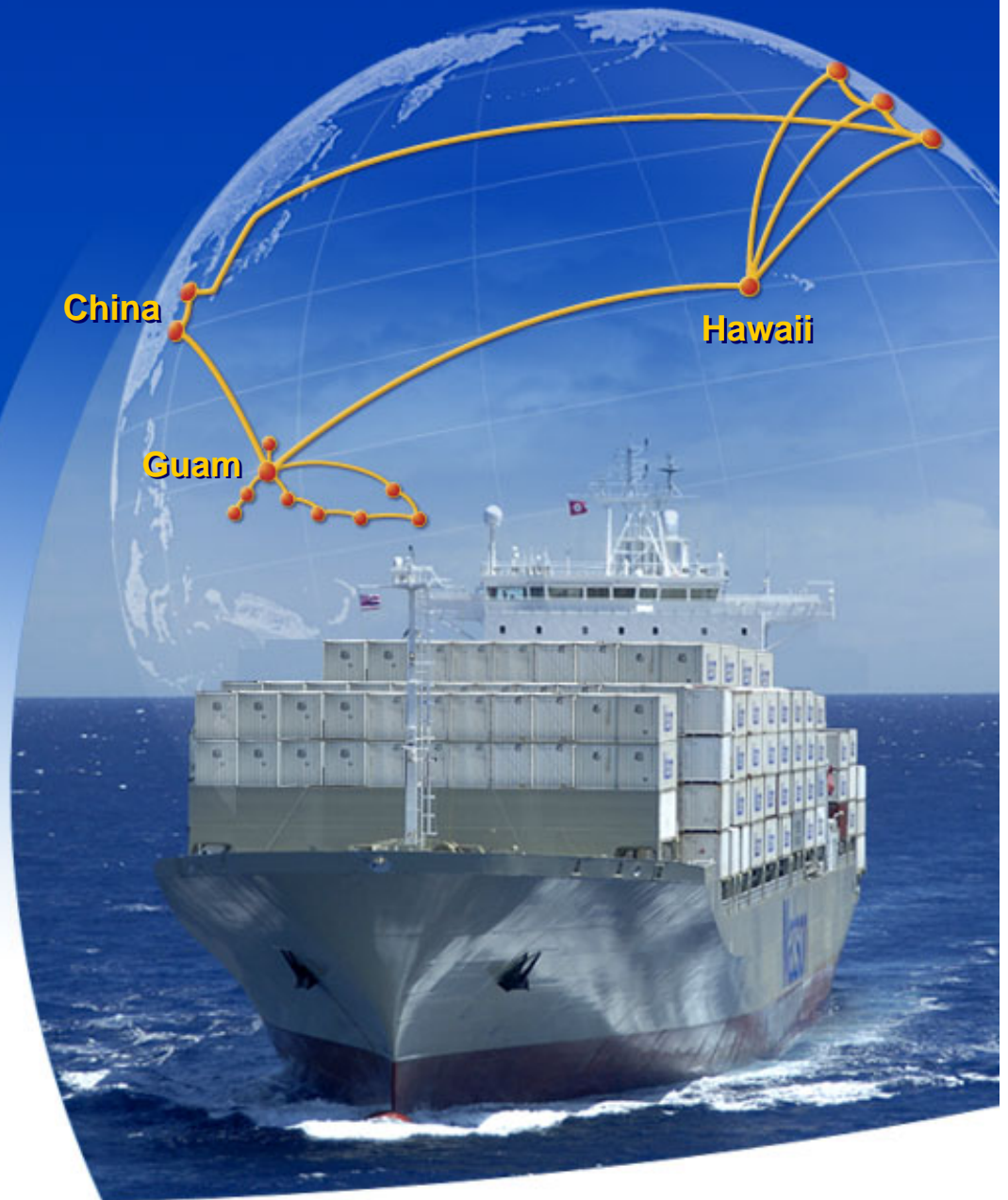


Matson® & Ecochlor Inc.

Shipboard
Demonstrations of Ballast
Water Treatment to
Control Aquatic Invasive
Species



Matson's Environmental Stewardship

- Winner of the 2006 USCG Benkert Award for Environmental Excellence
- All Matson vessels SQE certified, offices ISO 14000 certified
- Zero Discharge Policy and Matson Environmental Protection Zone
- Air emission reduction projects
- Ballast water treatment projects
- Community outreach – Ka Ipu Aina & International Coastal Cleanup Day



Partnership with CSLC

- Participation on technical advisory panels
- Participation in rulemaking process
- West Coast Regional Applied Ballast Management Research and Demonstration Project
- Contract Agreement for the Ecochlor Moku Pahu Project
- Allow ships to be used to conduct scientific studies

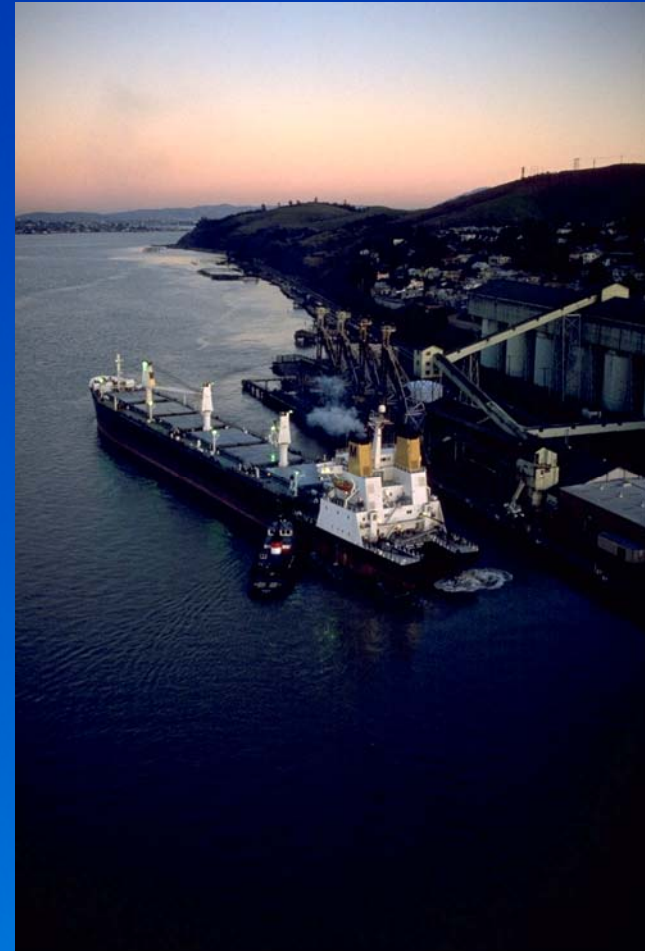
West Coast Regional Applied Ballast Management Research and Demonstration Project



- Funding from USFWS, Port of Oakland, and SWRCB.
- Matson's R.J. Pfeiffer became one of two vessels to have an OptiMar® treatment system installed.
- This system treats ballast water with a 2-step process beginning with a cyclonic separation chamber followed by ultraviolet irradiation.
- The original system was installed in early 2002, however propulsion vibrations from the engine caused quartz tubes to break inside the UV chamber.
- Results documented in public report.

Ecochlor Project aboard the Moku Pahu

- Integrated tug and barge operated by Matson for the Hawaiian Sugar and Transportation Cooperative.
- Also has operated with the United Nations World Food Program and other humanitarian organizations to ship food aid to Mongolia, Pakistan, Indonesia, Bangladesh, North Korea, and Ethiopia.
- Tonnage: 37,000 long tons
- Ballast water capacity: 17,000 m³
- BW exchange is costly and difficult



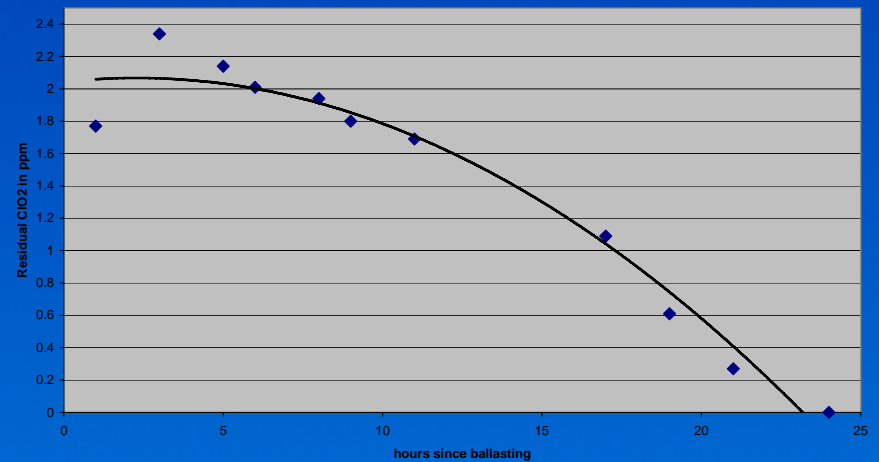
Ecochlor Treatment – Chlorine Dioxide

- Approved for drinking water, direct contact with food, numerous industrial applications
- Highly effective on all organisms, biofilm
- No effect on metals, coating, slight effect on water pH
- No formation of chlorinated by-products
- Cost effective even at high and very high flow rates
- No chlorine dioxide residuals discharged, environmentally acceptable

Ecochlor Treatment Methodology

- Treat the incoming ballast water
- Target dosage of chlorine dioxide controlled by PLC
- Chlorine dioxide neutralizes all incoming invasive species
- Residual maintained in ballast tanks to neutralize biofilm
- Residual decays to “non-detect” within 24 hours

CIO₂ Decay Rate
Djibouti Africa, December 2005
M/V Moku Pahu, #3 wing tank, starboard



Ecochlor Treatment System

- Flexible system enclosure
- Fully automated, no crew interaction
- No changes to ballasting operations or rates
- Hastaloy / 316 SS construction
- Small footprint – 7.5 m² or 80 ft²



Shipboard Test Results

University of Rhode Island
Graduate School of Oceanography
M/V Atlantic Compass
Summer 2005



Shipboard Test Results

- M/V Atlantic Compass
 - 52,000 dwt Ro-Ro Containership
 - Max BW Flow rate: 2500 m³ per hr
- Treated ballast water during port call in Newark, New Jersey
- Scientist sailed with vessel for 5 days
- Onboard + Dockside + Laboratory analysis of samples



Shipboard Test Results

Zooplankton greater than 50 micron / m³

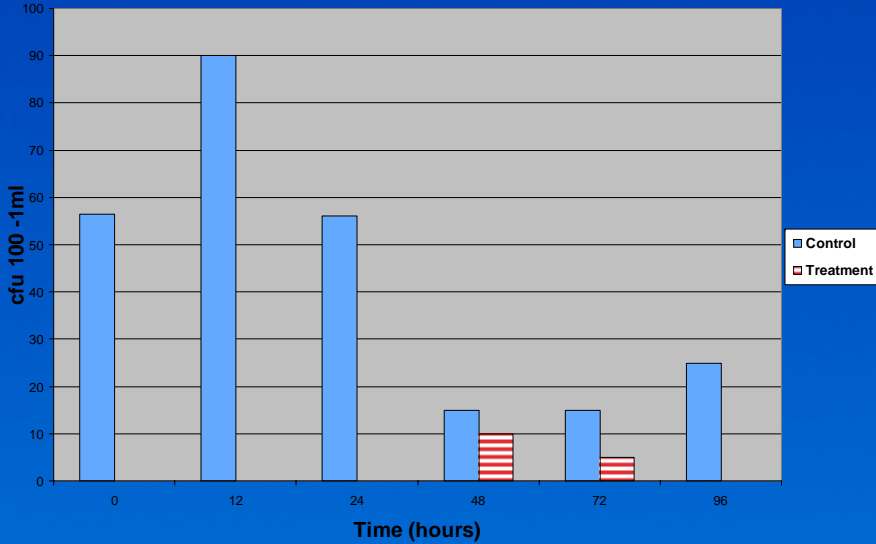
	Time =0	12 hr	24 hr	48 hr	72 hr	96 hr
Control	7121	5703	6615	2945	2846	1901
Treatment	0	0	0	5	0	0

Species Identified (in decreasing concentration):

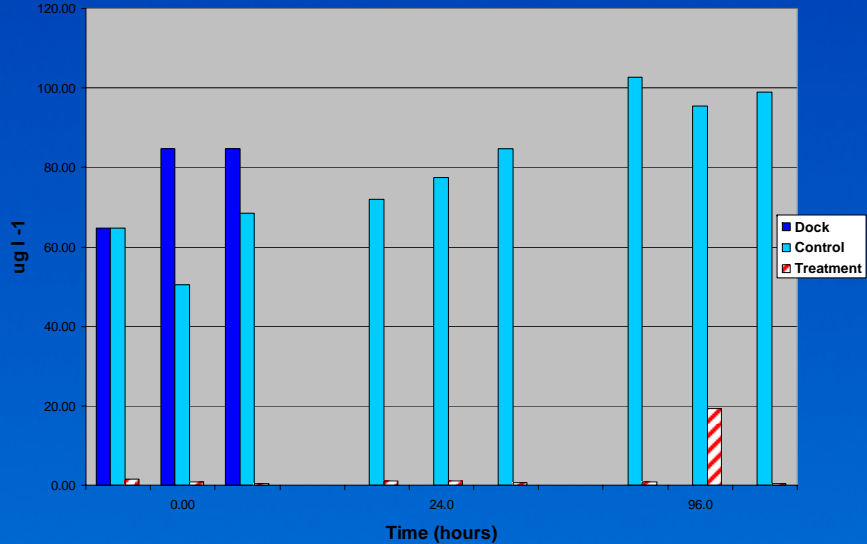
- Calanoid copepod (*Acartia tonsa*)
- Calanoid copepod (*Eurytemora* sp.)
- Cyclopoid copepod (*Oithona similis*)
- Harpacticoid copepods
- Barnacle cyprindids

Shipboard Test Results

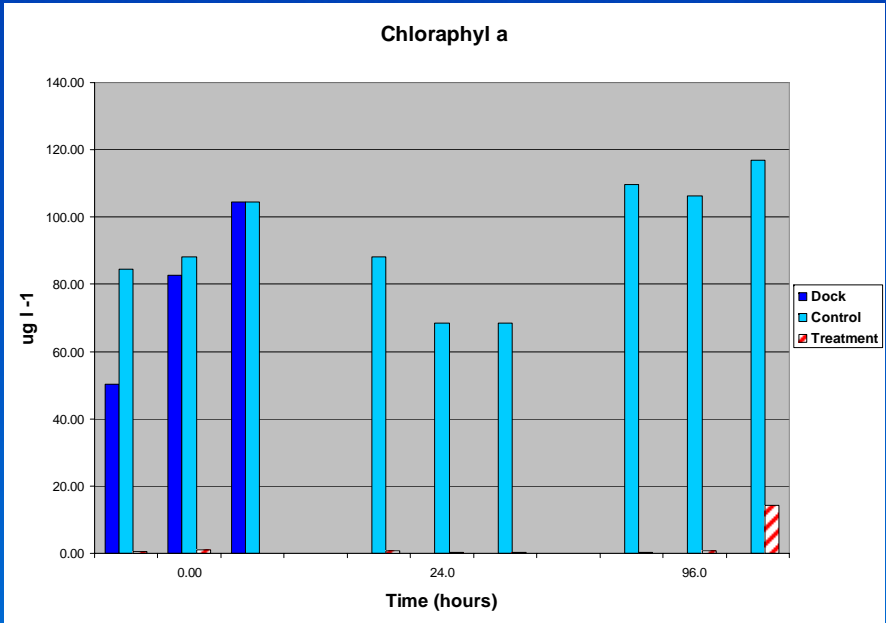
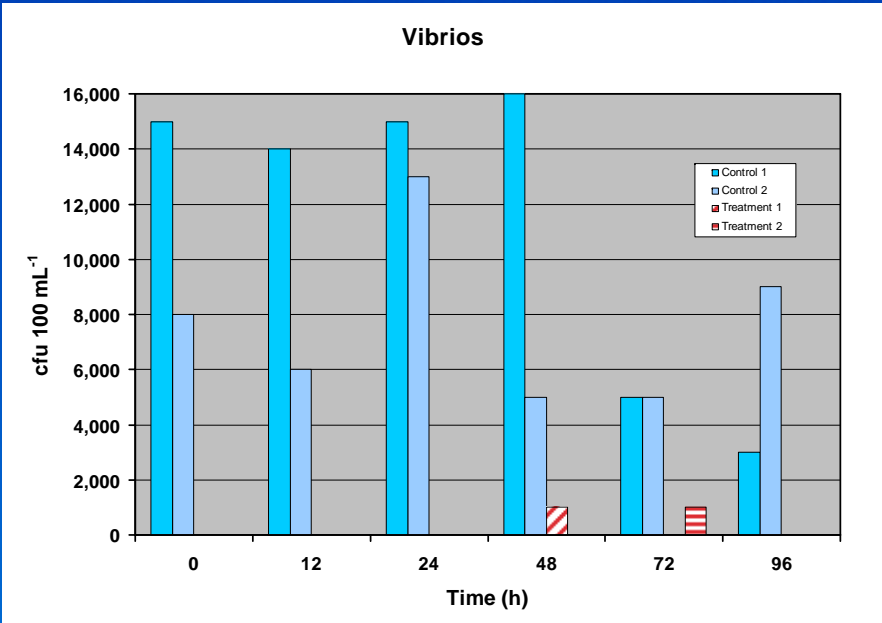
E. Coli Colonies



Chlorophyl a



Shipboard Test Results



Regulatory Update

- USCG Shipboard Technology Evaluation Program (STEP)
 - Matson application submitted for the Moku Pahu
 - ACL application submitted for the Atlantic Compass
 - Application currently being reviewed
- Washington State
 - Matson application submitted for Interim Approval
 - Application currently being reviewed
- IMO / MEPC
 - Information on Ecochlor technology presented by the USCG
 - Formal application for approval after USCG STEP

Path Forward: Matson + Ecochlor

- Moku Pahu system in full operation after acceptance into STEP
- University testing on Moku Pahu scheduled for winter 2006/2007
- University testing on Moku Pahu scheduled for summer 2007
- Share shipboard data with international community
- Monitor system reliability and effectiveness for STEP and ultimate Type Approval of the Ecochlor technology

Conclusion

- Matson continues to demonstrate commitment to the environment
- Moku Pahu project will eliminate one vector for invasive species into California and other potential ports of call for the vessel
- Efficacy data collected from project will benefit the State of California, USCG, IMO and other international organizations seeking viable technologies for BW treatment
- Operational data will benefit other ship owners and operators who are also interested in controlling aquatic invasive species with effective treatment methodologies

Matson®

Q & A

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