Ballast Water

INTRODUCTION

What is Ballast Water and Why Ships Carry Ballast Water

Ballast water is carried in ships to provide stability and trim. A ship's ability to take on and discharge ballast water is fundamental to its safe operation. As a ship loads or unloads cargo or takes on or consumes fuel, the ship must accommodate changes to its displacement and trim by taking on or discharging ballast water. Ballast water is taken on through openings near or on the bottom of a ship's hull and is pumped in or out of a ship through piping connected to ballast pumps which are located in the ship's lower machinery space. Without these ballast water operations, ships cannot be operated safely: ballast water intake and discharge provides proper stability and trim, minimizes hull stress, aids or allows maneuvering, and reduces ship motions of roll and pitch. The water pumped into a ship's ballast tanks must inevitably be pumped out when the ship takes on cargo. Ballast uptake and discharge most often occurs in port during cargo operations, but may also occur while the ship is in transit on the open lake or through connecting waterways to maintain proper trim and stability.

Ballast Water is a Global Issue

Ballast water has received considerable attention globally over the past several years. When ships uptake ballast water, small marine organisms and sediment suspended in the water can be captured in the ballast water. Ships could then transport these organisms, often in a viable condition, across natural biological barriers to other areas where they are released and may become invasive. Efforts to prevent and curb the introduction of aquatic nuisance species (ANS) are taking place at international, national and local levels. The Marine Environment Protection Committee (MEPC) at the International Maritime Organization (IMO) and other related subcommittees have made significant progress toward an international ballast water management policy which includes a ballast water discharge standard.

Even when fully loaded with cargo, ships commonly referred to as NOBOB's (No Ballast on Board) are rarely completely empty of ballast water. There is clearance below the bell mouths of the ballast lines in the ballast tanks to avoid clogging that makes some water un-pumpable using standard ballast pumps. This residual ballast water can be a mixture of water and sediment from ports recently visited around the globe. The residuals may be transported to the next port of call and become resuspended in the ballast water during subsequent ballast uptake.

Ballast Water Management on the Great Lakes Seaway System

When ships declare "Ballast Water on Board" (BOB ships) they are inspected

during each Seaway/Great Lakes transit. BOB ships are inspected prior to entering the Seaway/Great Lakes on their initial transit each shipping season. The inspection is done before the ship is granted permission to transit the Seaway/Great Lakes system. Every subsequent transit of a BOB ship that does not intend on stopping at a St. Lawrence River port is inspected between the two US Locks (Snell and Eisenhower) to ensure compliance with ballast water regulations.

Regulatory bodies test the salinity in certain ballast tanks in order to confirm that the salinity meets the minimum required salinity of 30 ppt (parts per thousand). Ships that do not comply with the minimum salinity of 30 ppt are required to retain all non-compliant ballast water onboard, return to sea and conduct a full ballast water exchange or treat the non-compliant ballast water with an approved treatment.

On arrival in the Great Lakes Seaway System, ships declaring “No Ballast on Board” generally off-load cargo in ports in the lower lakes and thereafter take on ballast water and proceed to a series of Great Lakes ports in the upper lakes to pick up and/or off-load additional cargo (and ballast water). During these short voyages, the residual un-pumpable ballast water from overseas ports is mixed with Great Lakes ballast water and can be discharged into the ports of call in the upper lakes where cargo is generally loaded.

The trading patterns of transoceanic ships (“salties”) to the Seaway reveal a possible route for the introduction of ANS. For example, cargoes such as iron and steel products carried by “salties” generally arrive from ports in Belgium, the Netherlands, Brazil, France, Germany, Russia, Poland, Spain, Turkey, and the United Kingdom.

It is common for ships to discharge part of their cargo at lower-lakes ports as they travel farther west in the Great Lakes basin, taking on more ballast water as they unload cargo. From their final discharge port, the “salties” normally transit in a ballast condition to pick up cargo for their outgoing voyage. The cargo is then transported to overseas ports, in Belgium, the Netherlands, Algeria, Italy, Spain, Venezuela, and the United Kingdom, amongst others.

Ballast Water Regulations for the Great Lakes Seaway System Today, ballast water management requirements in the Great Lakes St. Lawrence Seaway System are the most stringent in the world. U.S. Coast Guard regulations and Transport Canada’s “Ballast Water Control and Management Regulations” with “Canadian Guidelines for Ballast Water Management” require all ships destined for Great Lakes ports from beyond the exclusive economic zone (EEZ) to exchange their ballast at sea. If the ships have not complied, they are required to retain the ballast water on board, pump the ballast water ashore, treat the ballast water in an environmentally sound manner or return to sea to conduct a ballast water exchange.

As part of the Enhanced Seaway Inspection (ESI) program for foreign-flagged vessels, the SLSDC, U.S. Coast Guard, Transport Canada Marine Safety and/or their contractors verify a vessel’s successful ballast water exchange through its boarding program, which includes measuring the salinity of on board ballast. Ballast with a salinity of at least 30 ppt is considered evidence that the tanks have been adequately exchanged with seawater, providing a reasonably harsh environment for any remaining organisms.

The Seaway Corporations have required ships transiting the Seaway to comply with the above mentioned standards. In addition, ships that do not operate beyond the EEZ but do operate within the Great Lakes and Seaway (i.e., lakers) must agree to comply with the “Voluntary Management Practices to Reduce the Transfer of Aquatic Nuisance Species within the

Great Lakes by U.S. and Canadian Domestic Shipping", dated January 26, 2001". These voluntary management practices require ships to agree to regular inspections of ballast tanks and regular removal of sediment.

Additionally ships coming from outside waters under Canadian jurisdiction, declaring 'no ballast on board', must ensure that the residual ballast water in tanks has been exposed to salinity conditions equivalent to ballast water exchange by complying with one of the following options:

1. The residual ballast water came from ballast water that was properly exchanged at sea;
2. The residual ballast water meets the international standard for treated ballast water;
3. The ship complies with sections 1, 2, 6 and 7 of the "Code of Best Practices for Ballast Water Management" of the Shipping Federation of Canada dated September 28, 2000, or;
4. The ship conducted a saltwater flushing at least 200 nautical miles from shore.

Shipping Federation of Canada (SFC) and Lake Carriers' Association (LCA)/Canadian Shipowners Association (CSA) Committed to Reducing the Introduction of ANS

The SFC and the LCA/CSA have taken a pro-active stance to the matter of introduction and/or transfer of ANS via ballast water and in 2000/2001 voluntarily agreed to certain preventive measures to reduce the spread of ANS. The above mentioned associations have tabled a series of "ballast water management practices" that their membership companies have agreed to conduct prior to obtaining clearance to transit the Great Lakes Seaway System in order to prevent the introduction and/or transfer of ANS.

The Shipping Federations of Canada's membership has agreed to comply with the SFC "Code of Best Practices for Ballast Water Management", dated September 28, 2000, when operating beyond the EEZ and while operating anywhere within the Great Lakes Seaway System.

The LCA/CSA's membership has also agreed to comply with the LCA/CSA "Voluntary Management Practices to Reduce the Transfer of Aquatic Nuisance Species within the Great Lakes by U.S. and Canadian Domestic Shipping", dated January 26, 2001, while operating anywhere within the Great Lakes Seaway System.

LINKS TO BALLAST WATER REGULATIONS

- Seaway Regulations – Practices and Procedures Section 30 (2)
- Shipping Federation of Canada Code of Best Practices for Ballast Water Management dated September 28, 2000
- Lake Carriers Association's and Canadian Shipping Association's Voluntary Management Practices to Reduce the Transfer of Aquatic Nuisance Species within the Great Lakes by U.S. and Canadian Domestic Shipping dated January 26, 2001
- Part 151--Vessels Carrying Oil, Noxious Liquid Substances, Garbage, Municipal Or Commercial Waste, And Ballast Water
- U.S. Coast Guard regulations
- USCG Ballast Water Reporting Form (must be submitted 24 hours prior to ocean vessel's arrival at Montreal)
- Transport Canada, Ballast Water Control and Management Regulations (Master of ships should take note of Canadian Reporting requirements of section 13 & 14).
- Transport Canada, TP 13617E, A Guide to Canada's Ballast Water

Control and Management Regulations

- IMO Guidelines Resolution A.868(20)
- Michigan's New Ballast Water Regime

U.S. AND CANADIAN BALLAST WATER INITIATIVES

Bi-National Ballast Water Working Group

The agencies that inspect, test, and monitor ballast water saw a need to standardize commonly needed information such as ballast water inspections, verifications, testing, sampling, reports and data collection. The various agencies in 2005 combined their efforts and collaborated in a joint venture where testing, sampling and inspection can be done simultaneously at locations/ports prior to entering the Great Lakes Seaway System.

As a result of these discussions a U.S./Canadian Ballast Water Working Group (BWWG) was formed in January 2006. The BWWG is comprised of representatives from Transport Canada Marine Safety, U.S. Coast Guard, the U.S. Saint Lawrence Seaway Development Corporation, and the Canadian St. Lawrence Seaway Management Corporation.

The BWWG's mission is to coordinate regulatory, compliance and research efforts among the group's membership for reducing aquatic nuisance species invasions via ballast water in the Great Lakes.

The results to date noted from the BWWG have been positive. The ballast water compliance rate of ships entering the Great Lakes Seaway System has increased since joint targeting was introduced during the 2005 and 2006 navigation seasons.

In 2006, the BWWG accomplished the following initiatives: (1) developed a Standardized Ballast Water Reporting Form; (2) developed and coordinated a Memorandum of Understanding signed by Transport Canada and U.S. Coast Guard setting out procedures and parameters to conduct Joint Vessel Exams in Montreal, Quebec, Canada; (3) developed and implemented a standardized Great Lakes / St. Lawrence Seaway System Joint Agency Ballast Water Management Inspection Report which captures each agency's inspection needs; and (4) presented results of the 2006 testing program through July 2006 at the 1st Annual Ballast Water Conference in Cleveland, Ohio.

In 2007, the BWWG will continue to work to finalize plans for a bi-national data base to be used for input and data management by the four agencies, track progress of International Ballast Water Standard, and compile and review end of year data on the Ballast Water Tank Exam program.

Great Ships Initiative

The Northeast-Midwest Institute, in collaboration with the American Great Lakes Ports Association, the National Fish and Wildlife Foundation, the University of Wisconsin-Superior and relevant federal, state and provincial agencies, and interested carriers, launched a "Great Ships Initiative" (GSI) in July 2006 to focus resources and expertise on producing solutions to the problem of ship-mediated invasive species in the Great Lakes. It plans to do so in a way that offers a possible model and structure for similar action by other regions and nationally.

The primary objectives of the GSI program are: (1) solicit and identify promising treatment systems most relevant to Seaway-sized transoceanic vessels; (2) provide technical support through operational and biological testing and expert review of findings to accelerate effective research and development of promising systems; and (3) facilitate successful evaluation

and approval by regulators of any promising treatment alternatives. Research capabilities at three scales - bench scale (laboratory at UW-Superior); pilot scale (barge-based); and shipboard scale - activate a set of "technology incubators" to accelerate the identification and verification of treatment tools to stop organism introductions by Seaway-size ships.

LINKS TO BALLAST WATER INITIATIVES

- USCG Shipboard Technology Evaluation Program
- Naval Research Laboratory (Key West, Florida)
- ANS Task Force
- IMO GloBallast Program

BALLAST WATER TECHNOLOGIES AND PRESENTATIONS

- Instrumented Ballast Tank Studies to Examine Ballast Management Practices
- Two Ballast Water Treatment Technologies – Hyde Marine Inc.
- Binational Ballast water Working Group-2006 Great Lakes Ballast Water Management Exam Program
- FedNav's Testing of OceanSaver® Technology
- The Great Ships Initiative-Northeast/Midwest Institute
- BalPure Electrolytic Ballast Water Treatment System-Severn Trent De Nora
- PERACLEAN® Ocean Ballast Water Treatment-Degussa Corporation
- Ballast Water Technology Demonstration Program-National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service U.S. Maritime Administration
- Venturi Oxygen Stripping TM-NEI Treatment Systems
- Best Management Practices – Philip T. Jenkins & Associates Ltd.

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