

Ballast Water Control – The Canadian Approach

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INTRODUCTION

Ballast water discharges from ships have been identified as a major vector in the transfer of nuisance aquatic species from one area of the world to another. Ballast water is carried on ships to maintain stability and comfort when the ship has little or no cargo on board. Water was not always used – most ships in the days of sail carried solid ballast in the form of rock or sand. To discharge this was a laborious, often dangerous job and there are many records of ships taking days or weeks to discharge ballast in preparation of loading a cargo. With the advent of steam, and the technology to pump water into tanks in minutes or hours, the economic benefits of using water ballast were quickly grasped by shipowners and shipbuilders. The fact that ballast tanks could be used for the carriage of fresh water or fuel oil was an additional bonus. Water ballast was the accepted form of ballast by the late 1800's.

Until fairly recently discharge of ballast water was considered environmentally benign. Canadian and International regulations have permitted the discharge of water ballast from ships as long as the water did not contain either oil or certain chemicals.

In Canada, the primary study that identified the perhaps not so benign side of ballast water was undertaken by Bio-Environmental Services Ltd on behalf of Environment Canada and was published in 1981. This study found viable aquatic organisms in ballast water of ships sampled and warned of the possibility of the introduction of unwanted species into the Great Lakes.

However it was concern over the fragile ecology of Grand-Entree Lagoon in the Magdalen islands that first brought restrictions on the discharge of ballast water to Canada. The Federal Department of Fisheries was concerned that ships discharging ballast prior to loading salt would introduce exotic species into the area. As a result, in 1982 a Notice to Mariners was published prohibiting the discharge of ballast water into Grande-Entree Lagoon or within 10 miles of the Magdalen Islands unless the ballast was taken on in a well defined area off Canada's east coast at a distance of 5 miles or greater from the shoreline.

It was not until 1988 that the Canadian and U.S. Coast Guards were put on notice by the Great Lakes Fishery Commission that action was needed to reduce the threat to the Great Lakes from non native fish and other nuisance species.

On May 1, 1989, the Canadian Coast Guard, after consultation with the U.S. Coast Guard, the Great Lakes Fishery Commission, Fisheries and Oceans Canada, and Environment Canada as well as representatives from the shipping industry, promulgated the **Voluntary Guidelines for the Control of Ballast Water Discharges from Ships Proceeding to the St. Lawrence River and Great Lakes.**

Under these guidelines all vessels bound for St. Lawrence river and Great Lakes ports west of 64 degrees west longitude were to exchange their ballast far from any coastline. By doing so it is theorized that any non indigenous freshwater organisms picked up in the ballast would be flushed out and that any remaining freshwater organisms will be placed in a stressed condition by the influx of saltwater. Provision was made in the guidelines for ships that were unable to exchange ballast far out at sea to exchange ballast within the Laurentian Channel in an area southeast of 64 degrees west longitude in water depths greater than 300 metres.

REGULATIONS

Canada has yet to make the leap from guidelines to regulatory form although that is the intent. At the time the Guidelines were introduced there were a number of hurdles that prevented immediate regulatory initiatives. These included the following:

- a) the fact that the Canadian Coast Guard, under the Canada Shipping Act did not have the legal authority to introduce such regulations.
- b) There was no proven method of effectively prohibiting the introduction of unwanted nuisance species. Exchanging ballast water in mid ocean seemed logical but there was little scientific data to support the theory.
- c) If mid ocean exchange of ballast was to be the recommended way of flushing exotic species out ballast tanks, was it the only way of dealing with the problem?. The regulatory process required a "equivalency clause". There was little scientific data to suggest alternatives.
- d) Ships are not normally designed to exchange ballast in mid ocean. Stability and strength requirements would have to be researched to see if in fact it was a safe thing to do. With the exception of actual changes in the Canada Shipping Act, research has taken place on the other three points of concern. In 1990 Locke et al, examining ships bound for the Great Lakes concluded that at sea exchange was 67% effective in removing fresh water organisms from ballast tanks. This study also recommended that ballast water controls be extended to 63 degrees west to prevent the introduction of unwanted species to the St Lawrence River. The Guidelines were modified to reflect this concern.

A study commissioned by the Canadian Coast Guard and published in 1992 by Pollutech Ltd. examined alternative methods of treating Ballast Water. Treatments such as U.V. radiation, chemical additives, tank coating, filtering and discharge to shore facilities were examined. Alternatives were evaluated in terms of practicality, effectiveness and environmental

acceptability. No practical shipboard alternative was identified that would not require major modification to ships equipment or systems with the exception of the installation of a 50 micron wedgewire strainer. Further research is anticipated.

Strength and stability factors in ballast water exchange at sea has been recently examined in a paper by Woodward et al in the U.S. The study examined three typical ship types trading into U.S. ports and concluded that in wave conditions at of 10 ft or less, that shears and bending moments induced by ballast water exchange were within acceptable design values. Waves of 20 ft or higher did however could possibly produce bending and shear moments that exceed design values. In short, in reasonable weather conditions ships of the size studied can safely exchange ballast.

Further investigations must be undertaken on this last issue however. While compliance of Seaway sized vessels heading for Great Lakes ports has been very high, the compliance for many of the very large bulk carriers trading into the St. Lawrence River has been relatively low. Many have cited safety concerns as reasons for not exchanging ballast. With the recent attention given to Large Bulk Carriers in the "**Ships of Shame**" documentary and the sinking of the **Marika 7** last year after leaving a St Lawrence port these concerns have to be taken very seriously.

Once the Canada Shipping Act is modified to allow writing of regulations a number of factors will be imposed on any regulation brought in. The regulatory process in Canada has a very long gestation period and any regulations brought in are relatively difficult to change once in place.

As a result, the trend, especially in an area where knowledge is evolving , as is certainly the case with Ballast Water exchange, is to provide the bare minimum within the regulation itself and to use any regulation to reference standards or guidelines. In this case it is assumed that the present Voluntary Guidelines would be incorporated as an regulatory standard.

To maintain Canada's competitiveness in a Global economy, any regulations imposed will be examined to ensure they do not impose requirements which are at odds with our trading partners or at odds with international Standards.

The United States has recently brought in regulations and IMO has guidelines in place as per Resolution A.774(18) of 1991. These "Guidelines for Preventing the Introduction of Unwanted Organisms and Pathogens froms Ship's Ballast Water and Sediment Discharges" will have to be considered when the regulations are finally written. Similarly Australia has guidelines in place.

TODAY

On the Great Lakes , Canada, through the Ship Safety Branch of the Canadian Coast Guard, has a close working relationship with the U.S. Coast Guard in regards to operational Ballast Water issues. The issues that came to light in the Ballast Water Round Table in Cleveland in

August of 1994 after the implementation of the regulations under the U.S. NonIndigenous Aquatic Nuisance Prevention and Control Act are by and large joint issues.

These issues – the 30ppt salinity test, the vessels with unpumpable ballast, the potential of Basin to Basin transfer of nuisance species and the research into alternative methods other than Ballast Exchange will no doubt be spoken to in greater detail by my colleague from the U.S. Coast Guard.

This year Ship Safety – Central Region is supporting a Ballast Water monitoring study in the Welland Canal to obtain further data on salinity stratification, unpumpable ballast and sediment, and the potential of Basin to Basin transfer of nuisance species.

Ship Safety – Ottawa is undertaking the study on the safety considerations of large Bulk Carriers and compliance with the guidelines.

An information/ educational binder similar to the excellent publication the U.S. Coast Guard has undertaken, is being prepared so that the shipping public on both the commercial and recreational sides can be targeted with preventative messages.

In addition to monitoring compliance with Voluntary Guidelines that have been referred to above, the shipping industry on the Great Lakes in conjunction with the States and Provinces involved has proactively put in place voluntary guidelines for ballast exchange on Lake Superior to combat the transfer of the European River Ruffe. The Canadian Coast Guard monitors compliance for Canadian ships.

Operationally, Ship Safety Central Region is using the provisions of the Canada Shipping Act, to ensure that ballast water that is not in compliance with the Voluntary Guidelines is not pumped into the waters of the Great Lakes.

The Act clearly sets out the roles of pollution prevention officers and what they may do to prevent pollution. It also sets out fines for disobeying the orders of a PPO or giving misleading information to a PPO regarding pollution. As these fines are substantial, a reasonable deterrent is presently in place to dissuade ships that do not comply with the Voluntary Guidelines, that it is not in their interest to discharge ballast into the Great Lakes. All Canadian Coast Guard Ship Safety inspectors are appointed as Pollution Prevention Officers.

On the international front, Canada is active in the Marine Environmental Committee at IMO (the International Maritime Organization) . Canada is a participant in the subcommittee looking into the development of a new annex to MARPOL 73/78 dealing with Unwanted Aquatic Organisms in Ballast Water.

THE FUTURE

It is anticipated that legislation to amend the Canada Shipping Act to allow regulations pertaining to Ballast Water will be placed before parliament by this fall. The regulatory process can then begin.

The Canadian Coast Guard anticipates entering partnerships in the next fiscal year with the Provincial Ministry of Natural Resources, and the Ontario Federation of Anglers and Hunters to disseminate information to the general public on the threat to the environment of Nuisance Aquatic species and the various vectors for inadvertently transferring them.

Further research is anticipated on many of the issues highlighted today.

CONCLUSION

The Canadian approach to Ballast Water issues has been to be an active participant with both our colleagues in the the U.S.C.G on the domestic front and internationally at IMO on issues concerning the introduction of unwanted aquatic organisms in ballast water. Through the monitoring the Voluntary Guidelines, the Canadian Coast Guard has worked with the shipping industry to ensure that ballast water is not functional medium of transport for unwanted species. Through research and efforts to support education the Canadian Coast Guard has demonstrated a commitment to deal effectively with the problem of unwanted nuisance species in the waters we are responsible for.

BALLAST WATER CONTROL - CHRONOLOGY

- AUG 1988 - GUIDELINES DEVELOPED
- SEP 1988 - IMO INFORMED
- MAR 1988 - AUSTRALIA SUPPORT AT IMO
- MAY 1989 - CANADIAN GUIDELINES INTRODUCED
- MAR 1990 - IMO SETS UP WORKING GROUP
- APR 1990 - CANADA REVISES GUIDELINES
- MAY 1990 - U of T STUDY ON COMPLIANCE / EFFECTIVENESS
- JUL 1991 - IMO GUIDELINES ADOPTED
- MAR 1992 - BALLAST EXCHANGE ALTERNATIVES STUDY
- DEC 1994 - WELLAND CANAL STUDY
- DEC 1994 - LARGE BULK CARRIER STABILITY STUDY

COMPLIANCE STATISTICS

BALLAST WATER EXCHANGE FORMS	# SHIPS	NOT IN COMPLIANCE
1989 - 83 %	207	36
1990 - 97 %	185	5
1991 - 97 %	215	6
1992 - 98 %	189	2
1993 - 84 %	222	36 (26 River, 1 Lake, 3 unknown)
1994 - 89 %	218	24 (17 River, 6 Lake, 1 unknown)

1993/94 Statistics - High compliance for Great Lakes bound - lower for River -especially for larger bulk carriers .

RESEARCH NEEDED:

Basin to Basin Transfers
Unpumpable Ballast
Actual vs. Paper Compliance
Availability of Shore Treatment Facilities
Biological Test
Definition of Pollutant
Part XV Canada Shipping Act