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Aquatic Invasive Species

Industry Perspectives

NMIC Technology and Innovation Working Group

Industry-Government Workshop

***Industry Perspectives and Round-table Discussion on
Reducing the marine Environmental Footprint in Canada***

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Aquatic Invasive Species

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The Issue:

- Invasive species permanently modify the biotic environment.
- Mankind's actions in the spread of invasive species across all sectors and activities reduces biodiversity and disrupts natural evolutionary processes.



The Drivers:



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- **Environmentally responsible operators must address invasive species as a top priority.**
- **A “black eye” to the marine industry that strives to be seen as the “green” alternative to other modes.**
- **The potential for closed ports and waterways to marine transport due to risk of invasive species introduction.**



The Drivers:

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Local ecological concerns such as from:

- Great Lakes (States of Mich, Wisc, Minn, USCG, TC).
- West Coast of North America: (Washington State).
- Australia.
- South America.
- Croatia.

But shipping is international in scope:

- IMO Ballast Water Convention:
 - Adopted February 2004.
 - Expected phase-in period 2009-2016.

Technology and innovation are required to contain the spread of invasive species in ballast water to meet or exceed existing and future regulatory requirements.





Actions: Current Ballast Water Treatment Options

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i) Best practices.

ii) Ballast exchange:

- Flow thru method.
- Sequential method.
- NOBOB condition – replace FW with SW.

iii) Treatment:

a) Mechanical

- Filtration, separation.

b) Physical

- De-oxygenation.

- Ozone.

- Ultra violet.

- Ultra sound.

- Electric.

- Heat.

- Radiation.

c) Chemical

- Chlorine, copper ions.

iv) Shore reception facilities.



Combinations of various technologies are being developed and tested:

- i) **Laboratory Scale – pure research.**
- ii) **Proof of concept tests – applied research.**
- iii) **Pilot installations on-board vessels:**
 - a) **OceanSaver (NO):** Filtration, Nitrogen, Cavitation.
 - b) **NEI (USA):** Venturi oxygen stripping using inert gas.
 - c) **Bengard (SW):** Filtration, UV, Catalyst, Ozone.
 - d) **Optimarin (NO) :** Separation, UV.
 - e) **MiTech (AUS):** Heating.
 - f) **Greenships (NL):** Separation, Electrolysis.



Full-scale Trials:

2000 - 2001:

Fednav worked with the State of Michigan on ballast water treatment leading to copper ion and chlorine efficacy trials on the m/v “Federal Yukon”.

These trials completed during a period of uncertain ballast water treatment standards prior to the IMO Ballast Water Convention of 2004.

2002- 2004

Fednav completed a through investigation of available ballast water treatment systems on the market to ascertain the best direction forward.



Full-scale Trials:

2004 - ongoing:

Fednav worked closely with DNV to identify an effective solution capable of meeting the IMO 2004 Ballast Water Convention. This led to the development of OceanSaver.

Fednav has since contributed significantly to the further development of the OceanSaver system with full-scale trials ongoing on the m/v "Federal Welland".

The OceanSaver trials are supported by Transport Canada, the Seaway Development Corporation (US), Seaway Management Corporation (CAN) as well as 6 Great Lakes ports.



Actions: Copper Ion Experiments

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Federal Yukon 2001 – copper ion generator





Actions: OceanSaver – Proof of Concept Trial 2004

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Federal Welland – Trial of OceanSaver installation

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SDWT – 36,563 MT
LOA – 200 metres
Beam – 23.8 metres
Built 2000
Oshima Japan

W 1988 (2'W)

Federal Welland – Model of OceanSaver installation



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Federal Welland – OceanSaver air compressor



Federal Welland – OceanSaver nitrogen generator



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Federal Welland – OceanSaver actual installation



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Example of ballast sediments



Challenges:

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- i) Aquatic invasive species comprise a very wide variety of organisms, algae, bacteria etc:
 - a) Target species – suitable/adequate treatment methods.
 - b) Test protocols/standards.
- ii) Treatment of sediments.
- iii) Practicality of treatment systems:
 - Flow rates.
 - Space.
 - Cost.
- iv) Safety issues:
 - Chlorine.
 - Nitrogen.
 - Corrosion.
- v) Nature itself:
 - Re-growth in tank, need to re-invigorate on return.



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