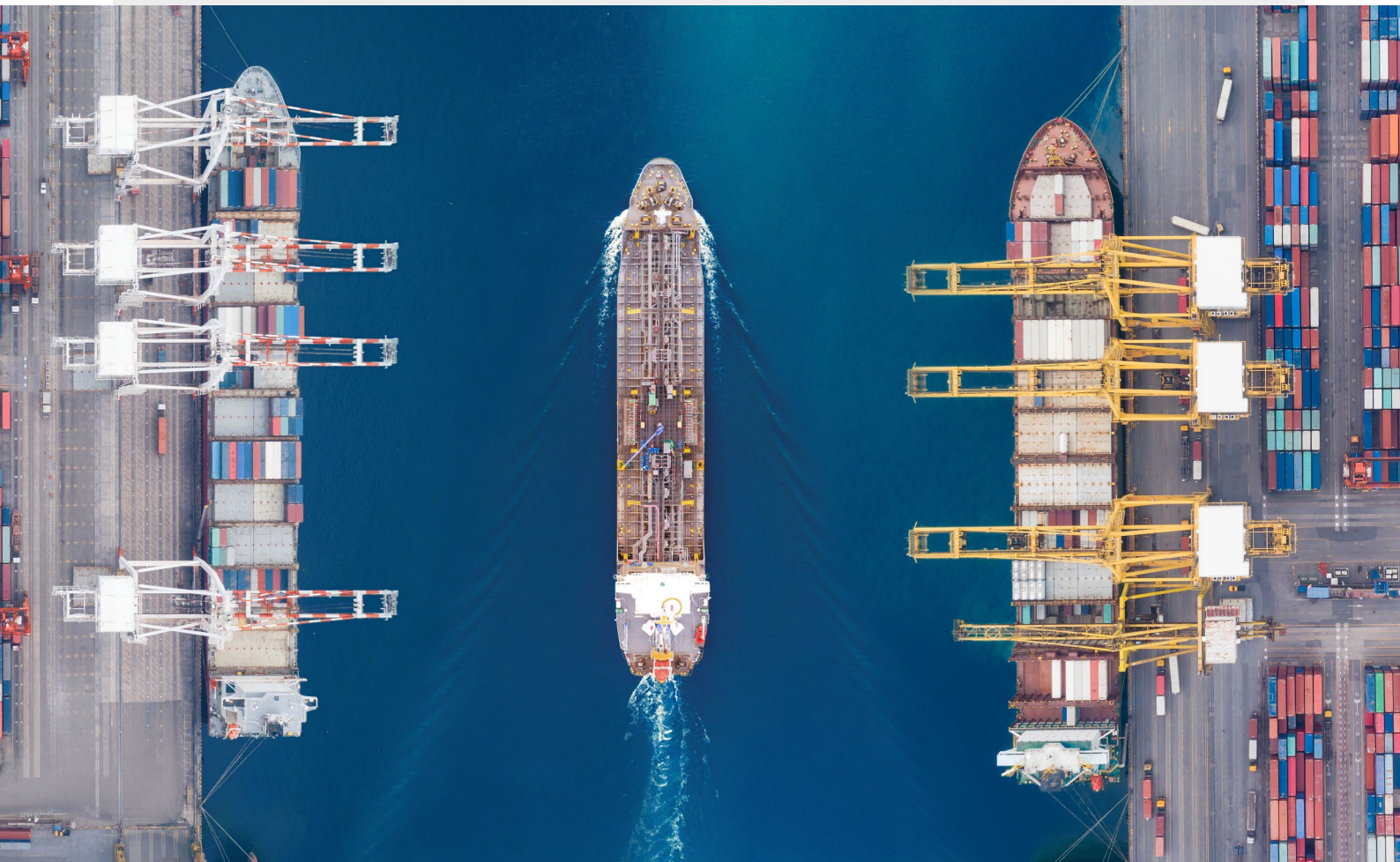
The National Cargo Bureau urges all those involved in the ocean carriage of containers to take action and adopt a comprehensive, holistic DG program that sets a high, minimum bar for achieving regulatory compliance and minimizing incidents.

The incorporation of digital tools and centralized databases will be a critical component of any program and should result in better detection of undeclared and misdeclared cargo before loading to vessels; increased efficiencies and reduction in unnecessary administrative functions and associated costs; a decrease in human error and faster turn time on DG booking approvals; and the production of valuable data to be used for analysis to determine trends and better target resources to address recurrent issues and bad actors in the supply chain.

The development of a robust safety culture with strong management backing is crucial to the successful implementation and ongoing effectiveness of a company's DG program. This includes continual improvement through investment, education, training and outreach to the broader community of industry stakeholders who play a role in the safe transport of dangerous goods.

The industry should also work together in order to address DG regulatory issues. This may best be accomplished by establishing working relationships between relevant organizations to consider the way forward, engage with regulators as appropriate, and arrest the disturbing and costly trends in recent years involving the carriage of undeclared, misdeclared and other non-compliant dangerous goods.

The National Cargo Bureau is calling for industry to adopt its recommendations. In doing so, the NCB is confident that the number of maritime incidents directly related to the carriage of undeclared, misdeclared and other non-compliant dangerous goods will be reduced.



## About National Cargo Bureau

National Cargo Bureau was incorporated as a non-profit organization in May 1952 with a mission of "Safety of Life and Cargo at Sea". The Bureau was created to render assistance to the United States Coast Guard in discharging its responsibilities under the 1948 International Convention for Safety of Life at Sea\* which addressed the carriage of Dangerous Goods and Grain cargos for the first time.

Under the authority of the United States Coast Guard, the certificates issued by National Cargo Bureau, Inc. may be accepted as prima facie evidence of compliance with the provisions of the Dangerous Cargo Act and the Rules and Regulations for Bulk Grain Cargo. NCB is a continuation and amplification on a significantly expanded base of inspection services formerly performed by the Board of Underwriters of New York and the Board of Marine Underwriters of San Francisco and now operates on a global basis.

The catalyst that led to SOLAS 48 and the creation of NCB in 1952 was a series of maritime disasters that demonstrated a need for uniform standards and regulations. Those disasters included the capsizing of grain ships due to shifting of cargoes, shipboard fires relating to wet cotton or metal turnings, and an ammonium nitrate ship explosion at Texas City, Texas in 1947.

National Cargo Bureau conducts tens of thousands of marine surveys and inspections related to the transport of dangerous goods on behalf of vessel operators, marine terminals, insurers and shippers in support of its mission each year. This experience provides unique insight into today's trends and the significant challenges faced by vessel operators when transporting dangerous goods.

In 2018, NCB acquired Exis Technologies, the leading global supplier of systems for the management of dangerous goods in sea transport. For over 30 years, major container lines, ports and shippers have been relying on Hazcheck Systems from Exis for DG regulatory compliance, efficiency and safety in their global operations. Given the profile and synergies between the two companies, the acquisition of Exis was a natural fit and has significantly enhanced NCB's Dangerous Goods service offerings globally.







For further information on National Cargo Bureau's holistic approach and potential solutions to assist in the development of a robust DG program:

[www.natcargo.org/Holistic Approach](http://www.natcargo.org/HolisticApproach)    [\*\*HolisticApproach@Natcargo.org\*\*](mailto:HolisticApproach@Natcargo.org)

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