BALLAST exchange

west coast ballast outreach project

http://ballast-outreach-ucsgep.ucdavis.edu

VOLUME FIVE ■ SPRING/SUMMER 2003

GREETINGS

By Karen McDowell, California Sea Grant Extension Program

Welcome to the 5th edition of the Ballast Exchange. This issue focuses on various aspects of ballast water treatment technologies and highlights some of the work that is being conducted on the West Coast. The articles on evaluating treatment technologies and creating treatment protocols highlight the complexity of designing, testing and verifying ballast water treatment technologies. The willingness for all of the involved organizations/agencies to work cooperatively and to commit their time and effort to these projects has resulted in significant progress in developing testing protocols, designing repeatable experiments that have consistent results, and identifying an effective suite of sampling assays. In addition, this issue of the newsletter reviews new developments in the management of ballast water at the federal and international levels, reinforcing the need to develop effective strategies for managing ballast water.

The next volume of the ballast exchange will focus on the coastal transport of ballast water, an issue that has been a major concern on the west coast of North America. The West Coast Ballast Outreach Project has sponsored two workshops on coordinating the management of coastal ballast water exchange along the west coast of North America. This has been a collaborative effort with the Pacific Ballast Water Group, the Pacific States Marine Fisheries Commission, federal agencies, the maritime industry, researchers, and state agencies along the west coast of North America. Results from the workshops and other research on the coastal transport of organisms will be presented in the Fall 2003 issue of the Ballast Exchange.

IMO to Hold Diplomatic Conference on Ballast Water Management

The 49th session of the International Maritime Organization's (IMO) Marine Environment Protection Committee (MEPC) met in July 2003.

At the meeting, the MEPC finalized the draft of the proposed International Convention for the Control and Management of Ships' Ballast Water and Sediments.

The MEPC agreed to hold a diplomatic conference from Feb. 9-13, 2004 to adopt the Convention in accordance with the agreed timetable already approved by the Council.

For more information about MEPC 49, visit the IMO website at www.imo.org.

Additional information about the proposed convention can be found at the GloBallast Web site: http://globallast.imo.org/.

TABLE OF CONTENTS

Evaluation of Ballast Treatment Efficacy: Third Time Is a Charm

Nick Welschmeyer*, Stephen Bollens**, Rusty Fairey*, Eli Landrau*, Tamara Voss*, Sean Avent**, Jena Bills**

*Moss Landing Marine Laboratories, 8272 Moss Landing Rd., Moss Landing CA 95039
**Romberg Tiburon Center for Environmental Studies, San Francisco State University, 1600 Holloway Ave., San Francisco, CA 94132

Introduction

California Assembly Bill 703, which outlines the state's Ballast Management Program, calls for the onboard testing of newly designed ballast treatment technologies. In 2001, the California Regional Water Quality Control Board (CRWQCB), in conjunction with the California State Lands Commission (CSLC), initiated test trials of ballast treatment systems installed on "volunteer" commercial vessels in support of this bill. Here we describe recent efforts to determine ballast treatment efficacy on board the Princess cruise liner, SEA PRINCESS. Our research team was headed by scientists from Moss Landing Marine Laboratories (Nick Welschmeyer and Rusty Fairey) and the Romberg Tiburon Center for Environmental Studies (Stephen Bollens); both institutions are members of the California State University system. The treatment technology under evaluation is the Hyde Marine/Optimarin UV/Hydrocyclone ballast treatment system, similar to the one installed on the sister cruise liner, REGAL PRINCESS (see McDowell 2000).

Sampling Rationale

The primary question at the core of any evaluation of ballast treatment systems is simple: does the treatment remove or kill plankton harbored in ships' ballast tanks? Unfortunately, the practical answer to that question is complex because planktonic organisms constitute a diverse biotic assemblage, representing autotrophic and heterotrophic organisms from all phyla known to inhabit the ocean. Viruses, bacteria, phytoplankton, seaweeds, invertebrates and fish have all been documented in discharged ballast water (Carlton and Geller 1993; Ruiz et al. 2000). To our knowledge there is no single test assay that can be applied to verify removal or sterilization of all biota in a bulk sense. To provide as thorough an evaluation as possible, we assembled an array of test assays directed towards most of the expected organismic groups (Table 1).

Table 1 List of Test Assays

1. **Virus-Like Particles (VLP):** Epiflourescent enumeration, Syber Gold stain, 0.02 µm filter.
2. **Bacteria:** Epiflourescent enumeration, Syber Gold stain, 0.02 µm filter.
3. **Culturable bacteria:** colony counts on marine agar plates, 24 h grow-out incubation.
4. **ATP (a measure for living biomass):** Luciferin-luciferase photometric assay.
5. **Chlorophyll *a* (chl *a*) (a measure for phytoplankton):** Fluorescence assay of 90% acetone extracts.
6. **PAM (a measure for phytoplankton):** Pulse Amplitude Modulated (PAM) fluorometric assay of photosynthetic quantum yield.
7. **Zooplankton survivorship:** real-time microscopic evaluation on unpreserved samples

The method of ballast tank "sampling" is also a nontrivial aspect of the overall evaluation protocol. Internal characteristics of ballast tanks (shape, baffling, corrosion, sludge, etc.) are unique for each ship (and each tank). Our research team benefited from numerous meetings and shipboard site visits with representatives from CRWQCB, CSLC and Princess Cruise Lines made in advance of the actual sea trials; as a group, we collectively evaluated the sampling limitations. It was decided, on practical terms, that the best real-world evaluation of treatment efficacy would be given in the measured biological characteristics of the water ultimately discharged by the ballast pumping system. Engineers from Hyde Marine provided in-line sampling ports along the ballast piping system that allowed water to be sampled before and after UV/Hydrocyclone exposure during the onboard ballasting phase, as well as during the offboard de-ballasting phase. Thus, all sampling was confined within the engine room, with no need for direct access to individually tested ballast

Figure 1: Engine room sampling conditions

tanks (Figure 1). As will be documented below, the ability to measure water entering ballast tanks, followed by measurements of the same water immediately drawn from the tank after mixing, provided significant information on the internal variability of each tank.

Cruise Results

Three cruises were made aboard SEA PRINCESS from Long Beach, CA to Mexican ports; two in October/November 2001 and one in October 2002. Our experiences on SEA PRINCESS cruises 1 and 2 (SP1&2) identified large, uncontrollable tank variations that masked our ability to quantitatively evaluate treatment efficacy per se (described below). Moreover, corrosion problems inside the UV treatment system were also observed, which may have compromised the overall optical sterilizing efficiency. For these reasons, the ballast system and its piping were reinstalled for the third cruise (SP3) and our sampling strategy was modified. We will report the results for SP1&2 and SP3 separately.

Figure 2 provides a schematic diagram of sampling strategies employed during the three cruises. On SP1&2 we tested the treatment system in two ways: 1) sea-to-sea sampling in which seawater was drawn through the treatment system and immediately discharged overboard, thus never involving the ballast tanks, and 2) ballast/de-ballast sampling in which incoming ballasted water passed through the treatment system, entered a ballast holding tank and was later de-ballasted by passing through the treatment system a second time, just before being discharged overboard. The latter ballast/de-ballast protocol follows the specified procedure for actual treatment operation.

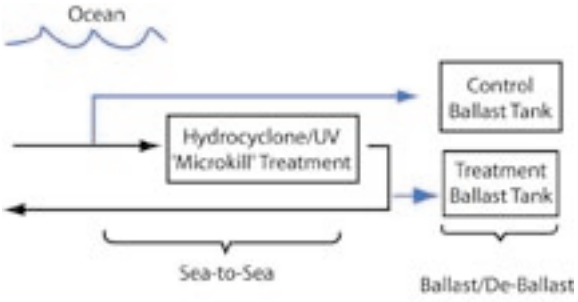


Figure 2 Diagram of sampling strategies: Sea-to-sea vs. ballast tank sampling.

On SP3, we utilized a third sampling strategy in which treated and untreated water was sent directly to small-volume, darkened holding containers that could be sampled over time to test for treatment effects. Holding temperatures were within 2°C of ambient seawater. This sampling strategy was chosen to avoid contact with ballast tanks (and their confounding variability), while allowing suitable time for UV-kill to take effect. We used 8 L darkened plastic carboys to hold samples for microbial assays and 200 L darkened plastic drums for zooplankton samples taken during SP3.

SP1&2 Ballast/De-Ballast Experiments: In Figure 3, we present example data for ballast/de-ballast experiments made during SP2. Note that the de-ballasted water had bacterial counts that were as much as two- to three-fold higher than noted in the initial ballasted water, even though ballasting and de-ballasting operations were only separated by 4 h in these experiments; the oddity was observed in controls as well as treatments. Results such as these were typical for all ballast/de-ballast experiments conducted during SP1&2.

Several possible explanations can be suggested: 1) The high counts observed during de-ballasting may have been due to contamination from existing bottom sludge, stirred up by the filling action of the ballasting operation. (The de-ballasting procedure leaves considerable water/sludge even when tanks are metered as empty by ships' engineers). 2) Environmental patchiness in the harbor water bacterial populations may have led us to inaccurately estimate the initial ballasting concentrations since the filling operation required more than 1.5 h of pumping. 3) We also suspect cross-contamination with the ship's internal grey water during de-ballasting operations (samples were occasionally grey and foul, but could be cleared with continual flushing). Regardless of the actual cause of the tank variability, this much was certain – the variability intro-

continued from page 3

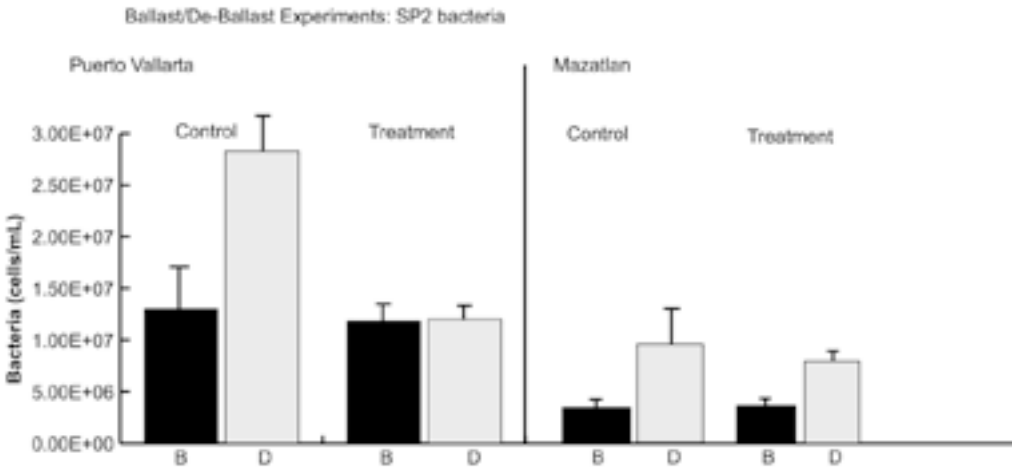


Figure 3 Bacteria concentrations for control and treatment tanks, with 95% confidence intervals, during the ballast/de-ballast experiments from SP2. The ballast samples were taken from the pipes before the water entered the treatment system and/or the ballast tanks. The de-ballast samples were taken just before discharge.

duced from ballast tanks per se, as well as tank filling/draining operations, compromised our attempt to accurately assess differences in organism abundances between control and treatment tanks. Assays that are biomass-independent, such as percent survivorship or pulse amplitude modulated (PAM) fluorescence determination of photochemical quantum yield, might still be applicable. However, some questions would remain regarding the actual relative proportions of originally sampled organisms constituting the control and treatment samples.

SP1&2 Sea-to-Sea Experiments: No differences in number of bacteria or viruses could be detected between controls and treatments when sampled under side-by-side conditions in the Sea-to-Sea Experiments during SP1&2 (all assays were made in triplicate). We realize that some consideration must be given to the fact that UV sterilization may not result in immediate reductions in cell numbers, and the results for concentration-based assays must therefore be considered with reservation. However, the overall results for biomass-independent determination of zooplankton survivorship also showed no differences between controls and treatments for the taxa examined.

SP3 Small Volume Container Experiments: Results for SP3 that used small volume containers to hold treated and untreated samples drawn through the ship's ballast pump yielded results more complementary to the stated performance of the UV ballast treatment system. A time-course experiment conducted while enroute from California to Mexico showed that chlorophyll *a* (a measure for phytoplankton) was reduced more than six-fold relative to its initial concentration over a 72 h period (Fig. 4). Similar results were observed for culturable bacteria (Fig. 5) over a 48 h period. Concentrations of adenosine triphosphate (ATP) (a measure for living biomass) showed similar decreases to UV treatment after 72 h in both ballast tank and experimental, small-volume containers (Fig 6). Percent survivorship for copepods was significantly lower in treatment samples relative to controls (Fig. 7) after 21 h.

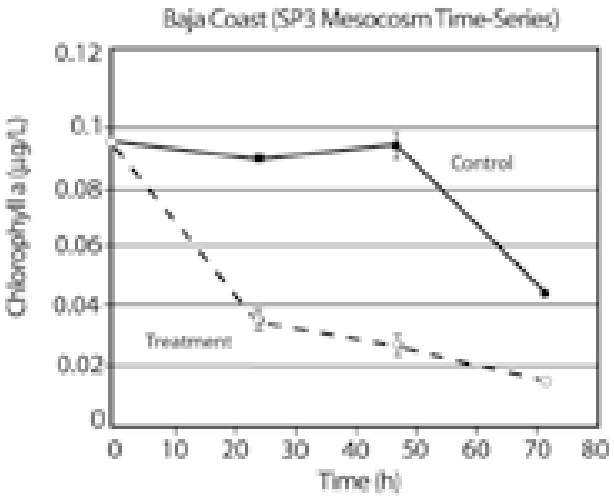


Figure 4 Chlorophyll *a* concentrations (measure for Phytoplankton) for control and treatment samples from the SP3 mesocosm time-series experiment. Water was collected off coast of Baja California while enroute to Puerto Vallarta, Mexico.

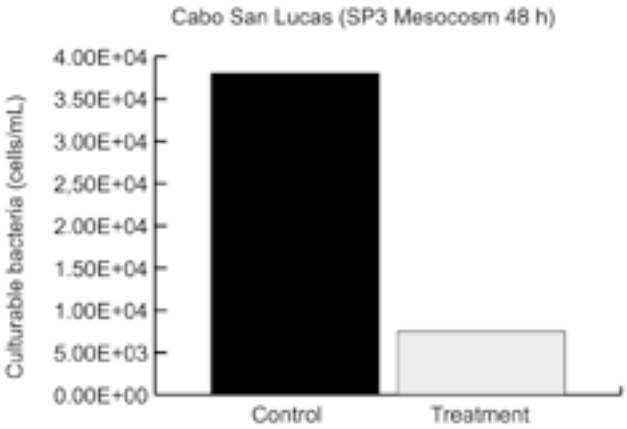


Figure 5 Culturable bacteria concentrations for control and treatment samples from the SP3 mesocosm time-series experiment, taken 48 h after treatment.

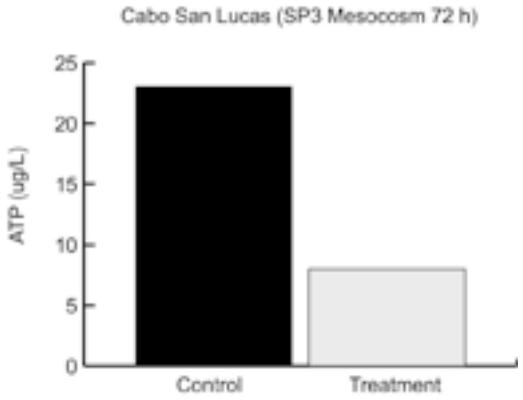


Figure 6 ATP concentrations (a measure for total living biomass) for control and treatment samples from the SP3 mesocosm time-series experiment, taken 72 h after treatment.

Summary of Results: Overall, the measured efficacy of the UV/Hydrocyclone ballast treatment system was significantly enhanced after installation problems were addressed for the third SEA PRINCESS cruise. We are now aware that ample time for UV-kill to take effect must be incorporated in the test procedures (at least 24 h). The only assay we have employed that showed near instantaneous response to UV treatment is PAM-based fluorescence assessment of photochemical yield of phytoplankton (Fig. 8). Bio-optical PAM fluorescence measurements require no reagents and can be plumbed into flow-through sampling configuration for unattended operation, suggesting that PAM fluorescence might be exploited as an online sensor for evaluating ballast treatment performance.

The "percent-kill" varied widely depending on the assay and the length of time allowed for kill to take hold (Figs. 4-8). We note here that the realized kill effect under routine ship operation may be significantly higher than measured in our small-volume holding containers because those samples passed through the UV treatment system only once. Under normal operating procedures the ballast water would be directed through the UV sterilizer a second time during the outgoing de-ballast phase. Therefore, we are optimistic that real-world ballast treatment efficacy can be improved over that observed thus far within our study. The effect of the Hydrocyclone separator was relatively insignificant, since only the rare, larger organisms (> 5 mm) were successfully captured by this system.

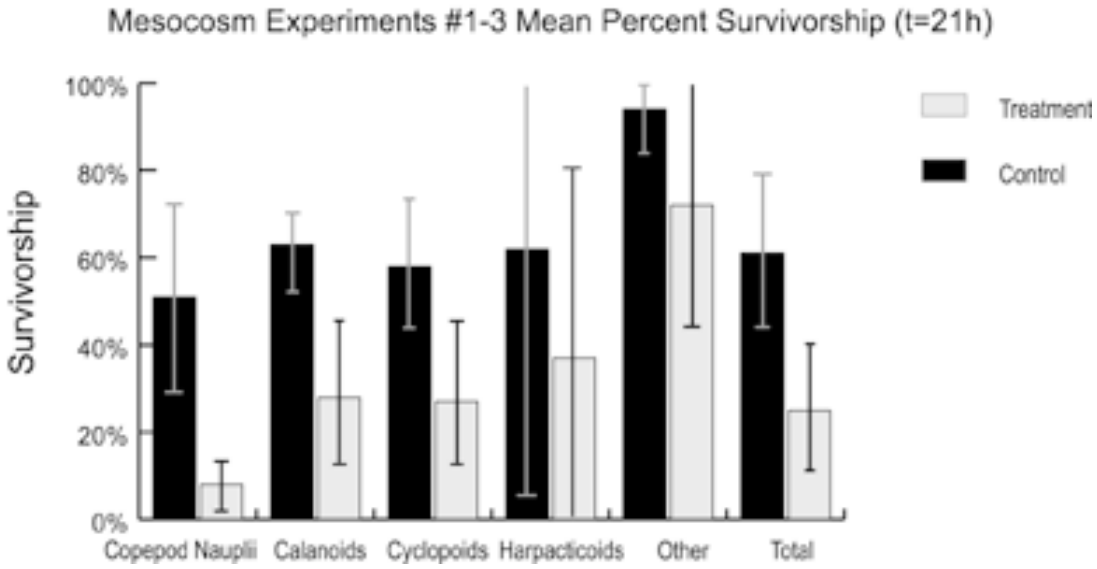


Figure 7 Mesozooplankton survivorship for control and treatment sampels from the SP3 mesocosm time-series experiment. Mean percent survivorship measured 21 h after treatment. Categories include: copepod nauplii (larvae), calanoid copepods, cyclopoid copepods, harpacticoid copepods, other and total.

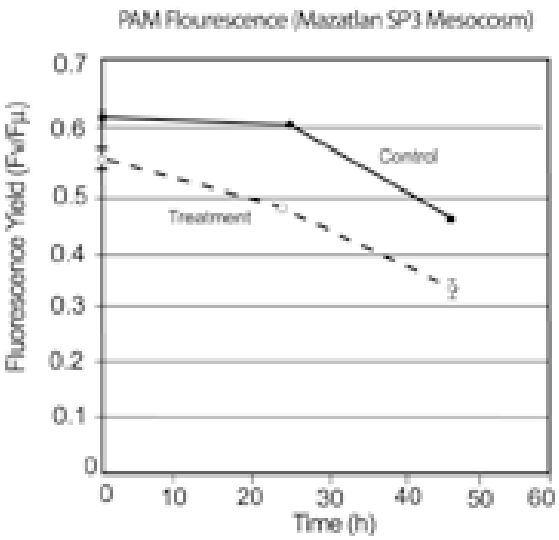


Figure 8 PAM flourescence (a measure for phytoplankton) for control and treatment samples from the SP3 sea-to-sea sampling experiment.

Future Work

Results obtained during SP3 were encouraging. Improvements in UV dosage and stability are being engineered in newly assembled systems by Hyde Marine. The important comparative test of treatment vs. open-ocean exchange could not be made for our coastal California-Mexico SEA PRINCESS cruises. Just recently, the comparative test between the treatment system and open-ocean exchange was completed during oceanic cruises between Honolulu and Oakland aboard the Matson container ship, R.J. PFEIFFER, which was fitted with an upgraded Optimar treatment system.

References

Carlton, J.T. and J.B. Geller. 1993. Ecological roulette: The global transport of non-indigenous marine organisms. Science 261:78-82.

McDowell, K. 2000. Princess Cruises tests the Optimar ballast water treatment system on the Regal Princess. Ballast Exchange 3:8-9.

Ruiz, G.M. et al. 2000. Global spread of microorganisms by ships. Nature 408:49-50.

On Line

ANS Task Force
http://www.anstaskforce.gov/

California State Lands Commission
http://www.slc.ca.gov/

Global Ballast Water Management Programme (GloBallast)
http://globallast.imo.org/

Great Lakes Panel on Aquatic Nuisance Species
http://www.glc.org/ans/

InvasiveSpecies.Gov
http://www.invasivespecies.gov/

National Ballast Water Information Clearinghouse - SERC
http://invasions.si.edu/ballast.htm

Northeast-Midwest Institute – Aquatic Invasive Species Site
http://www.nemw.org/biopollute.htm

USGS Nonindigenous Aquatic Species Site
http://nas.er.usgs.gov/

Sea Grant National Aquatic Nuisance Species Clearinghouse
http://www.cce.cornell.edu/programs/nansc/nan_ld.cfm

Sea Grant Nonindigenous Species Site
http://www.sgnis.org/

Ship Operations Cooperative Program – BWM Web Site
http://www.socp.org/

U.S. Coast Guard Ballast Water Program
http://www.uscg.mil/hq/g-m/mso/mso4/bwm.html

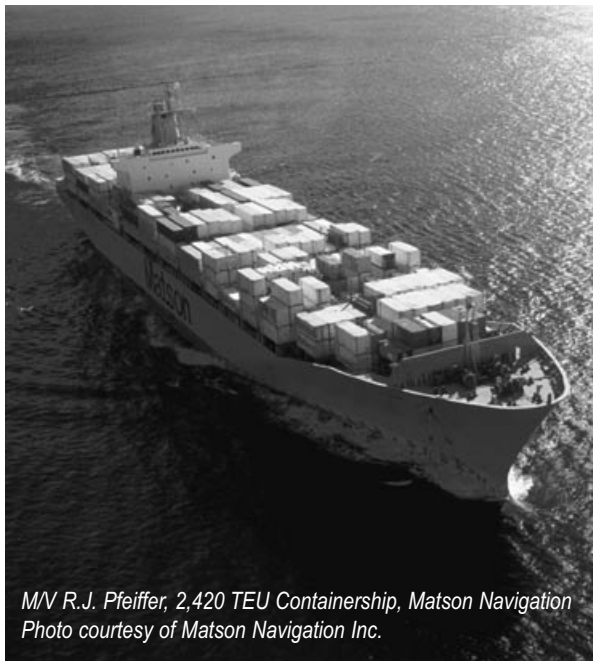
Western Regional Panel on ANS
http://answest.fws.gov/

West Coast Ballast Outreach Project
http://ballast-outreach-ucsgep.ucdavis.edu/

Matson Navigation, Inc. – Testing the OptiMar Ballast Water Treatment System on the R.J. Pfeiffer

By Karen McDowell, California Sea Grant Extension Program

Matson Navigation, Inc. has made the commitment to take a proactive approach to the ballast water problem. Over the past three years, Matson has worked with a variety of programs to design, develop, and test a full-scale, ballast water treatment system aboard their containership, R.J. PFEIFFER. Matson worked with Herbert Engineering Company and The Glosten Associates to conduct a full-scale design study of an innovative ballast water treatment system as part of the Great Lakes Ballast Technology Demonstration Project. Subsequently, Matson decided to install and test the OptiMar Ballast System as a part of the West Coast Demonstration Project, which is led by the California State Lands Commission and includes funding from the U.S. Fish & Wildlife Service and the Port of Oakland.



M/V R.J. Pfeiffer, 2,420 TEU Containership, Matson Navigation Photo courtesy of Matson Navigation Inc.

The vendors of the treatment system, Hyde Marine and OptiMarin A/S, worked closely with Matson's engineering team to make sure that the system was installed and functioning properly before efficacy testing began. During commissioning of the OptiMar system, some problems were experienced, which resulted in a delay to the project until improvements could be made to make the system work reliably and effectively aboard the container vessel. The upgraded OptiMar Ballast System installed on the R.J. PFEIFFER includes an HRN Cyclonic separator and a new Medium Pressure MicroKill UV system. This Medium Pressure UV unit has a single 7300 Watt UV Lamp. Advantages of the Medium Pressure UV over the earlier Low Pressure design include higher UV dosage, better ability to survive shipboard vibrations, fewer cables, easier installation and maintenance, and lower sensitivity to changes in seawater temperature. In addition, the engineering team was able to design the system so that the researchers would have access to six identical ballast tanks (two tanks to test the efficacy of the treatment system, two tanks to test the efficacy of an open ocean ballast water exchange, and two control tanks).

Full-scale testing of the treatment system was just completed by an independent team of researchers during a voyage between Honolulu and Oakland in early July 2003. The California-based research team, the same team that ran the experiments on the SEA PRINCESS (see page 2), was able to run complete tests on two consecutive voyages. Although results of the testing will take several months to process, the initial indications were positive.

Matson has demonstrated their long-term commitment to solving the ballast water issue by providing their expertise and a vessel for full-scale testing of a ballast water treatment system. Matson, along with the vendors Hyde Marine and OptiMarin A/S, are commended for their continued commitment to work closely with state and federal regulators to ensure that the testing of the treatment system is in line with pending regulations. In addition, they have all continued to work closely with independent experts so the results accurately reflect the efficacy of the system and can be easily compared to other well-designed demonstration projects. Collaborative, well-designed projects (like this one) will lead the way to developing successful ballast water treatment systems.

Ship Ballast Water Treatment Technologies Verification: EPA's Environmental Technology Verification Program

By Ray M. Frederick, U.S. EPA; and Tom Stevens, NSF International

What Is the ETV Program?

The Environmental Technology Verification (ETV) Program promotes the adoption of new environmental technologies in domestic and international markets.

ETV, which is sponsored by the Environmental Protection Agency's (EPA) Office of Research and Development, operates through public/private testing partnerships to evaluate the performance of environmental technologies in all media. All protocols, test plans, and quality assurance plans are developed with the participation of technical experts, stakeholders and vendors, and are peer reviewed prior to testing. The ETV website (www.epa.gov/etv) provides information on test procedures, technology performance reports, and vendor verification statements.

The ETV program is not an approval process, but a voluntary program intended to provide stakeholders with credible performance data for new and innovative environmental treatment technologies.

The verification of ballast water treatment technologies is one of several activities being conducted under the ETV by the Water Quality Protection Center (WQPC). NSF International (NSF) manages the WQPC through a competitively awarded cooperative agreement with EPA. NSF is also a partner with EPA in the ETV Drinking Water Systems Center.

How Was the Ballast Water Verification Program Established?

Early in 2001, representatives from the U.S. Coast Guard's National Ballast Water Management Program in Washington, D.C., and Research and Development Center in Groton, Connecticut, met with ETV program managers to discuss a cooperative effort in the verification of ballast water treatment technologies. The U.S. Coast Guard (USCG) was interested in developing testing protocols to establish ballast water treatment standards and for the certification of ballast water treatment systems that could be used alone or with open-ocean ballast exchange. EPA's interest included the ecological, economic and public health risks associated with ballast water discharges. On June 12, 2001, the EPA and the USGC signed a Memorandum of Agreement committing collaboration of the two agencies in verifying the performance of innovative environmental technologies designed to control invasive species in ballast water discharges.

The ETV Ballast Water Verification Program

ETV program managers formed a special stakeholder group to prioritize technologies for the development of specific verification factors. The stakeholder group included members of existing advisory groups, federal agencies, state and local governments, research institutions, consulting firms, technology developers, the shipping industry, and environmental interest groups.

At the first stakeholder meeting, the group determined that the top priority was to provide guidelines for verification of test protocols at land-based facilities for ballast water treatment systems (designed for shipboard and/or onshore treatment). To develop the protocol, a smaller panel of stakeholders was formed to work through the more technical issues raised during the meeting, leading to development of a protocol. NSF also contracted with Battelle's Coastal Resources and Ecosystems Management Group in Duxbury, Massachusetts, to provide technical assistance to the panel and to prepare the draft protocol for the ETV Program. The parameters to be verified included biological treatment performance, operation and maintenance, reliability, cost factors, environmental acceptability, and safety. The panel agreed that the protocol would need to define the types and ranges of challenge conditions and parameters by treatment type, possibly using a matrix approach. The information obtained from the meeting was sufficient to allow Battelle to begin drafting sections of the test protocol, which was provided to the technical panel for review in January 2002.

During the development of the draft protocol, several issues needed to be clarified concerning the biological constituents of the challenge water. A small panel of experts in environmental biology/marine microbiology was convened to discuss the selection of physical and biological components for the challenge water, and the potential problems associated with the large-scale culturing and use of marine organisms that will be required to support the verification process. Currently, the protocol is still being

refined and the program managers are looking to schedule a pilot test of the verification protocol.

An overriding concern that became evident during protocol development was the potential for verification testing to become cost prohibitive for vendors. The amount of proposed testing in the verification protocol may need to be revisited to assure that it will provide purchasers and regulators with adequate performance information that is obtained in a cost-effective manner. Participating vendors may also need to investigate sources of financial support to offset testing costs.

Most recently, future U.S. and international collaborations on several areas of protocol development and testing have been discussed and specific areas of cooperation and appropriate pathways to facilitate information exchange will be further investigated. It is hoped this work will provide input to the USCG and the International Maritime Organization in their efforts to establish ballast water treatment standards and certification programs.

Summary

The ETV Program requires that stakeholders meet at least annually to be advised of progress in ETV's activities and to provide continued direction for future activities. The next meeting of the Stakeholder Advisory Group for the Ballast Water Treatment Technologies Verification Program is scheduled for September 23, 2003 in the Washington, D.C. area. All current stakeholders and prior meeting attendees will be notified of the meeting date and location. Interested individuals who wish to attend the next meeting or receive more information on this program should contact Thomas Stevens of NSF International at (734) 769-5347, or send email to stevenst@nsf.org. Additional information about the ETV Program and the Water Quality Protection Center may be found on the EPA website (www.epa.gov/etv) and the NSF website (www.nsf.org/etv).

RECENT EVENTS

12th International Conference on Aquatic Invasive Species, June 9-12, 2003, Windsor, Canada

The Ontario Ministry of Natural Resources was the host sponsor of the 12th International Conference on Aquatic Invasive Species. This annual four-day conference is widely considered the most comprehensive international forum for the review of scientific knowledge on the impacts of aquatic invasive species, discussion of policy to prevent new introductions, and approaches to effective public education and outreach initiatives.

To view some of the presentations from the 12th International Conference on Aquatic Invasive Species, you can visit the conference website and CQD Journal website.

Conference Website:
http://www.aquatic-invasive-species-conference.org/

CQD Journal Website
http://www.cqdjournal.com/Hot_Events/Inv_Species_6-03/inv_species_6-03.htm

The 13th International Conference on Aquatic Invasive Species will be held in Ireland in September 2004. For more information, please contact: Elizabeth Muckle-Jeffs, Conference Administrator, profedge@renc.igs.net or 800-868-8776.

2nd International Ballast Water Treatment R&D Symposium, July 21-23, 2003, London, England

The GEF/UNDP/IMO Global Ballast Water Management Programme (GloBallast), The Institute of Marine Engineering Science and Technology (IMarEST), the UK Maritime and Coastguard Agency and the North Sea Directorate (Netherlands) sponsored the 2nd International Ballast Water Treatment R&D Symposium at IMO Headquarters in London.

The R&D symposium had a truly global scope and highly focused objectives:

- Update the current status of ballast water treatment R&D around the world, and stimulate innovation and investment in global R&D efforts.
- Enhance communication and cooperation between IMO, member countries, the R&D community and ship designers, builders and owners on ballast water treatment issues.
- Provide technical and scientific support to the development and implementation of the international regulatory regime for ballast water management.

Proceedings available at the GloBallast Website:
http://globallast.imo.org

Additional coverage available at the CQD Journal Website:
http://www.cqdjournal.com/Hot_Events/Ballast_IMO_7_03/ballast_imo_7_03.htm

The U.S. Coast Guard Proposes National Ballast Water Management Program

By: Bivan R. Patnaik, Regulatory Coordinator, U.S. Coast Guard's Ballast Water Management program, U.S. Cost Guard Headquarters, Environmental Standards Division

On July 30, 2003, the U.S. Coast Guard (USCG) published a notice of a proposed rulemaking to develop a National Ballast Water Management Program. This program would require vessels equipped with ballast tanks that operate in U.S waters, and/or enter U.S. waters after operating beyond the Exclusive Economic Zone (EEZ) to conduct ballast water management practices. This proposed rulemaking would increase the Coast Guard's ability to protect U.S. waters against the introduction of nonindigenous species.

Background

Following the invasion of the Great Lakes by zebra mussels, Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA), and amended it by passing the National Invasive Species Act of 1996 (NISA). These acts directed USCG to issue regulations and guidelines for ballast water management to prevent and control the spread of NIS to U.S. waters via ballast water discharges.

Responding to NANPCA's directive, USCG developed mandatory ballast water management provisions for the Great Lakes in 1993, and in 1994 extended the provisions to include the Hudson River north of the George Washington Bridge. In 1999, under NISA, the Coast Guard developed voluntary ballast water management guidelines for vessels entering all other U.S. waters, and developed regulations mandating ballast water management reporting and recordkeeping requirements, without penalty provisions. It was Congress' intent to exclude penalty provisions from the mandatory ballast water management reporting and recordkeeping requirements until the voluntary ballast water management program was evaluated.

NISA required USCG to submit a report to Congress evaluating the effectiveness of the voluntary ballast water management program. Congress anticipated that in this report, USCG might determine that either compliance with the voluntary guidelines was inadequate, or the rate of reporting was too low to allow for a valid assessment of the compliance. In either case, Congress stipulated the development of additional regulations to make the voluntary guidelines a mandatory national ballast water management program, and providing penalties for violations of these regulations.

The report, which was submitted to Congress on June 3, 2002, concluded that compliance was too low to allow for an accurate assessment of the voluntary program. As a result, USCG is proposing regulations that would make the voluntary ballast water management program a national mandatory program with penalties. The Great Lakes ballast water management program would remain unchanged.

Proposed Mandatory Ballast Water Management Program

The mandatory national ballast water management program would require all vessels equipped with ballast water tanks entering U.S. waters after operating beyond the EEZ to employ at least one of the following ballast water management practices:

- Prior to discharging ballast water in U.S. waters, perform complete ballast water exchange in an area no less than 200 nautical miles from any shore;
- Retain ballast water onboard the vessel;
- Prior to the vessel entering U.S. waters, use an alternative environmentally sound method of ballast water management that has been approved by the U.S. Coast Guard; or
- Discharge ballast water to an approved reception facility.

Other USCG Activities

This proposed rulemaking is one step USCG is taking to increase its ability to prevent and control introductions of nonindigenous invasive species (NIS). USCG is currently working on other related projects addressing the NIS problem in U.S. waters:

- Penalties for Non-submission of Ballast Water Management Reports – On Jan. 6, 2003, USCG published a notice of proposed rulemaking in the Federal Register that would establish penalty provisions for vessels equipped with ballast tanks bound for ports or places within the United States that fail to submit a ballast water management report. In addition, it would widen the reporting and recordkeeping requirements for vessels equipped with ballast tanks bound for ports or places within the United States. The comment period for the proposed rulemaking on penalties ended April 7, 2003, and USCG is in the process of reviewing these comments and incorporating them into the final rule.

- Approval for Experimental Shipboard Installations of Ballast Water Treatment Systems Program – USCG is developing a program through which vessel owners may seek approval of experimental ballast water treatment systems installed and tested onboard their operating vessels. This program will facilitate the development of effective ballast water treatment technologies, and will aid in fulfilling the requirements of NISA to develop alternative ballast water treatment methods.

- Ballast Water Treatment Standards – NANPCA and NISA authorize USCG to approve alternative ballast water treatment methods that are found to be at least as effective as ballast water exchange in preventing and controlling infestations of NIS. In order to evaluate the effectiveness of these alternative methods, USCG is developing a ballast water treatment goal and standard. These will determine whether alternative ballast water treatment methods are environmentally sound and at least as effective as ballast water exchange in preventing and controlling NIS.

The public is encouraged to participate in the proposed rulemaking process by submitting comments and related material. The U.S. Coast Guard will accept comments on the proposed Mandatory Ballast Water Management Program until Oct. 28, 2003. The proposed rulemaking can be found at: http://dms.dot.gov. In this website, proceed to “simple search,” and under “docket number,” enter “14273.”

For further information on this rulemaking or related projects, please contact Mr. Bivan R. Patnaik at (202) 267-1744, bpatnaik@comdt.uscg.mil.

CONTACTS

West Coast Ballast Outreach Project

Jodi Cassell, Marine Advisor
California Sea Grant
300 Piedmont Ave, Bldg. B - Rm 227
San Bruno, CA 94066
jlcassell@ucdavis.edu
650-871-7559 fax 650-871-7399

Karen Hart McDowell, Project Coordinator
California Sea Grant/SFEP
1515 Clay St., Suite 1400
Oakland, CA 94612
kdhart@ucdavis.edu
510-622-2398 fax 510-622-2501

Local Ballast Water Contacts

Alaska
Denny Lassuy, U.S. Fish & Wildlife Service
denny_lassuy@fws.gov 907-786-3813

British Columbia
Pat Lim, Fisheries and Oceans Canada
LimP@pac.dfo-mpo.gc.ca 604-666-6529

California
West Coast Ballast Outreach
Project Reps. (above)

Hawaii
Paul Murakawa, Hawaii Dept. of Land and Natural Resources
paul_y_murakawa@exec.state.hi.us
808-587-5404

Oregon
Mark Sytsma, Portland State University
sytsmam@pdx.edu 503-725-3833

Washington
Scott Smith, Washington Dept. of Fish & Wildlife
smithsss@dfw.wa.gov 360-902-2724

Western Regional Panel

Tina Proctor, U.S. Fish & Wildlife Service
Bettina_Proctor@fws.gov 303 236-7862. ext. 260

Regional Fish & Wildlife A.N.S Representative - Pacific Region

Paul Heimowitz, U.S. Fish and Wildlife Service
Paul_Heimowitz@fws.org 503-872-2763

In addition to working on the newsletter and the coastal ballast exchange issue, we are also working to update and reprint the “Stop Ballast Water Invasions” poster and brochure. We have distributed almost all of the copies from the first printing: 20,000 copies of the brochure and 15,000 copies of the poster. Please feel free to contact us if you would like to review or comment on the new version of the “Stop Ballast Water Invasions” brochure, and/or if you would like to receive a copy of the current version. The new version of the poster and brochure will be available in January 2004. To keep track of coming events and newly released reports, please visit our website at (http://ballast-outreach-ucsgep.ucdavis.edu).

We enjoy working with our many partners and look forward to continuing our partnerships and creating new ones. Once again we would like to encourage your active participation and feedback on the West Coast Ballast Outreach Project. We are just a fax, phone call, or email away and always appreciate any comments or suggestions.

Karen McDowell, Project Coordinator,
West Coast Ballast Outreach Project

Jodi Cassell, Marine Advisor,
California Sea Grant Extension Program

Ballast Exchange is funded in part by a grant from the National Sea Grant College Program, National Oceanic and Atmospheric Administration, U.S. Department of Commerce, under grant number NA06RG0142, project number A/EA-2 through the California Sea Grant College Program, and in part by the CalFED Bay-Delta Program. The views expressed herein are those of the author(s) and do not necessarily reflect the views of NOAA or any of its sub-agencies.

University of California
California Sea Grant
One Shields Avenue
Davis, California 95616-8751