BWM LEGISLATION IMPLEMENTATION:
Possibilities and impossibilities

INTERCARGO welcomes and supports the Ballast Water Management (BWM) international initiatives and legislation however, it should be recognised that the implementation needs to be made in the most effective and practical manner possible. A newbuilding vessel case is totally different than retrofitting an existing vessel, while a bulker carrier is also a different case than other types of ships.

This paper discusses some of the technical and operational difficulties faced by bulk carrier owners and operators and provides some insights on the implementation of the IMO Ballast Water Management Convention and US legislation.

NB vs EXISTING VESSELS – BULK CARRIER TECHNICAL & OPERATIONAL CHALLENGES

The introduction of type approved treatment equipment to bulk carriers, particularly the existing fleet, brings its own unique considerations and challenges that remain unrecognised by the regulators;

Availability of Type Approved Systems: insufficient

Currently there are 69 Ballast Water Management Systems (BWTS) that have received Type Approval Certification by their respective Administrations. It is important to highlight that this does not mean that a ship owner or shipyard has a choice of 69 different systems.

From a new building perspective, not all the systems are suitable due to the treatment capacity of some of the systems i.e. a number of the listed Ballast Water Treatment systems are not able to treat the water at the same rate as required by the ship's ballast system to enable normal ballasting operations. Compared to most other vessel types, bulk carriers together with tankers and gas carriers tend to have a larger ballast capacity with pumps of higher capacity.

The existing fleet is confronted with even greater challenges than those faced by new builds. In addition to the lack of suitable systems discussed previously, bulk carriers have less choice due to the size limitations imposed by available space and also by the additional electrical powering requirements imposed by these systems compared to the available power onboard.

Gravity Discharged Top Side Tanks: an inevitable sacrifice?

The world bulk carrier fleet is by far the largest single sector by deadweight tonnage and a significant portion of the fleet utilises the highly energy efficient gravity discharge system for the topside ballast water tanks unique to bulk carriers.

On those vessels which use the gravity discharge system, the Top Side Tanks are typically filled from the fire main, not from the ballast line and are discharged directly overboard, which of course is incompatible with the requirements for the obligatory discharge monitoring and secondary

discharge treatment required to reach the performance standard or for neutralisation of any chemicals used in the treatment process.

UV Systems generally require a secondary treatment phase at discharge to achieve the required D-2 standard and thus to fit this type of system on bulk carriers with gravity discharged top side tanks is extremely challenging because of the technical obstacles and financial burden associated with altering the existing arrangements onboard a vessel.

It is not possible to simply connect the Top Side Tanks to the Double Bottom Tanks as the structure of the lower tanks, particularly the Hopper Tanks, is not able to support the rise of pressure due to the additional head of water without additional strengthening of the tanks. It has been estimated that the additional weight, in the form of stiffeners, collar plates and brackets, would amount to between 50 and 200 tonnes depending on the vessel size. The considerable modifications, damage to and the repair of the ballast tank coatings also increases the scope of work that will need to be carried out.

Connecting the Top Side Tanks to each other, via a valve, and then piping back to the Engine Room brings its own problems such as penetrating the Engine Room forward bulkhead and running ballast piping through fuel tanks. There will also be problems with effective emptying of tanks due to trim, which may lead to operational difficulties during loading and unloading.

A third possibility is to connect each Top Side Tank to the ballast main in the double bottom/duct keel. In addition to modifications to existing pipework, fitting of pipe supports, new penetrations through watertight boundaries and repairs to the existing ballast tank coating system, isolating valves would need to be fitted to each new branch of the ballast line.

Fitting a common ballast discharge line through the Top Side Tanks with cross valves to each tank is an option; however this would also lead to major modifications including penetrations through the Engine Room bulkhead, other tight bulkheads, fitting of pipe supports and damage to the ballast tank coatings.

On top of the difficulties associated with the discharge, gravity discharged Top Side Tanks are not filled by the ballast line serviced by the ballast pump but are filled using the fire main and general service pump. Therefore, a second treatment system would be required to treat the uptake of the general service pump, either that or a major modification to the fire main so that ballast water entering the fire main is passed through the ballast water treatment system.

Most chemical treatment systems require monitoring of the discharge and then a chemical neutralisation phase and with these systems the same challenges faced with fitting a UV System would also apply. There are, however a limited number of chemical treatment systems which treat on the uptake only but modifications described previously would need to be carried out.

In addition to the major modifications that would be required, the advantages of gravity discharged tanks would be lost, these advantages include; a) Faster ballasting and de-ballasting; b) Less electrical energy used; c) Less wear and tear on the existing pumps and piping; and d) Effective tank stripping.

Powering requirements: prohibitively high

A significant portion of the existing fleet are geared bulk carriers. For these vessels, BWTS retrofit will create additional problems that will need to be overcome.

It may be obvious to state that the powering for newbuilding vessels is calculated at the design/construction phase and that these calculations are performed on the basis of the intended vessel operation and equipment/machinery fitted onboard.

However it is important to appreciate that for the existing fleet there is little or no spare available power to run a BWTS. Geared bulk carriers typically have 4 cranes and 4 grabs which are used simultaneously during cargo operations. For these vessels, cargo operations will need to cease during ballasting or de-ballasting, or a major upgrade of the onboard power generation would be required. Cargo discharging capacity is often governed by the Charter Party and thus any reduction of the speed of cargo discharge could lead to failure to meet contractual requirements.

Electro Chlorination and UV Systems require significant power requirements which would compound the issues in the previous paragraph. It would be necessary to upgrade the onboard power generation and electrical systems. The increased power requirements of BWTS will lead to more fuel being consumed in the auxiliary engines resulting in an increase in air emissions.

Low treatment capacity compared to ballasting requirements

Not all the available BWTS have sufficient treatment capacity that is equal to the capacity of the ballast pumps. This means that the owners have to choose a system from the limited options available or have to fit additional treatment systems in order to operate under the conditions that the vessels were designed to. Additional systems would of course mean further modifications to the ballast and power supply systems, thus increasing the financial burden. This issue is even more complex when the large bulk carriers are considered.

Fitting BWTS will most likely incur significant ballast pump pressure drops due to the BWTS filters, which will cause a reduction in ballast pump capacity or the replacement of the ballast pumps with those of a greater capacity. The BWTS filters will also affect ballasting operations in sediment rich water, such as rivers, as additional time will be required to backflush the filters.

There is more… (coating, space, etc.)

The effects of chemically treated water on ballast tank and floodable hold coatings is not known and may have a detrimental effect on the coating. The coating system plays a fundamental role in maintaining the structural integrity of the vessel which is recognised by Class and by the IMO Marine Safety Committee, which adopted the Performance Standard for Protective Coatings for Dedicated Seawater Ballast Tanks in all Types of Ships and Double-side Skin Spaces of Bulk Carriers.

The available space for fitting a BWTS also provides challenges for the ship owner which is especially true for the smaller bulk carriers where there is insufficient room to fit all the BWTS components in the engine room. This entails the BWTS being “broken up” and the components being installed in different locations in the machinery and deck areas which adds to the installation complexity, maintenance scope and is detrimental to the BWTS operation which could affect monitoring and safety.

Any modifications to the tanks and piping associated with retrofitting a BWTS will require Class and Flag appraisal. New connections between tanks may have significant impacts on stability, intact and damage stability requirements and would need to be re-assessed, documents such as the Loading Manual, Stability Booklet and Damage Control Plan would need to re-appraised and possibly amended.

Not so long ago, a big problem at terminals was ballast discharging speed and a bulk carrier’s capacity to load cargo at the rate the terminal wanted, so as to save loading time. Terminals black

listed ships that delayed loading operations. It is entirely probable that such 'swift' loading times will no longer be possible if ballast discharge has to pass through the BWTS, and therefore it is likely that we will once again have the same or similar problems at load ports.

REGULATORY IMPLEMENTATION: IMO vs US LEGISLATION

The latter part of 2016 brought unprecedented development to the regulatory world of ships ballast water requirements, including the agreed Entry into Force of the Convention, the much needed revised treatment equipment type approval 'G8' guidelines with the additional agreement to give these a mandatory application, and the granting of US Type Approval to three ballast water treatment systems. The interaction and conflict in the differing timelines has increased the confusion and provided ship owners with an additional dilemma for the most appropriate way forward.

The BWMC

The International Convention for the Control and Management of Ships' Ballast Water and Sediments (Ballast Water Management Convention - BWMC) was agreed on 13th February 2004 with the intention to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. Initiated by the accession of Finland, the Convention finally entered into force (EIF) on the 8th September 2017, over 13 years later.

What started out with optimism and a recognised need for pragmatic application and flexibility has turned into what many consider a Convention that is currently not yet ready for implementation, as evidenced by the continuous ongoing need for the development of more and more guidelines and with the strict performance requirements coupled with a lack of confidence in the ability of the type approved treatment equipment to meet the demanding standards set. The costs coupled with the technical and operational challenges associated with the installation and operation of unproven equipment only adds to concerns.

Type Approval Guidelines

Revised Type Approval Guidelines (G8) were adopted during MEPC 70 at the end of October 2016 when it was also agreed to make the new type approval requirements applicable on a mandatory basis; the IMO Secretariat has been instructed to rewrite the guidance agreed in a mandatory form for consideration during MEPC 71. This task may well prove unattainable as changing the current recommendatory text drafted into an acceptable mandatory text without the Committees input will be demanding.

The revised guidelines will certainly enhance the IMO type approval process, however there is unlikely to be acceptance by the US authorities as equivalent to the US EPV test procedures as the US requires a 'kill' standard and IMO accepts the MPN (most probable number) assessment for UV treatment systems. Other minor differences exist which will prevent a common acceptance and therefore both US and IMO Type approval will unfortunately be required for international trading which will most likely prove cost prohibitive for many treatment systems on the market. It is also to be noted that the G8 procedures will be kept under review in light of experiences gained in application.

MEPC 70 agreed the following timelines for application of the revised Type Approval Guidelines:

28 October 2016	Revised G8 Guidelines adopted
28 October 2016	Revised G8 Guidelines can be used

28 October 2018 Last date for approvals under old G8
28 October 2020 Last date for ship installations of old G8 approved systems

It is obvious that any new applications from manufacturers for treatment system type approval should be under the revised new requirements as all existing approved systems are required to be re-tested prior to October 2020 to continue in the market.

To avoid future problems it will be desirable for ship owners to purchase and install treatment systems approved under the revised procedures as it can be foreseen that a number of existing type approved ballast water treatment systems will either not meet the revised requirements or will have stringent operational limitations imposed. It is also obvious that such approved systems will not be available for some time. It has been agreed that 'early movers' who have installed the earlier type approved systems on their ships will not be penalised, however if the so called 'experience building phase' which commences upon EIF and scheduled to last 3 years identifies certain treatment systems as 'unreliable' it may be anticipated that many ports will not allow discharge of ballast water treated by such systems without further measures being applied, if BW discharge is permitted all.

The need for fitting a treatment system with additional US type approval also needs to be carefully considered, as certainly not all systems have the intention (whether stated or not) of pursuing US type approval and those systems currently with a US 'Alternative Management System' (AMS) status have only a limited life acceptability under US ruling.

BWMC Required Installation Dates

The Convention is to EIF September 8th 2017. It has already been agreed that the date of renewal of the ships IOPP Certificate following EIF for existing ships (to include those contracted and under construction) is the applicable last date for complying with the D-2 discharge standard by the installation and use of type approved ballast water treatment systems. MEPC 70 discussed the possibility of providing an additional allowance for ships with their IOPPC Certificate falling within the first two years following EIF to require to fit treatment systems by the second IOPP renewal, which would provide a D-2 required compliance span 2019 – 2024, however this is not to be finalised until MEPC 71 which has now been postponed from its scheduled April meeting to 3-7 July 2017. The possibility of MEPC accepting this additional allowance is uncertain although there remains a reasonable chance for adoption. This however gives very little time or even a realistic possibility for ships that could benefit from this consideration to pursue the alternative of arranging for, and renewing the IOPP Certification prior to the 8 September EIF should the proposal be rejected and provides further unwelcome uncertainty for the demanded implementation dates immediately prior to EIF.

It is also worth noting that any firm amendments agreed to the BWM Convention, including the implementation schedule, can only be circulated on or after EIF, that is 8th September 2017, and require 6 months in circulation prior to consideration for adoption, and then if adoption is approved another 12 months before the amended legislation can be official. The traditional way to bring forward any change in legislation has been to invite early implementation, which has been the prerogative of each individual Member State to decide, however, the most recent IMO Council meeting extensively discussed and disagreed with the use of early implementation of legislation, this may give rise to further cause for uncertainty. However Assembly resolution A.1088 (28) adopted in 2013, already clarifies that existing ships do not need to comply with the D-2 discharge standard until the first renewal survey following the Convention's EIF and that the renewal survey applicable is the survey associated with the International Oil Pollution Prevention Certificate under MARPOL Annex I.

US situation

During December 2016, the US Coast Guard completed its assessment of, and granted US Type Approval to three BWMS; Optimarin UV 167 – 3,000 m3/h; Alfa Laval Filter + UV 250 - 3,000 m3/h, and; OceanSaver In situ electrolysis 1,500 – 7,200 m3/h. This development has resulted in a 'game changer' in the Coast Guard's extension process and ship owners will now have to document and justify how they cannot possibly fit an approved system on their ship.

For future extension requests supporting documentation providing such information as the evaluation of BWMS and discussions with BWMS vendors, issues with the availability of suitable systems, lack of dry-docking space, problems encountered during purchasing, installation and commissioning, and a systems operational practicality pertinent to the individual ship and or trade, as relevant, will be required to gain acceptance. The only recently understood unique and onerous demands of ballast water treatment system requirements for bulk carriers may prove helpful when requesting USCG future extensions, in comparison with other ship types that require a much smaller and simpler system.

Otherwise the US dry bulk market will be facing a shortfall of vessels in a few years of time, in the case where there will not be enough dry bulkers compliant with US legislation. Who is going to meet the trade demands of the United States?

THE WAY AHEAD

The conflicting demands of US legislation and the IMO Ballast Water Management Convention will require careful attention to avoid costly mistakes when assessing options going forward, especially for bulk carrier owners.

An obvious option for compliance with IMOs BWM Convention has been to take advantage of renewing the ship's IOPP Certificate immediately prior to EIF so as to give the greatest time possible for the fitting of a treatment system. This would be for a number of reasons, not least to allow time for suitable BWTS approved under the revised Type Approval requirements to become available in the market. Also the additional reprieve from considerable capital expenditure would provide time for the bulk carrier market to hopefully strengthen to justify such expenditure and verify the ships financial sustainability.

The one complexity to be considered in the equation is the possibility of MEPC 71 agreeing for ships with a scheduled survey renewal falling in the first two years following EIF to have the D-2 implementation delayed until the second survey, which would certainly be welcomed favourably by some older tonnage. However, is the chance of rejection of the proposal worth taking? One two-way possibility could be to arrange IOPP renewal to follow MEPC 71 and then decide whether or not to take-up the arrangements made dependent upon the IMO decision. Opportunities for alternative scheduling of a de-harmonised IOPP survey renewal may be limited, especially when the potential demand is considered. Owners would be well advised to make firm arrangements early to ensure completion in the requisite timing.

It is recognised that it will take time before BWMS manufacturers are able to attain type approval under the recently revised G8 procedures and make such systems available. To not take advantage of possibilities to extend implementation dates would place some owners in the injurious position of having to install 'first' generation ballast water management systems at substantial expense that may not work and may not meet the environmental objectives of the Convention.

Fortunately both the US Coast Guard and EPA to date have been found to be realistic in the implementation of the existing and in force ballast water regulations and it is hoped that this pragmatism will continue when viewing extension applications for bulk carriers with the many very real challenges bulk carrier owners face; an honest appraisal and documentation of the difficulties faced will be necessary together with a reasoned assessment of the possibilities for fitting the US type approved equipment that may be available.

In a world where efficiency and reduction of fuel consumption has become so sought after it is surely an anomaly to demand the increase of energy consumption on a separate environmental concern when virtually equivalent protection can be obtained so easily and simply. The Voltaire quote that 'the best is the enemy of the good' can easily be applied to ships ballast water management demands. The result of demanding that biological treatment systems be installed on all existing ships will no doubt result in many otherwise viable bulk carriers being scrapped due to the costs and structural work required making continued trading financially unsustainable. The energy expended and CO2 produced during scrapping and building new replacement tonnage is not considered, perhaps it should be? The protection of the environment requires a holistic approach, rather than a fragmented one.

Finally there are concerns regarding the production capacity and availability of service engineers of the approved systems manufacturers. Will they be able to meet the required demand for fitting these systems both for new build and for the existing fleet? The lack of experience with these systems cannot be underestimated. It is not known how these systems will perform in the future and whether they will be able to meet the requirements leading to potential extra burdens for the ship owners. It is only now becoming fully clear to ship owners how complex and onerous the requirements are for bulk carriers that need to be retrofitted with approved BWTS.

INTERCARGO is willing to work together with other stakeholders and BWTS manufacturers in order to resolve specific issues for existing bulk carriers. Some issues to be resolved are specifically:
- A solution for bulk carriers fitted with gravity discharged top side tanks (such as extended ballast water exchanges).
- The excessive electrical power requirements necessary with certain BWTS. These make their retrofit to many bulk carriers infeasible.
- A sensible feedback mechanism and solution in the case where a bulk carrier has taken ballast water aboard at a port outside the U.S., the BWTS has been correctly used and treatment carried out to the prescribed level, yet, on arrival in the U.S., the sampling still shows surviving micro-organisms to be above the U.S. limit.

About INTERCARGO: The International Association of Dry Cargo Shipowners was established in 1980 with the objective of giving a voice to shipowners, managers and operators of dry cargo vessels and better representing this shipping sector. Our Members commit to a safe, efficient, high quality and environmentally-friendly dry cargo shipping industry. INTERCARGO is an accredited NGO observer at IMO and a member of the Round Table of International Shipping Associations. INTERCARGO considers that free and fair competition in the shipping industry is of fundamental importance and this serves as its prime principle.

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