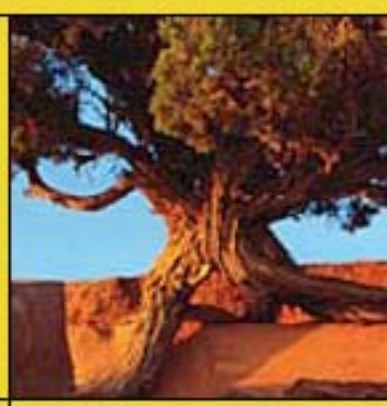
Ballast Water Treatment Systems: Practical Considerations






Westin Detroit Metropolitan Airport
September 24, 2009

Who is the Shipping Federation of Canada?

- Incorporated by an Act of Parliament in 1903
- Represents owners, operators and agents of ocean ships trading at Canadian ports, particularly in the Atlantic, St. Lawrence and Great Lakes regions
- Core membership of 75 Canadian companies that own, operate or act as agents for over 200 international shipping lines trading to Canadian ports
- Ships represented by Federation members transport over 90% of the trade moving between overseas ports and eastern Canada

Shipping Federation of Canada

Committed to a safe, competitive, environmentally-responsible and quality-oriented marine transportation system**.**

Our primary activities:

- **Promote and Protect the Trades** ;
- **Inform** members of legislative, regulatory or operational developments;
- **Support operations** (water levels, pilotage, port infrastructure, contracts with response organizations, Services to ships from Coast Guard navaids and icebreaking, waste management, waterway managers, etc.);
- **Provide training;**
- **Increase industry's profile**

Environment: A Strategic Issue

The Federation's approach to environmental issues is based on:

- Market access (including social licence to trade);
- Managing expectations & feasibility: technology and operational viability;
- Continuous improvement: from accident avoidance, to compliance, to quality management, to best practices, to sustainability;
- Relationships with regulators, environmental groups and coastal communities;
- Communications, public image (myth vs reality), branding.

Our Approach to Environmental Issues

Guiding principles:

- International framework
- Best practices (social licence to trade)
- Continental (trade route) perspective
- Federal context

Seaway Trade: Some Facts & Figures

- 2008 Seaway Navigation Season:
  - 4234 vessel transits through the Montreal / Lake Ontario and Welland Canal
  - 40.800 million metric tonnes of cargo
- Ocean-going vessels:
  - Traffic share: 25%
  - Origins / Destinations: Europe, South America, Middle East, Africa

Treatment Technologies

- **Key criteria for adopting & implementing a ballast water treatment system:**
  - It must be **safe** (operational level and crew)
  - It must be **environmentally acceptable**
  - It must be **economically viable** (retrofits)
  - It must **work**

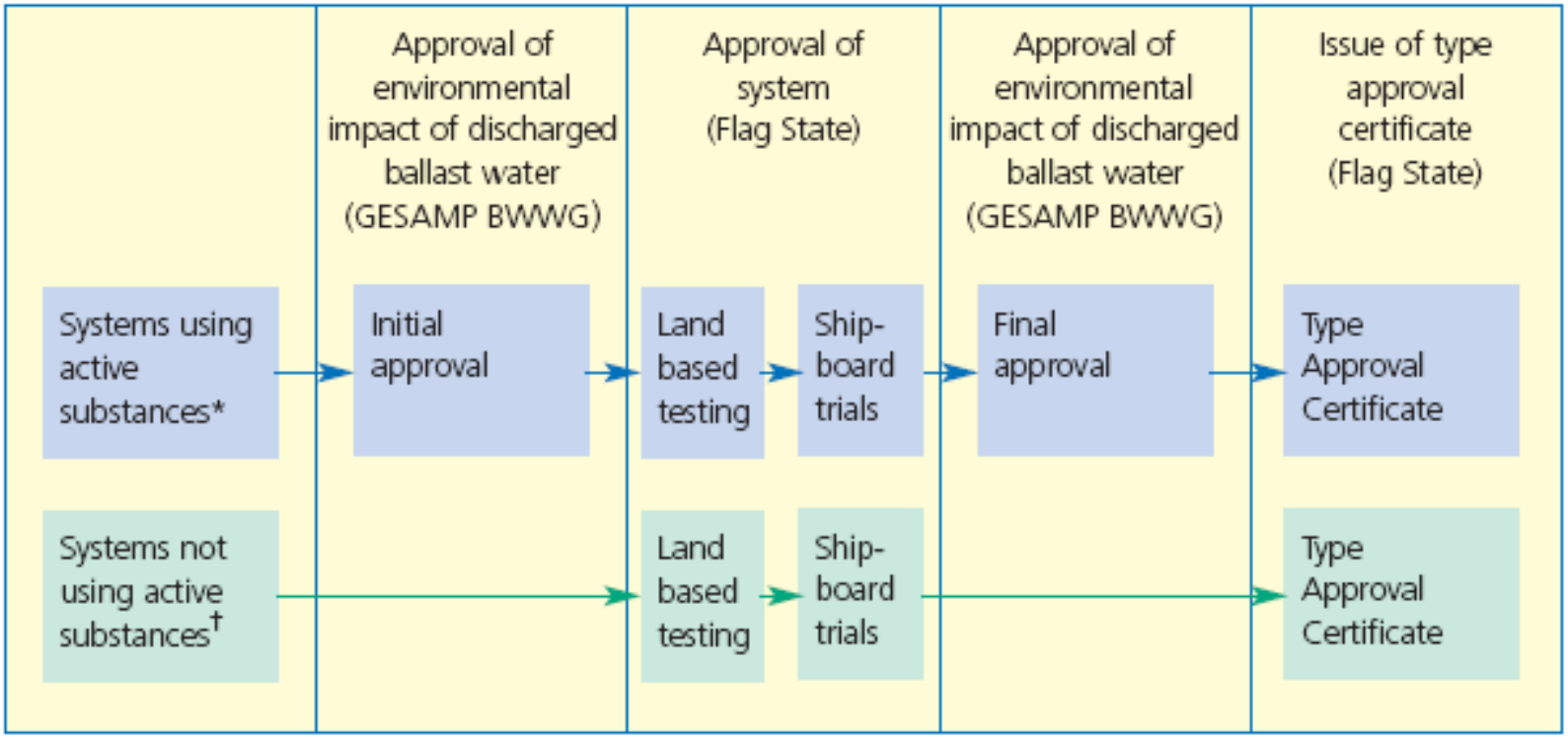
Ballast Water Convention: Implementation

- Current ratification status: 18 countries (15.27% world fleet tonnage).

- Implementation Deferral:

  – Ships constructed in 2009 with ballast water capacities of less than 5000 m3 are not required to comply with the ballast water discharge standard included in Regulation D-2 until their second annual survey, but no later than December 31, 2011.

IMO Approval Process



* Includes chemical disinfectants, e.g. chlorine, ClO_2, ozone

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

Source: Lloyd's Register – Ballast Water Treatment Technology

Technologies: Current Status

- Basic Approval: 16 systems
  - First step in the approval process for systems using active substances
- Final Approval: 8 systems
  - Includes sea-based and land-based tests; the sea-based test alone requires six months of testing
- Type Approval: 6 systems
  - Certificate issued by the Flag Administration, usually 2 years after application for Basic Approval

Some Numbers...

	Size (m^2)		Height	Capital Expenditures ($ '000)		Operating Expenditures	Power
	200 m^3/h	2000 m^3/h	m	200 m^3/h	2000 m^3/h	\$/1000 m^3	kW/1000 m^3
Minimum	0.25	1	1.38	145	175	0	4
Maximum	25	145	4.3	780	2000	200	220
Mean Value	7	26	2	375	875	47	67

Source: Lloyd's Register – Ballast Water Treatment Technology, 2008.

Additional Technical Considerations

- Ballast water treatment technologies:
  - Power is the biggest operating cost; for some systems, power requirements may be an issue
  - Some systems (electrolysis and electrochlorination) are complicated to operate
  - Chemical systems: need to be neutralised before discharge in waters (up to 24 hours). Issues related to storage space, availability in ports of call
  - Deoxygenation: processes will take 1-4 days

Commercial Availability

- In July 2008, 56 units were installed on-board ships
- Possibility of up to 55,000 retrofits between now and 2016
  - Creates issues related to drydock availability for retrofits
- Projected production varies between 40 units/year for some manufacturer to thousands units/year
  - Few of these systems have been tested in freshwater

State Ballast Water Programs - Results

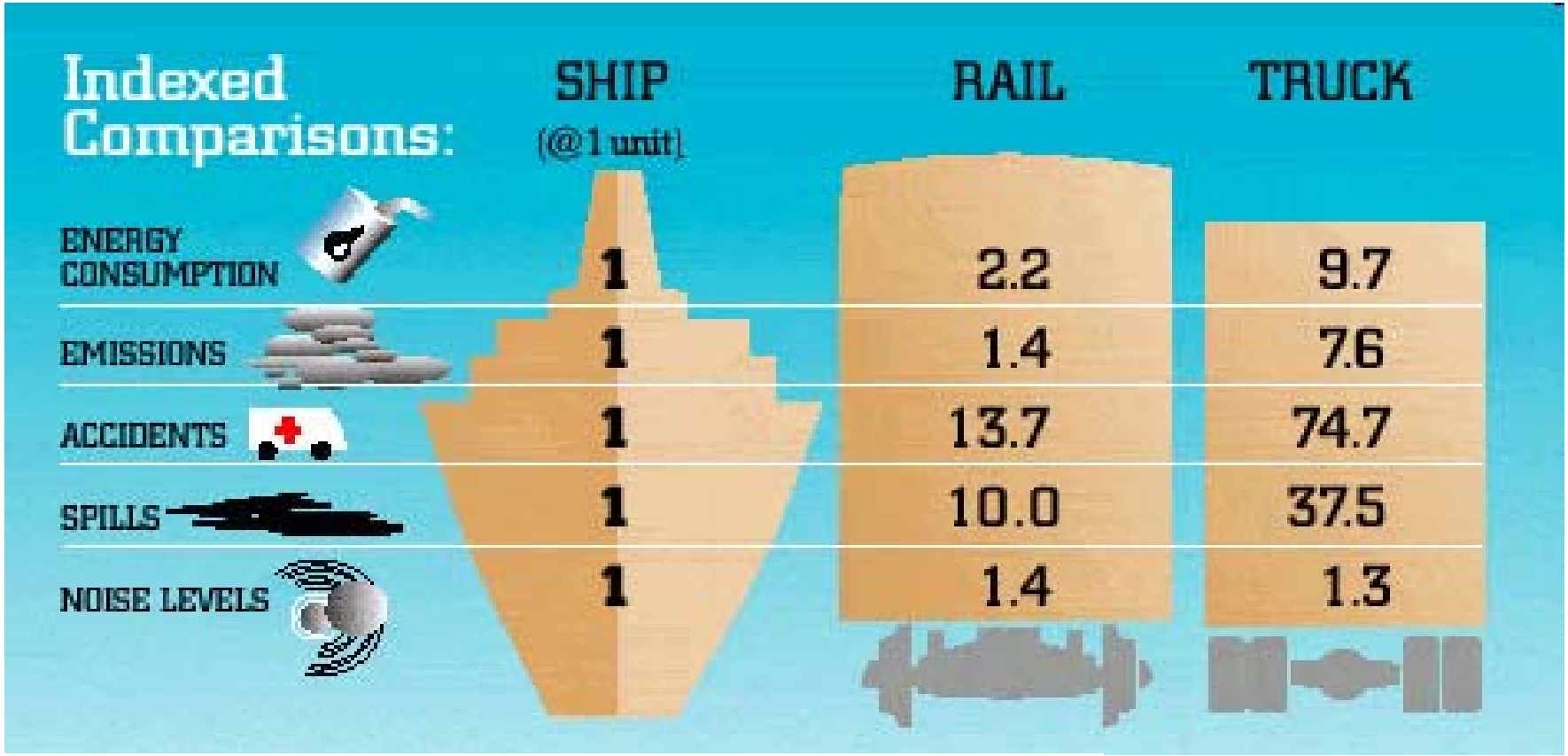
- Technology developers - Uncertainty over performance standards slows technology development:
  - Size of the potential market will influence technology development and investments
  - Some State standards cannot yet be measured, hindering technology developments
- Shipowners/operators - Delays in technology investments:
  - Disconnect between technology and regulations
  - Regulatory uncertainty inhibits investments
- Industry associations – Difficulty developing consistent and coherent compliance guidelines

Impacts of Intermodal Shifts

Effect	Ship	Rail	Truck
Fuel use – tonne-km per litre	312	181	75
Greenhouse gas emissions – grammes per tonne-km	10	17	33
NOx – g/tonne-km	0.253	0.3	0.83
VOCs – g/tonne-km	0.008	0.024	0.04
CO – g/tonne-km	0.011	0.092	0.49
PM10 – g/tonne-km	0.021	0.011	0.004
Land occupied – hectares	10,000	10-15,000	36,000
Accidents: injuries per tonne-km	0.23	3.12	13.22
Spills	L	Greater than ship	
Noise – noise depreciation cost per tonne-km	L	M	H
Congestion – delay time or $ per tonne-km	L	M	H
Aesthetics	L	M	H
Introduction of nonindigenous species	H	Less than ship	

Source: Lawson, 2007.

Environmental Advantages of Marine



Source: Great Lakes St. Lawrence Seaway System website, 2007.

Key Messages

- **Regulatory fragmentation can hinder technology improvements**
- **Onboard ballast water treatment technologies are the optimal solution (**but need **UNIFORM STANDARDS THAT ARE EFFECTIVE AND ENFORCEABLE) National Acadamies**
- **Build on current efforts:** the result may not be ideal, but it is a step in the right direction **(adaptive management = NA)**
- **Collaboration with the regulated industry is essential:** will result in more meaningful buy-in and faster implementation

Fragmentation

- **Fragmentation is current state of affairs**
- **State Permits**
  - Multiplication of paperwork requirements
  - Zero enhancement to prevention
- **No single standard**
  - Moving target for technology developers
  - Production and installation retarded

On-board Treatment

- **On-board treatment** of ballast water
  - Optimal solution for international shipping
  - Needs attainable carriage requirement

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  - It must be **environmentally acceptable**
  - It must be **economically viable** (retrofits)
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Guiding Principles

- Ballast water governance must fit guiding principles:
  - International framework
  - Best practices (social licence to trade)
  - Continental (trade route) perspective
  - Federal context

Build on Current Efforts

- Scientific research CAISN
- International Ballast Water Convention
- Seaway and Canadian Regulations:
  - Including effective bi-national enforcement
  - Proven track records, increasing compliance rates
- United States Coast Guard Discharge Standard
- Best practices

Collaboration

- Regulators work with regulated industry, resulting in:
  - Better communication and understanding of the industry
  - Effective, science-based prevention strategies
  - Realistic expectations related to development of technologies
  - Uniform application of enforcement measures, public reporting of results

Collaboration

- Ships districted by paperwork burden
- Production is prevention
- One stop shop for reporting
- Share reporting with science
- Focus on the product = prevention in action

Conclusion

- Great Lakes Shipping now subject to 5 levels of regulators:
  - Canada
  - Seaway
  - USCG
  - EPA
  - State
- Effective prevention is offered by Canadian Regulation and USCG proposed discharge standard.

National Academies Recommendations

- Access to Great Lakes
  - Only ships that manage the ballast
    - (including Coastal trades)
- **Uniform** Standards
  - Effective and enforceable
- Monitoring and Compliance
  - Enforcement and remediation
- Early Detection
  - Monitoring Great Lakes for new arrivals

National Academies Recommendations

- Emergency Response
  - Containment or eradication
- Adaptive Management
  - Use scientific findings (feedback) to amend
- Mandate bi-national oversight
  - Use existing bi-national agencies