

2007 Summary of Great Lakes Ballast Water Management

May 2008



Great Lakes Ballast Water Working Group

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Chapter 1 – Executive Summary

The 2007 Summary of Great Lakes Ballast Water Management report was compiled by the Great Lakes Ballast Water Working Group (BWWG), comprised of representatives of the United States Coast Guard Ninth District, the U.S. Saint Lawrence Seaway Development Corporation, Transport Canada - Marine Safety, and the Canadian St. Lawrence Seaway Management Corporation. The group meets regularly throughout the year to develop, enhance, and coordinate binational enforcement and compliance efforts to reduce the introduction of aquatic invasive species via ballast water. The BWWG is actively engaged and providing an energetic response to calls for tougher ballast water regulation of ocean-going ships transiting the Seaway.

Today, ballast water management requirements in the Great Lakes St. Lawrence Seaway System are the most stringent in the world. There is currently no unmanaged ballast water entering the Great Lakes. Mandatory ballast water regulations that now include saltwater flushing, detailed documentation requirements, increased inspections, and monetary fines provide a tougher enforcement regime to protect the Great Lakes Seaway System. U.S. Coast Guard regulations, Transport Canada's Ballast Water Control and Management Regulations, and the new Seaway ballast water regulation, 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.

In 2006, Canadian regulations began requiring all ships entering waters under Canadian jurisdiction to comply with the International Maritime Organization (IMO) ballast water exchange standards including ships with "no ballast on board" (NOBOB). These NOBOB ships were

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required to expose residual water to conditions equivalent to ballast water exchange through saltwater flushing procedures before arrival in Montreal. The new Seaway regulation that was implemented at the start of the 2008 navigation season requires all NOBOB ships headed for U.S. ports to engage in saltwater flushing of their ballast water tanks before entering the Seaway, thus harmonizing U.S. regulations with those of Canada. Virtually every ship entering the Seaway System undergoes inspection in Montreal by the U.S. Coast

Guard, Transport Canada, and the two Seaway Corporations to assure they are compliant with the saltwater flushing and exchange requirements. Until national ballast water regulations and procedures are promulgated by the U.S. Coast Guard, this is an effective and responsible interim measure to address invasive species.

In 2007, there was marked improvement over the prior year's inspection program statistics in a number of areas, including ship compliance rates. In 2007, 100% of first trip ships bound for the Great Lakes received a ballast water exam. A total of 6,394 ballast tanks were examined with a 95% compliance rate for tank samples. There was a 21% increase over 2006 in the number of ships utilizing best management practices for ballast water. In addition, 100% of ballast water reporting forms were screened to assess ballast water history, compliance, voyage information

and proposed discharge location. The BWWG anticipates ever increasing ship compliance rates for the 2008 navigation season.

In preparation for ensuring compliance with the new Seaway regulation, the BWWG developed a more intensive inspection regime during the 2007 navigation season. The four agencies are working collaboratively and have dedicated additional resources to the increased tank inspection program in place for 2008. There will be a sizeable increase in ship boardings as each and every ship entering the Seaway System from outside the EEZ will be inspected on every transit. Furthermore, there will be an increase in the actual number of ballast tanks tested, on both BOB and NOBOB ships. These efforts will ensure maximum compliance with the new regulations on saltwater flushing.

Ongoing research and development initiatives are critical to the effort to eradicate aquatic invasive species. There is a need for standardized testing and evaluation of ballast water treatment technologies. The Great Ships Initiative (GSI) was launched in 2007 by governmental, academic and industry representatives as a collaborative binational effort to end the problem of ship-mediated invasive species in the Great Lakes St. Lawrence Seaway System through independent research and demonstration of environmental technology, financial incentives and consistent basin-wide harbor monitoring. The GSI program's objective is to accelerate research, development and implementation of effective ballast treatment systems for ships. A new GSI shore-based RDTE facility was opened last summer to provide an intensive testing environment for prospective ballast treatment technologies. The U.S. Coast Guard also utilizes its Shipboard Technology Evaluation Program (STEP) to facilitate the development of effective ballast water treatment technologies through experimental systems, thus creating more options for ship owners seeking alternatives to ballast water exchange. The STEP is available to all foreign and domestic ships subject to the Coast Guard's Ballast Water Management regulations, 33 CFR 151 Subparts C & D. Transport Canada and the Department of Fisheries and Oceans have an extensive Research & Development (R&D) program to test the effectiveness of the ballast water enforcement regime. They have also undertaken studies to examine the potential effectiveness of the IMO ballast water discharge standards in the Great Lakes, the potential use of various biocides (two which have received final approval at IMO) and are currently researching the use of brine in conjunction with NOAA and the U.S. Coast Guard as an option for ships found to be non compliant.



Chapter 2 – Joint Ballast Water Management

A Successful Bi-national Program between U.S. Coast Guard Ninth District, Transport Canada-Marine Safety, and the St. Lawrence Seaway Corporations

Ballast Water Working Group

The Great Lakes Ballast Water Working Group (BWWG) was formed in January 2006.

The mission of the BWWG is to harmonize ballast water management efforts between the U.S. Coast Guard, Transport Canada-Marine Safety, St. Lawrence Seaway Development Corporation (US) and the St. Lawrence Seaway Management Corporation (CA). The BWWG coordinates enforcement and compliance efforts for reducing aquatic nuisance species invasions via ballast water in the Great Lakes.

Ballast Water Management on the Great Lakes Seaway System

A Historical Perspective:

1989:

In response to calls from the International Joint Commission and the Great Lakes Fishery Commission over the discovery of the Ruffe in Lake Superior, Canada brought in guidelines requesting all ships entering the freshwaters of the St Lawrence River and the Great Lakes to exchange their ballast. The use of ballast water exchange was based on the effectiveness of Canadian studies undertaken by Environment Canada to protect the aquaculture facilities in the Magdalen Islands.

Early 1990's to 1997:

The U.S. Coast Guard brought in regulations based on the Canadian Guideline in 1993 under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA). Ballast Water on Board or "BOB" are ships that declare they have ballast tanks that contain ballast water. The U.S. Coast Guard started testing BOB ships on a voluntary basis in 1991 and on a mandatory basis in 1993. The inspection process included boarding ships between the two U.S. locks in Massena (Eisenhower and Snell) and testing the salinity of the ballast water to ensure salinity was at least 30 parts per thousand (ppt). 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.

1997 to Present:

The U.S. Coast Guard, Transport Canada and the Seaway Corporations developed a joint inspection program called the "Enhanced Seaway Inspection" (ESI), which covered applicable safety and environmental equipment onboard ships and was conducted prior the ship's initial transit of the Seaway Great Lakes System.

During the ship's ESI, the Seaway Corporations and U.S. Coast Guard conduct a ballast water inspection to ensure compliance with flag state and/or Seaway ballast water regulations. The ship's ballast water tanks are sampled in order to confirm that salinity of the tanks is not less than 30 ppt.

Every foreign flag BOB ship has been, and is, inspected as follows:

- **FIRST TRANSIT OF THE SEASON:** The ballast water inspection is done during the ESI inspection before the ship is granted permission to transit the Seaway Great Lakes system.
- **SECOND & EVERY TRANSIT THEREAFTER:** The ballast water inspection is done either in a lower St. Lawrence River Port or in between the two U.S. Locks (Snell and Eisenhower).

Non-compliance: Ships that have ballast water that does not meet 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.



2002 St. Lawrence Seaway Requirement:

The U.S. and Canadian Seaways instituted a requirement that all foreign flag ships entering the Seaway Great Lakes System comply with the Best Management Practices of the Shipping Federation.

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.

2005 U.S. Coast Guard NOBOB Best Management Practices:

As a result of the National Oceanic and Atmospheric Administration (NOAA) and Great Lakes Environmental Research Laboratory (NOAA/GLERL) study published in April 2005 and the risks identified therein, the U.S. Coast Guard and Transport Canada Marine Safety inspectors began examining NOBOB vessels in conjunction with the ESI in May of 2005. In August 2005, the U.S. Coast Guard issued its "NOBOB Best Management Practices". This policy recommends the ship to conduct mid-ocean ballast water exchange whenever possible, and if not possible, to conduct mid-ocean salt water flushing. The goal of these practices is to raise the salinity level of residual, umpumpable ballast above 30 ppt. The increase in salinity reduces the likelihood of introducing aquatic nuisance species to the Great Lakes when the tanks are ballasted with Great Lakes fresh water at one port and deballasted in another Great Lakes port.

2006 Canadian Regulations:

Canada promulgated the Ballast Water Control and Management Regulations under the Canada Shipping Act in June of 2006. The regulations enact the IMO D1 requirements for ballast water exchange for any ship entering waters under Canadian jurisdiction from outside Canada's EEZ and include both trans oceanic and costal voyages.

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:

- The residual ballast water came from ballast water that was properly exchanged at sea;
- The residual ballast water meets the international standard for treated ballast water;
- 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;
- The ship conducted a saltwater flushing at least 200 nautical miles from shore.

NEW INITIATIVES

2008 St. Lawrence Seaway NOBOB Requirement:

The U.S. and Canadian St. Lawrence Seaway agencies enacted new requirements effective at the start of the 2008 Navigation Season that requires ships to conduct saltwater flushing of their ballast water tanks that contain residual amounts of ballast water and/or sediment in an area 200 nautical miles from any shore before entering waters of the Seaway. Ships must also maintain the ability to measure salinity levels in each tank onboard so that final salinities of at least 30 ppt can be ensured.

The BWWG worked diligently over the 2007 navigation season to devise a more intensive inspection regime in order to ensure compliance to the new Seaway requirement. All four agencies have committed resources to accomplishing the additional work that will be required to carry out the increased tank inspection program. The overall goal of the 2008 inspection program is to inspect each ship entering the system from outside the EEZ on every transit and increase the number of both BOB and NOBOB tanks tested.

Results from the previous inspection program are outlined in the next section. You will see an increase in the number of compliant ships. We are confident that the 2008 season results will continue to show an increasing compliance rate.

U.S. Coast Guard Discharge Standard:

In addition to the current regulations and policies, the Coast Guard is engaged in a rulemaking that would set a performance standard for the quality of ballast water discharged in the U. S. Waters. This rulemaking is being carried out under the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and the National Invasive Species Act of 1996, which authorize the Cost Guard to approve alternative ballast water management systems (BWMS)

that are found to be at least as effective as mid-ocean ballast water exchange (BWE) in preventing aquatic invasive species introductions. As the effectiveness of ballast water exchange varies from ship to ship, the Coast Guard believes that setting a performance standard would be the most effective way for approving BWMS that are environmentally protective and scientifically sound. Currently, this rulemaking is in clearance.

Chapter 3 – Results of Ballast Water Management Exams

Ballast Water Management Exams

The Joint Ballast Water Management Exam Program uses a comprehensive approach to ship inspections. The inspection begins with a review of ballast water reports, logs, records and ballast water management plans. The crew is interviewed to assess their understanding of the requirements of the ship's Ballast Water Management Plan as well as answer questions on actual practices. Finally, ballast tanks on both BOB and NOBOB ships are sampled for salinity.

Ballast Water Reporting Form

Ships bound for the Great Lakes from outside for the EEZ are required to submit a ballast water reporting form before entering Canadian waters. The form provides detailed ship and ballast water information. The ship lists voyage information, ballast water usage/capacity, ballast water management, ballast water sources, ballast water management practices, and proposed discharge location. In 2007, 100% of ballast water reporting forms were screened to assess ballast water history, compliance, and intentions.

Ship Inspection Totals

Figure 1 summarizes the total exams completed in 2007 by the joint USCG/TCMS team and the St. Lawrence Seaway Corporations. "Ballast Exams Conducted" is the percentage of ships inspected by a joint team of any combination. **323 or 74%** ships bound for the Great Lakes received a ballast water exam. "Non-Stop or Subsequent Trip" indicates the number of ships that did not stop in the Seaway while enroute to a Great Lakes port during a second or subsequent voyage and ships that were inspected during the first trip into the system and are on a subsequent trip. **111 or 26%** of ships bound for the Great Lakes were either non-stop or subsequent trip. **100% of first trip ships bound for the Great Lakes received a ballast water exam.** This figure does not differentiate between ships with ballast and NOBOB ships.

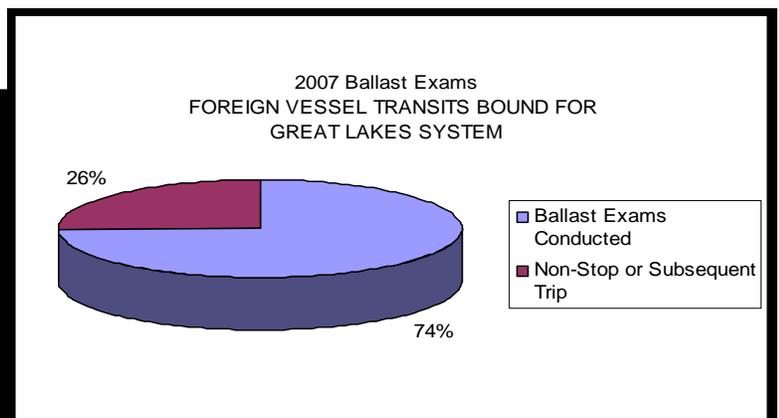
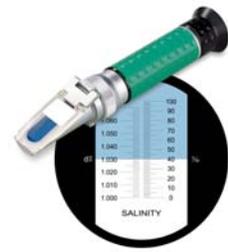


Figure 1 summarizes the total exams completed in 2007.

Ballast Tank Sampling

Ballast water is typically found in wing tanks, double bottom tanks, peak tanks, and cargo holds. Access to these tanks is normally gained through vents, sounding tubes or hatches. Normal procedure calls for the inspector to utilize the sounding tube or vent for primary access, and access manhole covers and hatches if unable to gain access via a primary means. Ballast water salinity is checked using a handheld salinity refractometer or with an electronic meter. The results of the sampling are captured on a sampling report form created by the BWWG.



Refractometer

Figure 2 summarizes the number of tanks that were sampled by TCMS, USCG, joint USCG/TCMS team, or the St. Lawrence Seaway Corporation inspectors. There were a total of **6394 ballast tanks** onboard ships that received a ballast water exam. A total of **5016 or 78% tanks were sampled** with only **164 found having salinity less than 30 ppt**. Upbound ships with noncompliant ballast water receive a retention letter that requires the Master to retain ballast water onboard. When the ship is down bound, inspectors board the ship and sample the water as

well as take soundings to confirm the noncompliant water has not been discharged. The “Tanks Sampled” column indicates tanks with ballast water sampled and tanks without pumpable ballast sampled. **Overall, the compliance rate for tank samples was over 95%.**

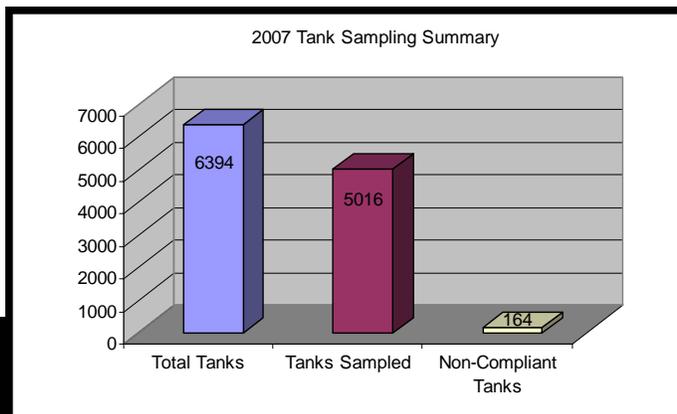


Figure 2 summarizes the number of tanks that were sampled.

Best Management Practices for NOBOB Ships

The regulations protecting the Great Lakes during the 2007 Navigation Season included Ballast Water Control and Management Regulations under the Canada Shipping Act and Best Management Practices for NOBOB ships entering the U.S. Canadian regulations apply to all ships entering waters under Canadian jurisdiction from outside the EEZ and apply to ships on both oceanic and coastal voyages. Loaded ships with residual sediments are required to flush their tanks with water of a salinity equivalent to ballast exchange. Best management practices call for ships to conduct mid-ocean ballast water exchange during ballast laden voyages in an area 200 nm from any shore, whenever possible. For ships unable to conduct mid-ocean ballast exchange due to cargo, they are asked to conduct saltwater flushing of their empty ballast water tanks in an area 200 nm from any shore whenever possible. Salt water flushing is defined in U.S. policy as the addition of mid-ocean water to empty ballast water tanks; the mixing of the flush water with the residual water and sediment through the motion of the ship; and the discharge of the mixed water, such that the resultant residual water is as high salinity as possible, preferably greater than 30 ppt.

In 2007, there was a notable improvement in the best management practices for NOBOB ships. The number of ships that exhibited poor management practices such as low salinity, no treatment of unpumpable ballast, inconsistent or missing records, poor maintenance of ballast equipment, or inadequately trained crew decreased by 21% from 2006. While approximately a third of the arriving ships still have minor deficiencies such as missing information in the ballast water management plan, incomplete logs, or only partial flushing of the unpumpable ballast, the data suggests that ship operators entering the Great Lakes Saint Lawrence Seaway System are becoming more knowledgeable of the requirements and are taking steps to properly treat ballast residuals. As the joint ballast exams continue and mariners become more familiar with the regulations, it is expected that the compliance rate will continue to improve.

Chapter 4 – Summary of Enforcement and Regulatory Action

Regulatory Action

Although, regulatory action is limited to the jurisdiction of each agency, information exchange between agencies ensures appropriate action is taken to address discrepancies. The various tools commonly used for discrepancies include education, a Letter of Warning, a fine issued through a Notice of Violation, and for ballast water - a Retention Letter.

Retention Letters

In accordance with 33 CFR 151.1510, the master of a ship must employ one of three ballast water management practices. **These methods include:**

- Conducting an exchange at sea more than 200 nautical miles from shore in water great than 2,000 meters deep;
- Retain the ballast water on board for the entire voyage, or use an alternative environmentally sound method approved by the Commandant of the Coast Guard.
- Since there are no alternative methods approved by U.S. Coast Guard, ships that fail to conduct proper ballast water exchange must retain the ballast water on board; or
- Return to sea to conduct exchange.

Additionally, Canada's June 2006 - Ballast Water Control and Management Regulations requires all ships entering waters under Canadian jurisdiction from outside the EEZ to exchange their BOB or flush their NOBOB tanks with water of a salinity equivalent to ballast exchange. Ships with noncompliant tanks that agree to retain ballast water are issued a Letter of Retention. When the ship departs the system the USCG/TCMS inspectors sample the ballast tanks to ensure compliance and remove the Retention Letter. **In 2007 the USCG and TCMS issued a total of 46 Retention Letters for ships going to U.S. and Canadian ports.**

Letters of Warning

A Letter of Warning is issued by U.S. Coast Guard when a ship is found with discrepancies in its ballast water management plan, records or reports. It is used for minor first time offenses with a warning of possible assessment of fine if not corrected. **In 2007, the USCG issued 1 Letter of Warning.**

Notices of Violation

A Notice of Violation imposes a fine on a ship for failure to comply with U.S. regulations. Fines associated with ballast water vary from \$500 to \$1000 for the first offense and may reach \$6,000 for repeated offenses. **In 2007, the USCG issued 2 Notice of Violations for ballast water report form issues.**

Chapter 5 – Conclusion

The Great Lakes are uniquely situated to combat the further introduction of invasive species. With a central inspection point, situated outside of the lakes, the ballast water tanks of all inbound ships are inspected by both Canada and the United States. Joint ship inspections by Transport Canada, the U.S. Coast Guard, and the U.S. and Canadian Seaway Corporations have been regularly conducted in Montreal. This inspection process, in place since 1997, has been successful in enhancing the operational and environmental safety of the Great Lakes St. Lawrence Seaway System. Improvements are continually being made to the inspection programs to incorporate updated procedures and technology. All four agencies work cooperatively in a binational manner to address issues as they arise. The new Seaway regulation harmonizes the ballast water requirements for ships transiting the U.S. waters of the Seaway with those currently required by Transport Canada for transit in waters under Canadian jurisdiction of the Seaway. This regulation is intended to be an interim solution while the U.S. Coast Guard completes its ballast water discharge rulemaking, anticipated to be issued in the near future. The Ballast Water Working Group will continue its work to combat the introduction of aquatic invasive species in the Great Lakes using regulatory, technological, and management-based protocols. The agencies take the threat of invasive species very seriously and are dedicated to finding new answers to combat the problem.



Chapter 6 – Contributions

Members of the Ballast Water Working Group

U.S. Coast Guard, Ninth District would like to thank the following members of the Great Lakes Ballast Water Working Group and all the inspectors who contributed to the 2007 Joint Ballast Water Management Exam Program and to this final report.



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U.S. Coast Guard

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CDR Tim Cummins
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Bivan Patnaik
LT Teresa Peace
CWO Matt Trego

For further information on the Great Lakes Ballast Water Program, please visit the following:

The Seaway website: <http://www.greatlakes-seaway.com/en/environment/ballast-water/index.html>

The NBIC website: <http://www.hrw.com/science/si-science/biology/animals/marineinvasions/ballast.html>

The USCG website: <http://cgweb.comdt.uscg.mil/g-ms/g-mso/estandards.htm>

Transport Canada's website: <http://www.tc.gc.ca/en/menu.htm>