

Ballast Water Treatment

Presented By:

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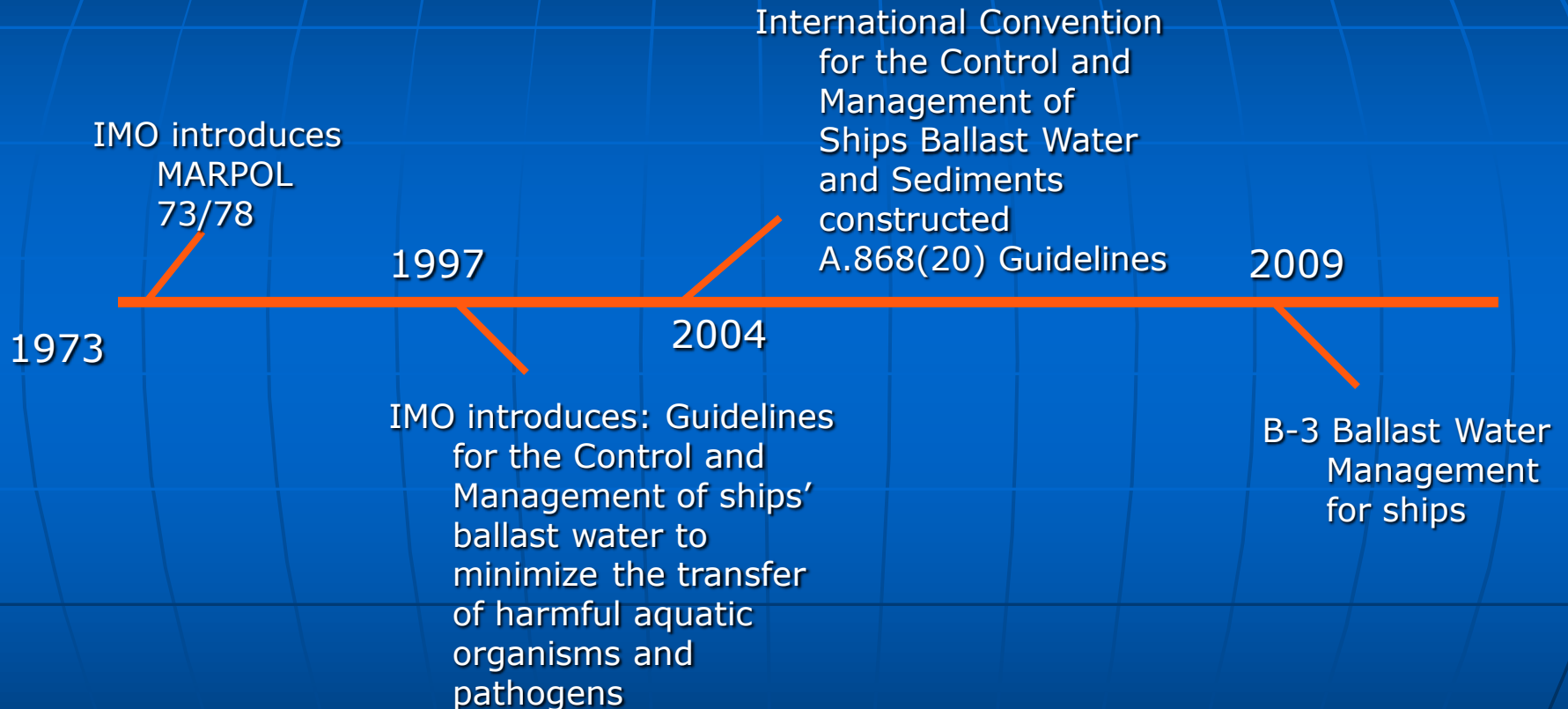
Hyde Marine, Inc.



The Problem

- Invasive marine species introduced into new environments by ships' ballast water
- Rapid increase in trade results in natural species barriers across the oceans being reduced
- Serious environmental problems arise when ballast water contains marine life and change whole ecosystems

IMO Ballast Water Time Line



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B-3 Ballast Water Management for Ships

- Ships constructed before 2009:
 - w/ capacity of 1500-5000m³ must conduct BW management that meets BW exchange standards or BW performance standards until 2014
 - w/ capacity less than 1500 or greater than 5000m³ must conduct ballast water management that meets BW exchange standards or BW performance standards until 2016

B-3 Ballast Water Management for Ships

- Ships constructed in or after 2009
 - w/ capacity of less than 5000m³ shall conduct BW management that meets the BW performance standard
 - w/ capacity of 5000m³ or more shall conduct BW management that meets the BW performance standard

B-3 Ballast Water Management for Ships

- Ships constructed in or after 2012
 - w/ capacity of 5000m³ or more shall conduct BW management that meets the BW performance standard

IMO Ballast Guidelines

- 1997 new guidelines introduced A.868(20):
 - Minimal uptake of organisms during ballasting
 - Cleaning ballast tanks/removing mud & sediments on a regular basis
 - Avoid unnecessary discharge of ballast
 - Manage ballast by: ballast water exchange at sea, non/minimal release of ballast, discharge to onshore facility

Filtration/UV System



CORAL PRINCESS



Disk Filter

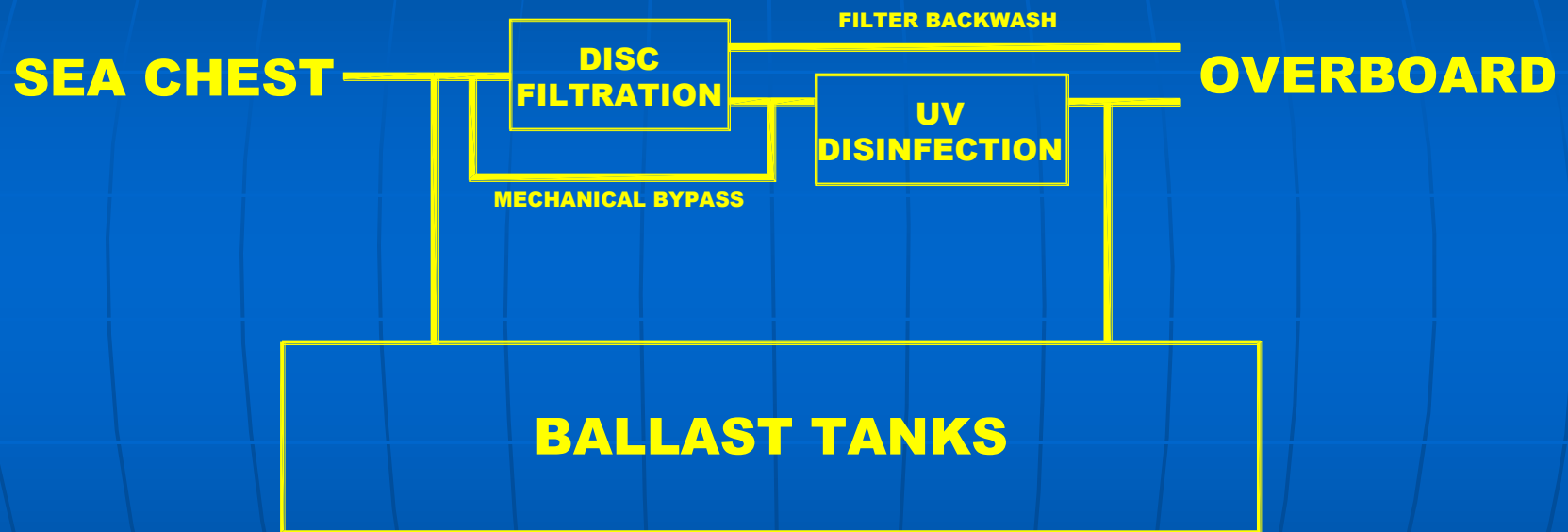


Medium Pressure UV

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Filtration/UV System

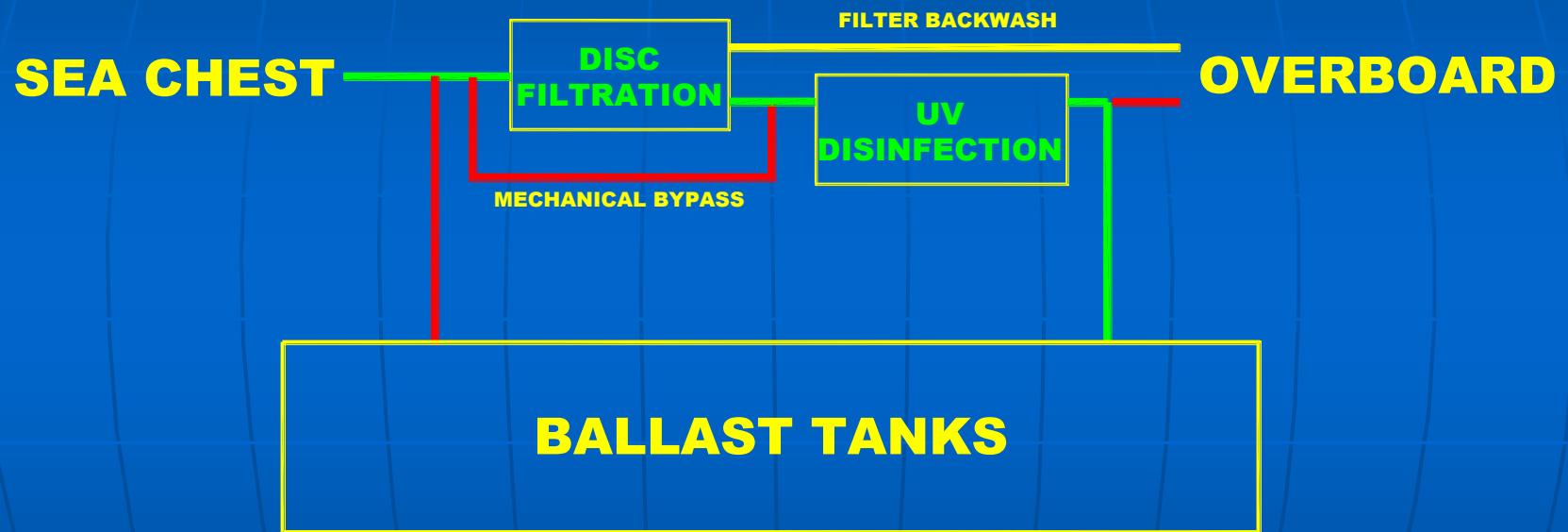


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Filtration/UV System

BALLAST MODE

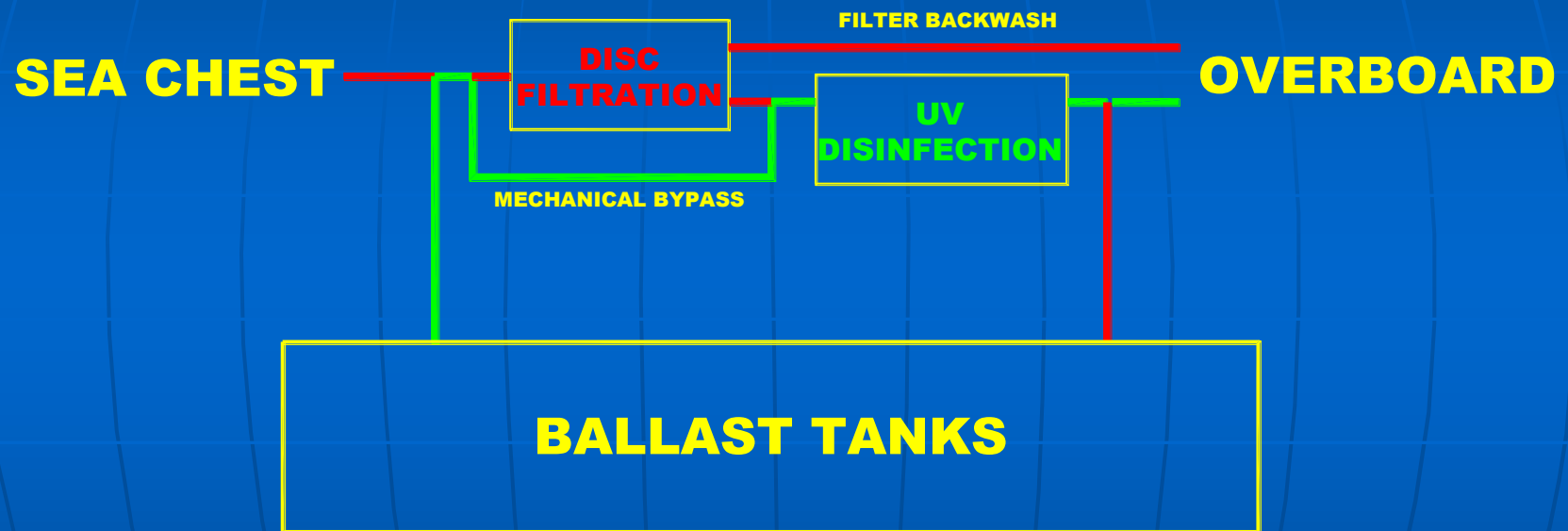


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Filtration/UV System

DE-BALLAST MODE



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Full Scale Testing

- Great Lakes Ballast Technology Demonstration Project Barge Testing
 - 1998 Screen Filtration
 - 2000 Screen Filtration/Cyclonic Separation/UV
 - 2001 Arkal Disk Filtration and UV
- 2000 Testing on “Regal Princess”
- 2001 “Cape May” Testing of UV/Filtration
- 2001-03 Multi-Ship Testing
- 2004 “Coral Princess” STEP Testing
- 2004-06 Baltimore Harbor

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Installed Systems

- UV Treatment with Cyclonic Separation
 - April 2000 – “Regal Princess” – 200 m³/hr
 - Aug. 2001 – “Sea Princess” – 220 m³/hr
 - Mar. 2002 – “R. J. Pfeiffer” – 350 m³/hr
 - Feb. 2002 – “Star Princess” – 255 m³/hr
 - Apr. 2002 – “Stolt Aspiration” – 250 m³/hr
- UV Treatment with Filtration
 - May 2003 – “Coral Princess” – 250 m³/hr
 - Oct. 2006 – “Celebrity Mercury” – 210m³/hr

USCG STEP Results

Type of Test and Date Performed	Percentage removal of >50µm organisms	Citation
October 2004 MV Coral Princess. Final trial comprised nominal 55µm backwash filter and nominal 200mJ/cm ² UV treatment on ballasting and UV treatment only deballasting.	100%	Wright, D.A., R. Dawson (V), C.E. Orano-Dawson, S.M. Moesel (2006), A Test of the Efficacy of a Ballast Water Treatment System Aboard the Vessel Coral Princess. Mar. Technol. (in press)

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Filtration/UV Treatment

- Capacities to meet any requirement
 - Small Footprint – Modular Construction
 - New Builds or retrofit in service
- Simple Operation
 - Fully automatic
 - Safe – No Chemicals
 - Minimal Maintenance
- MEETS USCG and IMO STANDARDS

Biocide



SEABULK MARINER



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Biocide

- Cost Effective – 10 to 20 cents per tonne
- Highly Soluble in Fresh and Salt Water
- Not Corrosive to Piping or Ballast Tanks - Unlike Oxidizing Biocides
- Delivered in Safe Powder Form – Can be Stored on Board and Handled by Crew With No Special Training
- Low Affinity for Particulate Matter and Sediment

Biocide

- Particularly Suitable for Bulk Carriers and Tankers with Large Ballast Volumes
- Naturally Degrades And Is Quickly Diluted To Non-toxic Levels
- Straightforward Dosing Under all Ballasting Conditions Including Gravity Ballasting
- Tested aboard the Seabulk Mariner in August 2006

Biocide Full Scale Test

- 2001 "Cape May"
- 2004-06 Baltimore Harbor
- 2006 "Seabulk Mariner"

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Biocide

Full Scale Test Results from Seabulk Mariner

- Zooplankton densities per m³ in untreated (1S) ballast tank (8 taxonomic groups)
 - >50um : 17,585 ± 2,182
 - <50um : 1,150 ± 468
- Zooplankton densities per m³ in treated (5P) ballast tank (1.52mg/L SeaKleen) – 0
- Zooplankton densities per m³ in treated (5S) ballast tank (0.75mg/L SeaKleen) – 0

Baltimore Harbor Test Facility

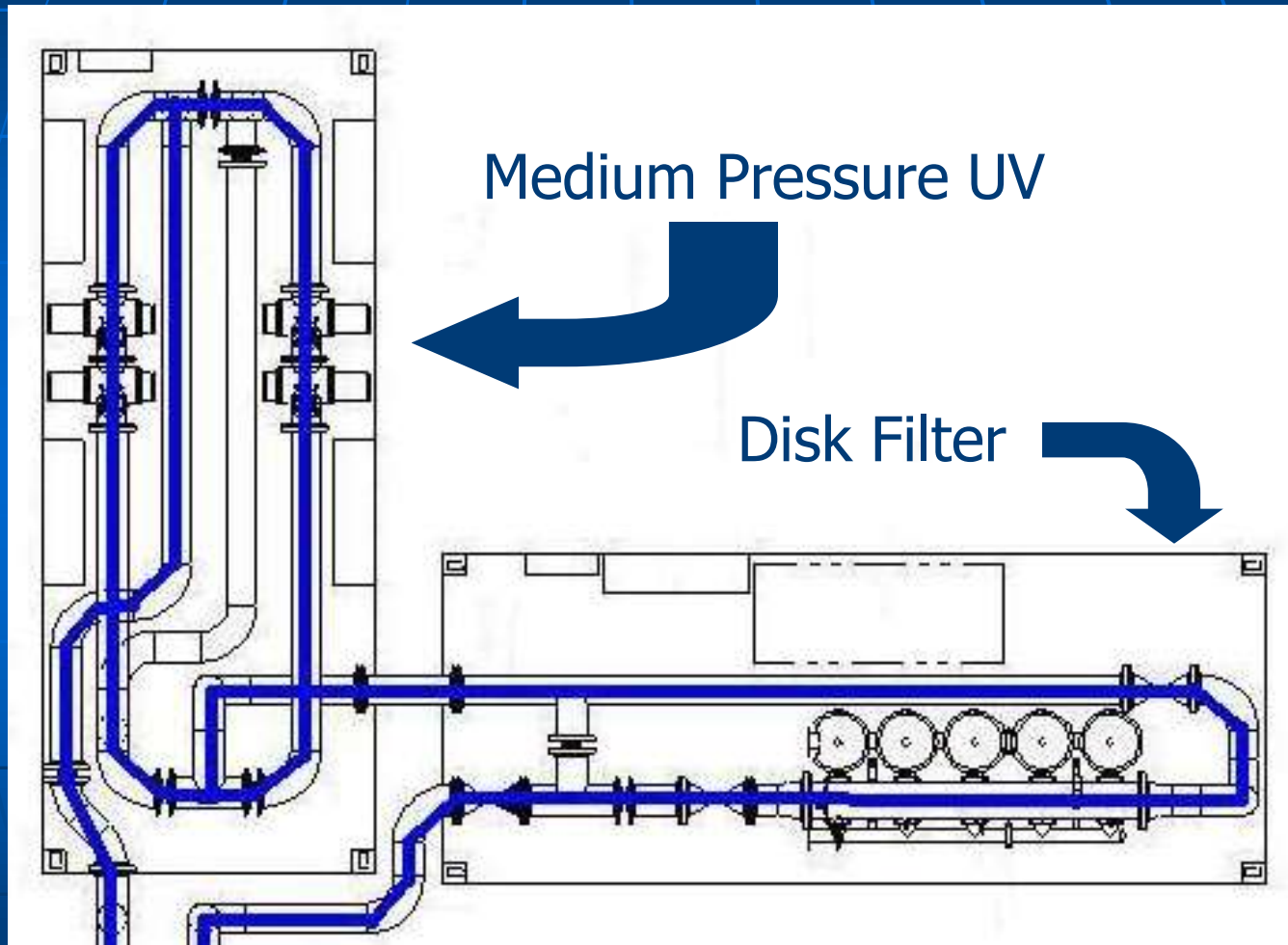


MPA Pier 1 Baltimore Harbor

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Baltimore Harbor Test Facility



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Ballast Tank Mud Remover

- Proven for over 40 years
- Increases Cargo Capacity
- Helps eliminate invasive species in ballast tanks
- Low dosage rates
- Safe handling and easily injected



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QUESTIONS??

***THANK YOU FOR
YOUR ATTENTION***

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