



**BALLAST WATER
MANAGEMENT AND CONTROL**

Shipping Federation of Canada

March 13 2008

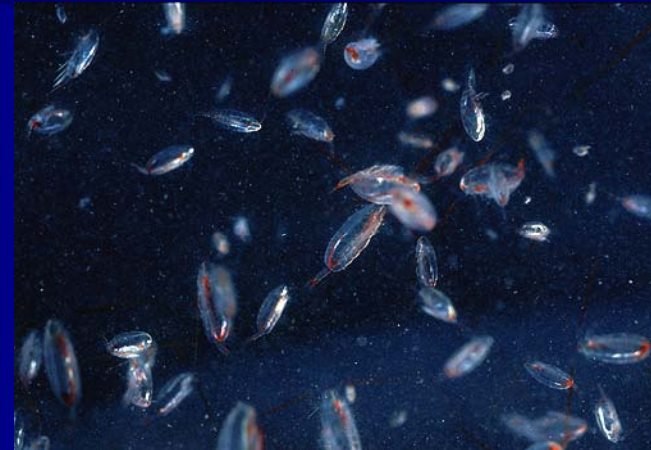
AGENDA

- Context for Ballast Water Management
 - Why?
- International positioning
 - IMO
- Canadian Regulations
 - TP 13617
 - Code of Best Practices
- Shipping Federation Instructions to Masters

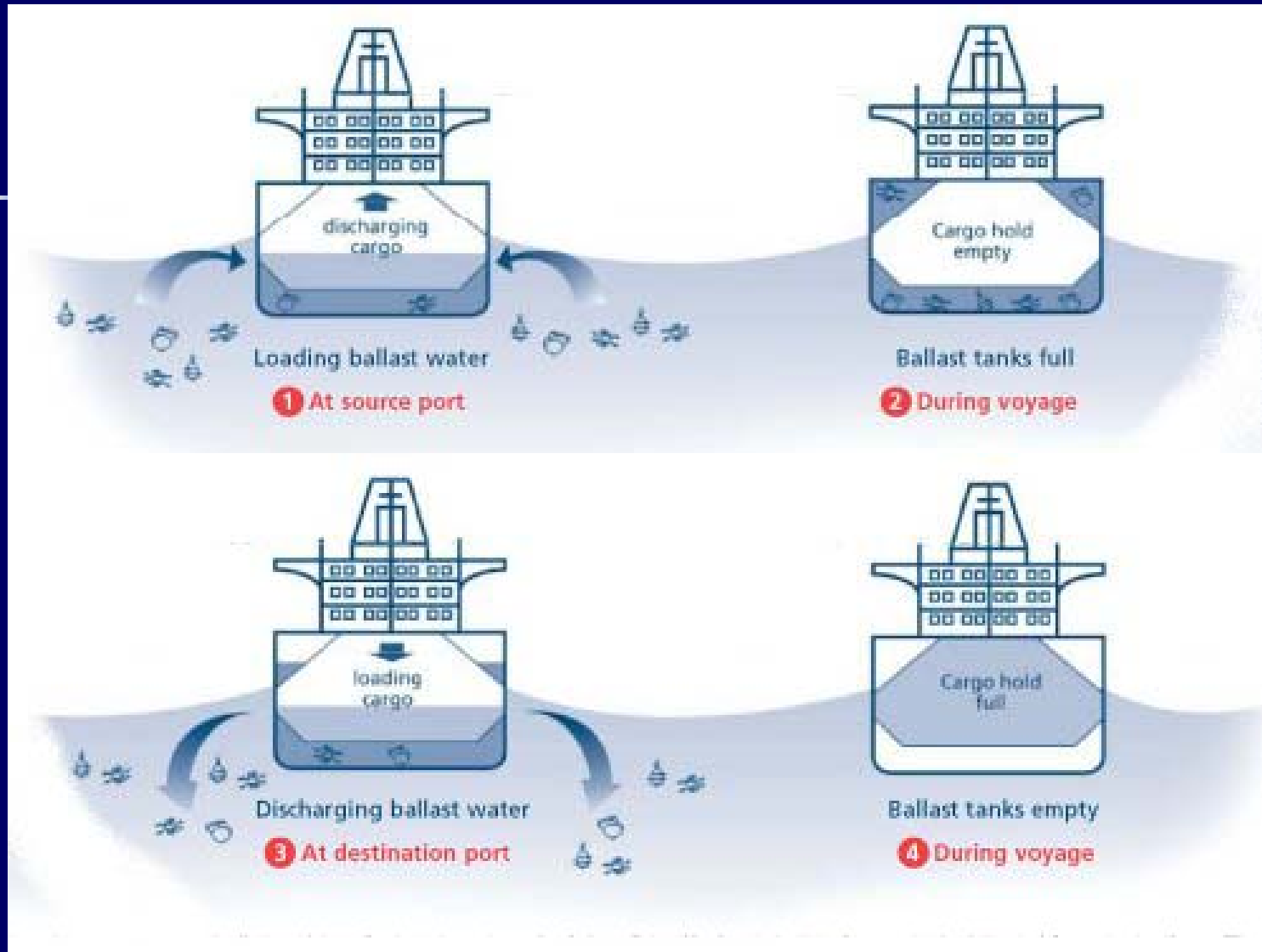


Context for Ballast Water Management

- Ballast Water considered (prior to 1988)
 - Harmless water used to stabilize ships and improve seakindliness
- Water taken aboard in port rich with organisms & pathogens

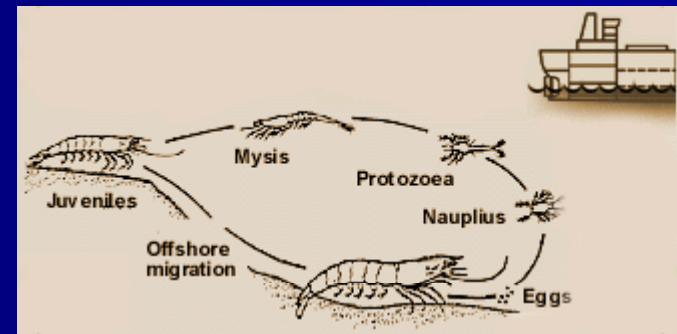
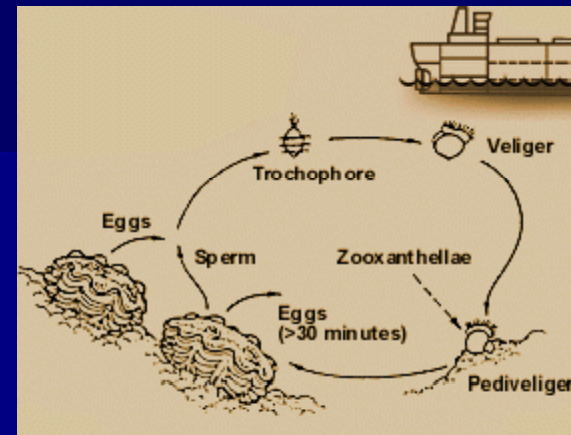


Cross section of ships showing ballast tanks and ballast water cycle



A problem arises when this ballast water contains marine life.

- 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.
- These include 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.



Internationally



- The *Mnemiopsis leidyi*, introduced to Black and Azov Seas in the 1980's, wiped out anchovy and sprat fisheries causing losses of US \$200 million annually. This invader has since spread to Caspian Sea and the Baltic region.



- The Mitten crab (*Eriocheir sinensis*) established in San Francisco Bay in the 1990's and is now found in densities exceeding 10,000 individuals per M².



- The Northern Pacific sea star was introduced to Australia by ballast water from Japan in the 1980's causing severe damage to aquaculture and fishing industries.



- The toxic dinoflagellate *Gymnodium catenatum* is now established in Australian waters and has been responsible for the occasional closure of shellfish harvesting.



- Costs associated to repair and control of damages caused by the zebra mussel (*Dreissena polymorpha*) is estimated at US \$ 500 million over a period of 10 years.



- *Vibrio cholerae* - believed to have been transferred to Peru causing cholera epidemics.



Timeline (1)

1989: Voluntary provisions for ballast water exchange for vessels travelling to the Great Lakes.

1991: Ballast exchange guidelines were introduced by the International Maritime Organization (IMO) - these were revised in 1997 as resolution A.868(20), *Guidelines for the Control and Management of Ships Ballast Water to Minimize the Transfer of Harmful Aquatic Organisms and Pathogens*;

1993: US Coast Guard introduced mandatory regulations that required ballast exchange for vessels traveling to the Great Lakes.

2000: - Development of the SFC's *Code of Best Practices for Ballast Water Management*.

- Application of the Canadian guidelines was expanded to cover all waters under Canadian jurisdiction and renamed *Guidelines for the Control of Ballast Water Discharge from Ships in Waters under Canadian Jurisdiction, TP 13617*.

- Shipping Federation requested Transport Canada to extend Voluntary Guidelines to all waters, including East Coast of Canada.

- Establishment of CMAC National Ballast Water Working Group and consultations begin on implementing Ballast Water Management on Canada's Atlantic coast



Timeline (2)

2002: The Seaways amended their joint Practices and Procedures to make compliance with the SFC's Code of Best Practices a mandatory prerequisite for transit of the Seaway system.

2004: - IMO finalized the *International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004*.

- Amendment of the USCG regulations that required ballast exchange for vessels traveling to the Great Lakes to make reporting mandatory for all US waters.

2005: - Second amendment of the USCG regulations that required ballast exchange for vessels traveling to the Great Lakes to make ballast water management mandatory for all US waters.

- CMAC consultations on Canadian ballast Water Regulations concluded.

2006: Entry into force of the Canadian *Ballast Water Control and Management Regulations*.

2007: Development of the SFC's *Instructions to Masters* and related training sessions on Canadian Regulations.



Context (Alternatives)

- IMO defined the alternative
 - Treatment system that would remove / reduce viable organisms and pathogens to level agreed by parties to the Convention

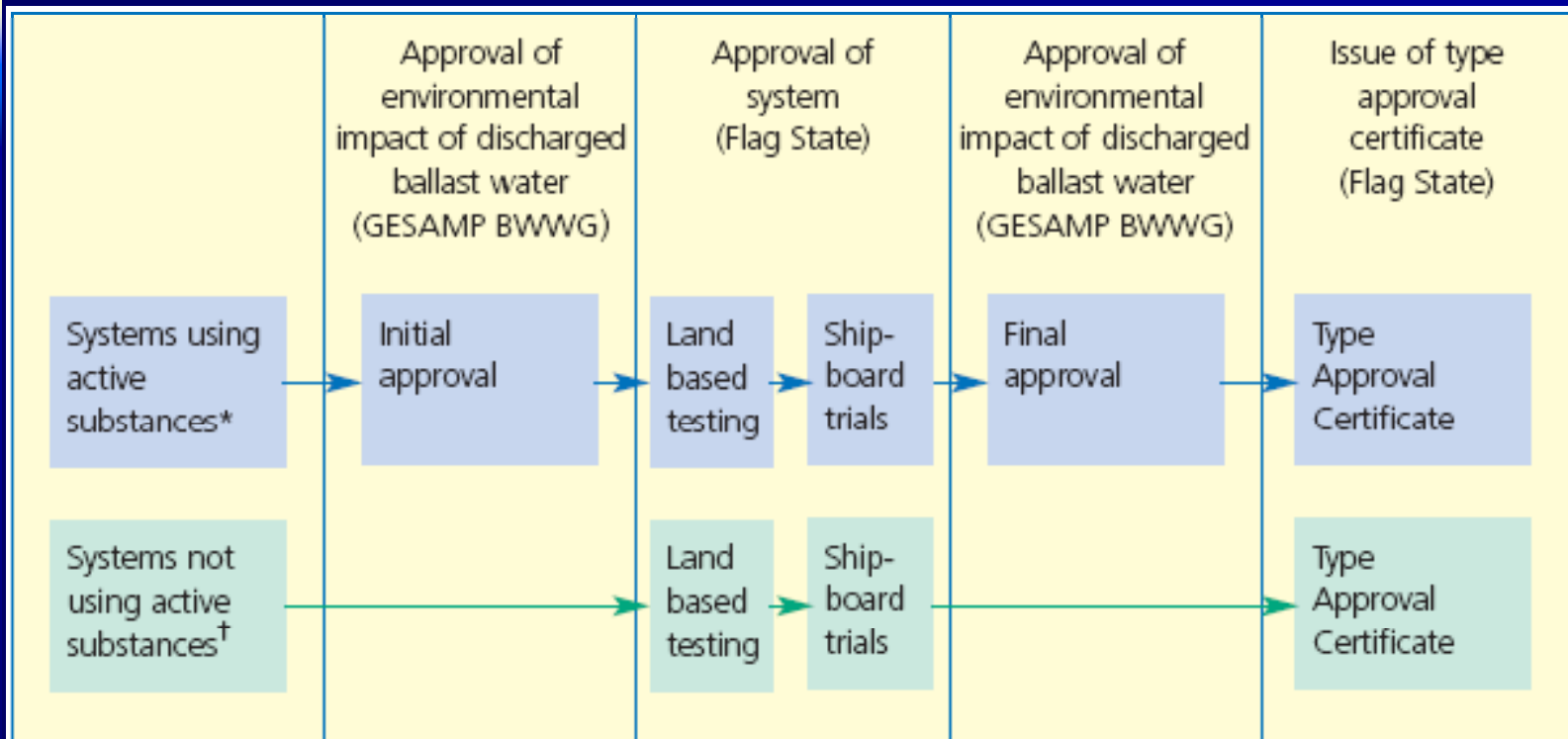


Ballast Water Standard Treatment

- 9. A ship that treats ballast water shall attain, after the treatment, ballast water having a viable organism and indicator microbe content less than the following concentrations:
 - (a) 10 viable organisms per cubic metre greater than or equal to 50 μ in minimum dimension;
 - (b) 10 viable organisms per millilitre less than 50 μ and greater than or equal to 10 μ in minimum dimension;
 - (c) one colony-forming unit (cfu) of toxicogenic *Vibrio cholerae* (O1 and O139) per 100 mL or one cfu per 1 g (wet weight) zooplankton samples;
 - (d) 250 cfu of *Escherichia coli* per 100 mL; and
 - (e) 100 cfu of intestinal enterococci per 100 mL.



IMO Process



* Includes chemical disinfectants, e.g. chlorine, ClO₂, ozone

† Includes techniques not employing chemicals, e.g. deoxygenation, ultrasound



Treatment Technologies

- Generic types of process technology:
 - Solid-liquid separation is simply the separation of suspended solid material from the ballast water, either by sedimentation or by surface filtration.
 - Disinfection removes and/or inactivates micro-organisms using one or more of the following methods:
 - Chemical inactivation of the microorganism
 - Physicochemical inactivation by irradiation with ultraviolet light, which denatures the DNA of the micro-organism and therefore prevents it from reproducing. Ultrasound or cavitation are also physico-chemical disinfection methods
 - Deoxygenation either by displacement of the dissolved oxygen with an inert gas injection or stripping it by means of a vacuum and thereby asphyxiating the micro-organism.

- Criteria for acceptance of these systems include:
 - It must be safe (operational level and crew);
 - It must be environmentally acceptable;
 - It must be cost-effective (retrofits);
 - It must work.



Convention Implementation

Ballast capacity	Year of ship construction*			
	Before 2009	2009+	2009-2011	2012+
< 1500 m ³	Ballast water exchange or treatment until 2016 Ballast water treatment only from 2016	Ballast water treatment only		
1500 – 5000 m ³	Ballast water exchange or treatment until 2014 Ballast water treatment only from 2014	Ballast water treatment only		
> 5000 m ³	Ballast water exchange or treatment until 2016 Ballast water treatment only from 2016		Ballast water exchange or treatment until 2016 Ballast water treatment only from 2016	Ballast water treatment only

Source: Lloyd's Register – Ballast Water Treatment Technology



Context (search for prevention)

- Ballast water exchange
- Deep ocean waters
 - Low density population of organisms
 - Viability low in brackish, port and fresh water
- Proven by
 - University of Windsor and NOAA




Canadian Regulations

- Authorized by Canada Shipping Act 2001
 - Section 190 (f)
- Ballast Water Control and Management Regulations
 - Not applicable: ships operating only in Canadian waters, Great Lakes, St. Pierre & Miquelon
- TP 13617
 - A supporting document referenced in the regulations
- Code of Best Practices for Ballast Waster Management
 - Developed by Shipping Federation of Canada



Ballast Water Exchange – Transoceanic Voyages

- **All ballast is subject to exchange no matter how small the amount**
 - Exchange = 95% exchange
 - Salinity = 30 ppt 
 - 200 miles offshore
 - 2000 metres deep
- **All criteria must be met**

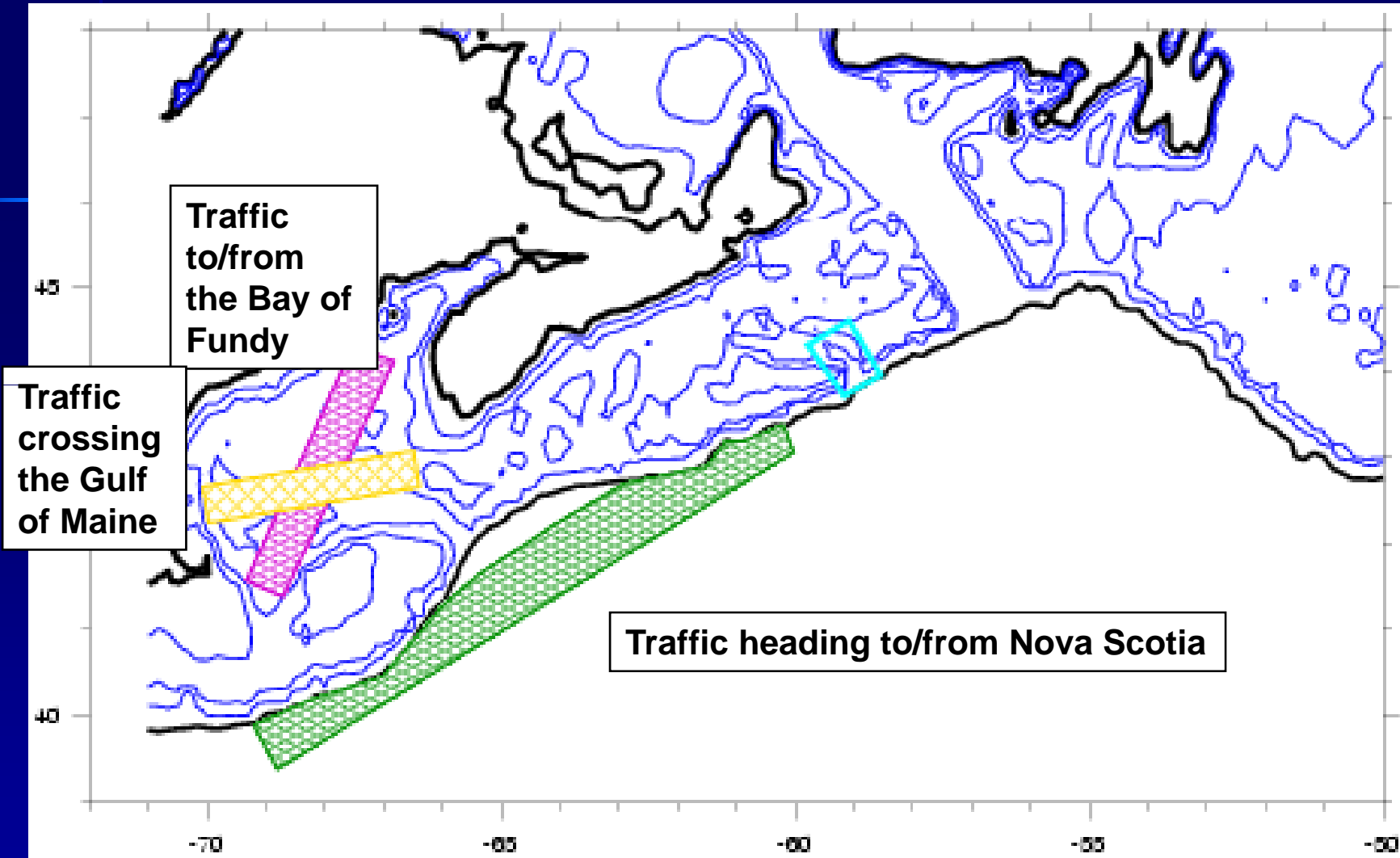




Non-Transoceanic Voyages

- 50 miles offshore
- 500 metres deep
- Salinity 30 ppt
- Except
 - Voyages from north of Cape Cod bound for Bay of Fundy, Newfoundland and Nova Scotia





Alternative Zones

- Seasonal use of Laurentian Channel
 - Transoceanic only to St. Lawrence River and Great Lakes
 - East of 63° W where water is 300m deep
 - December 1 to May 1
 - **Advise the Minister first**
- To Arctic and High Arctic
 - Hudson Strait or Lancaster Sound



Ballast Water Exchange - Empty Tanks

- Includes salt water flushing of empty tanks
- If Transport Canada takes a sample (one drop is enough):
 - It must read 30 ppt
 - All tanks will be sounded



Instructions to Masters

- **Shipping Federation of Canada
Instructions to Masters**
- **Re: Ballast Water Control Regulations - Atlantic Approach**



Layout of the Instructions to Masters

- Documents to have onboard
- Equipment (refractometre)
- En route reporting & logging
- Exchange
 - **Flushing empty tanks**
 - Options depending on approach
 - Non-transoceanic voyages
 - Alternative Exchange Zones
- Exceptional Circumstances
- Enforcement



Documents to have on board

Document	TC	Seaway	USCG
Ballast Water Management Plan	X	X	X
Ballast Water Management Records and Reports	X	X	X
IMO Resolution A868(20)	X	X	X
Canada's Ballast Water Control and Management Regulations	X	X	
TP13617	X	X	
Shipping Federation of Canada's Code of Best Practices for Ballast Water Management	X	X	
TC Report Form and Seaway Report form	X	X	
US 33 CFR 151 Subparts C and D		X	X
70 Federal Register 51831		X	X
OMB Form OR Seaway Ballast Water Reporting Form (Great Lakes only)			X



Shipboard Ballast Water Management Plan

- Required by
 - International Convention,
 - Canadian Regulations
 - US 33 CFR 151
- Recommended:
 - document approved by either Flag State or Classification Society
- Information required for BW Management plan contained in:
 - TP 13617 Schedule 1 Part B
 - 7 mandatory inclusions



BW Management Plan cont'd - Ship-Specific 7 Mandatory Requirements

1. Safety
 - **Flushing empty tanks**
2. Actions to Implement BW Management
3. Sediment Disposal
4. Coordination with Coastal State
5. Designate Officer in charge of Plan
6. Reporting Requirements
7. Working language + English, French or Spanish



Records and Reports

- Start recording Ballast Water Management Decisions and actions
 - Upon deciding to conduct exchange
 - Upon deciding not to conduct exchange
 - Send First Ballast Water Report
 - 96 hours before entering territorial waters
 - Territorial waters = 12 nautical miles
- OR
- Upon departure last port if less than 96 hours away



Why Report so Early?

- To qualify for Exceptional Circumstances



Why Record Decisions?

- To show compliance with Best Practices
- To save sequence of events leading to a “cannot exchange” decision
- To show good faith and good intentions
- Essential to favourable consideration when applying to Minister for consideration under Exceptional Circumstances



Reporting

- TC requires
 - “as soon as possible after a management process is performed” OR
 - “a measure determined by the Minister is implemented”.
- Seaway
 - 96 hours before Montreal



Report Forms

- Include Salinity
 - If not available – say not available!
- Send them to:
 - atlanticballastwater@tc.gc.ca
 - Fax: 902 426 6657

or

- Via MCTS (ECAREG)
 - use this if you need off hours help
 - Fax: 902 426 4483
 - Phone: 902 426 4956
 - Telex: 019 22510



Exceptional Circumstances

- Applicable only on notification to the Minister

- Contact details:
 - Via MCTS (ECAREG)
 - use this if you need off hours help
 - Fax: 902 426 4483
 - Phone: 902 426 4956
 - Telex: 019 22510



Exceptional Circumstances

- Retain on board
- Use an alternative exchange zone
- Discharge ashore
- Alternative treatment
 - Example: Heat or increase salinity
- Risk analysis based on last port
 - Origin of ballast water in tank(s)



Enforcement

- Canadian water added on top of **any** water from a foreign port
 - Cannot be discharged into waters under Canadian jurisdiction
- Non-compliant tanks cannot be discharged
 - 30 PPT Exchanged and flushed as per voyage
- Letter of Retention will be issued by Transport Canada
- Ships failing to report may be fined
- Discharge without authorization
 - Will result in detention and prosecution



SFC Contact

Caroline Gravel

Director, Environmental Affairs

T: (514) 849-2325

F: (514) 849-8774

Email: cgravel@shipfed.ca

