Yes, you can store your records offsite, except for records of a carrier's written procedures required by 21 CFR 1.908(e)(6)(i) that describe practices for cleaning, sanitizing and inspecting vehicles and transportation equipment that the carrier provides for use in the transportation of food. These carrier written procedures must remain onsite as long as the procedures are in use in your transportation operations. (21 CFR 1.912(i))

However any records stored offsite must be able to be retrieved and you must provide the records to us onsite within 24 hours of request for official review. (21 CFR 1.912(i))

Your electronic records are considered to be onsite if they are accessible from an onsite location. (21 CFR 1.912(i))

F. Do I have to make my records available to FDA officials?

Yes, you must make all records required by the Sanitary Transportation rule available to FDA promptly upon oral or written request. (21 CFR 1.912(f))

G. If FDA collects or copies my records are they protected from public disclosure?

Records collected or copied by FDA will be protected from public disclosure to the extent allowable under 21 CFR Part 20 and under applicable Freedom of Information Act exemptions. (21 CFR 1.912(j))

VIII. WAIVERS

A. What is a waiver?

A waiver is a notice published in the Federal Register by which FDA grants that all or some of the requirements of the Sanitary Transportation rule will not be applied to persons, vehicles, food, or nonfood products identified in the notice. A waiver is effective on the date the notice is published. (21 CFR 1.930)

B. How does FDA issue a waiver?

We will issue a waiver by publishing a notification of the waiver in the Federal Register, when we determine that:

(a) The waiver will not result in the transportation of food under conditions that would be unsafe for human or animal health; and

(b) The waiver will not be contrary to the public interest.

(21 CFR 1.914)

C. When will FDA consider *issuing a waiver*?

We will consider whether to waive a requirement of the Sanitary Transportation rule on our own initiative or in response to a petition submitted under 21 CFR 10.30. (21 CFR 1.916 – 1.926)

D. Can FDA modify or revoke a waiver it has issued?

Yes, we will modify or revoke a waiver if we determine that the waiver could result in the transportation of food under conditions that would be unsafe for human or animal health or that the waiver could be contrary to the public interest. (21 CFR 1.932)

If we modify or revoke a waiver, we will follow the procedures set forth in the Sanitary Transportation rule to inform the person who requested the waiver of our determination and to seek public input through the publication of a notice in the Federal Register. We will also publish a notice of our decision and the effective date in the Federal Register. (21 CFR 1.934)

E. Has FDA issued any waivers?

Yes, see Section II C.

IX. DEFINITIONS

Below is the full list of definitions in the rule (21 CFR 1.904):

Adequate means that which is needed to accomplish the intended purpose in keeping with good public health practice.

Animal food means food for animals other than man, and includes pet food, animal feed, and raw materials and ingredients.

Bulk vehicle means a tank truck, hopper truck, rail tank car, hopper car, cargo tank, portable tank, freight container, or hopper bin, or any other vehicle in which food is shipped in bulk, with the food coming into direct contact with the vehicle.

Carrier means a person who physically moves food by rail or motor vehicle in commerce within the United States. The term "carrier" does not include any person who transports food while operating as a parcel delivery service.

Cross-contact means the unintentional incorporation of a food allergen as defined in section 201(qq) of the Federal Food, Drug, and Cosmetic Act into food, except animal food.

Farm has the meaning given in 21 CFR 1.227.

Food not completely enclosed by a container means any food that is placed into a container in such a manner that it is partially open to the surrounding environment. Examples of such containers include an open wooden basket or crate, an open cardboard box, a vented cardboard box with a top, or a vented plastic bag. This term does not include food transported in a bulk vehicle.

Full-time equivalent employee is a term used to represent the number of employees of a business entity for the purpose of determining whether the business is a small business. The number of full-time equivalent employees is determined by dividing the total number of hours of salary or wages paid directly to employees of the business entity and of all of its affiliates and subsidiaries by the number of hours of work in 1 year, 2,080 hours (i.e., 40 hours x 52 weeks). If the result is not a whole number, round down to the next lowest whole number.

Loader means a person that loads food onto a motor or rail vehicle during transportation operations.

Non-covered business means a shipper, loader, receiver, or carrier engaged in transportation operations that has less than $500,000, as adjusted for inflation, in average annual revenues, calculated on a rolling basis, during the 3-year period preceding the applicable calendar year. For the purpose of determining an entity's 3-year average revenue threshold as adjusted for inflation, the baseline year for calculating the adjustment for inflation is 2011.

Operating temperature means a temperature sufficient to ensure that under foreseeable circumstances of temperature variation during transport, e.g., seasonal conditions, refrigeration unit defrosting, multiple vehicle loading and unloading stops, the operation will meet the requirements of 21 CFR 1.908(a)(3).

Pest means any objectionable animals or insects including birds, rodents, flies, and larvae.

Receiver means any person who receives food at a point in the United States after transportation, whether or not that person represents the final point of receipt for the food.

Shipper means a person, e.g., the manufacturer or a freight broker, who arranges for the transportation of food in the United States by a carrier or multiple carriers sequentially.

Small business means a business employing fewer than 500 full-time equivalent employees except that for carriers by motor vehicle that are not also shippers and/or receivers, this term would mean a business subject to 21 CFR 1.900(a) having less than $27,500,000 in annual receipts.

Transportation means any movement of food in by motor vehicle or rail vehicle in commerce within the United States.

Transportation equipment means equipment used in food transportation operations, e.g., bulk and non-bulk containers, bins, totes, pallets, pumps, fittings, hoses, gaskets, loading systems, and unloading systems. Transportation equipment also includes a railcar not attached to a locomotive or a trailer not attached to a tractor.

Transportation operations means all activities associated with food transportation that may affect the sanitary condition of food including cleaning, inspection, maintenance, loading and unloading, and operation of vehicles and transportation equipment. Transportation operations do not include any activities associated with the transportation of food that is completely enclosed by a container except a food that requires temperature control for safety, compressed food gases, food contact substances as defined in section 409(h)(6) of the Federal Food, Drug, and Cosmetic Act, human food byproducts transported for use as animal food without further processing, or live food animals except molluscan shellfish. In addition, transportation operations do not include any transportation activities that are performed by a farm.

Vehicle means a land conveyance that is motorized, e.g., a motor vehicle, or that moves on rails, e.g., a railcar, which is used in transportation operations.

[Code of Federal Regulations]

[Title 21, Volume 1]

[Revised as of April 1, 2017]

[CITE: 21CFR1.908]

TITLE 21--FOOD AND DRUGS

CHAPTER I--FOOD AND DRUG ADMINISTRATION

DEPARTMENT OF HEALTH AND HUMAN SERVICES

SUBCHAPTER A--GENERAL

PART 1 -- GENERAL ENFORCEMENT REGULATIONS

Subpart O--Sanitary Transportation of Human and Animal Food

Transportation Operations

Sec. 1.908 What requirements apply to transportation operations?

(a) General requirements. (1) Unless stated otherwise in this section, the requirements of this section apply to all shippers, carriers, loaders, and receivers engaged in transportation operations. A person may be subject to these requirements in multiple capacities, e.g., the shipper may also be the loader and the carrier, if the person also performs the functions of those respective persons as defined in this subpart. An entity subject to this subpart (shipper, loader, carrier, or receiver) may reassign, in a written agreement, its responsibilities under this subpart to another party subject to this subpart. The written agreement is subject to the records requirements of 1.912(d).

(2) Responsibility for ensuring that transportation operations are carried out in compliance with all requirements in this subpart must be assigned to competent supervisory personnel.

(3) All transportation operations must be conducted under such conditions and controls necessary to prevent the food from becoming unsafe during transportation operations including:

(i) Taking effective measures such as segregation, isolation, or the use of packaging to protect food from contamination by raw foods and nonfood items in the same load.

(ii) Taking effective measures such as segregation, isolation, or other protective measures, such as hand washing, to protect food transported in bulk vehicles or food not completely enclosed by a container from contamination and cross-contact during transportation operations.

(iii) Taking effective measures to ensure that food that requires temperature control for safety is transported under adequate temperature control.

(4) The type of food, e.g., animal feed, pet food, human food, and its production stage, e.g., raw material, ingredient or finished food, must be considered in determining the necessary conditions and controls for the transportation operation.

(5) Shippers, receivers, loaders, and carriers, which are under the ownership or operational control of a single legal entity, as an alternative to meeting the requirements of paragraphs (b), (d), and (e) of this section may conduct transportation operations in conformance with common, integrated written procedures that ensure the sanitary transportation of food consistent with the requirements of this section. The written procedures are subject to the records requirements of 1.912(e).

(6) If a shipper, loader, receiver, or carrier becomes aware of an indication of a possible material failure of temperature control or other conditions that may render the food unsafe during transportation, the food shall not be sold or otherwise distributed, and these persons must take appropriate action including, as necessary, communication with other parties to ensure that the food is not sold or otherwise distributed unless a determination is made by a qualified individual that the temperature deviation or other condition did not render the food unsafe.

(b) Requirements applicable to shippers engaged in transportation operations. (1) Unless the shipper takes other measures in accordance with paragraph (b)(3) of this section to ensure that vehicles and equipment used in its transportation operations are in appropriate sanitary condition for the transportation of the food, i.e., that will prevent the food from becoming unsafe, the shipper must specify to the carrier and, when necessary, the loader, in writing, all necessary sanitary specifications for

the carrier's vehicle and transportation equipment to achieve this purpose, including any specific design specifications and cleaning procedures. One-time notification shall be sufficient unless the design requirements and cleaning procedures required for sanitary transport change based upon the type of food being transported, in which case the shipper shall so notify the carrier in writing before the shipment. The information submitted by the shipper to the carrier is subject to the records requirements in 1.912(a).

(2) Unless the shipper takes other measures in accordance with paragraph (b)(5) of this section to ensure that adequate temperature control is provided during the transportation of food that requires temperature control for safety under the conditions of shipment, a shipper of such food must specify in writing to the carrier, except a carrier who transports the food in a thermally insulated tank, and, when necessary, the loader, an operating temperature for the transportation operation including, if necessary, the pre-cooling phase. One-time notification shall be sufficient unless a factor, e.g., the conditions of shipment, changes, necessitating a change in the operating temperature, in which case the shipper shall so notify the carrier in writing before the shipment. The information submitted by the shipper to the carrier is subject to the records requirements in 1.912(a).

(3) A shipper must develop and implement written procedures, subject to the records requirements of 1.912(a), adequate to ensure that vehicles and equipment used in its transportation operations are in appropriate sanitary condition for the transportation of the food, i.e., will prevent the food from becoming unsafe during the transportation operation. Measures to implement these procedures may be accomplished by the shipper or by the carrier or another party covered by this subpart under a written agreement subject to the records requirements of 1.912(a).

(4) A shipper of food transported in bulk must develop and implement written procedures, subject to the records requirements of 1.912(a), adequate to ensure that a previous cargo does not make the food unsafe. Measures to ensure the safety of the food may be accomplished by the shipper or by the carrier or another party covered by this subpart under a written agreement subject to the records requirements of 1.912(a).

(5) The shipper of food that requires temperature control for safety under the conditions of shipment must develop and implement written procedures, subject to the records requirements of 1.912(a), to ensure that the food is transported under adequate temperature control. Measures to ensure the safety of the food may be accomplished by the shipper or by the carrier or another party covered by this subpart under a written agreement subject to the records requirements of 1.912(a) and must include measures equivalent to those specified for carriers under paragraphs (e)(1) through (3) of this section.

(c) Requirements applicable to loaders engaged in transportation operations. (1) Before loading food not completely enclosed by a container onto a vehicle or into transportation equipment the loader must determine, considering, as appropriate, specifications provided by the shipper in accordance with paragraph (b)(1) of this section, that the vehicle or transportation equipment is in appropriate sanitary condition for the transport of the food, e.g., it is in adequate physical condition, and free of visible evidence of pest infestation and previous cargo that could cause the food to become unsafe during transportation. This may be accomplished by any appropriate means.

(2) Before loading food that requires temperature control for safety, the loader must verify, considering, as appropriate, specifications provided by the shipper in accordance with paragraph (b)(2) of this section, that each mechanically refrigerated cold storage compartment or container is adequately prepared for the transportation of such food, including that it has been properly pre-cooled, if necessary, and meets other sanitary conditions for food transportation.

(d) Requirements applicable to receivers engaged in transportation operations. Upon receipt of food that requires temperature control for safety under the conditions of shipment, the receiver must take steps to adequately assess that the food was not subjected to significant temperature abuse, such as determining the food's temperature, the ambient temperature of the vehicle and its temperature setting, and conducting a sensory inspection, e.g., for off-odors.

(e) Requirements applicable to carriers engaged in transportation operations. When the carrier and shipper have a written agreement that the carrier is responsible, in whole or in part, for sanitary conditions during the transportation operation, the carrier is responsible for the following functions as applicable per the agreement:

(1) A carrier must ensure that vehicles and transportation equipment meet the shipper's specifications and are otherwise appropriate to prevent the food from becoming unsafe during the transportation operation.

(2) A carrier must, once the transportation operation is complete and if requested by the receiver, provide the operating temperature specified by the shipper in accordance with paragraph (b)(2) of this section and, if requested by the shipper or receiver, demonstrate that it has maintained temperature conditions during the transportation operation consistent with the operating temperature specified by

the shipper in accordance with paragraph (b)(2) of this section. Such demonstration may be accomplished by any appropriate means agreeable to the carrier and shipper, such as the carrier presenting measurements of the ambient temperature upon loading and unloading or time/temperature data taken during the shipment.

(3) Before offering a vehicle or transportation equipment with an auxiliary refrigeration unit for use for the transportation of food that requires temperature control for safety under the conditions of the shipment during transportation, a carrier must pre-cool each mechanically refrigerated cold storage compartment as specified by the shipper in accordance with paragraph (b)(2) of this section.

(4) If requested by the shipper, a carrier that offers a bulk vehicle for food transportation must provide information to the shipper that identifies the previous cargo transported in the vehicle.

(5) If requested by the shipper, a carrier that offers a bulk vehicle for food transportation must provide information to the shipper that describes the most recent cleaning of the bulk vehicle.

(6) A carrier must develop and implement written procedures subject to the records requirements of 1.912(b) that:

(i) Specify practices for cleaning, sanitizing if necessary, and inspecting vehicles and transportation equipment that the carrier provides for use in the transportation of food to maintain the vehicles and the transportation equipment in appropriate sanitary condition as required by 1.906(b);

(ii) Describe how it will comply with the provisions for temperature control in paragraph (e)(2) of this section, and;

(iii) Describe how it will comply with the provisions for the use of bulk vehicles in paragraphs (e)(4) and (5) of this section.

THE LOADSTAR
LongRead

LongRead • Vol 2

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This publication is produced with the support of
MAERSK LINE

The inside story on how to keep it cool

Inside

With the rapid growth in global populations that has characterised the modern era, *food wastage has become* one of the most pressing social issues. Each link in the food supply chain has its part to play in reducing waste, shipping included.

According to the Food and Agriculture Organisation (FAO) of the United Nations, which conducted a landmark study on food loss and wastage around the world in 2012, around 30% of the food the world produces is lost each year; this equates to a mind-boggling 1.3bn tonnes wasted every year.

There is not a single food type that does not see significant wastage, and it can take place at almost any point of the "farm-to-fork" supply chain.

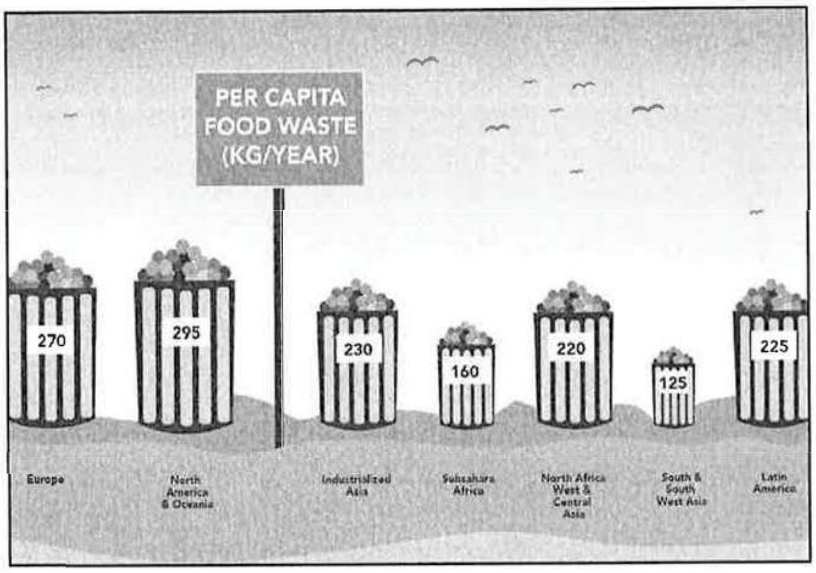
Where and when can vary wildly depending on geographic region and type of food product – some 30% of global cereal production is lost, with households in developed counties throwing away 283m tonnes a year;

35% of fish and seafood catches are lost, equivalent to three billion Atlantic salmon, thrown overboard before they are even processed.

Worst of all is the 45% of the world's fruit and vegetable volumes – equivalent to an almost unimaginable 3.7 trillion apples a year – lost at a variety of stages in the food supply chain: during agriculture; post-harvest; processing; distribution and consumption.

The loss varies, depending on geography. In Northern Europe it is far more likely to take place at the consumption stage, either from households throwing out still-edible goods or supermarkets unable to sell "wonky" fruit and vegetables. In food-exporting areas, such as sub-Saharan Africa and Latin America, there is more wastage at the post-harvest and distribution stages of the supply chain.

These numbers suggest that everyone in the food supply chain, including the shipping industry, has a part to play, and a common reaction from various quarters to the FAO statistics was incredulity at the sheer amount of waste – although to a large extent, that was because it simply had not been recorded before and, as the saying often goes, "you cannot solve what you cannot measure".



45% of the world's fruit and vegetable volumes are wasted

While shipping lines claim that as little as 1-2% of product is wasted under their care, the development of refrigerated container (reefer) transport has become a truly multimodal offering, rather than a purely maritime service.

It is for this reason that the development of a remote container management (RCM) system by Maersk Line, as well as separate, independent projects undertaken by technology companies, are expected to play a crucial role in eliminating waste and improving cargo care. Harnessing global satellite networks, mobile phone technology and new thinking about what data they can deliver will allow shipping lines to meet these challenges far more effectively than has been done in the past.

Reefer containers have widely been credited for expanding global trade in

How RCM works

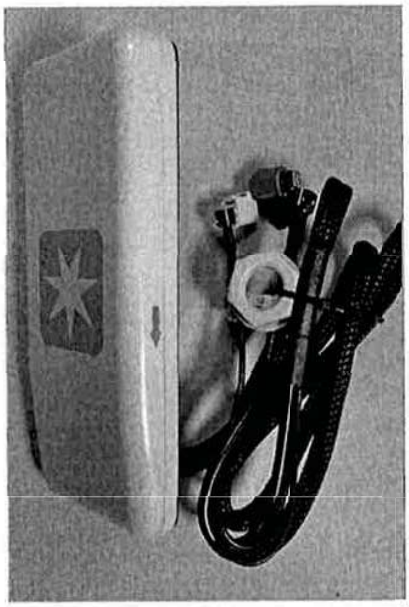
The key to developing a global remote container management system was creating the concept of each vessel becoming its own mobile phone network while traversing the globe, "because we don't have mobile coverage across the world's oceans", explains Catja Rasmussen, who is leading the RCM team at Maersk Line.

Two antennae, one placed at the bow and one at the stern of each vessel, pick up data sent from a remote container device (RCD) fitted to every Maersk reefer unit.

Each RCD unit has a 3G high-temperature SIM card, a GPS unit, a ZigBee radio and antenna, and multiple interfaces for connecting into the refrigerated container's controller. The RCD can operate with two-way connectivity from just about anywhere in the world.

This data is then transmitted from the antennae to a VSAT dome installed on the monkey deck of each vessel – the roof of the bridge – which then retransmits the data to satellites employed by telecoms giant Ericsson.

The satellites then transit that data back to Maersk's data centre, as well as to the vessel's bridge, a process that takes about 45 minutes.

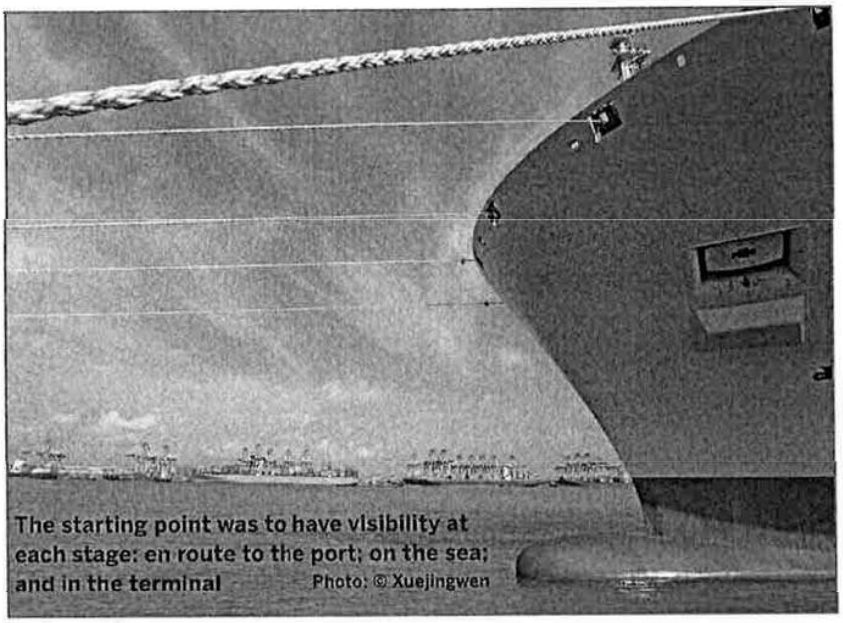

Data is transmitted from antennae at the bow and stern of the ship

fresh foods; their integrated, almost self-sufficient, nature enabling the door-to-door transport of 29 tonnes of goods from anywhere in the world to virtually anywhere else. And by their very nature, with generator sets (gensets) attached, they ought to ensure continuous chilling of these goods irrespective of where they are.

Yet most fresh produce shippers and receivers have at least one gruesome tale concerning ruined cargo, and in today's era of global mobile communications many cannot understand why there is not a more all-encompassing way to monitor the reefers and the condition of their cargoes.

In short, there appears to be a classic gap between expectation and reality. Cargo owners that live in a world of smartphones, and are e-commerce consumers in their own right, have difficulty understanding why they cannot access information about the status of their goods at any given time, no matter where in the world those goods might be – and, primarily, what condition those goods are in.

But it is not just enhanced monitoring that will enable greater degrees of cargo care, but also the increased data levels that will allow Maersk and its customers more insight into the root causes of damage to goods.



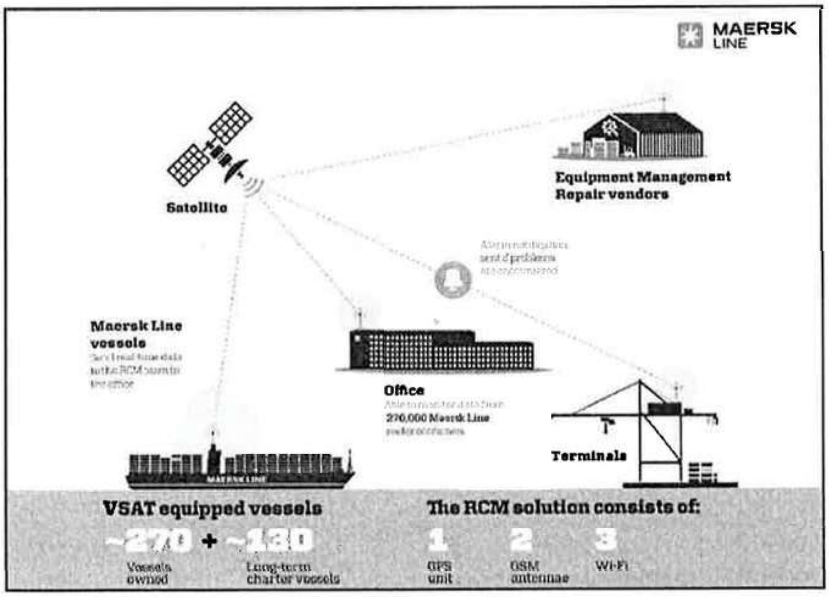
The starting point was to have visibility at each stage: en route to the port; on the sea; and in the terminal Photo: © Xuejingwen

Shipping lines, on the other hand, are still working through the logistics of trying to secure that end-to-end visibility and the data flow required to achieve it. Most container vessels with significant amounts of reefer plugs will have one or two technicians whose job it is to monitor the performance of the units while at sea, although rough sea conditions can often make that job physically impossible.

And, as Henrik Lindhardt, head of reefer research and support at Maersk Line, tells **The Loadstar**, reefer units have been able to convey some data for at least the past two decades.

"We have had reefer monitoring before, which was transmitted through the power cable in a concept that was

Continued on page 6



"The process is actually very simple if you look at the basic thinking, but the technology behind it is more complex," Ms Rasmussen says.

Henrik Lindhardt, Head of Reefer Research and Support at Maersk Line, adds: "The antenna and the VSAT cover the entire vessel. But you have to close the network down once you are within 12 nautical miles of land, because you enter national territories and the normal land-based mobile connectivity takes over.

"The mobile network on land covers when the reefer has left the terminal and is on the road, without having to employ the satellites, and the data is transmitted to our data warehouse through the normal mobile phone networks," he says.

Ms Rasmussen describes the remote container device as "looking like an old fashioned modem" – you have to drill a few holes into the reefer and pass three cables to the modem. The device is then directly linked into the controller of the reefer.

developed by a third party, and we have used this for more than 20 years.

"It was fine until we began to load more reefers than anyone previously imagined, then the limitations of the system became apparent," he says.

Over the past few years, it has become increasingly obvious to the world's largest container line that having more information about the status of its reefer units would be of considerable benefit to its own operations – let alone the opportunities it could ultimately provide in the way of improved cargo care and customer service.

And this led it to develop a remote container management (RCM) project that would seek to revolutionise the way it collected and processed the huge amounts of data it is possible to capture from reefer units.

Clearly, some of the philosophy behind it had been inspired by ongoing IT developments in Big Data and the Internet of Things – unsurprising, given that the company boasts an "innovation lab" to develop new maritime solutions and technologies, and adapt advances in other sectors to container transport systems.

Maersk Line's head of reefer management, Shereen Zarkani, says: "The starting point for this project was to obtain visibility at a very granular level – knowing where each container is, including when it is en route to the port; on the sea; in the terminal; when it is gating in and out; and so on across all the links in the supply chain.

"What we are looking for is the ability to aggregate all the bits and pieces of data, which then gives us further insight into operations such as equipment maintenance and repair (EMR). The data has always been there, but it is difficult to bring it together."

In reality, putting RCM infrastructure in place represented a considerable challenge in itself [see box on page 2 for how the technology works]. A remote container device (RCD) had to be fitted to each of Maersk's 270,000 reefer units dotted around the globe, as well as the VSAT domes and antennae that had to be installed on its 270 owned vessels, and another 130 on long-term charter.

"If you want to monitor the reefers then it needs to be in all the reefers, otherwise some will still have to be physically monitored," Mr Lindhardt explains. "It has to be full-scale – a total roll-out.

" What is really interesting is that we are beginning to see changes because of the intelligence we get out of the reefer, and we are starting to find new ways of interpreting it"

"That was very difficult because all the assets are moving. When you think the container is in one place, it has been moved to another. A moving target is harder to hit, and it is fair to say it has taken longer than expected."

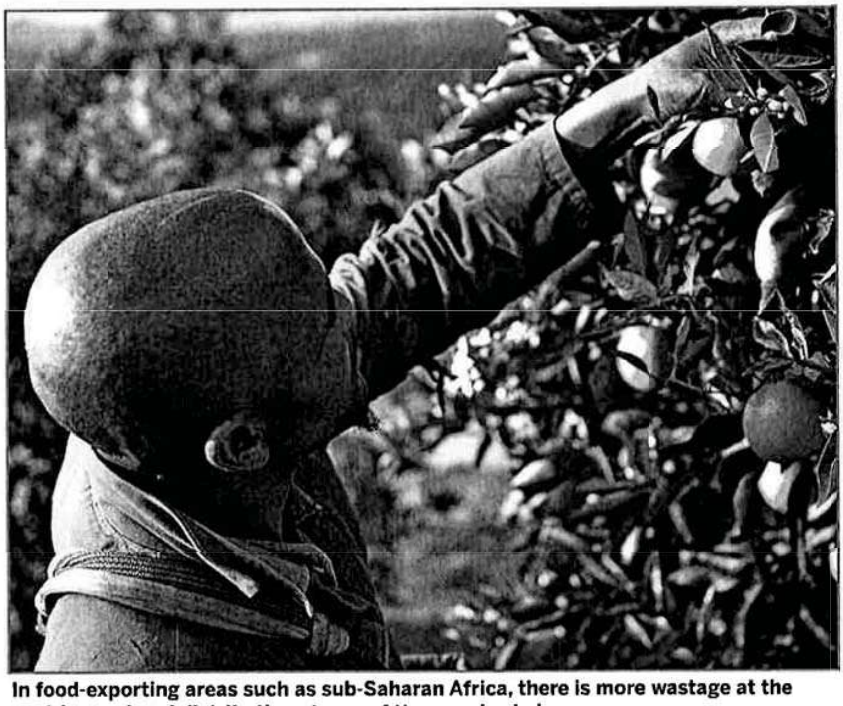
However, the five-year project went live in the middle of last year, says Catja Rasmussen, head of remote container management for Maersk.

"We chose some installation locations based on where the reefers were; and most of the work took place in 25 key ports around the world. In the beginning we were achieving about 7,000-8,000 installations a week, but by the end we were only managing to do five in a week as we searched for the last few reefer units," she says.

At the same time, she adds, the line's IT department had to create a new database to process the large amounts of information that it has begun receiving. But already the implications of the insight this could create both for the carrier and its customers are beginning to become apparent.

"The key challenge now is to figure out the new potential of the data because we are receiving so much of it," says Ms Rasmussen. "What's really interesting is that we are starting to see changes because of the intelligence we get out of the reefer, and we are starting to find new ways of interpreting it.

"And you can combine RCM data with other data to create new insights. For example, if certain alarm types are triggered, we can now begin to see if they combine with other occurrences and lead to concrete actions.



In food-exporting areas such as sub-Saharan Africa, there is more wastage at the post-harvest and distribution stages of the supply chain

It took time to locate all of Maersk's 270,000 reefer units dotted all over the world
Photo: © Xuejingwen

"This will enable us to be more proactive in fields such as the maintenance of container and cargo, and that's where we want to take this kind of technology. This will be a real benefit to customers," she says.

An improvement of reefer maintenance is one obvious area. Each reefer has to have a pre-trip inspection (PTI) to ensure its condition before it is delivered to the exporter, and which can typically take up to six hours.

Ms Rasmussen says: "With RCM, we have developed an e-PTI method that can take that process down to 12 minutes by calculating the condition the reefer is expected to arrive at the inspection point in," she adds. And Ms Zarkani says improved control of reefers while at sea is already beginning to filter into voyage operations.

"The cargo care can be improved on the ships – the reefer technicians aboard now receive data from each container every hour, and if there is a problem they now have the visibility to fix the box that needs attention.

"Those functions in themselves will save a lot of cases. I need the claims to go down, otherwise it's a lose-lose situation for us and our customers. Think of all that wastage in terms of money and time and effort that could be saved. For me, this is the biggest improvement that RCM would allow – it will hugely increase the level of cargo care," she says.

Ultimately, this will have significant implications for cargo owners, as some have begun to recognise.

Chayenne Wiskerke is managing director of Wiskerke Onions, the largest exporter of onions out of the Netherlands, with around 5,000 40ft reefer shipments a year. She says she has long been looking for greater control over conditions in the supply chain.

"I understand that it is quite tricky, but today the possibilities exist – the data is there. It is just that container lines do not want to share it yet. But that is coming to an end because they are beginning to capture that data," she says.

However, Maersk executives are urging patience, as RCM only went live a few months ago and it remains early days, as Ms Zarkani reveals.

"So far we have begun to review some of the standard operating procedures, but 2016 is the year that we will explore what insights the data can provide for both us and our customers.

"At some point I would of course like to commercialise, but how do you do that? And in what areas? Then there is creation of a front-end for customers to further consider.

"But there is no doubt that this is a game-changer," says Ms Zarkani.

Michael Dempsey, vice president of container and port solutions at Orbcomm, a company that runs machine-to-machine communication networks and has also developed a reefer monitoring solution, says there is a "bundle" of areas where carriers can realise a return on investment (ROI) in the technology.

"There are hard ROIs in terms of reducing direct operational cost savings and managing business complexity, and soft ROIs such as improving a carrier's business competitiveness.

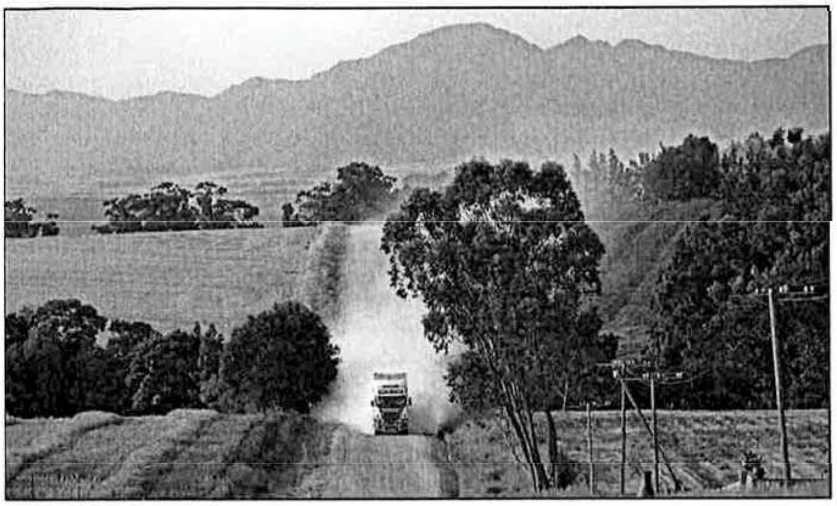
"The technology eliminates third-party services, data charges and monitoring costs; and it reduces internal operational costs in the way that Maersk have described, such as PTIs. It also reduces cargo theft, maintenance and repair costs and container damage.

"In terms of managing business complexity, the level of control offered by the systems reduces equipment repositioning costs; increases asset utilisation; reduces insurance claims and increases food safety compliance.

"And there is a 'softer' gain as well – the transparency they provide increases customer satisfaction and that will give carriers a clear competitive advantage," he says.

Interestingly, the transparency that this monitoring offers is also being welcomed by Maersk's erstwhile competitors.

The Loadstar spoke with the managing director of one of the largest conventional reefer shipping lines, who claims that it would



Once a truck is on the road, the local mobile network swings into action to track the shipment

benefit the industry as a whole because of the increased engagement with customers that it creates.

"Container monitoring like this would be good for the industry – customers have been asking for it and by satellite you should be able to read it. Whichever shipping line it is, it is the carrier's responsibility to be totally transparent in the service we supply.

"I wonder whether you want to know everything – you can have sleepless nights if you see the temperature go down by half a degree, which might not harm the food itself," he says.

However, he also questions where this will lead in terms of control over the equipment. "What if shippers are able to influence the temperature, because once you get into that part of logistics, it gets very risky with insurance and so on, because there are issues with who has done what."

For Ms Wiskerke, the potential for greater continual control over reefer conditions would make a material difference.

"We would like to have control over the temperature and humidity. Currently it is very hard to get this data from the shipping lines to see what temperature areas the container is going through, for example. Currently all the exporters use the same settings and there has never been a project to see what is the optimal setting for a particular destination.

"If we go to Brazil or Asia, we use the same settings, even though the vessel goes through different temperature zones. It would make a lot of sense if we can live view the current temperature in the container to make the most optimal setting for the onions to be kept at. If you can keep them at that setting, you have higher quality at the end destination. But you need to have the right data to make the best decisions.

"That comes through monitoring the live flows so we can keep our product at the most optimal temperature – and if I can do that, then the carrier and shipper will be stronger together."

MAERSK

Smart containers listen and talk

Wednesday, February 10, 2016 **John Churchill**

By outfitting its fleet of reefer containers with "smart" technology, Maersk Line is reducing risk in customer supply chains and saving itself millions of dollars in costs while representing the cutting edge technology and innovation in shipping.

From his desk in Maersk Line's Copenhagen headquarters, Musaddique Alatoor has a multi-billion dollar view. On his screen is the precise location and operational details of 270,000 refrigerated "reefer" containers, carrying anything from bananas to

The system enabling this is RCM, which stands for Remote Container Management. It's simple technology – a modem, GPS, wireless SIM card and satellite link – deployed on a global scale, and it is changing the concept of supply chain visibility, and the costs and opportunities associated with providing it.

Technology to save millions

"If you think about a basic supply chain, it stretches across the world. It involves trucks, terminals, depots, an ocean carrier and time. There is no end-to-end visibility and very little control, which for refrigerated cargo is very risky," says Alatoor, an RCM specialist in Maersk Line's Equipment Management and Repair.

Whether it is frozen poultry, pineapples or bananas, perishable commodities are time sensitive and require precise temperature and atmospheric conditions. If the power goes off on the reefer or a malfunction occurs and it is not discovered quickly enough in the terminal, on the truck or ship, an entire container of goods can be spoiled.

As a result, Maersk Line spends thousands of hours and about USD 200 million every year on physical inspections of its containers before customers use them and continuous monitoring of their functionality during a journey. And since people make mistakes and accidents happen, Maersk Line also pays millions in claims to customers for damaged cargo – most of which is related to the power on the reefer being off for too long.

Connected: Shipping's digital future

With RCM, all of that changes. Instead of counting on human eyes and hands to inspect and monitor reefers all over the world, the technology does it instead – removing much of these costs, along with many others including the danger associated with people walking among container stacks and handling electricity.

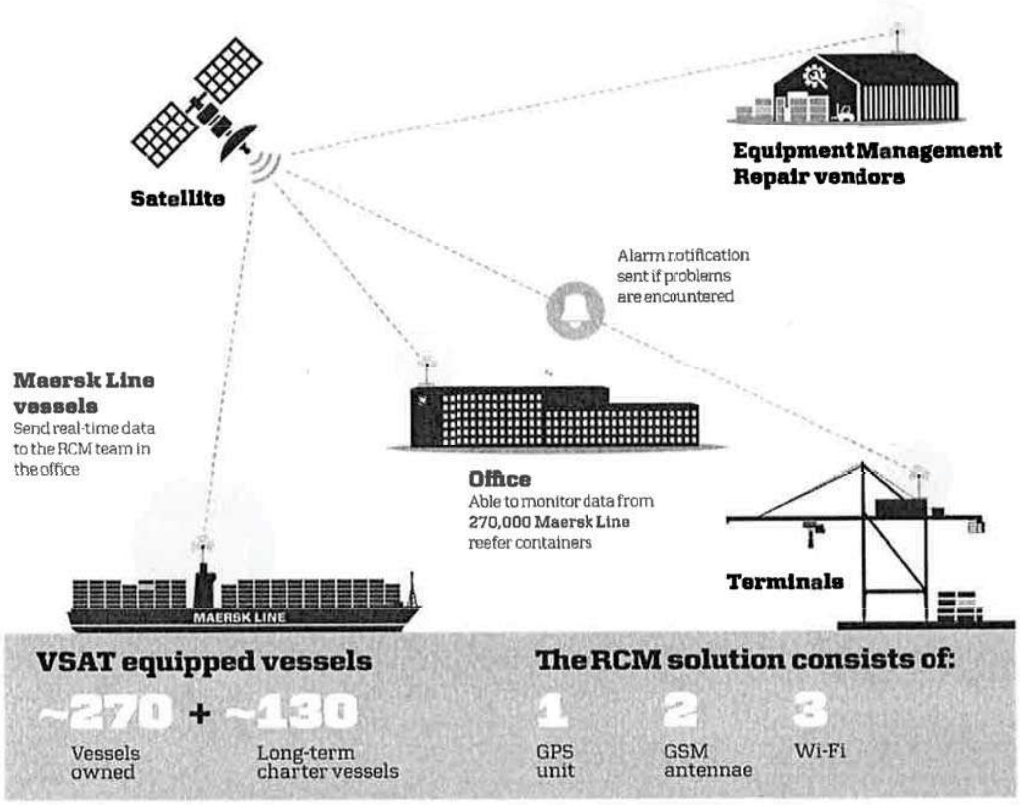
If the conditions inside the container change or the reefer malfunctions, an alarm instantly appears on the screens of the RCM teams on shore. In the same instant, the alarm, which describes the problem and the level of urgency, also goes to the closest local repair vendor. Automatic follow-ups are sent as needed until each alarm is resolved.

"Our reefer containers are transported about 900,000 times every year. With RCM we remove millions in operational cost and also a lot of the uncertainty that comes with the physical preparation, handling and monitoring of these containers every hour of every day for a supply chain journey that can last more than a month," says Catja Rasmussen, Head of RCM for Maersk Line.

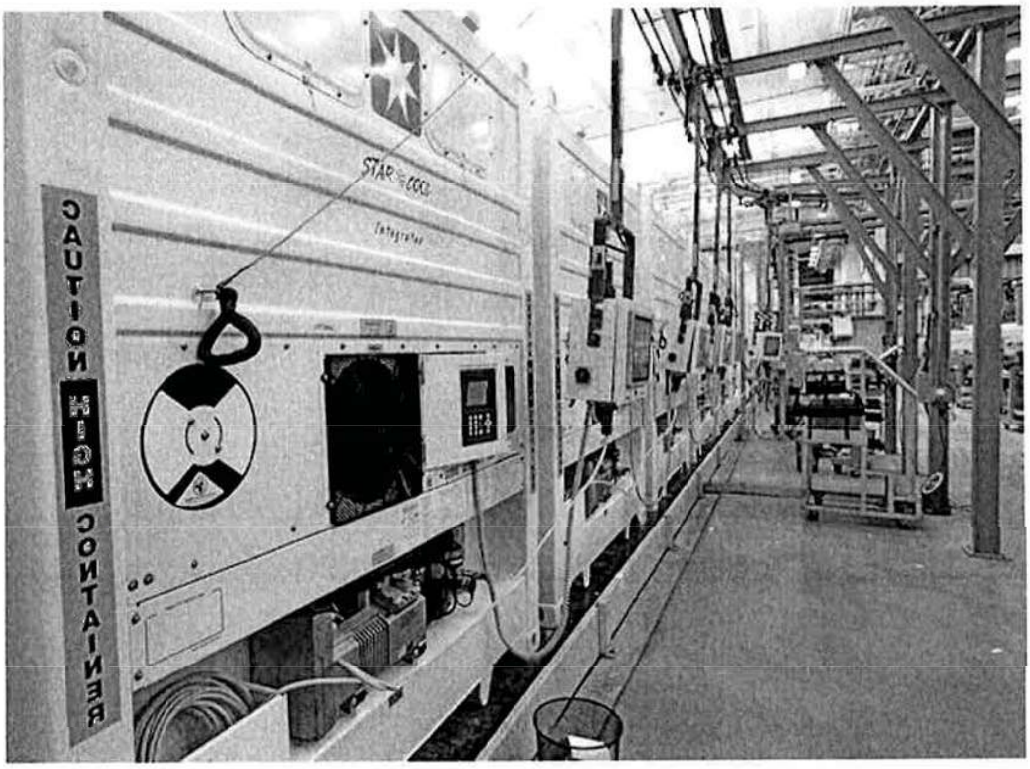
"This technology gives us total visibility into our operations, our suppliers' performance and our customers' supply chains, in real-time. That's a powerful capability, particularly for sensitive perishable cargo. And no other shipping line has it."

Welcome to the future Maersk app store

How does RCM work?



It starts with the hardware mounted on all 270,000 Maersk Line reefer containers. A GPS allows global tracking and a modem and SIM card enable the reefer's atmospheric conditions and power status to be collected, stored and shared. A satellite transmitter mounted on 400 of Maersk Line's vessels picks up the data streaming from the modem and sends it real-time to a satellite that beams it back to the RCM teams located around the globe.



Tech's next wave of hits

Technology and the data flow and capture it enables, whether it is "smart" containers or the development of a comprehensive e-platform for customers, is driving Maersk Line's next phase of operational and commercial excellence.

"Our vessels, our containers, the cargo we carry, it is all being connected with technology," says Robin Johnson, Maersk Line's Chief Information Officer. "From achieving the next level of operational efficiency with our vessels, to how our customers buy our products and services, tech is going to enable it."

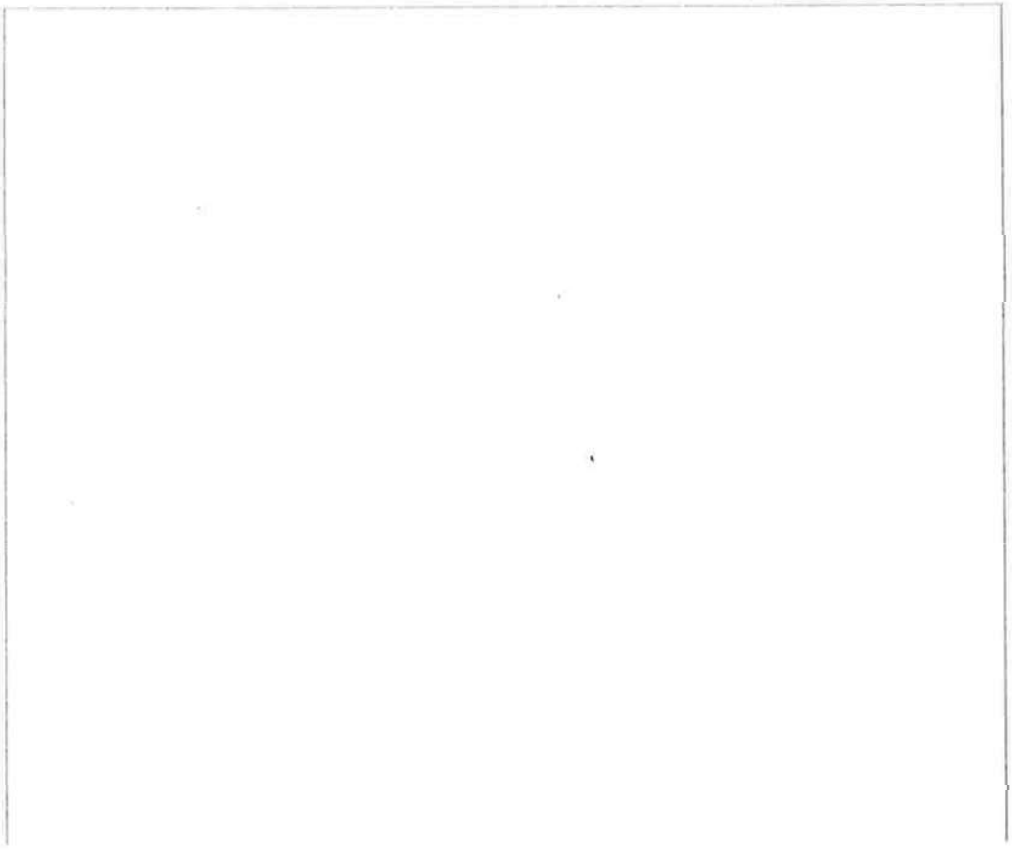
Individual sensors on ships already provide valuable insight. One example is bunker consumption flow metres, approximately 2,000 of which will be installed on 270 Maersk Line vessels by the end of 2017. These metres measure fuel consumption and relay this data in real-time to the vessel bridge and to shore, enabling Maersk Line to continually optimise the fleet's operational performance.

What if all these data sources on the different machinery and containers, could be linked to provide an overall picture? What could real-time data collection, not just for refrigerated containers, but for vessel operations like port stays do to improve vessel turnaround times, and ultimately entire supply chains? Hardware requirements and data transmission are challenges but Maersk Line is looking into it.

predictable, self-service type process for handling their shipping needs. An online platform will also reduce the millions of phone calls and emails related to transaction support that Maersk Line handles, enabling it to increase the time it spends on developing business. The data collected will also provide a rich source of insight into customer behaviour.

Early progress with the My.Maerskline.com (https://my.maerskline.com/) site indicates the potential. Today, 97% of customer bookings are received via the site; this is up from 60% just three years ago, but the end-to-end capability of this platform is still in the early stages. "A comprehensive e-platform is a very important development for our business, so we're being deliberate about its build in order to get it right," says Tom Sproat, Global Head of Customer Service.

The collection and analysis of the data the business produces across its global footprint are also increasingly important to Maersk Line. Here, a growing team of data scientists in the Advanced Analytics team are using mathematics and computer programming code to save Maersk Line millions by further optimising empty container flows, developing more accurate container supply and demand forecasts, and providing insight into customer behaviour and profitability.



CHARTER PARTY DISPUTES /
CARGO CLAIMS ROUNDTABLE

Agenda item no

3

Clause paramount – should you always include one in your charter?

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1 Asbatankvoy clause 18 (emphasis added) –

> 18. Cleaning. . . . The Vessel shall not be responsible for any admixture if more than one quality of oil is shipped, nor for leakage, contamination or deterioration of the cargo unless the admixture, leakage, contamination or deterioration results from (a) ***unseaworthiness existing at the time of loading or at the inception of the voyage which was discoverable by the exercise of due diligence***, or (b) error or fault of the servants of the Owner in the loading, care, or discharge of the cargo.

2 Asbatankvoy clause 20(b)(i)— "clause paramount" provides that the provisions of COGSA shall apply to the charter.

3 Arguably, clause 18(a) is more favorable to the owner than COGSA would be. If COGSA applied by law, any clause lessening the carrier's liability below COGSA is void. But COGSA does not apply to charter parties by law. So, did the parties intend, by contract, to incorporate COGSA so as to render invalid another provision in the charter which lessens the owner's liability to below COGSA?

4 In the Asbatankvoy situation above, there is a conflict between two printed clauses. What if the conflict is between a printed clause paramount and a specifically negotiated clause? *The Westmoreland*, 86 F. 2d 96 (2d Cir. 1936): "Thus, the Harter Act was relevant only because the parties incorporated it, and the question arises whether it should override the charterer's express assumption of risk from stowage upon the skin of the ship, a question of interpretation alone. If the law had forbidden them so to stipulate, the second stipulation would have been *brutum fulmen*; but that not being true, their first stipulation, that it should be unlawful to change the ship's duties under the maritime law, could not make any less a contract their second, that these duties should be different in a given particular".

5 Practical solution? One of our members includes the following proviso in the clause paramount in its charters: "PROVIDED, however, if any other provision of this Contract provides that the liability of the Owner or the Vessel shall be less than that provided under such Hague or Hague-Visby Rules [COGSA], such provision shall be valid and enforceable notwithstanding those Rules [COGSA]. Nothing in this Clause Paramount or elsewhere in this Contract shall be interpreted to exclude, restrict, or in any way waive the right of Owner or the Vessel to limit its liability under any applicable statute or convention."

Enclosure to Tab 3:

- *Voyage Charters* 68A.28-31 (4th ed 2015)

VOYAGE CHARTERS

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FOURTH EDITION

informa law
from Routledge

Consequence of tank acceptance

68A.27 Acceptance of the vessel's tanks by the charterer's inspector has been held not to affect the owner's non-delegable duty to tender cargoworthy tanks.[36] But see *The Giovannella D'Amico*,[37] where the cleaning and inspection clause provided that "[a]cceptance of the Vessel by the Charterer or loading the cargo shall be a complete fulfillment of the Owner's obligations under this clause" and, while tanks were inspected and accepted, cargo was shown to be damaged by the charterer's loading method. See also *The Mara*,[38] in which charterer was held to assume the risk of loading low sulfur crude in a vessel that had previously carried Boscan crude, where its inspectors chose not to conduct a visual inspection, accepted the vessel, and did not alert charterer to potential consequences. The charterer was found independently aware of the consequences and the terminal surveyor had visually observed that the 1-foot loading sample was darker than the pipeline sample.

Liability for "admixture," "leakage, contamination or deterioration"; relationship between clauses 18 and 20

68A.28 The second sentence of clause 18 provides that the vessel is not responsible for "admixture" or for "leakage, contamination or deterioration" unless caused by "(a) unseaworthiness existing at the time of loading or at the inception of the voyage which was discoverable by the exercise of due diligence, or (b) error or fault of the servants of the Owner in the loading, care or discharge of the cargo." Under the general maritime law, the parties are free to allocate responsibility for damage as they wish.[39] The second sentence of clause 18 appears to be such an allocation of risk for these specific types of cargo damage. Asbatankvoy clause 20(b) and Clause Paramount 20(b)(i) provide, however, that COGSA will govern the charterparty and bills of lading issued thereunder.[40] Under COGSA, the cargo claimant must carry the initial burden of establishing its *prima facie* case by proving that the cargo (1) was delivered to the vessel in actual good order and condition; and (2) was thereafter outturned in a short or damaged condition. If the claimant proves these facts, the owner then has the burden of proving that its negligence did not contribute to the loss.[41] COGSA's *§ 1303(8)* also states that any provision in the contract of carriage which lessens the liability of a carrier "otherwise than as provided in the Act, shall be null and void and of no effect."[42] Whether the clause 18 standards or the COGSA standards apply to such claims has been addressed several times. In *United States Steel International Inc.* v. *The Granheim*,[43] the court held that COGSA applied, but that the charterer had failed to establish its *prima facie* case. In *The Rodosto*,[44] the panel rejected the owner's contention that the charterer had not proven negligence within the meaning of clause 18, held that COGSA, by virtue of clause 20, applied, and found the owner liable for contamination. In *The Go Go Rambler*,[45] the panel held that COGSA applied by virtue of clause 20, but absolved owner of liability, finding that the owner had established the defense of due diligence under

36 *The El Zorro*, 1981 AMC 2883 (5th Cir. 1981); *The Mundogas Rio*, SMA 2723 (1990) (Smith, Arnold, Zubrod); *The Rodosto*, SMA 2222 (1986) (Berg, van Gelder, Ganly); *The Zakynthos*, SMA 2396 (1987) (Pitsios, Carlson, Sauer); *The Pam*, SMA 1289 (1979) (Powers, O'Riordan, Berg); and *The Fort Fraser*, 1992 AMC 1575 (E.D. La. 1991).

37 1970 AMC 379 (S.D.N.Y. 1969).

38 SMA 3744 (2000) (Berg, Nichols, Texor).

39 See *Associated Metals & Minerals Corp.* v. *SS. Jasmine*, 983 F.2d 410–412 (2d Cir. 1993).

40 See Chapter 72.

41 *Associated Metals & Minerals Corp.* v. *SS. Jasmine*, 983 F.2d at 414–415 (2d Cir. 1993), *The Guadalupe*, SMA 2642 (1989) (Nourse, Berg, Cederholm).

42 See Appendix 2, para. A2.2.

43 540 F. Supp. 1326, 1982 AMC 2770 (S.D.N.Y 1982).

44 SMA 2222 (1986) (Ganly, Berg, van Gelder).

45 SMA 2811 (1991) (Gilchrist, Berg, Cederholm).