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CANADIAN
NAVY

ENVIRONMENTAL PROTECTION PROGRAMME

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Canada

OUTLINE

- Overview
- Organizations
- Environmental Management - CMS
- Equipment Support - DGMEPM
 - Existing Environmental Protection Equipment
 - Projects Under Development
- Conclusions



THE CHALLENGES

- Naval Ops and Support activities pose risks to personnel and the environment, which must be managed and mitigated
- The Navy is subject to a wide variety of national and international laws and conventions
- It is Navy policy to comply
- Safety and environmental considerations are inherent in the planning and conduct of all MARCOM activities



A Few Internal Orders and Directives in the area of Environmental Management

- DAODs (Defence Administrative Orders & Directives)
 - 4003-0: Environmental Protection and Stewardship
 - 4003-1: Hazardous Materials Management
 - 4003-2: Environmental Assessment
- MARCORDs (MARITIME Command Orders)
 - 4-12: Policy Directive – Environmental Program
 - G-18: Environmental Management of Shipboard Waste
 - G-19: Halocarbon Management
 - 66-5: HAZMAT Management
 - Sustainable Range and Training Area Management (In Draft)
 - 46-13: Marine Mammal Mitigation Measures

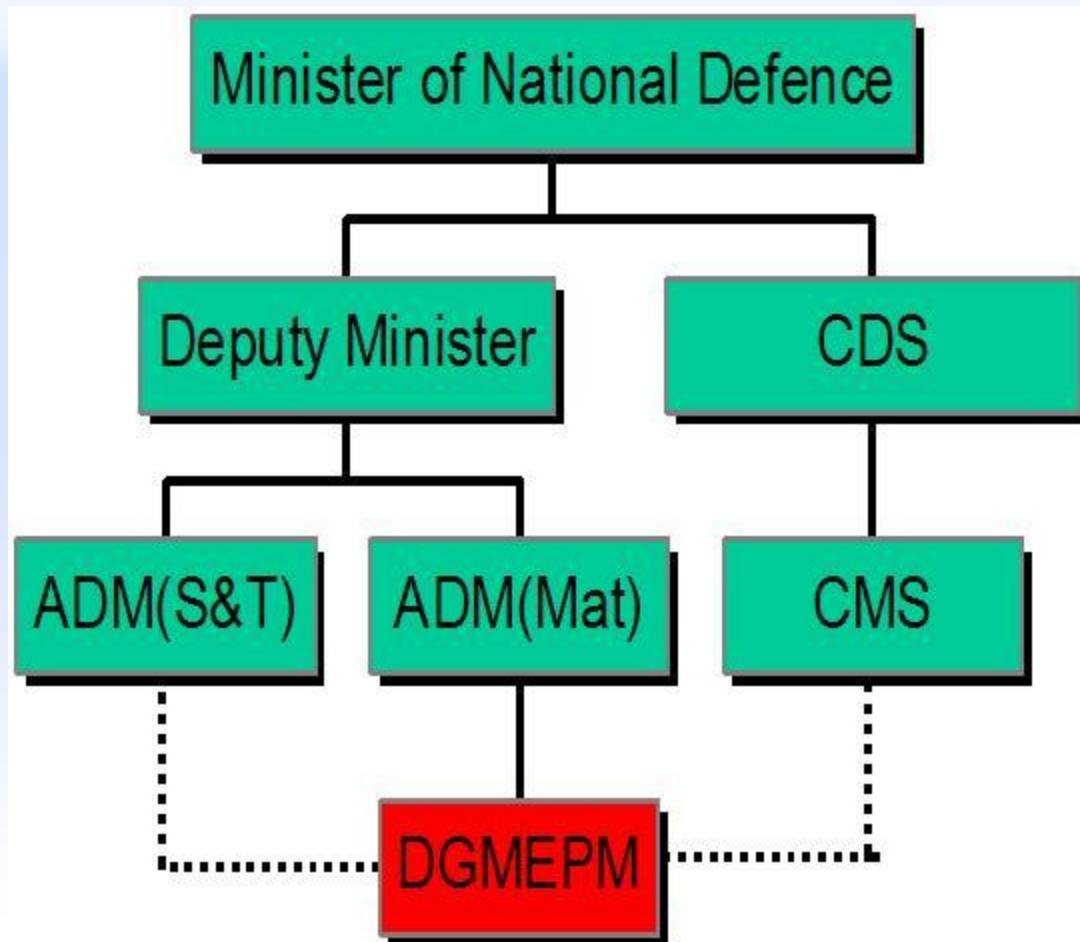


RELATIONSHIPS

- Work with:
 - NATO and partner Navies, particularly USN
 - Transport Canada
 - Environment Canada
 - Department of Fisheries and Oceans
 - Non-government organisations such as Friends of the Earth, T Buck Suzuki Foundation, Ducks Unlimited, etc
 - Municipalities of Esquimalt, Halifax, Quebec City, etc



ORGANIZATION





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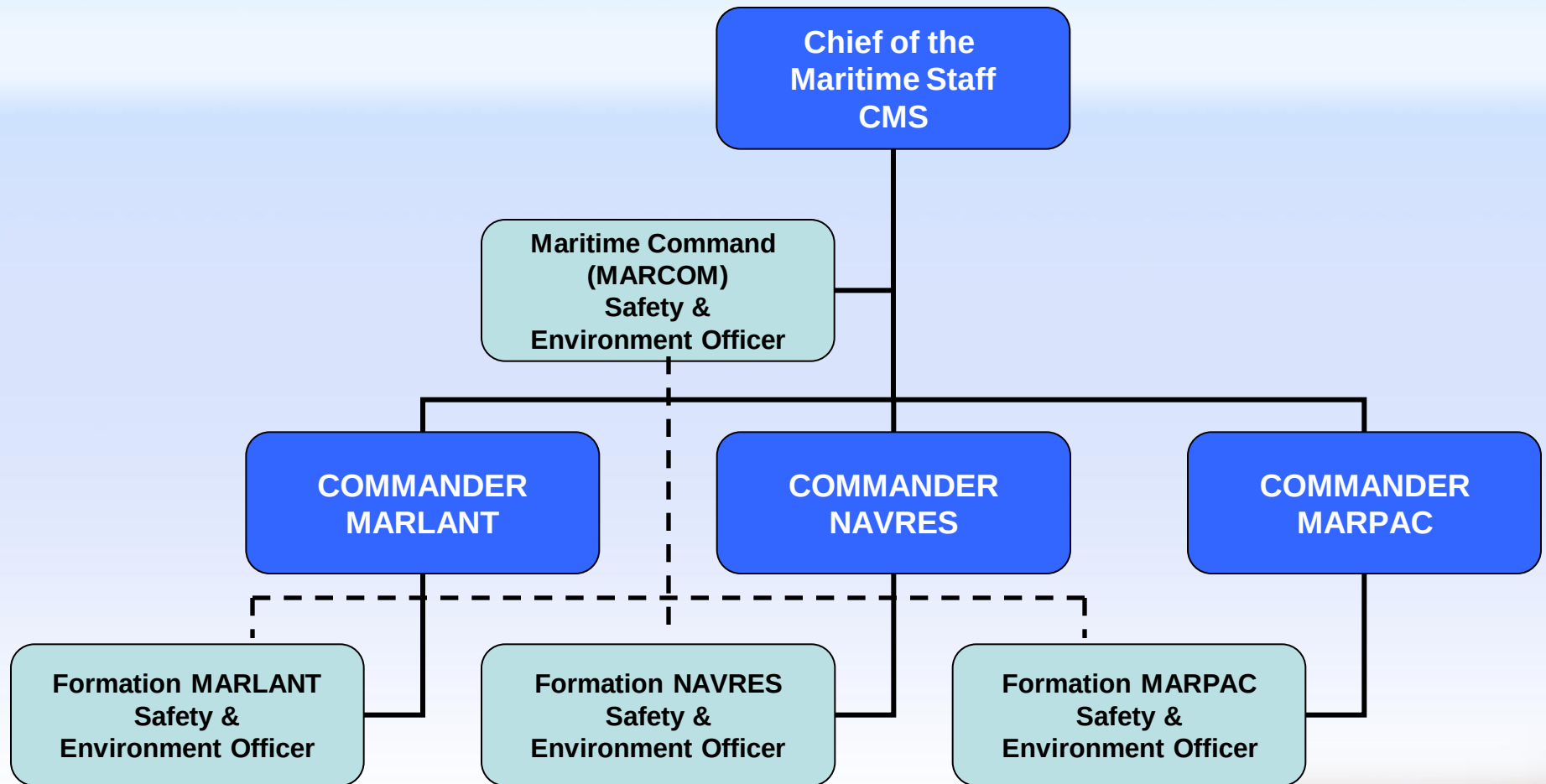


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**CHIEF OF MARITIME STAFF
(CMS)**

Canada

Maritime Command Safety and Environmental Management Organization



MARCOM's Safety and Environmental Management System (SEMS)

- Combined Safety and Environmental Management System (SEMS)
- Based on, and consistent with, ISO 14001 and CSA Z1000
- Used to assist in setting safety and environmental targets and objectives



SEMS

- Sets the Navy's overall Safety and Environmental Policy
- Ensures Navy policies and procedures are in compliance with applicable laws and conventions
- Provides a method to ensure the Formations are in operating in compliance with the Navy's SEMS
- Sets safety and environmental objectives and targets for the three Formations and then monitors success in achieving them
- Sets environmental performance measures to achieve continual improvement



RISK MANAGEMENT

Identification of Occupational Hazards and Environmental Aspects

Activity/Task	Risk/Impact
Refrigeration operation and maintenance	Ozone layer destruction, climate change
Fueling ships	Contamination of soil, surface and water
POL Management	Contamination of soil, surface and water
Ship operations	Water pollution



Identification of Consequences (C) and Likelihood of Occurrence (L)

Consequence (C)	Community Health	Legal & Other Compliance	Natural Environment	Operational Impact	Public Perception	
5 Catastrophic		Likelihood (L)		Description	International	
4 Critical		5 Frequent	Will occur at least once during the next 30 days			National
		4 Probable	Will occur once during the next 6 months			
3 Significant		3 Occasional	Likely to occur sometime in the next 12 months			Provincial
		2 Remote	Unlikely, but may occur once every 3 years			
2 Minimal		1 Improbable	Improbable, not likely to occur			Municipal
1 Negligible	Negligible effect	Compliant or Legislation not applicable	No appreciable effects	Insignificant impact on operations, corrected in < 1 hour	Internal	

$$\text{Risk Rating} = L * \Sigma C1-5$$



Assessing each Risk Rating

[(Sum of C) x L]	Risk Rating				
Likelihood	Negligible	Minimal	Significant	Critical	Catastrophic
Frequent	25	50	75	100	125
Probable	20	40	60	80	100
Occasional	15	30	45	60	75
Remote	10	20	30	40	50
Improbable	5	10	15	20	25

$$\text{Risk Rating} = L * \Sigma C1-5$$



Control or Mitigation Measures

- Engineered controls
 - Eliminate it (if possible), or
 - Substitute for one less hazardous, or
 - Isolate it from humans and the environment, or
 - Redesign the process to make it safer and more environmentally friendly.



Control or Mitigation Measures

- Administrative controls
 - Use more environmentally friendly practices,
 - Improve training,
 - Improve instructions
 - Develop a preventive maintenance program designed to prevent failures



Environmental Assessments (EA)

- Carried out in accordance with the Canadian Environmental Assessment Act
- Due Diligence Safety and Environmental Assessments (DDSEA)
- EAs are assessed for new hazards or enviro aspects
- any new aspects or hazards -> added to the Navy's hazard and aspect list -> formal risk process -> determine mitigation measures



Program Monitoring

- Carried out throughout the year
- Aim is to insure that the established mitigation processes are actually working
- Where mitigation processes are found to be ineffective, changes are implemented
- Performance measures need to be meaningful and data reporting requirements need to be clearly defined



Additional Measures

- Surveys for species at risk and critical habitat on MARCOM property
- Range and training area management to ensure the sustainable use of our ranges
- Cleanup of contaminated sites
- Eliminating or reducing the use of hazardous materials wherever possible
- Prevention of transfer of Invasive Species





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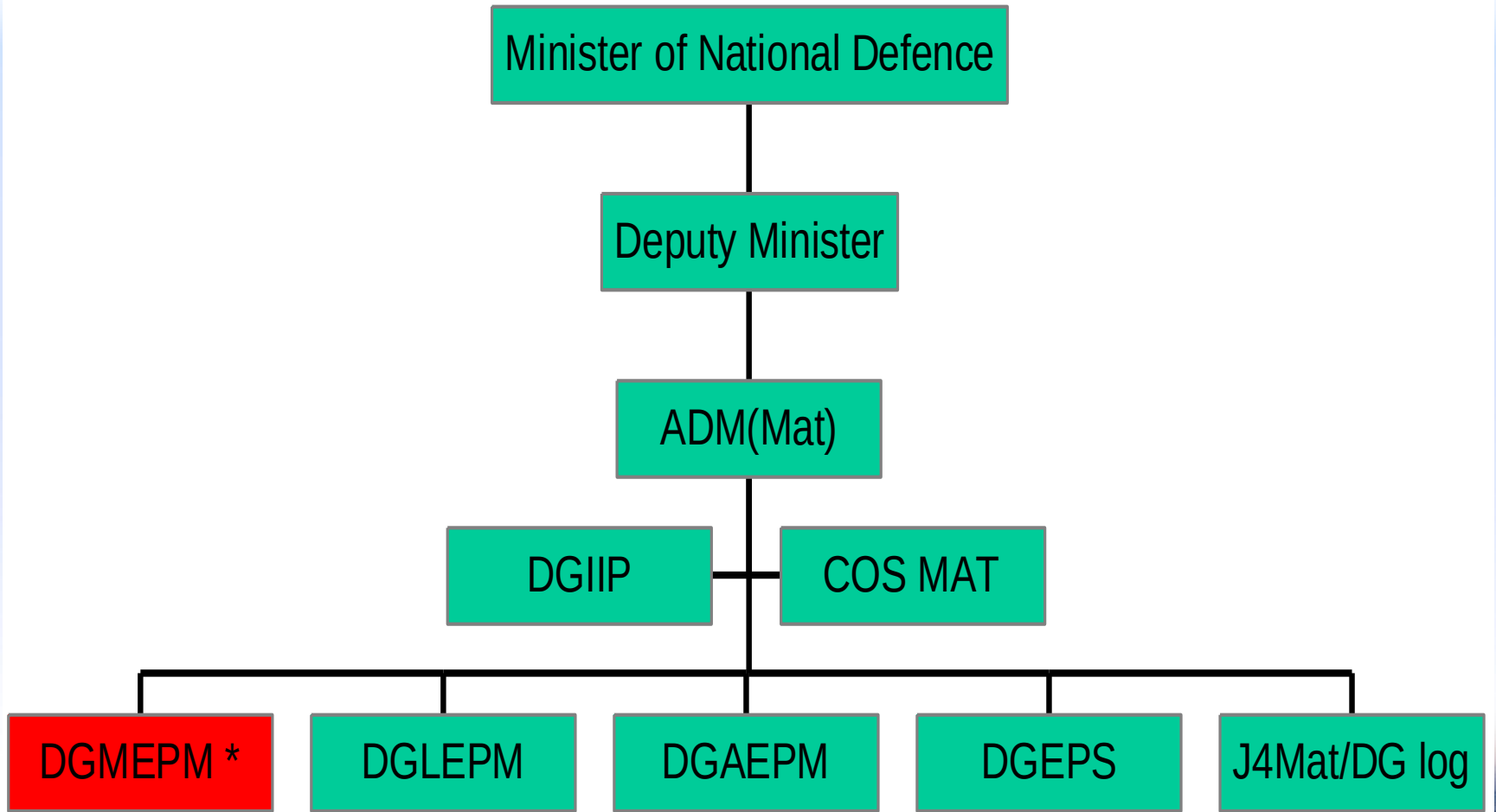


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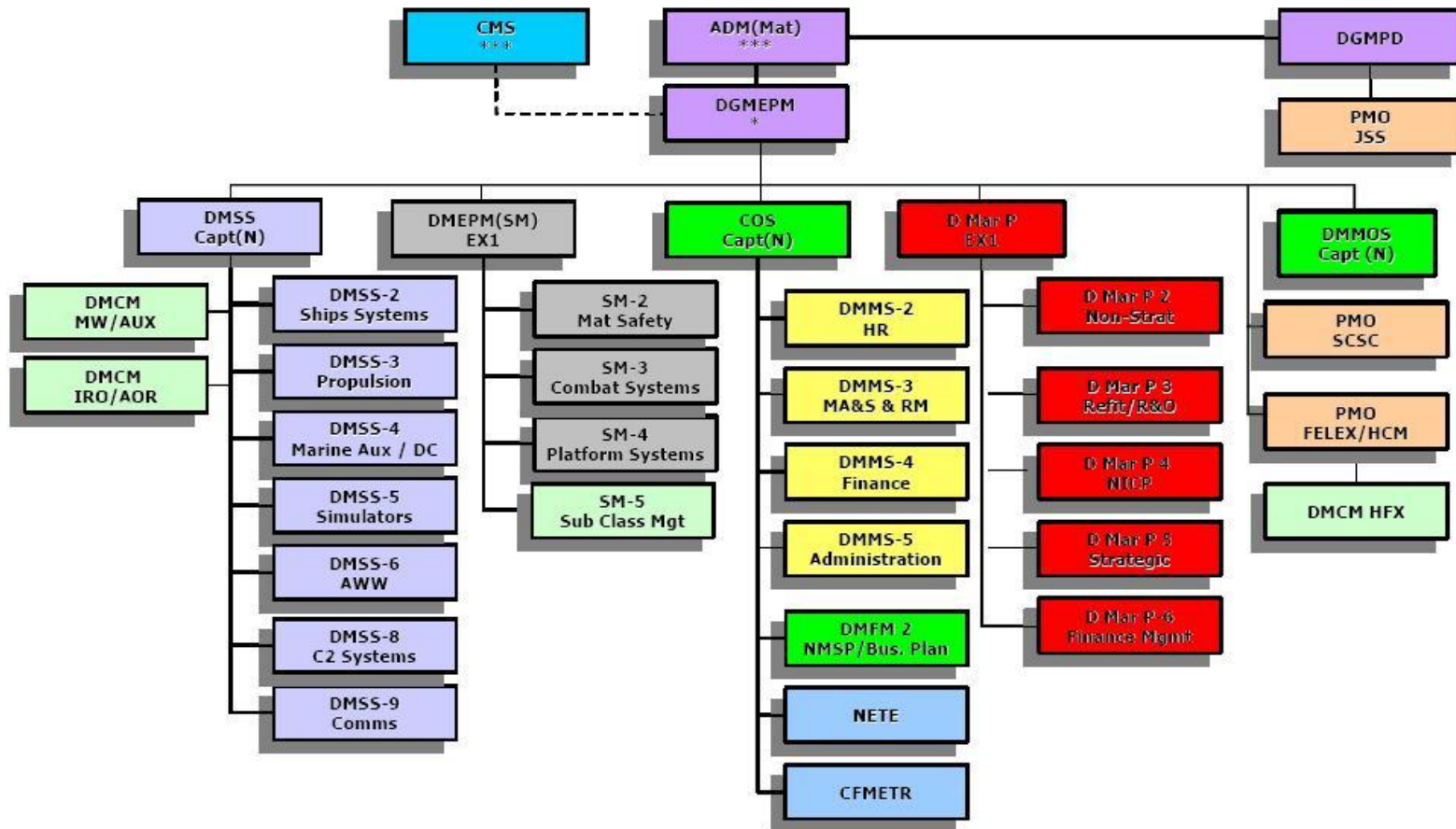
**DIRECTOR GENERAL MARITIME
EQUIPMENT PROJECT MANAGEMENT
(DGMEPM)**

Canada

Material Management



Organizational Structure



DGMEPM Roles and Responsibilities

- Life Cycle Material Management
 - Cradle to Grave Support
 - Technology Investigation
 - Materiel Acquisition
 - Through life support
 - Equipment Disposal
- Project Management



MARITIME ENVIRONMENTAL PROTECTION PROJECT

- Initiated in 1992
- Update or install environmental protection equipment in all major warships
 - Improved Oily Water Separators
 - Improved Sewage Treatment Systems
 - Improved Solid Waste Management Systems



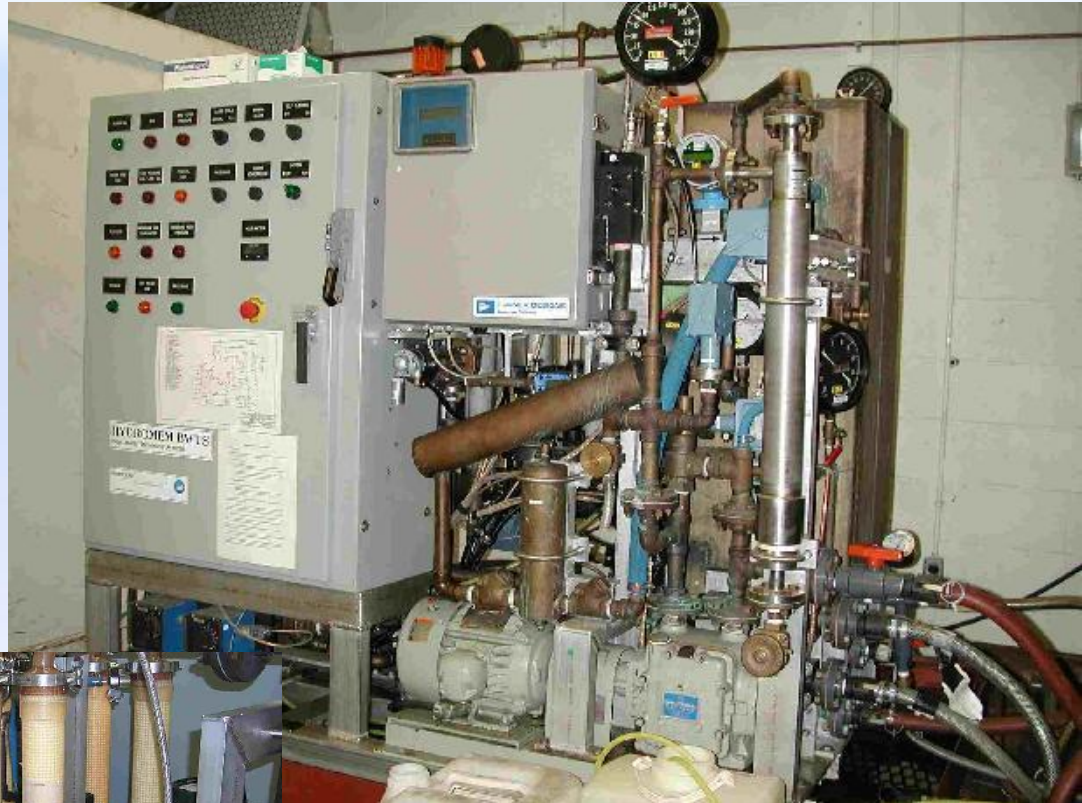
Sewage Treatment Plant (Marine Sanitation Device)

- Severn Trent DeNora Omnipure 12MX System
 - USCG Type II Certified IMO MEPC .2(VI)
 - Fit in all Major Warships
- Smith & Loveless FAST M-5 System
 - USCG Type II certified to IMO MEPC .2(VI) and Great lakes Certificate
 - Fit in Coastal Defence vessels



Oily Water Treatment System

- Hydromem Polymeric Membrane separation
- IMO MEPC 60(33) certified to under 15 ppm oil content in effluent with TD 4100 OCM
- Retrofit in frigates and destroyers



Solid Waste Disposal 1

➤ Compressed Melt Unit



➤ Shredder



➤ Pulper

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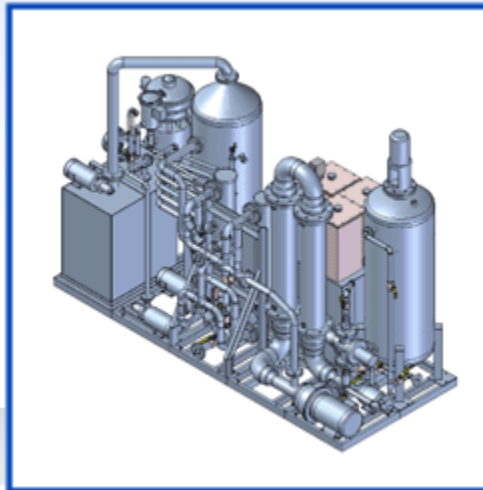
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ENVIRONMENTAL EQUIPMENT PROJECTS UNDER DEVELOPMENT

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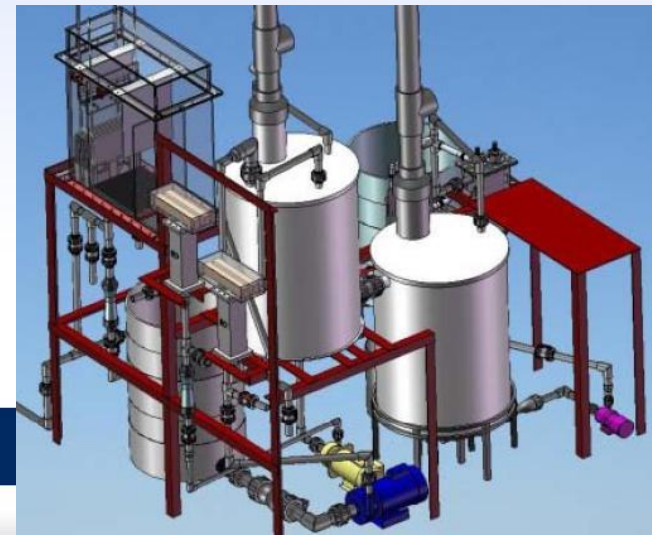
LIQUID WASTES

- Oily Water Separator – Researching the installation of Ceramic Membrane OWS
- Marine Sanitation Device (MSD) – Investigating next generation devices compliant with MEPC 159.55 and Alaska Cruise Ship Regulations
- MSD – Trialing a Navalis Orion model in CVAF QUEST later this year



LIQUID WASTES

- WETT – Wastewater Electrochemical Treatment Technology under development by Terragon Environmental Technologies Inc of Montreal
- Designed to treat Sewage and Oily Water waste
- Aiming for 0 ppm oil in effluent

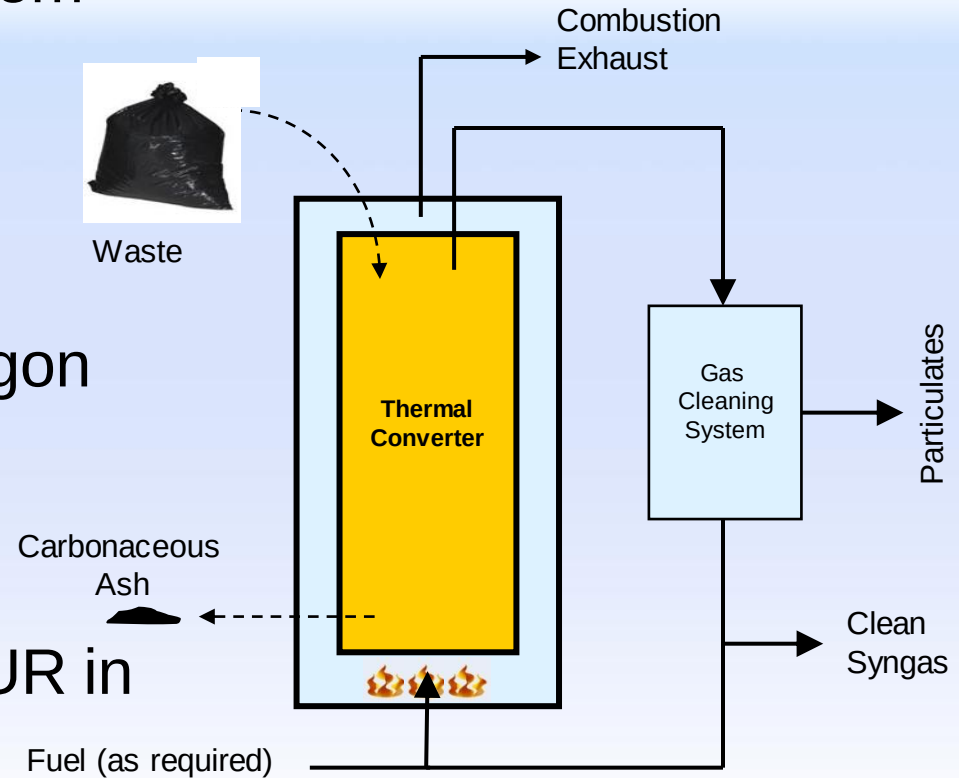


SOLID WASTES

➤ Micro-Auto Gasification System (MAGS)

➤ High Temperature Thermal Destruction Device from Terragon Technologies Inc of Montreal

➤ Trial on HMCS PROTECTEUR in early 2010

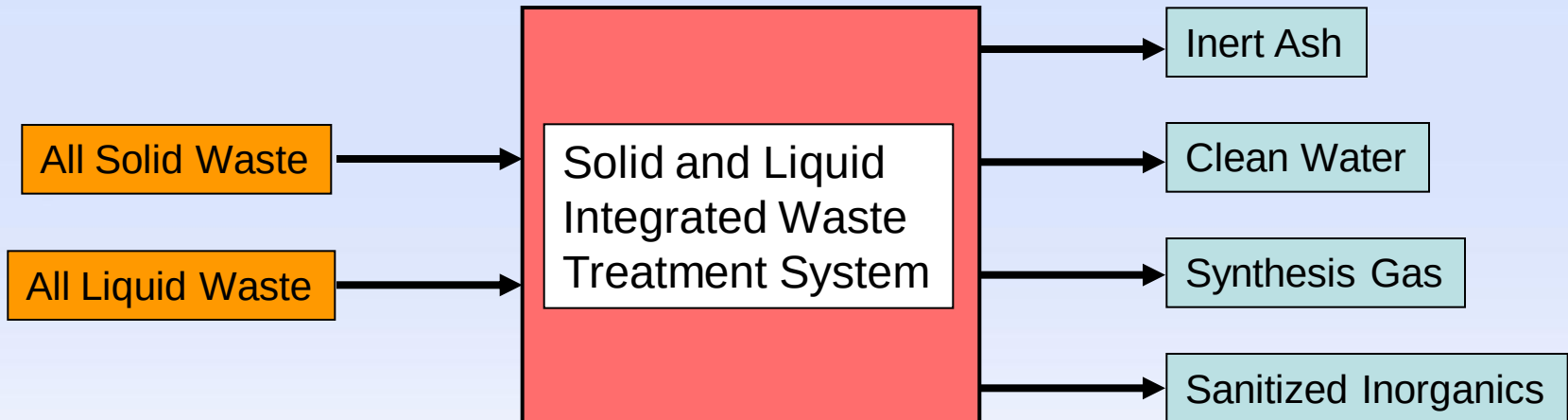


SOLID WASTES



TOTAL WASTES

STEP (System for Total Environmental Protection)



MISCELLANEOUS ENVIRONMENTAL PROJECTS

- MSD improvements
- Emission Studies
- Frigate Ballast Water Options Analysis
- Invasive Species studies with DFO & TC



HEATING, VENTILATION AND AIR CONDITIONING & REFRIGERATION

- Under Federal Halocarbon Regulations 2003 (FHR 03) and Ozone Depleting Substances Regulations (ODSR) Navy ships are required to stop using R-12 and R-22.
 - R-12 projects well underway and will be completed this year
 - R-22 projects starting up
 - Investigating magnetic bearing compressors.





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CONCLUSIONS

- Canadian Navy is committed to meeting and exceeding environmental obligations
- Organisations are in place to meet obligations
- New technologies are being actively pursued to be prepared for future regulations





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THANK YOU

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