STATEMENT OF
RICHARD E. FREDRICKS, PRESIDENT
MARITIME SOLUTIONS (BWT), INC.
ON

AQUATIC NUISANCE SPECIES, MANDITORY BALLAST WATER MANAGEMENT, AND ALTERNATIVE BALLAST WATER TREATMENT STANDARDS TO PROTECT THE MARINE ENVIRONMENT

SUBMITTED TO
U.S. COMMISSION ON OCEAN POLICY
BOSTON, MASSACHUSETTS
JULY 24, 2002

Mr. Chairman, members of the Committee, thank you for this opportunity to present an important issue concerning coastal and ocean protection, one of specific importance including to the Northeast region of the United States from New Jersey to Maine.

I am Richard E. Fredricks, President of Maritime Solutions (BWT), Inc. On behalf of my colleagues, I extend my thanks to you and to Congress for your commitment to the oceans and coastal zone, and for your efforts to protect the marine environment.

BACKGROUND

In light of the need to provide for a heightened level of marine environmental protection, and with the benefit of today's capabilities, the United States must address the threat posed by aquatic nuisance species.

The introduction of aquatic nuisance species into new waterway environments via vessel ballast water discharges has been identified as one of the four greatest threats to the world's oceans and the coastal waters they touch. These species generally lack predators when introduced into areas where they have not previously been and, in of themselves, can introduce diseases against which indigenous species will have little or no immunizing resistance.

Shipping moves over 80% of the world's commodities via a world fleet of more than 45,000 vessels and, in so doing, transfers approximately 10 to 12 billion tons of ballast water across the globe each year. Ballast water is essential to the safe and efficient operation of modern shipping, providing balance and stability to un-laden ships. However, it also poses a serious ecological, economic and health threat.

Ships have carried solid ballast, in the form of rocks, sand or metal, for thousands of years. In modern times, ships use water as ballast. It is much easier to load on and off a ship, and is therefore more efficient and economical than solid ballast. When a ship is empty of cargo or otherwise in light-load condition, it takes aboard ballast water to maintain its steerageway, stability, trim and structural integrity. When it loads cargo, the ballast water is discharged.

THE BIOLOGICAL PROBLEM

There are thousands of marine species that may be carried in ships' ballast water; basically anything that is small enough to pass through a ships' ballast water intake ports and pumps. This includes bacteria and other microbes, small invertebrates and the eggs, cysts and larvae of various species. The problem is compounded by the fact that, virtually all, marine species have life cycles that include a planktonic stage or stages.

Even species in which the adults are unlikely to be taken on in ballast water, for example because they are too large or live attached to the seabed, may be transferred in ballast during their planktonic phase.

Over the past millennia, marine species have dispersed throughout the oceans by natural means, carried on currents and attached to floating logs and debris. Natural barriers, such as temperature and landmasses, have prevented many species from dispersing into certain areas. This has resulted in the natural patterns of biogeography observed in the oceans today.

Humans have of course aided this process for as long as they have sailed, mainly by dispersing marine species that have attached to the hulls of vessels. The commencement of the use water as ballast, and the development of larger, faster ships completing their voyages in ever shorter times, combined with rapidly increasing world trade, means that the natural barriers to the dispersal of species across the oceans are being reduced. In particular, ships provide a way for temperate marine species to pierce the tropical zones, and some of the most spectacular introductions have involved northern temperate species invading southern temperate waters, and vice versa.

It is estimated that at any one time, from 3000 to over 4500 different species are being carried in ships' ballast tanks around the world. The vast majority of marine species carried in ballast water do not survive the journey, as the ballasting and deballasting cycle and the environment inside ballast tanks can be quite hostile to organism survival. Even for those that do survive a voyage and are discharged, the chances of surviving in the new environmental conditions, including predation by and/or competition from native species, are further reduced. However, when all factors are favorable, an introduced species may survive to establish a reproductive population in the host environment, it may even become invasive, out-competing native species and multiplying into pest proportions.

As a result, whole ecosystems are being changed. In the USA, the European Zebra Mussel *Dreissena polymorpha* has infested over 40% of internal waterways and may have required over US$5 billion in expenditure on control measures since 1989. In southern Australia, the Asian kelp *Undaria pinnatifida* is invading new areas rapidly, displacing the native seabed communities. In the Black Sea, the filter-feeding North American jellyfish *Mnemiopsis leidyi* has on occasion reached densities of 1kg of biomass per m^2. It has depleted native plankton stocks to such an extent that it has contributed to the collapse of entire Black Sea commercial fisheries. In several countries, introduced, microscopic, 'red-tide' algae (toxic dinoflagellates) have been absorbed by filter-feeding shellfish, such as oysters. When eaten by humans, these contaminated shellfish can cause paralysis and even death. The list goes on, hundreds of examples of major ecological, economic and human health impacts across the globe. It is even feared that diseases such as cholera might be able to be transported in ballast water.

There are hundreds of other examples of catastrophic introductions around the world, causing severe human health, economic and/or ecological impacts in their host environments.

Unlike other forms of marine pollution, such as oil spills, where ameliorative action can be taken and from which the environment will eventually recover, the impacts of invasive marine species are most often irreversible!

CURRENT INTERNATIONAL PRACTICE

Current IMO prescribed ballast water management practices, voluntary for the most part now but expected to become mandatory by convention as early as March 2003, are largely based upon the seriously troubled practice of ballast exchange with open ocean water. Ballast water exchange at sea puts many ships, their cargoes and, most importantly, the lives of their crews at risk due to the possible changes in longitudinal hull-girder loading and/or transverse stability.

Beyond this, ballast water exchange has, with little exception, been variously determined to achieve a level of only 65 % to 90 % effectiveness in the exchange of the original ballast water; the actual result being dependent on ship type (tanker, bulk carrier, containership, etc.), the specific design of a particular vessel, and its trade route or voyage pattern. In fact, the level of effectiveness of ballast water exchange is 0 % when it is not practiced (i.e., whenever the Master determines that 'conditions' do not allow it to be performed).

At the same time, only a fraction of the sediment contained in the original ballast water is eliminated, leaving a refuge and an active breeding ground for many marine organisms. It is, as a result, abundantly clear that higher-level technology needs to be employed to assure shipboard safety, to reduce sediment loading in ballast water, and to provide for a higher level of effectiveness in the mitigation of biological invasions.

POSITION OF THE UNITED STATES

Currently the U.S. Coast Guard is considering the development of a national ballast water treatment goal, and an interim ballast water treatment standard. The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 and the National Invasive Species Act of 1996 require the Coast Guard to regulate ballast water management practices to prevent the discharge of shipborne ballast water from releasing harmful nonindigenous species into U.S. waters of the Great Lakes, and to issue voluntary guidelines to prevent the introduction of such species through ballast water operations in other waters of the U.S. These acts further provide that the Coast Guard must assess compliance with the voluntary guidelines and if compliance is inadequate must issue regulations that make the guidelines mandatory. These guidelines and regulations must be based on open ocean water exchange and/or environmentally sound alternatives that the Coast Guard determines to be at least as "effective" as ballast water exchange in preventing and controlling infestations of aquatic nuisance species (ANS).

That said, the U.S. Coast Guard has recently submitted (June 6 2002) its Report to Congress on Voluntary National guidelines for Ballast Water Management. As stated above, The National Invasive Species Act directed the Coast Guard to institute voluntary measures for management of ballast water for ships arriving at most U.S. ports from outside the U.S. If compliance with the voluntary measures was not adequate, the program was to be made mandatory. The Report to Congress states that during the two-year trial period, only 30.4% of regulated ships submitted reports and that just 51.2% of those performed some degree of ballast water exchange The Coast Guard will now transition to the mandatory program. It estimates that regulations establishing penalties for reporting violations will be implemented in the autumn of 2003; that mandatory ballast water management will be instituted in the summer of 2004; that a standard to serve as a benchmark for ballast water management options will be promulgated in the autumn of 2004; and that a protocol for Coast Guard approval of installation of experimental technologies on board vessels will be published in the winter of 2002.

ALTERNATIVES TO "BALLAST WATER EXCHANGE"

The Committee on Ships' Ballast Operations, Marine Board, Commission on Engineering and Technical Systems of the National Research Council, part of the National Academy of Sciences, has already long ago identified and then reported upon a number of candidate technologies for shipboard treatment in "Stemming the Tide: Controlling Introductions of Nonindeginous Species by Ships' Ballast Water", National Academy Press, 1996. Candidate technologies presented included: filtrations systems, oxidizing and non-oxidizing biocides, thermal techniques, electric pulse and pulse plasma techniques, ultraviolet treatment, acoustic systems, magnetic fields, deoxygenation, biological techniques and antifouling coatings.

More recently, the International Maritime Organization, with funding provided by the Global Environmental Facility through the United Nations Development Program, has initiated the Global Ballast Water management Program (Globallast). As one of its many functions, Globallast has established and maintains an information resource center and clearinghouse in order to improve the global communication and dissemination of information relating to this issue. To this end, the Globallast Program has developed a Ballast Water Treatment R&D Directory.

The directory lists research and development projects that are focused specifically on the physical, mechanical or chemical treatment of ballast water to prevent/reduce the transfer of aquatic organisms. The directory is organized into three primary divisions, including Project Completed, Projects Underway, and Operational Treatment Systems.

A recent analysis of the information presented shows that of the 16 projects reported as 'Completed', six focused on heat treatment, three on separation and UV treatment, two on oxygen deprivation, one on filtration, one on chemical treatment, one on ballast water exchange, and two were studies of all possible approaches.

A similar analysis of the 19 projects reported as 'Underway', including the MSI Ballast Water Treatment Project, finds that one is focused on onshore treatment, three on separation and UV treatment, one on filtration and UV treatment, one on UV treatment, three on chemical treatment, one on ballast water exchange, two on ozone treatment, one on ultrasonic and ozone treatment, one on ultrasonic treatment, one on electro ionization, and four studies of all possible treatments. All of the approaches selected for consideration by the Marine Board, and then some.

MARITIME SOLUTIONS BALLAST WATER TREATMENT SYSTEM

In the interest of offering a viable shipboard alternative to ballast water exchange, Maritime Solutions, Inc. has lead the development of a two-stage system as recommended by The Shipping Study (Carlton et al. 1995), wherein it was clearly predicted that a multi-stage system would be necessary to effectively mitigate against sediment and organism introduction by ballast waters. The approach taken by Maritime Solutions also conforms with the conclusions reported by the National Research Council (1996) in that it couples state-of-the-art separator technology with advanced UV or, alternatively, chemical biocide technology resulting in what is expected to be a safe, effective, practical, and cost effective solution to the ballast water problem.

The resulting 'Maritime Solutions Ballast Water Treatment System' (MSI System), patent pending, is based upon the separation technology of Maritime Solutions Technology, Inc. (MST), serving as the first stage and the UV technology of Aquionics, Inc. or, alternatively, the chemical biocide technology of Degussa AG or, possibly, the ozone treatment of Norsk Ozon AS providing second stage treatment. The two-stage MSI System offers the promise of superior organism elimination, increased silt and sediment reduction, and flow rates to meet shipboard; all within a compact, crew friendly and energy efficient installation. Maritime Solutions is currently involved in a rigorous program of system engineering and independent shipboard system testing.

The MSI System testing has, to date, been supported by grants made by the State of Maryland Port Administration (MPA) and the National Oceanic and Atmospheric Administration (NOAA). Working in cooperation with the Center for Environmental Science, part of the University of Maryland, Maritime Solutions has additionally won the support of the U.S. Maritime Administration (MARAD) that has allowed the testing to take place aboard the CAPE MAY, a ship of the U.S. Ready Reserve Force. The former Lykes Lines SEABEE vessel of 39,000 tons dead weight (DWT), berthed in the Port of Baltimore, Maryland and managed by Interocean Ugland Management, has supported the realistic shipboard testing of the MSI System in treating water taken from Baltimore Harbor and the Chesapeake Bay.

The MPA and NOAA grants coupled with the financial support and in-kind contributions of Maritime Solutions, the other program participants and MSI System component suppliers has made for a public/private sector testing initiative that has a total value now exceeding One Million ($1,000,000) U.S. Dollars.

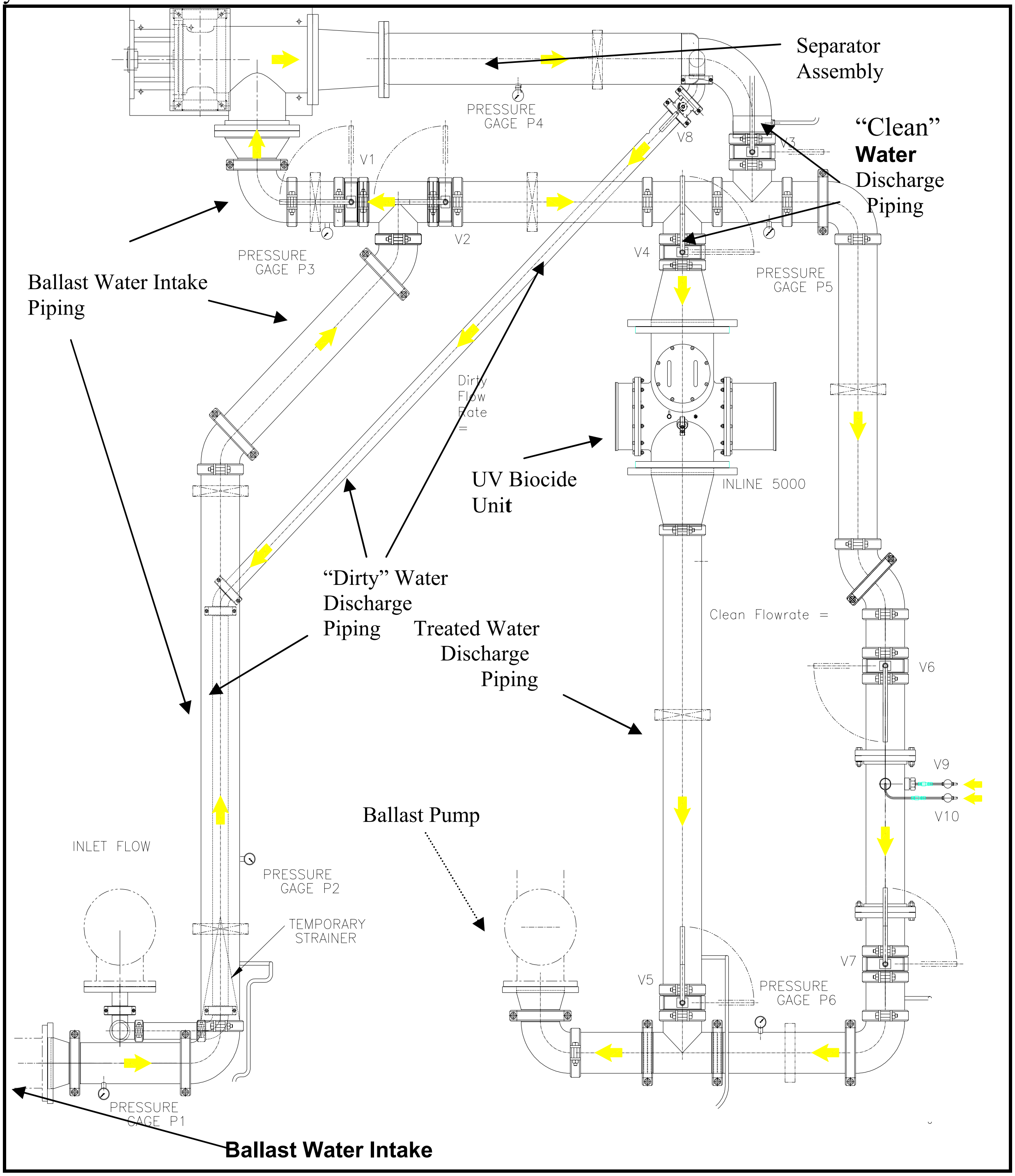
REQUIRED ACTION

Congress and the Administration should provide the U.S. Coast Guard with the mandate and support that it will need to address and deal with the threat of aquatic nuisance species; the time has long since come for action. The United States should be in a leadership position.

More specifically, the time frame proposed by the Coast Guard for the implementation of mandatory ballast water management must be accelerated; the summer of 2004 is too late. The International Maritime Organization is, reportedly, set to act on this very issue as soon as March 2003. Why should the United States be a year behind when, in fact, it should take a leadership position? Furthermore, the "standard" to serve as a benchmark for alternative ballast water treatment options will only be promulgated in the autumn of 2004, *after* the mandatory implementation period which is unacceptable. How can alternative standards be set forth after mandatory compliance is required? It is imperative that the Coast Guard work with industry now to set standards for alternative ballast water treatment technologies. Alternative treatment standards should be adopted by June 2003 at the latest. Important to note, standards must be established to induce such investment for industry to invest in the development of ballast water treatment alternatives. Without established treatment standards, commercial funding for technology development is uncertain.

That said, Maritime Solutions (BWT), Inc. remains committed to providing the world shipping community with the best technology to provide the required ballast water treatment.

Finally, Mr. Chairman, I want to commend and thank you and the Commission for your commitment to the oceans, for your efforts to protect the marine environment, and for your consideration of this issue.



Trial installation aboard the S.S. CAPE MAY for the testing of the MST Microfugal Separator and the Inline UV unit or, alternatively, the chemical biocide Peraclean® Ocean