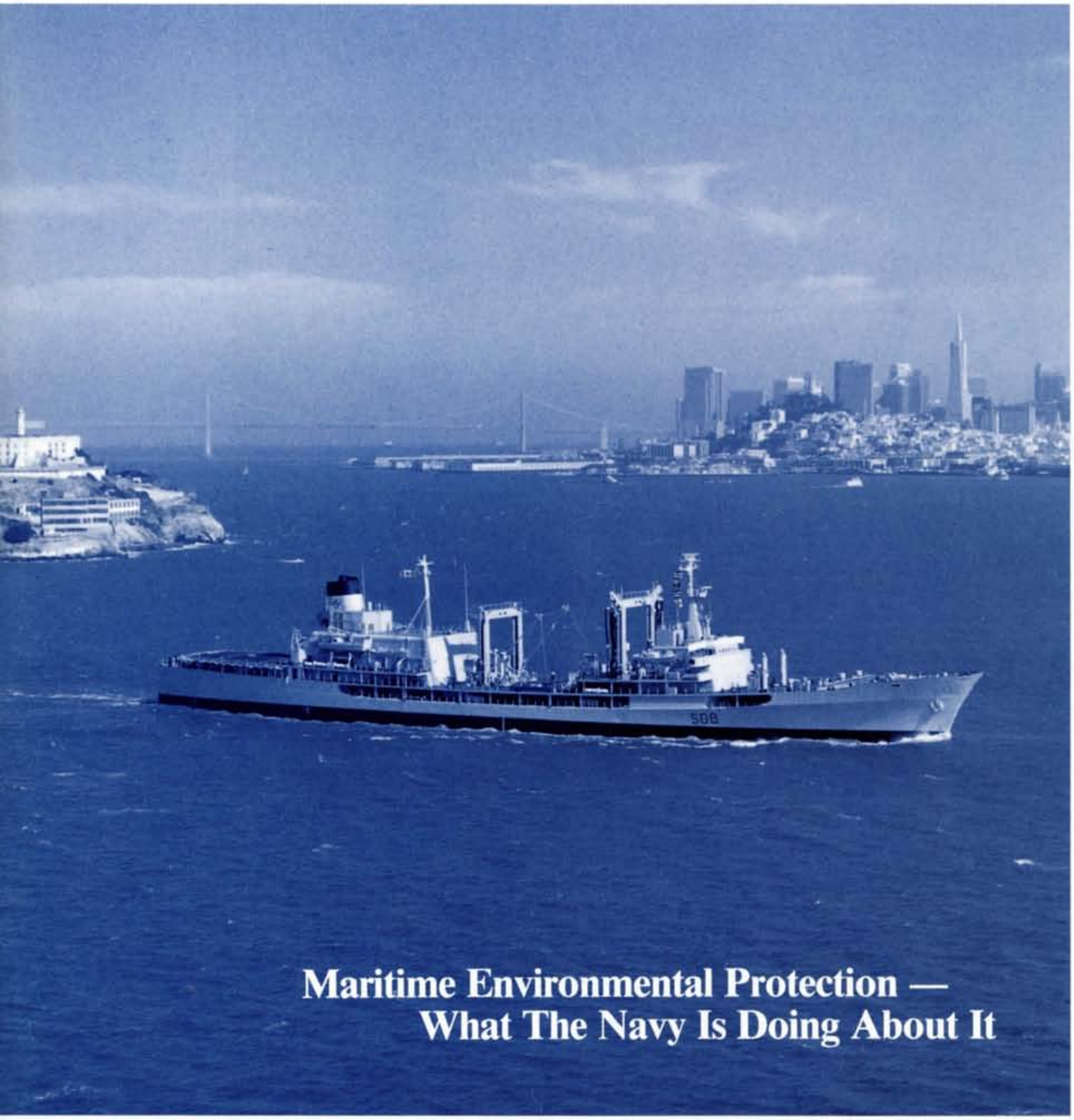
National Defence Défense nationale

Maritime Engineering Journal

January 1991



Maritime Environmental Protection — What The Navy Is Doing About It

Canada

A look back at the Royal Naval College of Canada

. . . page 28

The future had different things in store for these two classmates who stood shoulder to shoulder for their 1913 graduation photo. Naval Cadet John Hathaway (*on the left*) was a midshipman when he was killed in battle at sea in November 1914. Cadet J.C. Jones went on to reach vice-admiral rank.

Maritime Engineering Journal

Director General
Maritime Engineering and Maintenance
Commodore M.T. Saker

Editor
Capt(N) David Riis, DMEE

Technical Editors
Cdr Roger Cyr (Combat Systems)
LCdr Doug Thoreson (Combat Systems)
Cdr Dave McCracken (Marine Systems)
LCdr Bob Jones (Marine Systems)
LCdr Darcy Byrtus (Naval Architecture)
LCdr Cliff Johnston (Naval Architecture)

Production Editor
LCdr(R) Brian McCullough
(819) 997-9355

Graphic Design
Ivor Pontiroli DPGS 7-2

Word Processing by DMAS/WPRC 4MS
Mrs. Terry Brown, Supervisor

Translation Services by
Secretary of State Translation Bureau
Mr. Alain Wood, Director

OUR COVER
In certain U.S. ports, eligibility to enter harbour rests entirely on a ship's ability to comply with local antipollution regulations. (*ETC 83-2673*)

Photo by MCpl Sartori

JANUARY 1991

DEPARTMENTS

FEATURES

The Maritime Engineering Journal (ISSN 0713-0058) is an authorized, unofficial publication of the maritime engineers of the Canadian Forces, published four times a year by the Director General Maritime Engineering and Maintenance. Views expressed are those of the writers and do not necessarily reflect official opinion or policy. Correspondence can be addressed to: **The Editor, Maritime Engineering Journal, DMEE, National Defence Headquarters, MGen George R. Pearkes Building, Ottawa, Ontario, Canada K1A 0K2.** The editor reserves the right to reject or edit any editorial material, and while every effort is made to return artwork and photos in good condition the Journal can assume no responsibility for this. Unless otherwise stated, Journal articles may be reprinted with proper credit.

Editor's Notes

Maritime Environmental Protection — The navy is cleaning up its act

A retired MARE officer used to tell a joke about a person who, on Mondays and Fridays, would put a sign up in the window for the garbage men. The sign read: NONE TODAY THANKS. The humour may be warped, but it isn't nearly as twisted as the disturbing fact that for our oceans, harbours, lakes and rivers — every day is garbage day.

Think about it the next time your ship dumps gash, pumps bilges or discharges sewage. What happens to it after it leaves the ship? For years, of course, we rarely did give it a second thought. And why should we have? Environmental awareness simply wasn't the mainstream public issue it is today. It takes an enormous amount of effort to shift the conscience of a nation and its government. But, clearly, it can be done. Here we are in the 1990s, and just about any schoolchild from kindergarten on up can tell you, chapter and verse, what pollution is doing to this planet. It doesn't take too much convincing nowadays to realize that our waterways and coastlines are beginning to groan under the strain of years of pollutive abuse.

So what to do about it? The planet is a pretty big place. What difference can one person or one ship's company or even an entire navy make? Maybe not so much if you look at it only in terms of the big picture. But you have to start somewhere. And that's where the slogan for environmental concern in the nineties comes in: THINK GLOBALLY — ACT LOCALLY. It can't miss. It's the old strategy of divide and conquer.

There was a time when naval vessels, because of their "special" status, were exempt from having to comply with environmental regulations. But no more. And in this issue of the ***Journal*** we take a look at the navy's strategy for complying with current and projected regulations — what's been done, what is *being* done and what there is still to do.

By necessity, the job of making our in-service ships environmentally friendly falls squarely on the shoulders of the naval engineering community. One of the problems in taking on this considerable engineering task is the speed with which regulatory events are unfolding. You can sense the momentum. Still, as you read the articles that follow, you will also sense the considerable progress the navy has made toward achieving its goal. What's more, you will see how our own work fits into the bigger, global efforts of NATO and the International Maritime Organization. Divide and conquer — that's what it's all about.

As a true blue recycler, "composter," energy conservationist and nature lover, I find great personal satisfaction in doing my bit to help the navy meet the engineering challenge at hand. I am delighted, too, that we are able to bring you an edition of the ***Journal*** — my first as editor — that is dedicated to the theme of maritime environmental protection. Regrettably, budget cutbacks and the NDHQ functional review kept us from getting this issue out to you in October as we had planned. However, we think you will still find the information in these pages to be relevant and, if nothing else, encouraging. Can the navy really clean up its act? Read on. We think it can.

Captain(N) David W. Riis
Director of Marine and
Electrical Engineering

Commodore's Corner

By Commodore M.T. Saker, DGMEM

When I arrived at the door of the Louis St. Laurent Building on August 6th to start my turnover with Commodore Broughton, little could I imagine what was about to take place over the next three weeks. Of course, I am referring to Operation Friction and the dispatch of three considerably enhanced warships to the Persian Gulf area. I had the opportunity to see the output of this extraordinary effort first hand when I toured the ships on the day of their departure. In my 30 years in the navy it was, without doubt, the boldest and most dramatic undertaking I had ever seen. It is a credit to all concerned that it was accomplished so professionally and so quickly.

While we all would have preferred to have sent our sailors off in the new CPFs and TRUMPed Tribals, that was not possible. Even if both projects had been on their original schedules, it would have been difficult to have had even one of these ships ready for operational use at that time. Under the circumstances, we did the best that could be done. Let us hope that our naval crews are successful in their mission and that they return home safely. To those who are part of the task group, we wish you Godspeed. To all those who gave their best to prepare the ships and crews for the Gulf — thank you very much.

Even with all this excitement, the more routine aspects of life go on. Those of us in NDHQ who are undergoing the "NDHQ Review" will certainly know what I mean. Some time ago your editor decided that this edition of the ***Journal*** should be devoted to the issue of environmental protection. Thus, the bulk of the articles in this edition come from DMEE 5 (Auxiliary Systems) who looks after the implementation of environmental systems. There is little question that the '90s will be the decade of the environment (although a number of other issues look like they are not about to let the environment walk away with the spotlight). So read the enclosed articles carefully. You all will be touched by these issues in one form or another.

I am very honoured to have been appointed DGMEM and, among other things, to become the MARE Branch Adviser. I have a lot to learn about the branch, and in particular to hear about the things that concern you the most. As I travel across the country I hope to meet as many of you as I can and hear your views.

* * * * *

The editorial staff of the ***Journal*** bids welcome to Commodore Saker, and offers this biographical sketch of our new Branch Adviser:

Commodore Saker joined the RCN as an officer cadet in 1960, and is an engineering graduate of Royal Roads Military College at Victoria, and the Royal Military College at Kingston. As a sub-lieutenant serving in a West Coast destroyer, he qualified both as a ship's engineering officer and bridge watchkeeper. He later studied advanced marine engineering at the Royal Naval College at Greenwich, and attended the Canadian Forces Staff College at Toronto and the National Defence College at Kingston.

During his career, Commodore Saker served as engineering officer in HMC ships *Bras d'Or* and *Algonquin* — the latter following three years in the marine systems engineering design directorate in Ottawa where he participated in bringing the new Tribals into service. Following staff college in 1976 he served two years in Halifax as squadron technical officer for Desron One, and two years as head of the Marine Systems Engineering Division at NEU(A).

Commodore Saker arrived in Ottawa in 1980 to serve on the staff of the NDHQ Secretariat. The following year he was promoted captain(N) and attended National Defence College. He served a year in Program Evaluation at NDHQ, and in 1983 went to PMO CPF where he served in two deputy project manager positions. Commodore Saker was promoted commodore in July 1987 to become Project Manager CPF, and was appointed DGMEM last summer.

Maritime Environmental Protection — Striving for Compliance

By Cdr Ron Johnson

Introduction

The unprecedented global increase in concern for the environment has had significant operational and technical impact on all navies. Environmental legislation and regulations (both existing and planned) have reduced the number of ports and areas of operation available to non-compliant vessels, forced changes in mission profiles, and altered traditional warship design and construction.

In 1973, the International Convention for the Prevention of Pollution from Ships was established between the major countries of the world, with a further protocol enacted in 1978. This convention (known as Marpol 73/78) serves to impose mutually agreed-upon restrictions aimed at the worldwide prevention of marine pollution.

At the national level, the 1970 Canada Shipping Act established regulations pertaining to the discharge of pollutants in Canadian waters. Separate acts have specified the regulations for discharging pollutants into Arctic waters, and in the Canadian and non-Canadian waters of the Great Lakes and St. Lawrence River. Furthermore, the introduction of the Canadian Environmental Protection Act (CEPA) on 28 June 1988 effectively eliminates all environmental exemptions which federal departments might have had in Canadian waters (*Fig. 1*).

Environment Canada's major policy statement, the so-called Green Plan, highlights the government's plans to protect the environment and have all

	INTERNATIONAL LAW		NATIONAL LAW				
	MARPOL 73/78		CANADA SHIPPING ACT (CSA)	ARCTIC WATERS POLLUTION PREVENTION ACT	MARCORD 43-1	OCEAN DUMPING CONTROL ACT	CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA)
	Outside special areas	Inside special areas					
LIQUID WASTE							
OIL OR OILY WASTE	- 1-12 miles offshore: <15 ppm - beyond 12 miles: up to 100 ppm	N/A	prohibited in inland waters*; <10 ppm allowed in fishing zones, Arctic waters and territorial sea	zero discharge	permitted when >120 miles offshore (Canadian coast), >100 miles offshore (other coasts)	zero discharge	zero discharge
BLACK WATER	must be treated up to 12 miles offshore	N/A	must be treated in the Great Lakes, no treatment required prior to discharge in Arctic	discharge permitted	N/A	discharge permitted	zero discharge
GREY WATER	N/A	N/A	N/A	zero discharge	follow local regulations	discharge permitted if incidental to ship's operation	zero discharge
SOLID WASTE							
Plastics--includes synthetic ropes, fishing nets and plastic garbage bags	zero discharge	zero discharge	zero discharge	zero discharge	zero discharge	zero discharge	zero discharge
Floating dunnage, lining and packing materials	> 25 miles offshore	zero discharge	> 12 miles off shore	zero discharge	> 12 miles offshore, care must be taken to ensure sinking	zero discharge	zero discharge
Paper, rags, glass, metal, crockery and similar refuse	> 12 miles offshore	zero discharge	> 12 miles offshore	zero discharge	> 12 miles offshore, care must be taken to ensure sinking	zero discharge	zero discharge
All other garbage including paper, rags, glass, etc. comminuted or ground	> 3 miles offshore	zero discharge	> 12 miles offshore	zero discharge	> 12 miles offshore	zero discharge	zero discharge
Food waste not comminuted or ground	> 12 miles offshore	> 12 miles offshore	> 12 miles offshore	zero discharge	> 12 miles offshore	zero discharge	zero discharge
Food waste comminuted or ground	> 3 miles offshore	> 12 miles offshore	> 12 miles offshore	zero discharge	> 12 miles offshore	zero discharge	zero discharge

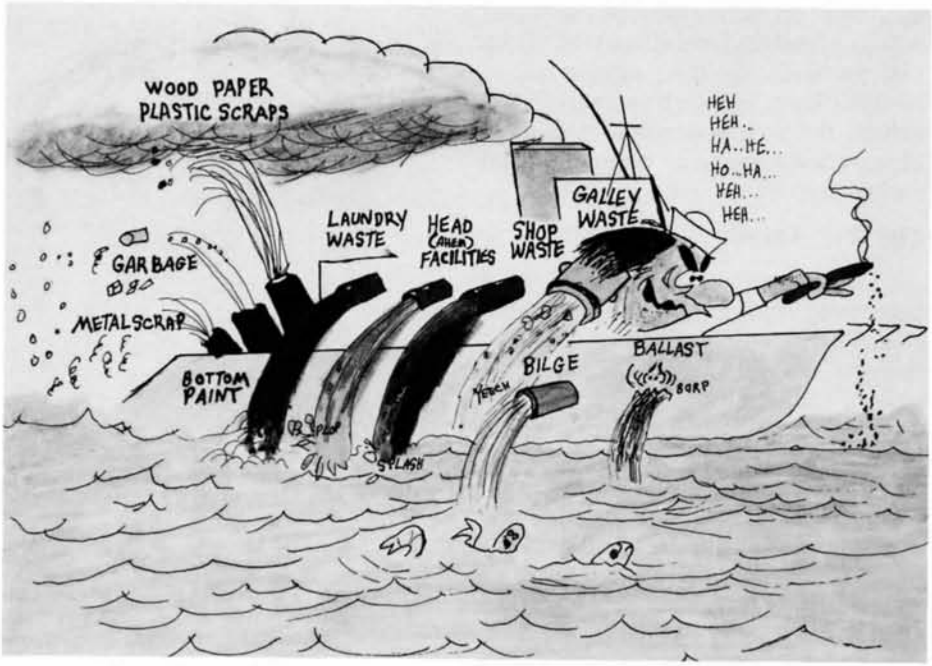
* inland waters are sometimes referred to as Canadian waters and include all rivers, lakes, the St. Lawrence River and other fresh waters in Canada

Fig. 1. Maritime Environmental Protection Regulations

federal departments set and maintain the example in this area. While the provisions of Marpol are not binding on warships, they cannot be ignored. The trend in legislation is clearly moving toward a policy of "zero discharge." The effort to become compliant with environmental regulations, then, is no longer a matter of choice for the Canadian navy.

Meeting the Challenge

The Canadian navy is committed to operating in a manner which both complies with the regulations and meets the spirit of our country's environmental objectives. The immediate challenge is to produce, maintain and operate a fleet of environmentally compliant warships capable of fulfilling their operational missions in any desired geographical location. It is a difficult task, one for which there is no painless solution. Enormous resources will yet be required to achieve the goal of environmental compliancy. Nonetheless, important research and development in-roads have already been made with respect to the systems, equipment and programs necessary for dealing with the various shipboard waste streams (*Fig. 2*).



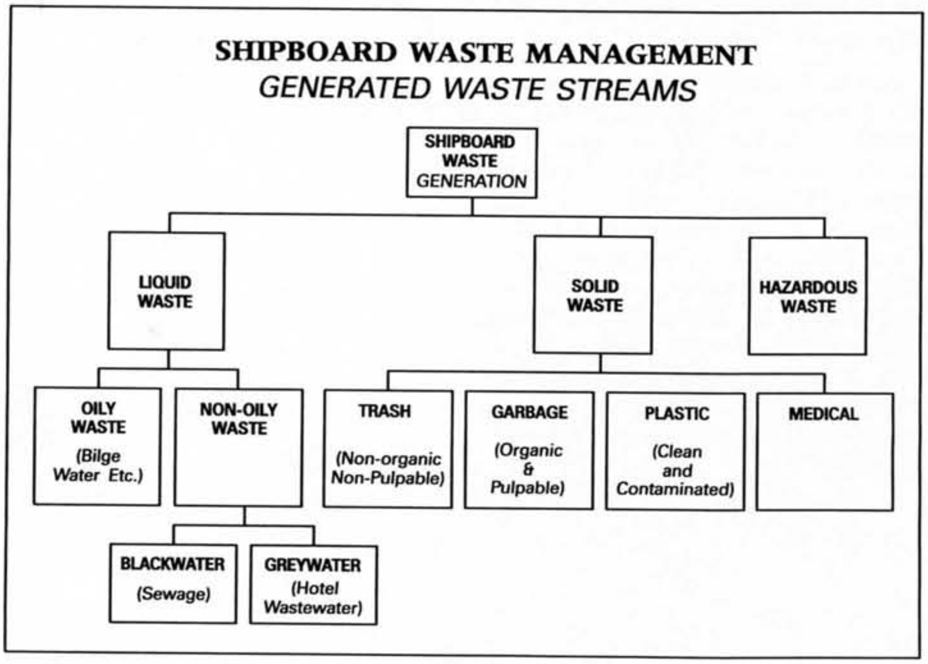


Fig. 2. Shipboard Waste Streams

In 1987, the Chief of Maritime Doctrine and Operations (CMDO) and the Director General of Maritime Engineering and Maintenance (DGMEM) conducted an analysis of the Canadian navy's ability to comply with environmental regulations of the day. All major warships were examined and designated as either compliant or non-compliant. For individual ships that did not comply, a decision was made either to upgrade them to compliancy or exempt them, depending on each ship's intended area of operation and length of time remaining in service.

Although the analysis dealt only with major fleet units, it was observed that most of the navy's minor war vessels and auxiliary vessels were either non-compliant or else had very limited holding capacity for waste water. However, it was noted that all new minor war vessels will likely be compliant with Marpol regulations.

As a result of the analysis, the O&M funded Shipboard Pollution Abatement Project (SPAP) was implemented in 1988. SPAP will retrofit the non-exempt ships with blackwater collection systems and fit HMCS *Provider* with a new oily water separator. (All new construction, commencing with the Canadian patrol frigate, should be capable of complying with the entire range of Marpol pollution abatement standards.)

The Shipboard Waste Management Program (SWMP)

While the blackwater issue for major warships is critical, SPAP is only a partial solution to the overall problem of environmental compliance. To address the bigger problem of shipboard liquid and solid waste management, the navy developed the wide-ranging Shipboard Waste Management Program which covers SPAP as well as a number of other initiatives. For example, the navy is investigating methodologies for dealing with the myriad problems of plastic waste management in ships.

The most important initiative within the SWMP has been the development of the Maritime Environmental Protection Project (MEPP). MEPP is a major capital project which will address the fleet's immediate compliance requirements and serve to consolidate all SWMP initiatives and projects. Providing the fleet with the necessary systems and equipment to adequately and properly deal with both solid and liquid wastes is the ultimate goal of the MEPP.

Concerns

Since 1987, new and proposed regulations such as those relating to the authorized dumping of plastics at sea have rapidly changed the shipboard requirements for handling and processing solid waste. New procedures and equipment are now required to deal with this. Only limited space is available for the storage of plastics and other solid waste, but even if ample space were available, food-contaminated waste can only be held on board for a limited time before becoming a health hazard.

Liquid waste management is the root of a number of concerns. Collection and storage systems often create excessive weight and space problems, while those with inadequate storage capacity severely limit a ship's operating time. Although SPAP collection and storage systems will result in some warships being compliant with existing blackwater regulations, the greywater problem has generally not been addressed. Untreated grey water must still be discharged overboard, a procedure already prohibited in some waters and ports. Collection and storage of black and grey water is an interim solution at best. The navy's goal is to acquire or develop a viable shipboard processor which can render all liquid waste effluent, *including oily waste*, safe enough for overboard discharge.

Also, a program is currently in place to address the handling and storage of shipboard hazardous material (HM). However, it is the prevention of HM and other substances on board ship from becoming hazardous *waste* (HW), and the disposal of HW which present a problem. Ships holding bilge or sewage waste until arrival in port may be faced with having their discharge classified as HW, requiring special handling. A number of nations are still discussing whether or not to classify all bilge water as hazardous waste.

A major problem within the environmental arena is that of popular misconceptions. What *seems* to be the most environmentally sound solution to a problem, and what actually is, can be two very different things. Thorough analysis of all factors must be conducted before a final decision is made to utilize any particular system, equipment or methodology. Just such an analysis was behind the navy's decision to dismiss incineration at sea as an option for solid waste disposal.

The Way Ahead

First and foremost the navy must become conversant and compliant with existing environmental regulations. To this end, a Fleet Environmental Coordinator's Committee (FECC) has been established to exchange information between the commands, headquarters and other agencies concerned with maritime environmental protection. While FECC has no authority beyond the exchange of information, it does serve to identify requirements and ensure all parties are aware of initiatives, programs and acquisitions aimed at ensuring environmental compliancy in new and existing naval vessels.

Besides striving to become conversant and compliant with existing environmental legislation, the navy must continue to monitor and analyze current trends with an eye toward the future. Planning for future requirements must not be curtailed if we are to avoid the costly and disruptive work of re-engineering or replacing outdated systems and equipment. Even now the navy is working with other NATO navies on designs for an environmentally friendly ship for the 21st century.

While the work which remains is colossal, tremendous effort has already been expended in addressing the issues of maritime environmental protection and fleet compliancy. This, along with an extensive information exchange between other NATO nations, has resulted in the identification of equipment and methods best suited to deal with both solid and liquid waste streams. Research and development of new and very promising technology is now under consideration. When approved funding becomes available through the MEPP, equipment earmarked for procurement will be purchased. By late 1991, major and tangible results should be seen within the fleet.

Cdr Johnson is the DMEE 5 section head for marine auxiliary machinery.

A Few Definitions

Black Water: Normally, effluent containing human waste.

Grey Water: Waste water from the galley, bathing and laundry facilities, deck drains, etc. (Does *not* contain sewage, oil, medical or hazardous waste.)

Oily Waste: Normally, liquid waste containing oil.

Garbage — More than just a nuisance

Condensed from *IMO News*.
Reprinted with permission.

On 31 December 1988 Annex V of the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) entered into force.

Annex V represents one of the biggest steps taken so far in the battle against pollution of the seas by garbage — a problem that has grown worse in recent decades. The most visible evidence is on holiday beaches, which are frequently disfigured by piles of unsightly rubbish that is washed ashore by the tide and mostly comes from ships.

But garbage does far more than spoil the occasional holiday: for fish, birds and other marine life it all too often means pain, suffering and a slow and lingering death.

The greatest threat

Garbage comes in many forms and is made up of many different materials, but there is no question at all that the substance with potential for causing the greatest harm is plastic. Not only is plastic used for a wide range of products but it is also virtually indestructible. This means that once it is in the sea it could stay there for several decades.

Plastics are used for such everyday items as bottles and shopping bags, cups and plates, rings for holding beer cans together and garbage bags. In industry plastic is used for ropes, strapping bands and sheeting. Products like these may seem harmless enough when they are casually tossed overboard, yet all of them can be — and have been — fatal to marine life.

The type of garbage found varies according to the sea area concerned. Where commercial fishing is widespread, nets and related materials are common. In areas near major shipping lanes, the garbage found is more likely to be from ships.

Clean-up exercises in the United States have produced depressingly large amounts of debris. Padre Island National Seashore in Texas collects some 580 tons a year — about 10 tons per mile. It achieved an unhappy record in 1987 when 477 volunteers collected 13 tons of rubbish from 13.6 miles of beach — in three hours. Much of it came from merchant shipping and the offshore oil industry, with plastic sheeting being the most abundant item found.

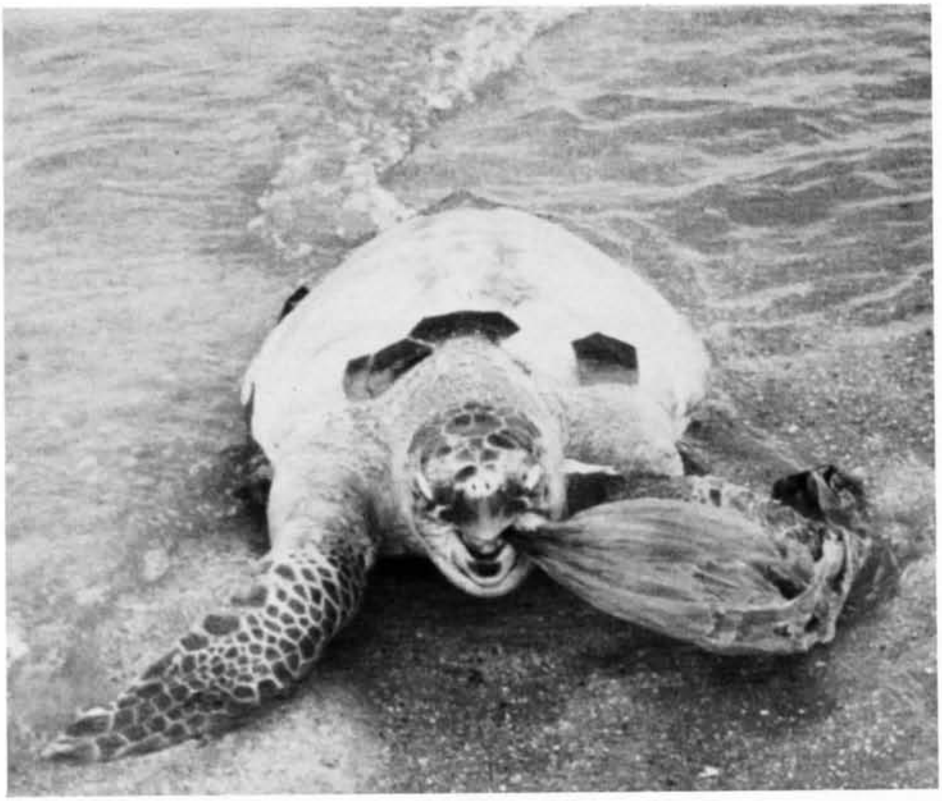
There is no doubt that merchant shipping contributes a great deal of the garbage that is currently floating around the world's oceans. The United States National Academy of Sciences calculated that shipping garbage in 1975 amounted to 5.6 million tonnes. Another estimate in 1982 calculated that the world's merchant marine disposed of 639,000 plastic containers a year — together with 426,000 made of glass and nearly 7 million of metal.

The same study showed that a crew of 46, during a 44-day period, dumped 320 cardboard boxes, 370 plastic beer can holders, 165 chip bags, 19 plastic bags and two plastic drums, 245 bottles, five glasses, 29 fluorescent tubes, two bulbs, 5,176 cans and two metal drums. And that was just the 'domestic' waste. . .

Just as the type of rubbish dumped by ships varies, so does its impact — and some of the most harmless-sounding items can be the most damaging.

Ropes and strap bands

Ropes are frequently made of plastics these days, as are strap bands used to secure boxes and other items. They are popular because they do not corrode,



are cheap compared with steel and are very strong. This is bad news for any mammal or other sea creature which happens to get its head trapped in one. The problem could be minimized if the bands were cut instead of simply slipped off.

Materials of this type can also be a problem to shipping and pleasure craft. Nylon or plastic ropes can entangle propellers and block water intakes. The problem is so great in some areas that manufacturers have responded by providing special 'spurs' to prevent propellers being fouled in this way.

Plastic bags

The 1987 Texas coast clean-up operation already referred to recovered nearly 32,000 plastic bags — the biggest single category of rubbish.

They can entrap fish and other creatures, but are also sometimes eaten by sea creatures — with equally fatal results. One baby sperm whale that died of infection of the abdominal cavity lining in 1984 was found to have a 30-gallon plastic garbage can liner in its stomach.

Beer can rings

The plastic rings used to tie six-packs of beer may seem harmless. But to many smaller sea creatures, such as fish, turtles and seals they can be deadly. The rings float in the water and can become stuck round the body of a fish or the throat of a mammal. This can lead to severe discomfort — or slow strangulation as the animal grows.

Pellets

Plastics are a product of the petrochemical industry and begin as small pellets which are then melted down and moulded to the required shape. They are frequently carried in bulk and are also used in packaging. Because they are so small, cheap and common they frequently get thrown away as rubbish.

Unfortunately, they can be mistaken for food — seabirds, for example, often think they are fish eggs. Sea turtles are also partial to plastic pellets — which then clog their intestines and, because they are indigestible, accumulate until the creature dies. Cases have been recorded of turtles ingesting so much plastic rubbish that they have become too buoyant to dive for food.

The future

The entry into force of Annex V provides the maritime community with a great opportunity to reduce the dumping of garbage into the sea. But this effort will only be truly successful if the Annex is properly implemented. This involves action by shipowners and crews, who must ensure that dumping is only carried out in accordance with Annex V requirements, and by Governments who must provide the reception facilities required by the Convention — and then ensure that ships use them.

Photographs supplied courtesy of the Department of Fisheries and Oceans.

Waste Not

By SLt Charles Brown
Photos by Sgt Ken Matheson

HMCS *Protecteur* in the Caribbean: one ship, one crew making headway in the fight against marine pollution. (*IHC 90-002-1*)

"The problem is global. It's not just the navy. It's all of us".

Capt(N) James Steele gets fired up when he talks about waste at sea — its disposal, storage and recycling. As commanding officer of HMCS *Protecteur* from April 1988 until July 1990, he became concerned about the amount of "gash" being dumped overboard every day the replenishment ship is at sea. Every man and woman on board *Protecteur* generates about 1½ kilograms of solid waste material a day. Although it's part of a much bigger problem — a staggering 6.3 billion kilograms of garbage are dumped into the sea from ships every year worldwide — Capt(N) Steele said he felt *Protecteur* should do her part to help.

During *Caribops* 90 he formed a mini-task force to define, analyze and find solutions to *Protecteur*'s problem. SLt John Downing, one of the ship's engineering officers, installed a monitoring system in the ship to track every bit of garbage heaved overboard. SLt Downing discovered some remarkable — and disturbing — facts. As many as 100 plastic garbage bags full of gash went over *Protecteur*'s side every day. An average of 900 aluminum cans joined them. And about 55 large cardboard boxes of solid waste were ditched every month.

The more the team looked into it, the more complex the problem appeared. Before waste can be disposed of properly, it must be broken down into categories — plastic, organic, metal, glass and other waste types. Plastic used for food packaging must be separated.

Only eight percent of *Protecteur*'s gash was plastic, but it's a particularly nasty form of waste in the ocean. It floats. Marine mammals and sea turtles

Capt(N) Steele, SLt Downing and OS Hurd: hands-on involvement with *Protecteur*'s gash. (*IHC 90-002-22*)

mistake it for jellyfish and eat it. A whale was found recently with 50 plastic bags in its stomach. Plastic kills an estimated 100,000 marine mammals and a million sea birds every year. They become entangled in things like six-pack rings and plastic strapping. And plastic can last for hundreds of years before breaking up.

"I've come to the conclusion that part of our problem arrives on board in harbour," said Capt(N) Steele. "We don't *create* plastic — someone gives it to us. So I want to see a larger solution — let's not put plastic on board in the first place."

There are other reasons for concern if a ship does not have a waste management system. More and more ports are refusing ships entry because of waste management regulations. "We're getting loud and clear signals from everywhere we visit that either new laws are in place or old laws are being firmly enforced," said Capt(N) Steele. For example, by 1993, by the Marpol Protocol agreement, U.S. Navy ships will not be allowed to jettison any harmful waste at all, in port or at sea, except in exceptional circumstances.

Protecteur has always obeyed certain rules of waste management. Bags are split open before they are dumped so that the contents can be broken down by the sea. The ship never dumps oil. No dumping is done near any coastline. But there are other things that can be done and Capt(N) Steele rolled up his sleeves to get on with them. It was not unusual for members of *Protecteur*'s crew to find their captain and SLt Downing up to their elbows in garbage, digging through the gash bags on the quarterdeck.

"Important and drastic steps are needed to cut down on the waste that we've always dumped overboard," said Capt(N) Steele, who said he believes small, individual acts ashore and afloat are the answer.

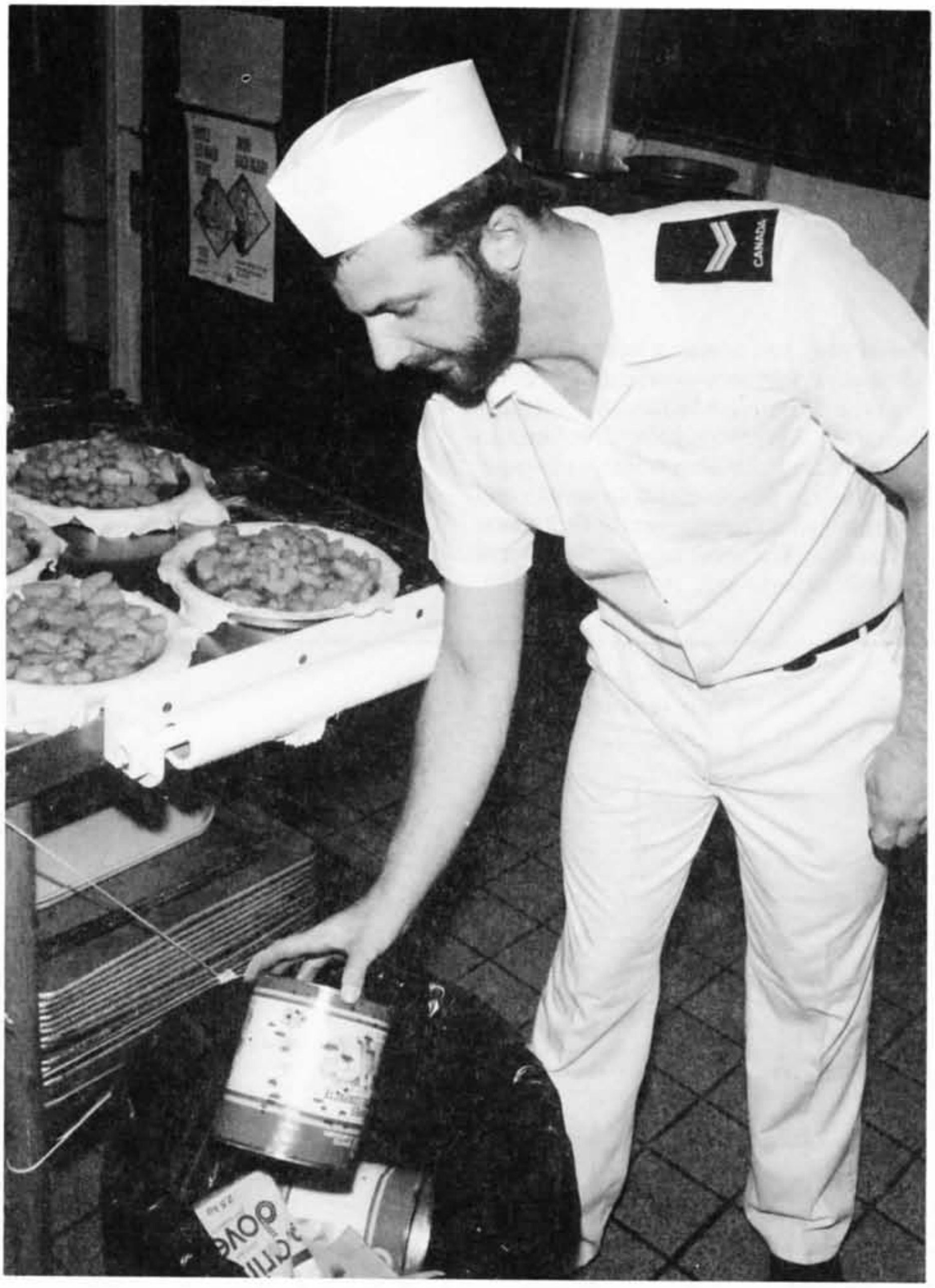
"*Protecteur* is just beginning to understand the problems of pollution at sea," added SLt Downing. "We need to do something we can succeed at and then build from there."

"On our own, we're starting to collect the more obvious waste such as aluminum cans, which are easy to handle, lightweight, and relatively hygienic," said Capt(N) Steele. *Protecteur*'s crew methodically collects and stows all of their aluminum cans — almost a thousand a day. When the ship gets back to Halifax, the cans are off-loaded and sold to a local recycler.*

There was little, if any, resistance among *Protecteur*'s crew of 300 to changing a whole way of life at sea.

"If there's one thing that's always bothered me in the navy, it's the amount of gash we throw overboard," said LS James Buzzee, a naval signalman and one of the ship's divers. "It hurts! We don't like it. We don't do it at home — why should we do it at sea? The lower deck is right behind the captain."

* *This program is temporarily on hold. Ed.*

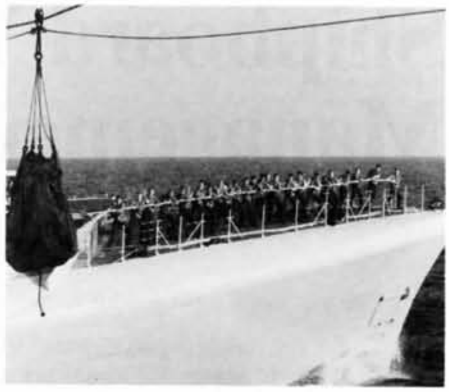


Ship's cook LS Tony Edwards was in a particularly good position to spot recycling opportunities as well as evidence of overpackaging. ***(IHC 90-002-27)***

LS Tony Edwards said he also hates dumping gash into the ocean. One of the ship's cooks, he was in a particularly good position to spot recycling opportunities — like saving tin cans — and problems of overpackaging, like plastic vacuum-pack food wrapping.

Capt(N) Steele said he was amazed at how quickly people came forward. "It's been most heartwarming to meet sailors of all ages with good ideas. They're all anxious to help. They just need some direction to do things in different ways, better ways. They rely on me and my small team of volunteers to make sure they're not going to waste their time. Once we've shown them practical solutions to what I know they regard as a problem, they'll join up happily and enthusiastically. I want to transform this from being the captain's 'little eccentricity' to a full commitment by the entire ship's company. I don't think that'll be too difficult, frankly."

Capt(N) Steele said he has other ideas for the ship's waste management effort. "I think we should look at our fleet replenishment role. We could take waste from the smaller ships. They have less space. They can neither dump nor store gash. But *Protecteur* does not lack space. We pass over fuel. We pass over



Endless possibilities: instead of dumping their gash overboard, destroyers could send their packaged, non-biodegradable garbage and recyclables across to an AOR for disposal ashore. ***(IHC 90-002-16)***

ammunition and stores. And those hooks come back empty. They could be coming back with neatly packaged blocks of sealed, non-biodegradable garbage which we could store safely and hygienically on board for proper disposal ashore. It seems practical, but at what cost? And the tactical implications have to be explored."

Capt(N) Steele looks beyond the next replenishment at sea. He sees a navy-wide waste management system that makes every ship a self-contained and self-sustaining unit — ships that don't add to the already enormous amounts of pollution in the oceans. "I see no reason why we can't be part of the solution," he said, "— a solution which must come. And soon."

SLt Brown is with the Primary Reserve, attached to NDHQ.

Sgt Matheson is a photographer with the DND office of information in Halifax.

(Capt(N) Steele is now Chief of Staff (Readiness) at Maritime Pacific Headquarters.)

Shipboard Waste Management

By LCdr N. Leak and Arlene Key

Waste management is recognized by the International Maritime Organization (IMO) as a fundamental requirement in the battle to protect the environment. In 1989, visits by DGMEM staff to the U.S. Navy's David Taylor Research Center served to reinforce the IMO position that a program to manage shipboard generated waste is essential when addressing the pressing issues of maritime environmental protection. Accordingly, a Shipboard Waste Management Program (SWMP) is being developed to ensure that Canadian warships comply as closely as possible with Canadian and international environmental protection standards. The areas of specific concern are oil, sewage and garbage pollution.

Four Phases of Waste Management

Shipboard waste management can be divided into four phases: collection, processing, storage and disposal.

Collection — Procedures for collecting ship-generated solid and liquid wastes are necessary to control or eliminate overboard discharge, and rep-

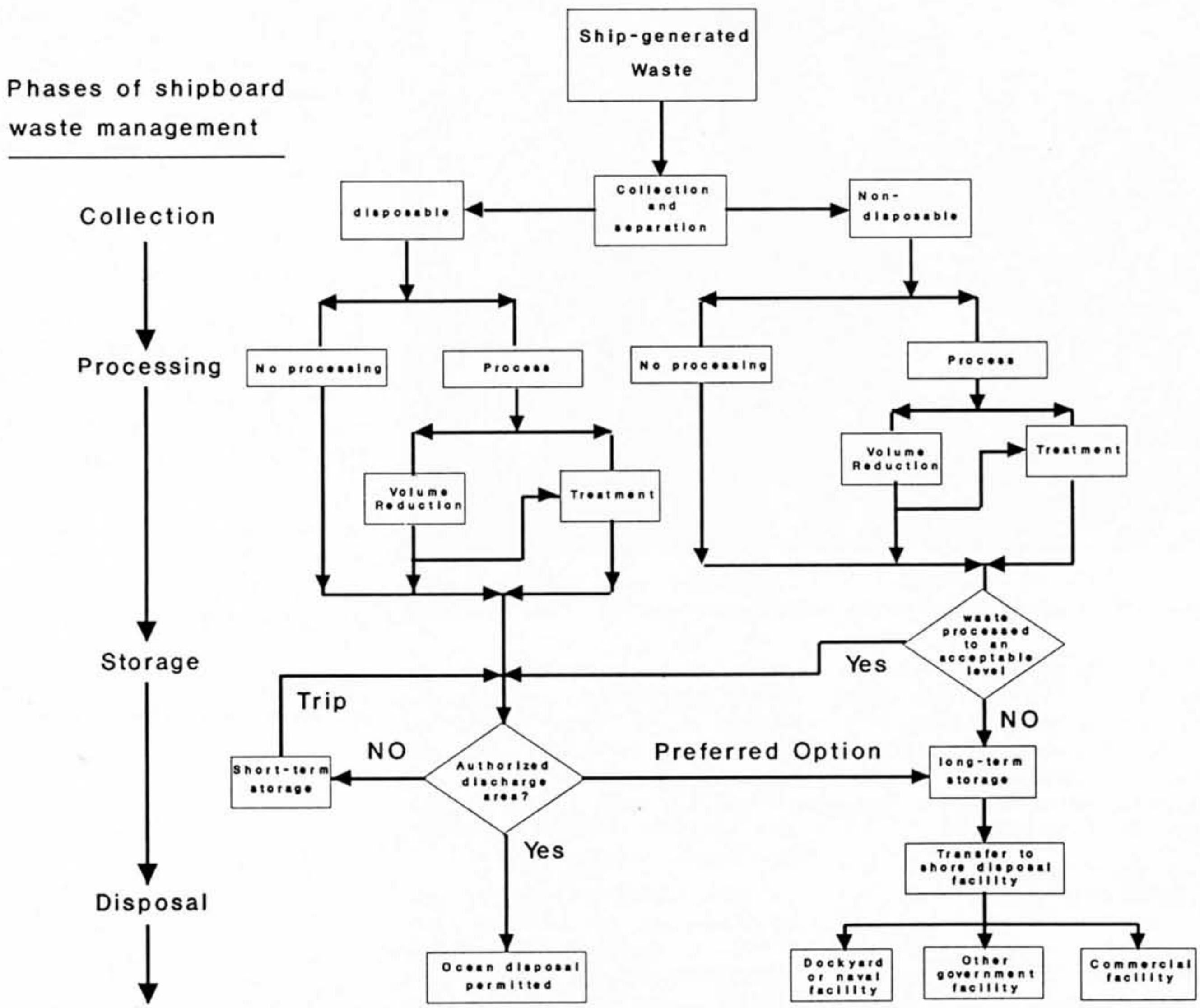


Fig. 1. Generalized Waste Management Guide

resent a major step toward achieving environmental compliance. Collection procedures may also involve waste separation (aluminum cans, plastics, etc.).

Processing — As internal space on a warship is always at a premium, waste processing serves the important function of reducing the volume of waste collected. Waste processing may also involve treatment to enable direct overboard discharge.

Storage — Collected waste must be stored regardless of the waste type or regulations governing its handling or disposal. Appropriate waste storage sites (compartments, holding tanks, etc.) are required for either long-term storage pending transfer ashore, or short-term storage pending onboard processing or treatment.

Disposal — Although international regulations permit the disposal of certain types of waste at sea, disposal via transfer to a shore facility is the preferred option.

An example of how these phases interface is presented in the generalized waste management guide shown in *Figure 1*. The guide is presented in flowchart form to show the options available, depending on waste type, for shipboard waste management.

The Shipboard Waste Management Program (SWMP)

In late 1989, the DMEE 5 Marine Auxiliaries section of the Directorate of Marine and Electrical Engineering initiated development of the Shipboard Waste Management Program. Its goal: to ensure Canadian naval vessels are never restricted from any operating area or port because of non-compliance with local environmental regulations. To achieve this, the SWMP aims at developing reliable waste handling equipment and systems which are fully capable of dealing with all ship-generated liquid and solid wastes. Two objectives have been identified:

a. to control overboard discharge through collection and storage systems; and
b. to consider technologies and methods for onboard waste processing.

By addressing the collection and processing phases first, naval equipment requirements could be identified early on in the program. Formulation of long-term R&D and procurement strategies, training and procedural documentation required for the program could then proceed. A significant R&D effort, it seemed, would likely be necessary since the availability of off-the-shelf (commercial) equipment capable of meeting environmental protection and naval (weight, space, shock, watchkeeping, maintainability, reliability, etc.) requirements, was extremely limited.

Due in part to the physical differences between liquid and solid waste, different management strategies must be employed. Liquid waste management can generally be accomplished with minimal (i.e. hands-off) human intervention by means of a collection system, holding tanks, processing units, etc. Solid waste management, however, requires the direct involvement of people. Research has revealed that successful solid waste management programs are based on the simple principle of reduce, reuse and recycle — and that means people; people to implement policies for environmentally safer packaging, people to sort and separate waste materials for reuse or recycling.

Liquid Waste Management

The control of overboard liquid waste discharge is currently being addressed, in part, by the ongoing Ship Pollution Abatement Project (SPAP) to retrofit certain major ships of the in-service fleet with blackwater (sewage) handling and containment systems. Collection and containment systems required to meet new regulations for the remaining liquid wastes (grey water, bilge water and oily water) will also be addressed. But it is the formulation of R&D and procurement strategies for liquid waste processing equipment that presents a major challenge, mainly because of the limited availability of off-the-shelf equipment considered capable of operating reliably in a naval environment.

The first aim in developing a liquid waste processing system is to reduce the volume of water collected into the system. It makes little sense to process the water when it is the contaminant, and not the carrier, that is the problem.

Initial investigations revealed that a number of options should not be pursued:

Chemical Treatment — Due to the requirement for personnel to handle these often toxic compounds and the inherent hazards associated with the presence of these chemicals on board ship, processes requiring treatment by the addition of chemicals were dismissed.

R&D — What the USN is doing

	HAZARDOUS MATERIAL/WASTE	BLACK AND GREY WASTE WATER	OILY WASTE	SOLID WASTE
EXPLORATORY DEVELOPMENT		- vacuum transport technology - technology for shipboard greywater treatment		- thermal destruction technology for shipboard waste - marine plastics programme support
ADVANCED DEVELOPMENT	- organotin environmental protection - HW reduction disposal - HW minimization	- advanced vacuum sewage collection - shipboard wastewater treatment systems - direct steam injection (DSI) upgrade - advanced site wastewater control		
R&D ACQUISITION			- oil content monitor - small craft oil/water separator - in-tank bilge oil/water separator	- vertical trash compactor - solid waste pulper - solid waste incinerator
FLEET SUPPORT		- naval environmental protection support service		- plastic waste disposal and demonstration - medical waste disposal

Biological Based Processes — Although such systems have had success in shore-based wastewater treatment facilities, the success has not been matched in naval applications. Biological systems are generally bulky and have demonstrated poor reliability during periods of inactivity (when alongside) or when subjected to contaminants such as bleaches and cleaners which are commonly used on board ship.

The ideal naval solution would be to develop a single unit capable of processing all three liquid waste streams (black water, grey water and oily waste) simultaneously. However, such an approach would be impractical at this early development stage. The problem was therefore divided to develop two separate processing systems — one for black water and grey water (BW/GW), and another for oily waste (OW).

The division of waste streams is based on the methods by which collection is being addressed. At present, blackwater vacuum, collection, holding and transfer (VCHT) systems are the preferred approach and are being retrofitted in designated in-service ships under the Ship Pollution Abatement Project. Greywater collection can be readily achieved through the use of interface valves which discharge to the blackwater collection system, thereby eliminating the need to install a separate system. Oily waste is collected via suction mains and stripping systems, often to the same tank.

With processing requirements defined, development commenced on two conceptual processing systems.

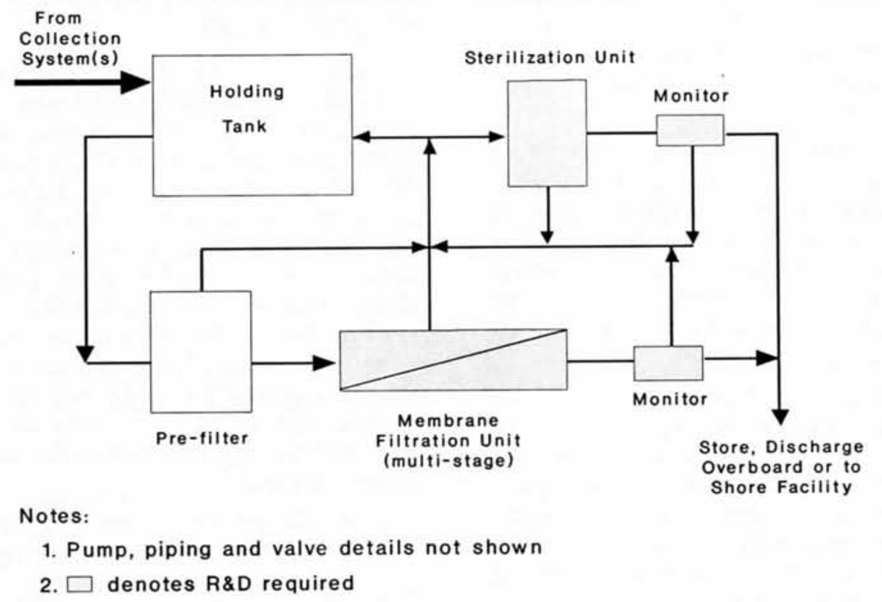


Fig. 2. Conceptual BW/GW Processing System

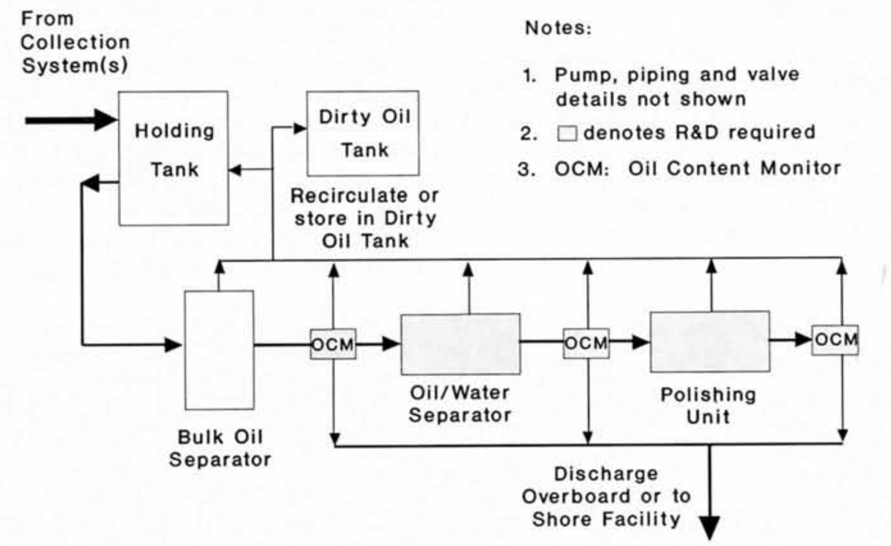


Fig. 3. Conceptual Oily Waste Processing System

The Conceptual Blackwater/Greywater (BW/GW) Processing System

As depicted in *Figure 2*, collected BW/GW waste is drawn from the holding tank and passed through a pre-filter to remove large solids, and then through a multistage membrane filtration unit (similar in concept to a reverse osmosis desalination plant). Output from the membrane filtration unit would be either "clean" water, which could be discharged overboard, or a filtered residue which could be returned to the holding tank or passed to a sterilization unit for treatment. Possible options for the sterilization unit include ultraviolet irradiation, ozone, oxidation, electrocution, or steam injection. The specific technology has yet to be determined and is one area targeted for research and development.

The BW/GW system, as conceptualized, is fully automated — including control of all pumps and valves, and real-time monitoring of the process. Monitoring is another area which will require further research and development.

The Conceptual Oily Waste (OW) Processing System

As depicted in *Figure 3*, collected oily waste is drawn from the holding tank and passed through a bulk oil separator to remove excessive quantities of oil. The stream then passes through an oil content monitor which determines whether the effluent must be reprocessed (recirculated), passed to the next process or discharged overboard if within permissible standards. As with the BW/GW system, monitoring will require further R&D.

Should further processing be required the stream would pass through an oil/water separator. At the present time a passive, parallel plate design is a preferred choice as it has no moving internal components and can be supplied by a low-flow pump. (This latter point is advantageous. Indications are that the high-output — i.e. closer tolerance — pumps of current oil/water separation systems do not operate reliably when constantly exposed to "dirty water.")

The effluent from the oil/water separator would then pass through a second oil content monitor, with a similar function as in the previous unit. It is anticipated that a pressure boost would be required at this point to ensure scavenging of the oil water separator and to meet downstream flow requirements. As the stream should now be relatively clean, a high output pump could be confidently inserted at this point in the system.

The final stage of the process would involve a polishing unit, also based on membrane filtration, which would serve to remove other contaminants such as heavy metals. Finally a third monitor would verify that the discharge effluent is within required limits. As with the BW/GW system, the OW processing system must be fully automated.

Solid Waste Management

The development of policies and procedures for solid waste collection, separation and storage are required. However, until suitable solid waste handling or processing equipment or systems can be identified it is premature to address this objective in any detail.

A number of possibilities (equipment presently under development) have been identified which should assist the navy with the formulation of R&D and procurement strategies with respect to solid waste management. These include compactors, pulpers, grinders and plastic waste processors. However, as with liquid waste management equipment, availability of off-the-shelf equipment is a problem.

The problems associated with solid waste management have highlighted the need to develop specific items of equipment. Unfortunately, one obvious option — incineration — had to be eliminated during the initial stages. Incinerators are relatively heavy units which must be located high in the ship to facilitate exhaust requirements. Moreover, their watchkeeping and weight/space requirements make them unfeasible for frigate-size ships. In addition, it can be argued that incinerators merely trade one pollutant (solid waste) for another (incinerator exhaust). A new annex (Annex VI) has been proposed to Marpol which would provide tough regulations for the incineration of ship-generated waste.

The selection of any waste processing equipment must consider the mission requirements of individual ships. Ships operating only for short periods away from port may not need any equipment, whereas ships required to deploy for extended periods will require some form of onboard waste processing which could involve combinations of any of the following:

a. *compactors* to achieve volume reduction;

b. *pulpers, grinders or disintegrators* to achieve volume reduction and process certain waste types to meet overboard discharge standards;

c. *can crushers* to reduce the volume of aluminum cans for storage prior to being landed for recycling; and/or

d. *plastic processors* to reduce volume and neutralize food-contaminated plastics. Onboard plastics recycling may prove feasible.

Conclusion

Development of a shipboard waste management program is an integral element in the efforts currently being undertaken to ensure that the Canadian

Grey Water
What the USN is doing

The USN's greywater program was started in 1989 in response to stricter regulations in some U.S. states regarding greywater discharge. In areas such as San Francisco Bay, the Great Lakes, Puget Sound and Hawaii, discharge of greywater is now regulated. The USN strongly suspects that within as little as five years grey water will be regulated by most, if not all, U.S. coastal states.

For the present the USN is trying to reduce the volume of fresh water being used and, thus, the amount of grey water being produced in their ships. They are installing low-flow hand-held shower heads, reusing laundry rinse water as wash water for the next load, and buying low-water-usage equipment — particularly washing machines and dishwashers.

A.K.

What the USN is doing
Hazardous Material/Hazardous Waste

The primary aim in dealing with hazardous material/hazardous waste (HM/HW) in ships is to improve the management of HMs to the point that they do not become HW. Not all hazardous materials end up as hazardous waste. By the same token, some materials not originally designated as hazardous end up as hazardous waste when discarded.

USN ships are required to package and store HM/HW on board until it can be turned over to a shore facility which then becomes responsible for its disposal. A program is now in place to catalogue all materials on board U.S. Navy ships, both through the supply system as well as through on-site verification. The system uses a standard personal computer and laser bar code reader to log and identify all materials being used. Proper identification ensures materials are properly processed — i.e. returned to stores, reissued, sold as usable scrap or disposed of as hazardous waste. Items purchased locally are also catalogued, either by existing bar code or manually if necessary.

A.K.

What the USN is doing

Solid Waste Equipment

While the reduction of solid waste is a primary goal in ships, total elimination of solid waste is not feasible. The next alternative is to reduce volume, primarily through compaction. The vertical trash compactor (*Fig. A*) was developed in-house to meet this requirement and was purposely designed to meet USN requirements for reliability, maintainability and ease of operation. They appear to have met all objectives with a system that is compact, automated and robust. Once compacted, the waste can be stored or disposed overboard, regulations permitting.

In addition to compaction, the USN has examined the use of pulpers (*Fig. B*) to handle the majority of waste products such as office and galley waste. When solid waste consisting of paper, wrenches and various other items were fed into the unit, it separated the material by weight through centrifugal force, processing the paper waste into a wet pulp and depositing the non-processable material into a collection basket. The process is compliant with environmental regulations and the unit is apparently also certified for classified waste destruction.

Plastic waste management is of particular concern to the USN. Under Marpol, of which the United States is a signatory, disposal of plastics into the sea is prohibited. The main problems with plastics are that they do not degrade, do not sink, and are difficult to store. To deal with this the USN has initiated a proactive navy-wide program to separate and sort plastics for disposal and processing ashore. (At present the USN uses a 20/3 rule for storage: all non-food-contaminated waste must be stored for at least the last 20 days of a deployment; for sanitary reasons, food-contaminated waste must only be stored for the last three days of a deployment.)

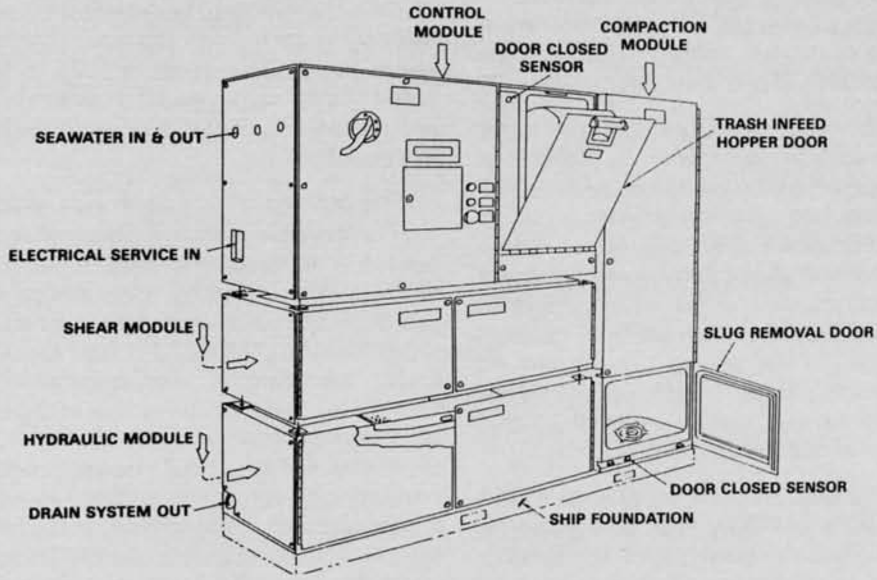


Fig. A. Shipboard Vertical Trash Compactor

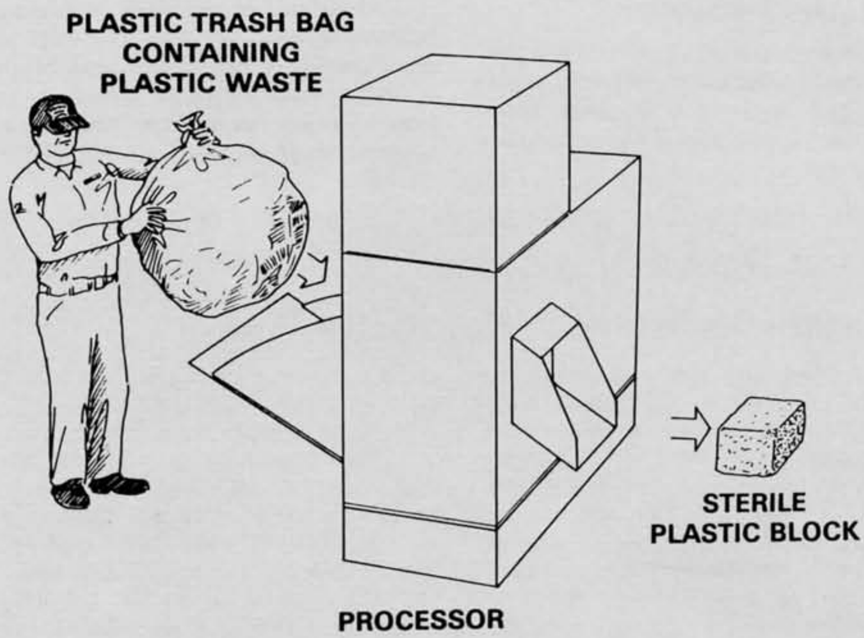


Fig. C. Shipboard Plastic Waste Processor navy achieves environmental compliance. Meeting the program's goals will necessitate that other issues such as hazardous material/hazardous waste, refits, interfaces with shore facilities, and operational implications be addressed. The co-operation and co-ordination of all concerned parties in NDHQ, Maritime Command, etc. will be essential to ensuring the program is successfully introduced to the fleet.

Reference

"Guidelines for the Implementation of Annex V of MARPOL 73/78," International Maritime Organization.

LCdr Leak is the former DMEE 5 sub-section head for naval environmental protection.

Arlene Key is an environmental protection engineer in DMEE 5.

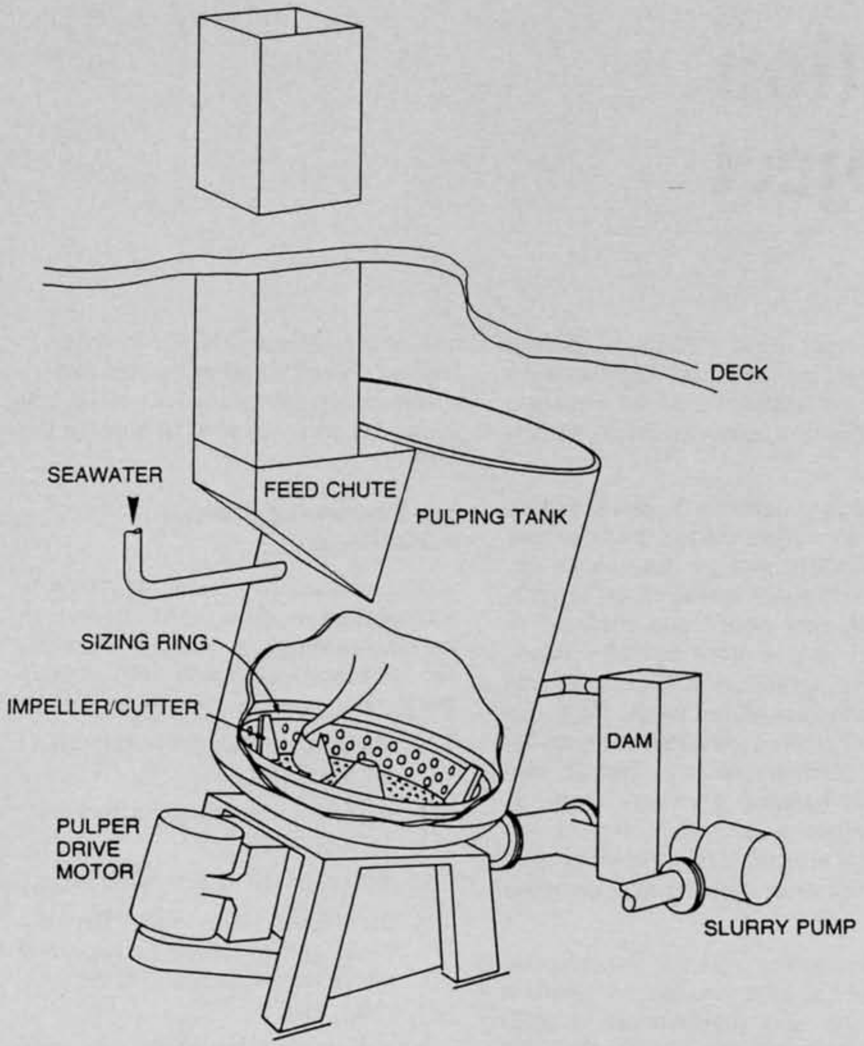


Fig. B. Shipboard Solid Waste Pulper

The USN is also investigating development of a plastics waste processor (*Fig. C*). Although currently in the development stage, it should be capable of shredding any plastic item, melting it down, sterilizing any food contaminants, and compressing the plastic into bricks that can be easily stacked for storage.

Biodegradable plastics are also being investigated; however, there is a problem with actually defining *biodegradable*, and producing materials that will not degrade while still "on the shelf."

A.K.

Oh, black water
The Ship Pollution Abatement Project

By Lt(N) Andrew Elmer

Growing public pressure to protect the marine environment has resulted in legislation which has effectively closed a number of ports and areas of operation to environmentally non-compliant vessels. Navies the world over, Canada's included, are having to adjust to the fact that warships are no longer exempt from environmental regulations. For its part the Canadian navy has been pursuing a number of environmental initiatives, not the least of which is blackwater (sewage) control under the Ship Pollution Abatement Project (SPAP).

The main impetus to blackwater control in Canadian warships stems from a 1987 study of the pollution abatement capabilities of the in-service fleet. The study examined ships for three major areas of concern: management of waste oil, waste liquids and solid waste. Ships were then designated either compliant or non-compliant with regulations in each of the study areas.

For waste oil management all but one of the ships were rated capable of achieving Marpol compliance without modification. Similarly, garbage disposal practices were deemed adequate in all ships. But it was a different story with liquid waste management. All but five of the in-service ships were designated *non-compliant*, requiring alteration to meet specified blackwater sewage regulations. It should be noted that a number of these non-compliant ships were also exempted from any plan to upgrade the fleet to compliancy. The entire *Improved St. Laurent* class, two of the *Mackenzie* class and the harbour training vessels were deemed exempt either because of their area of operation or because of their limited remaining time in service.

Reaction to the study was swift. The Chief of Maritime Doctrine and Operations directed that a pollution abatement implementation plan be established forthwith. The plan, developed initially for in-service ships, eventually achieved project status and was expanded to support pollution abatement measures for conversion and new-build vessels as well.

In the days before a funded pollution abatement project existed, procurement of blackwater systems had to be approved as shipalts by the Naval Modification Review Board and tendered to contract on a ship-by-ship basis. Because a number of different systems were being introduced to the fleet, this approach created problems with configuration management and logistic support (i.e. sparing, drawings, training, etc.). What was needed was a co-ordinated approach for procuring multiple blackwater systems of a common design.

In September 1988 the implementation plan was approved as a $5½-million operations and maintenance (O&M) project and handed over to the DMEE 5 Marine Auxiliaries section to manage as an NDHQ matrix function. Typical of O&M projects, the Ship Pollution Abatement Project received no allocation of person years. However, when it became evident the SPAP would require resources beyond the capacity of DMEE 5, one PY was allocated to manage the project.

The vacuum-pump raft for *Terra Nova*'s blackwater system.

The Engineering Analysis
Initial Design

The process of determining how to achieve the aim of the SPAP began with the establishment of evaluation criteria for a blackwater collection system design. For example, the system had to:

a. minimize weight changes (effect on stability);

b. minimize any effect on fuel storage capacity;

c. minimize the space required;

d. use proven technologies (to meet naval performance and maintenance requirements with minimal risk); and

e. ensure pollution abatement goals for black water would be achieved (i.e. compliance with Canadian Environmental Protection Act and Marpol 73/78 regulations).

A key aim with respect to blackwater collection and treatment is to minimize or eliminate the water element of the sewage. It simply is not efficient to have to treat excessive quantities of water (especially if a freshwater flush is being used) along with the sewage. Systems utilizing seawater flush were not considered feasible as the compounds and elements inherent in sea water increase scaling and, thus, piping system maintenance.

Engineers eventually settled on a collection, holding and transfer (CHT) system design incorporating a five-day capacity atmospheric holding tank. The big question was whether to choose a vacuum-operated system for transferring the black water or a more conventional gravity system.

	VACUUM-BASED (VCHT)	GRAVITY SYSTEM
PIPING	CAN BE RUN VERTICALLY OR HORIZONTALLY; I.E. CAN RUN OVER WT BULKHEADS INSTEAD OF THROUGH THEM.	MUST BE DIRECTED DOWN (PITCHED)
	2" DIAMETER, LIGHTWEIGHT 90/10 Cu Ni	4" STEEL SOIL PIPE (HEAVIER)
TOILETS	LOW FLUSH (1.5 L FW) GREATLY REDUCES VOLUME OF BLACK WATER THAT MUST BE HANDLED.	22 L SEAWATER (CORROSIVE) FLUSH
	FW CONSUMPTION INCREASES BY 2.3 TONNES PER DAY.	
SYSTEM	EXTRA PUMPS CAN BE "HARD-PIPED" INTO THE SYSTEM TO INCREASE RELIABILITY.	SIMPLER; COULD REQUIRE LESS TIME AND MONEY TO INSTALL.
	EMERGENCY BACKUP POSSIBLE BY CROSS-CONNECTING TO A FIREMAIN POWERED EDUCTOR.	

Table 1: Blackwater System Comparison

	($ X 1000)
LABOUR (MANHOURS @ $40/HR)	600
EQUIPMENT (TOILETS, PUMPS, CONTROL PANELS, ETC.)	160
MANUALS (ONE-TIME COST)	100
MATERIAL (PIPING, FITTINGS, WIRING, TANK, ETC.)	80
SPARES (2 YEARS, 12% OF LABOUR AND EQPT)	31
SHIPALT ENGINEERING	25
TOTAL	$ 996,000

Table 2: Cost Breakdown of Fitting a Typical VCHT Blackwater System on a Destroyer

After weighing the advantages and disadvantages of each (see *Table 1*), a decision was made to go with an advanced vacuum collection system for all SPAP ships. Spin-off benefits of such a system would allow the placement of heads and washplaces in "non-traditional" locations, with piping runs that pass over watertight and structural bulkheads instead of through them. As an interim measure for some ships, engineers would look at using a modified gravity CHT system until a vacuum, collection, holding and transfer (VCHT) system could be fitted.

Engineers also had a choice between two different types of vacuum generator for the VCHT system (*Fig. 1*). Sewage-powered eductors were preferred over the vacuum-pump generators because of their superior vacuum-generation capability, but as it turned out both types were eventually used.

System Operation

The main control logic operates on float-level sensors located in the holding tank. The system features two major operating modes and an override:

AUTO/AT SEA — (*Unrestricted overboard discharge*)
Selected when the ship is sailing in environmentally "non-restricted" waters (as defined by legislation).

AUTO/IN HARBOUR — (*Holding tank operations*)
Selected when the ship is in "restricted" waters. The ship can operate for approximately five days before the blackwater holding tank must be emptied to a barge or shore facility.

MANUAL — (*Override*)
Used by the ship's engineers to control holding tank discharge pumps.

Implementation

The Ship Pollution Abatement Project was mandated to install blackwater systems through the shipalt process as quickly as possible. However, 15 000 to 20 000 workhours (5 to 6 months) and close to $1 million (*Table 2*) are required to install a complete blackwater system. Most of that work involves stripping out existing gravity sanitary piping, fabricating and installing the blackwater holding tank and installing the new vacuum piping and toilets. The raft-mounted pump assemblies and control panel are usually prefabricated and relatively simple to install.

With the system design known, a detailed implementation plan was established. Basically, implementation of the SPAP would coincide with the fleet refit program. Contract demands incorporating technical statements of requirements for the *Improved Restigouche*, *Mackenzie* and AOR classes were tendered for proposal to procure blackwater systems, supporting technical data packages and spares.

Simultaneously, the naval engineering units in Halifax and Esquimalt (acting as the design agents) started developing the shipalt packages. Normally, approval to develop (ATD) and approval in principle (AIP) must be granted by the Naval Modification Review Board *before* procurement begins. But due to the severe time constraints and the fact that the contractor would be responsible for the final system design, AIP was sought at the same time as ATD.

Project Status

At the outset of the 1987 study leading up to the ship pollution abatement project, a number of fleet units had already been fitted with blackwater systems (*Table 3*). They were the Oberon submarines, the diving-support ship *Cormorant*, and the destroyers *Annapolis, Nipigon, Saguenay* and *Ottawa*. The destroyers were fitted with vacuum-pump-based VCHT systems in preparation for operations on the Great Lakes.

HMCS *Kootenay* became the first true "SPAP" ship to be fitted with a blackwater VCHT system. She was already in refit by the time SPAP was approved for implementation, so a "fast track" process was used to procure a sewage powered eductor-based VCHT system. (All of the remaining SPAP vessels were slated to receive vacuum-pump

LEGEND:

PRE-SPAP	▲
SPAP (FITTED)	●
SPAP (WILL BE FITTED)	○
OTHER PROGRAMS	■

CLASS/SHIP		SYSTEM FITTED
TRIBAL (DDH 280)		
Iroquois	280	○
Huron	281	○
Athabaskan	282	○
Algonquin	283	○
IMPROVED RESTIGOUCHE		
Gatineau	236	○
Restigouche	257	●
Kootenay	258	●
Terra Nova	259	●
ANNAPOLIS		
Annapolis	265	▲
Nipigon	266	▲
MACKENZIE		
Mackenzie	261	
Saskatchewan	262	●
Yukon	263	●
Qu'Appelle	264	
IMPROVED ST. LAURENT (DDH)		
Skeena	207	
Ottawa	229	▲
Margaree	230	
Fraser	233	
OPERATIONAL SUPPORT SHIP (AOR)		
Provider	508	○
Protecteur	509	○
Preserver	510	●
OBERON (SS)		
Ojibwa	SS72	▲
Onondaga	SS73	▲
Okanagan	SS74	▲
HTS Olympus		■
DIVING SUPPORT SHIP		
Cormorant	ASL 20	▲
CITY (PATROL FRIGATE)		
Halifax (330), plus 11		■

Table 3: Blackwater Control — How The Fleet Stacks Up

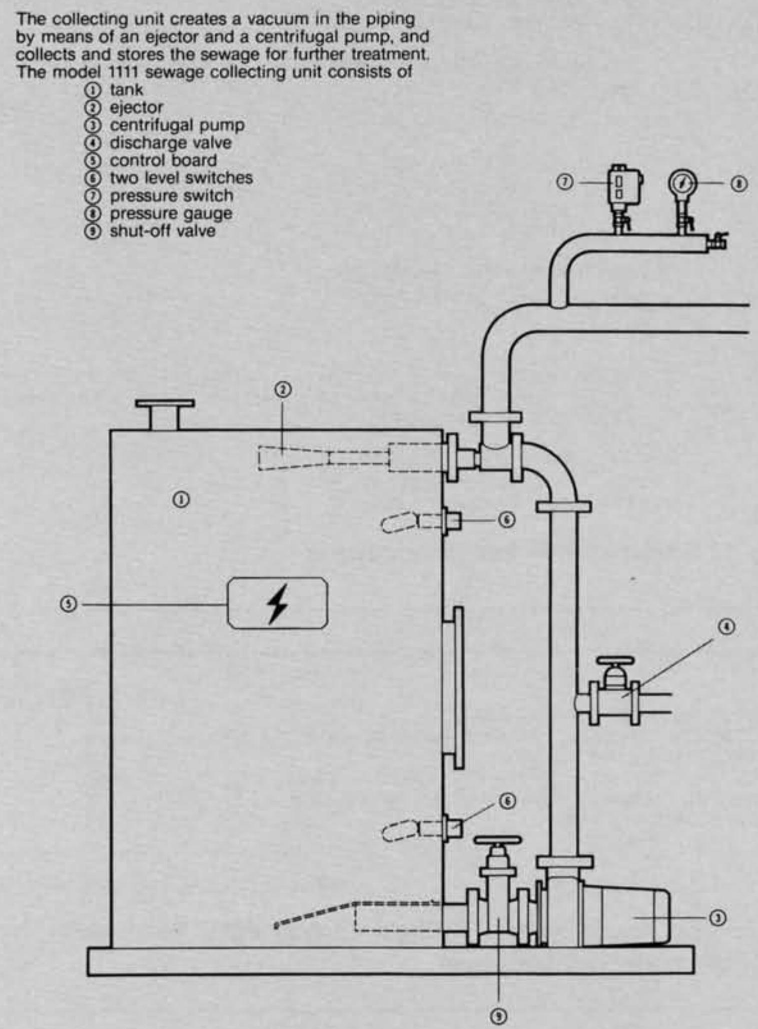
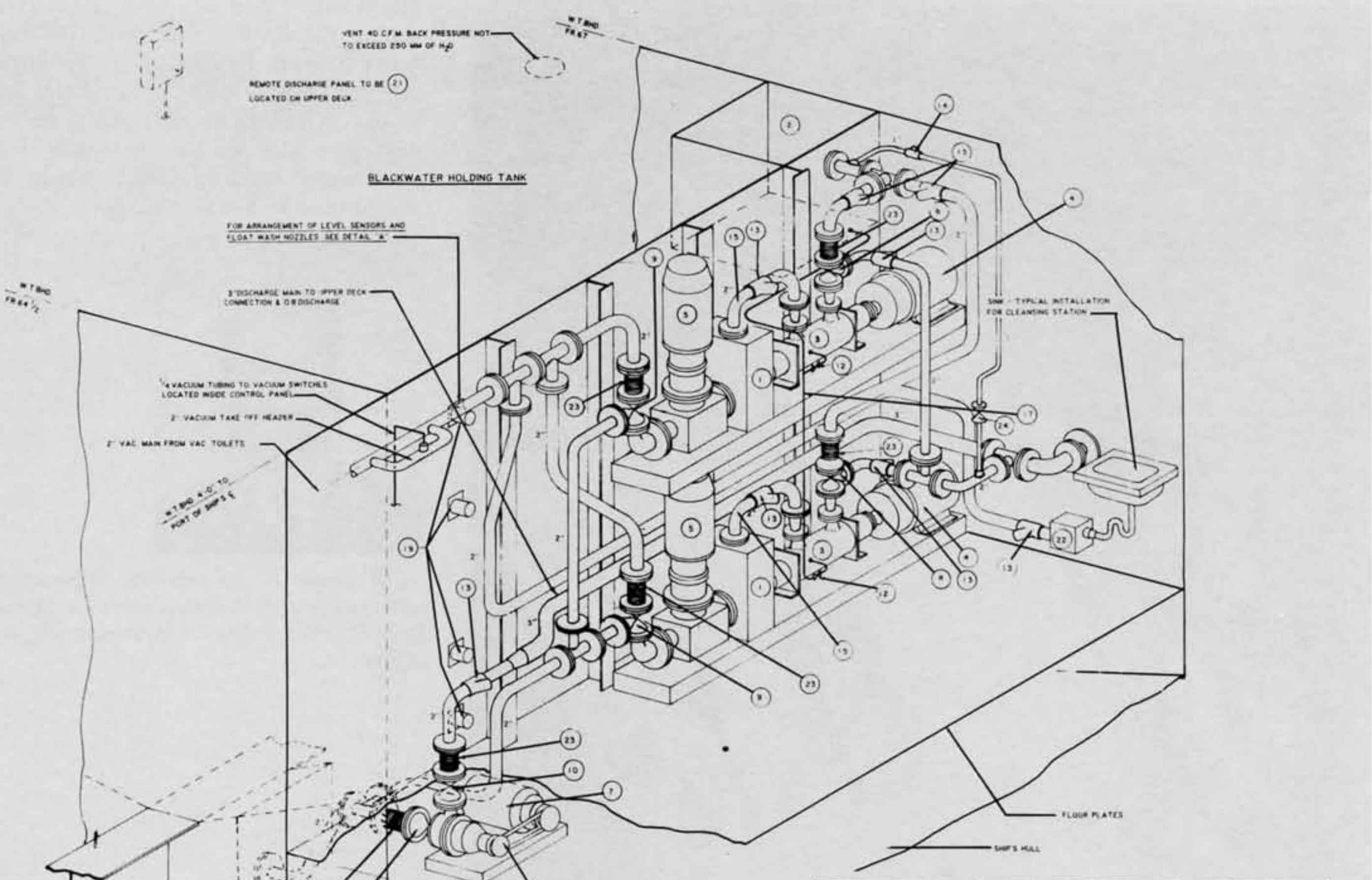


Fig. 1. Two types of vacuum collection, holding and transfer system. (A) SEWAGE-POWERED EDUCTOR SYSTEM

technology, as in fact the next four ships did. But for reasons that will be mentioned in a moment, the navy then reverted to sewage-powered eductors for *Gatineau* and the AORs.)

To minimize the costs and logistics problems associated with single-unit purchases, a multi-unit contract was tendered to procure four vacuum-pump VCHT sets for the destroyers *Terra Nova, Yukon, Restigouche* and *Saskatchewan*. Unfortunately, a high rate of failure was encountered with the vacuum switches and mechanical seals in *Terra Nova*'s vacuum pumps. This was unexpected since similar units in the pre-SPAP ships were functioning well.

Part of the problem was eventually traced to insufficient vacuum buffer — the ability of the system to retain a vacuum after repeated flushes. The five-day capacity atmospheric holding tanks have no vacuum buffer. Pre-SPAP ships, on the other hand, are fitted with one-day vacuum holding tanks that provide ample vacuum buffer, but by this time it was too late to change the procurement for the next three ships. Eventually all four will be fitted with vacuum buffer tanks. For the remainder of the



LIST OF MATERIAL

NO.	QTY.	DESCRIPTION	PART NO.
1	2	VACUUM TRANSFER TANK	REF. DWG. EL P5/88-3
2	1	SEALING LIQUID TANK	REF. DWG. EL P5/88-2
3	2	VACUUM PUMP	HELIVAC TYPE 1-141-30
4	2	ELECTRIC MOTOR WESTINGHOUSE TEFC EXP.PROOF NEMA TYPE C	FRAME NO 213TC
5	2	MACERATOR PUMP C & H PIPELINER SERIES 100	900-50875
6	1	DISCHARGE PUMP HAMWORTHY	
7	1	ELECTRIC MOTOR G.E.C	
8	2	VAC. PUMP OUTLET VALVE, 2" 3 WAY VALVE/COCK S.S	SUPPLIED BY OTHERS
9	2	MACERATOR PUMP INLET VALVE, 2" 3 WAY VALVE/COCK S.S	" "
10	1	DISCHARGE PUMP OUTLET VALVE, 2" BALL VALVE S.S. VELAN TYPE SB 150 (OR EQUIV)	F08-0-1413-SSTJ
11	1	DISCHARGE PUMP INLET VALVE, 2" BALL VALVE (AS PER ITEM 10)	
12	2	SEALING LIQUID SHUT OFF VALVE 1"	AVS 7210
13	8	CHECK VALVE 2" S.S. VELAN TYPE F-0114C-13 (OR EQUIV)	F08-0-114C-13MY
14	1	CHECK VALVE 1" S.S. VELAN TYPE F-0114C-13 (OR EQUIV	F05-0-114C-13MY
15	2	PIPE - VACUUM PUMP SUCTION 2" CUNI 90-10	
16	1	GREY WATER TANK C/W DISCHARGE VALVE	
17	1	PIPE - SEALING LIQUID ½ CUNI 90-10	SUPPLIED BY OTHERS
18	1	ELECTRICAL CONTROL PANEL 440/3/60	
19	4	LEVEL SENSORS	
20	1	VACUUM GAUGE 100MM SCALE 0-30"HG ¼ NPT	
21	1	REMOTE DISCHARGE PANEL - EMERGENCY STOP & RUN LIGHT	
22	1	GREY WATER VACUUM SCUPPER	
23	8	FLEX HOSE 2" AEROQUIP OR EQUIV.	SUPPLIED BY OTHERS
24	1	BALL VALVE 1" S.S VELAN TYPE SB150 (OR EQUIV)	F05-0-1413-SSTJ
25	15	NOT SHOWN ON DRAWING: TOILET, VACUUM, C/W DECK MOUNTING BKTS., SEATS & GREY WATER VACUUM SCUPPER. TOILETS ARE ELECTRICALLY OPERATE	

(B) VACUUM-PUMP SYSTEM

in-service fleet — *Gatineau* and the AORs — the navy selected the more reliable sewage-powered eductor VCHT system in combination with the five-day atmospheric tank. *Preserver* will be the first of the AORs to be fitted as she is currently in refit.

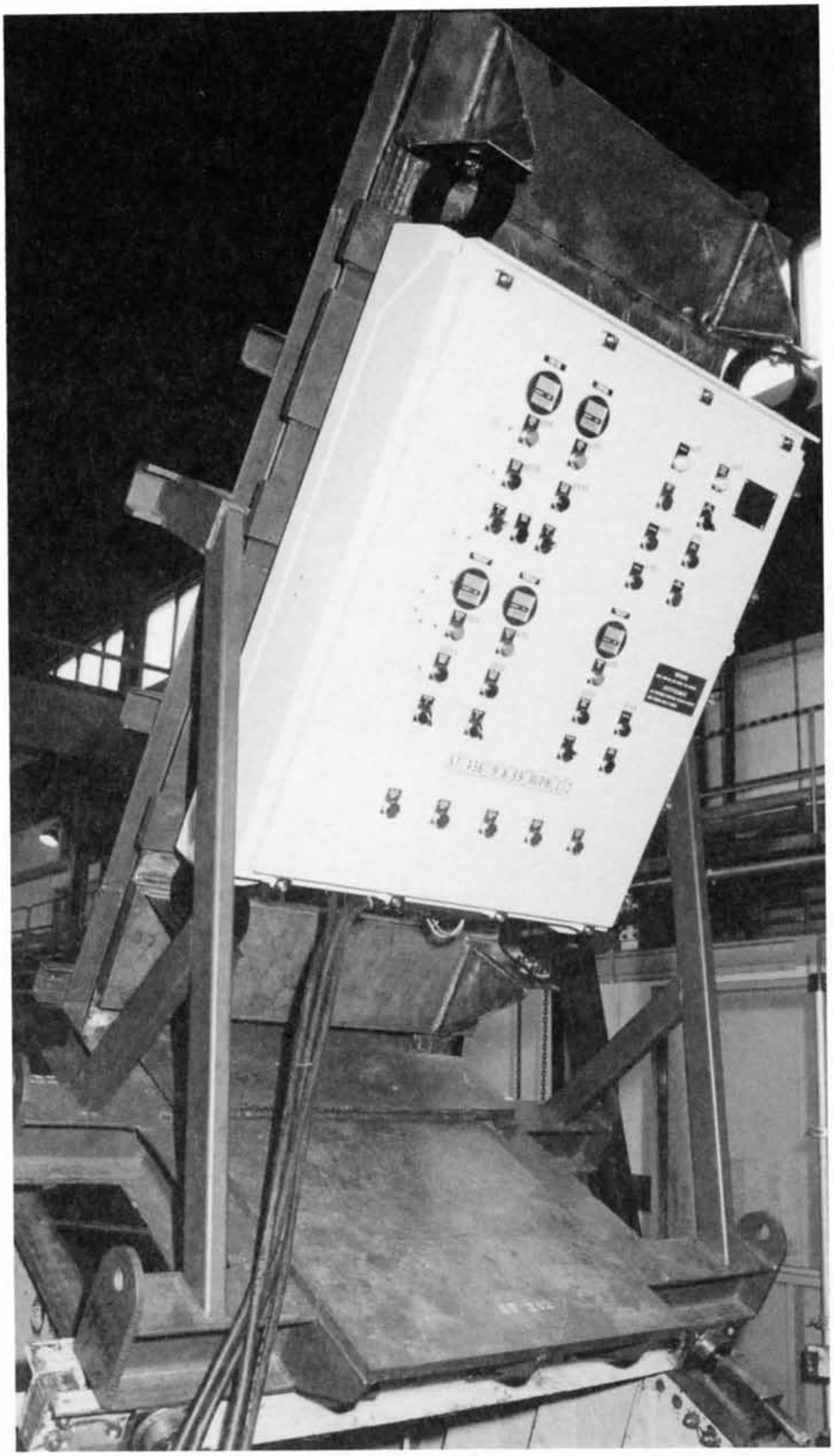
The four Tribal-class destroyers will most likely be fitted with VCHT systems some time after their TRUMP refits. A study is currently under way for an engineering solution to minimize any weight growth associated with the installation of a blackwater system. *Huron*, it should be noted, was fitted with an interim system during refit last year. It was a "fast and dirty" zero-weight-growth fix — routing the discharge of a number of gravity toilets to a seawater ballast holding tank — but at least it gave the ship some capability to operate in environmentally regulated waters.

All new ships, including the patrol frigates and maritime coastal defence vessels, will meet current antipollution regulations.

Conclusions and Future Considerations

Under the Ship Pollution Abatement Project, most major in-service ships will eventually be fitted with blackwater vacuum or gravity collection, holding and transfer systems. This is a major step forward in the navy's effort to comply with antipollution legislation. While the project addresses only the collection phase of blackwater management, it is expected that processing or and effective interface between the greywater, blackwater and even the oily waste systems. Regardless of the system selected, a processing/treatment plant would *definitely* be required since the aggregate size of the greywater and blackwater holding tanks would be prohibitive in a warship.

Lt(N) Elmer is the assistant engineering officer of HMCS Provider. *He is the former DMEE 5 ship pollution abatement project officer.*



A blackwater main control panel during high-impact shock testing at the Naval Engineering Test Establishment.

treatment plants will be required to complement the VCHT systems. In this regard, initiatives are under way to develop a processing/treatment system which will reduce the need for large holding tanks.

The collection of grey water, although currently unregulated, is also being studied in anticipation of stricter regulations. A separate greywater CHT system may also be required, although it might be possible to design an efficient

The NATO Link

By Lt(N) M.A. LeGoff

The present Canadian naval commitment to NATO generally infers a five- to six-month deployment with the Standing Naval Force Atlantic. It involves many operational exercises and port visits. A less glamorous, yet no less auspicious, commitment to NATO has been Canada's involvement with Subgroup Six (SG/6) of a NATO naval information exchange group on pollution abatement and hazardous material.

SG/6 met for the first time in February 1978 at NATO headquarters in Brussels, electing a Canadian as its first chairman. Since then, it has met 15 times to discuss environmental protection issues as they apply to NATO navies. The subgroup presently consists of representatives from Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, the United Kingdom and the United States. The Canadian delegation is headed by the DMEE 5 section head for marine auxiliary systems, and usually includes a member of the DNASE 6 material research and application section in DGMEM.

Over the 11 years since its inception, the aim of SG/6 has evolved to encompass:

a. the promotion of understanding national visions and requirements in order to comply with international environmental protection regulations;

b. the contribution to the improvement of these regulations; and

c. the promotion of co-operative efforts in developing and producing equipment by identifying equipment requirements and initiating multilateral programs.

SG/6 offers participating nations the opportunity to issue statements concerning their current national environmental policies, programs and laws; endorse each other's programs; and ensure compliancy with environmental regulations. The meetings also allow an exchange of

technical information regarding specific environmental protection concerns, and have enabled us to minimize costly duplication of effort in research and development.

To establish a database from which the subgroup could function, questionnaires were sent out to all NATO nations to determine what, if any, national pollution abatement regulations were in effect. Nations were specifically asked to identify which environmental protection equipment they had ever used or tested. From this information SG/6 was able to produce three baseline documents and one NATO standardized agreement (STANAG):

a. "NATO Navy Pollution Abatement Programmes," (AC/141 (IEG/6)SG/6-D/5(Revised));

b. "Waste Treatment Aboard NATO Naval Vessels," (D/6(Revised));

c. "National Navy Regulations for the Disposal of Waste," (D/7); and

d. "STANAG 4167 on NATO Pollutant Discharge Connections for Sewage and for Oily Water."

NATO countries can use these documents to support and develop their own environmental protection programs. They are an excellent source reference for determining whether or not specific naval vessels comply with local regulations. The documents are continually being updated. In this regard, statements on shipboard hazardous material/waste and naval occupational safety and health are expected sometime this year.

At the first SG/6 meeting in 1978, Canada outlined its formal position with respect to environmental protection. The statement in part read:

> Although we are not required by Canadian or known international rules to avoid pollution discharges, Canada is taking specific action to keep pace with developing commercial standards.

The Canadian representative also tabled an "innovative" pollution abatement design for the newly announced Canadian patrol frigate as evidence of the navy's commitment. Even at this early stage commissioned studies had produced recommendations for solutions to the existing fleet's shortcomings.

Unfortunately, the navy's good intentions were stalled during the early 1980s when other programs were assigned higher priority. Interest appeared to wane, both for involvement with SG/6 and for projects to fit environmental protection equipment in the ships. Interim solutions often failed to recognize the more stringent international antipollution laws which would soon come into effect.

But once again the tide has changed. Today, almost a decade later, Canada has regained its status as an active SG/6 participant. Tough environmental protection legislation under the Canadian Environmental Protection Act (CEPA) and renewed initiatives from the navy (such as the development of the Maritime Environmental Protection Project — MEPP) have signalled a new era for Canada in the fight against marine pollution.

While the efforts of Canada and the subgroup as a whole represent a positive step in addressing the requirements for environmental compliance, there is more to be accomplished. The International Maritime Organization's Maritime Pollution Convention (Marpol 73/78) — a benchmark guideline for pollution control — has yet to be fully ratified by several SG/6 countries, including Canada. (Although expected to do so shortly, Canada is the only SG/6 member not to be a signatory to the Marpol parent convention.) So far, roughly half the world's shipping is legally bound by this international agreement.

To ensure all ships refrain from polluting local harbours, some nations have "plugged the hole" with no-nonsense local regulations. The United States is a case in point. In certain U.S. ports eligibility to enter harbour rests entirely on a ship's ability to comply with local antipollution regulations — a fact of life which the Canadian navy has already discovered.

But if Canadian warships are restricted from entering certain U.S. ports because of non-compliance, why then do we allow these same ships to pollute Canadian harbours? It's a situation which the navy is rectifying through various programs.

At the same time, it has been argued that the majority of harbour pollutants do not originate from warships. Compared to the amount of sewage and industrial waste some cities pour into their harbours, a fleet's contribution may only be a drop in the bucket. And as far as the open sea is concerned, the Group of Experts on the Scientific Aspects of Marine Pollution estimated as recently as last year that only 12 percent of all ocean pollution is caused by maritime transportation.[1] So why should the world's navies even bother fitting costly, space-consuming environmental protection equipment?

SG/6 addressed this question of exempting warships from environment regulations: "Environmental protection aboard naval ships," the German representative stated, "should be considered a moral obligation. If government authorities want to educate the citizens by law and international convention to act responsibly in reference to (their) environment, they have to (set) an example in the first place."

In this era of increasing global environmental awareness and activity, marine pollutants from any effluent source are simply not being tolerated. Governments are being pressured to establish laws and guidelines that will ensure the protection of the environment. With laws in place pressure can be shifted easily onto the shoulders of environmental offenders throughout the land — as long as the government itself is seen to be complying. In this country the enactment of the CEPA and the expected ratification of Marpol 73/78 by Canada sometime this decade have already placed great pressure on the navy to become "environmentally friendly."

It is vital that Canada keep abreast of (and promote) the development of environmental protection policy and technology. If not, this country will be forever playing the expensive game of reactive policy making. And that's where the link to NATO's SG/6 is so valuable. SG/6 is a resource Canada can look to for inspiration, advice and support in doing its part for global environmental protection.

Reference

1. "GESAMP Report Highlights Threats to the Oceans," *IMO News*, Number 2, 1990, p.8.

Lieutenant(N) LeGoff is the environmental protection project officer for DMEE 5.

Oil/Water Separators in the Canadian Navy

By Lt(N) H.W. Polvi

Disposal of oil-contaminated water is an ever-present problem in Canadian naval ships. In keeping with Canadian environmental regulations, water contaminated with oil may not be pumped overboard unless it has been processed to reduce the oil content to a safe level — 100 parts per million (ppm) in the open ocean, 15 ppm in coastal waters and zero ppm in the Great Lakes.

Numerous oil/water separators (OWS) are available on the commercial market, but few if any can consistently meet effluent levels of even 5 ppm oil. Most are severely affected by the emulsifying agents (i.e. detergents) used to clean the bilges. Some are maintenance intensive, or else create an excessive amount of solid waste that must be stored on board until it can be off-loaded in port.

The history of oil/water separators in the Canadian navy has been a story of the best of intentions being offset by indifferent execution. Ambitious installation schedules, design problems, inadequate technical and supply support, limited operator and maintainer training — all of these have contributed to the virtual ineffectiveness of oil/water separators in the fleet. Fortunately, all of that may now be changing in the face of better understanding of the problems plaguing oil/water separators, and new OWS operator-maintainer training at the TQ5 level.

Initial installation of OWS began as a result of the 1971 white paper on defence which committed the Canadian Forces to making "a major contribution to the preservation of an unspoiled environment and an improved quality of life. . .."[1] In 1972 the Department of the Environment (a predecessor to Environment Canada) initiated a program to

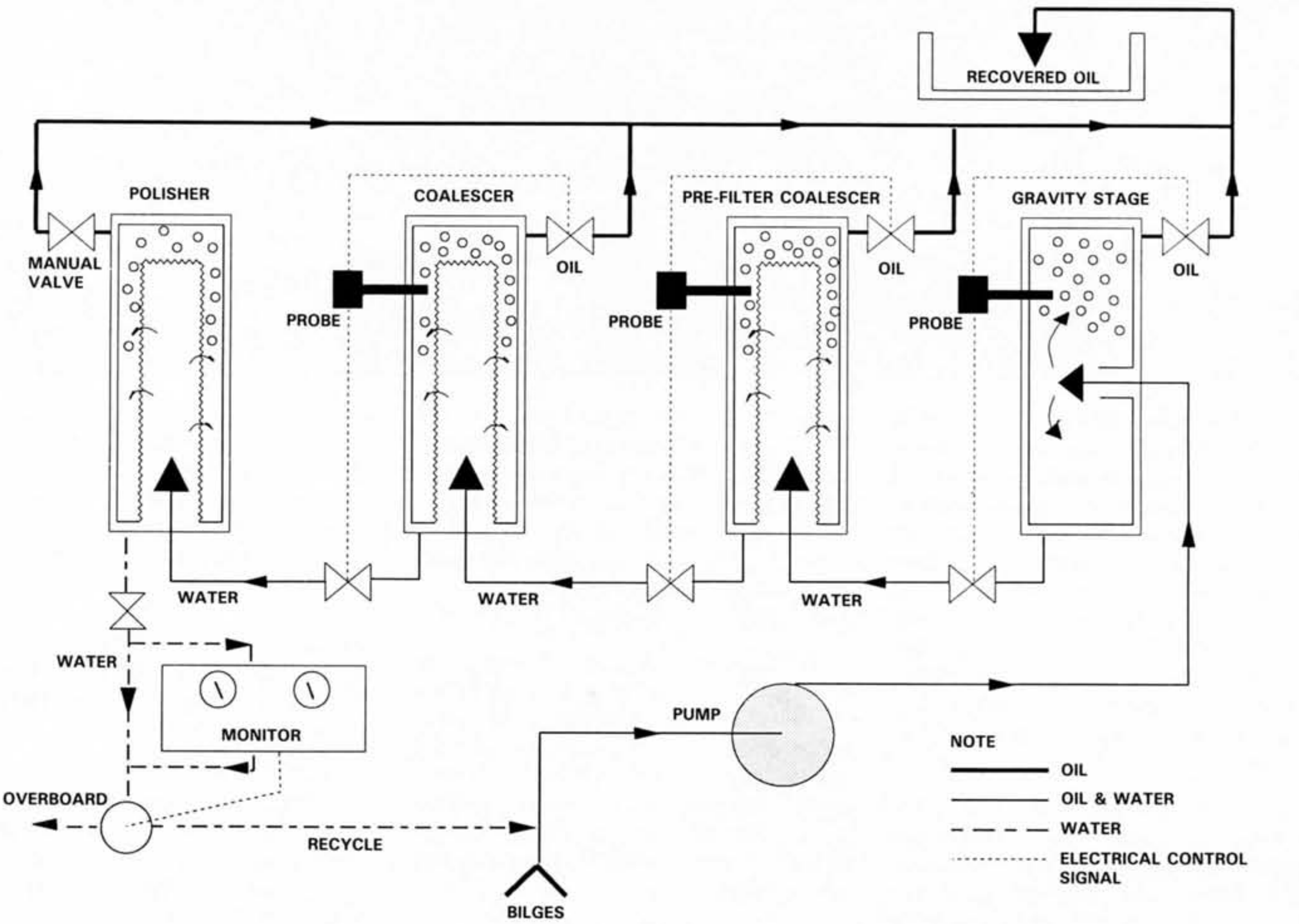


Fig. 1. An oil/water separator system

What the USN is doing

Oil/Water Separation

The USN is working to develop its own in-tank separation system (*Fig. A*) which aims to address many of the shortfalls which have been encountered with commercially available units. This unit is particularly impressive in that it is simple and robust, has no moving parts, and is not susceptible to emulsifying agents. A number of the shortfalls being addressed through this development program are similar to problems encountered with units fitted in Canadian warships and auxiliary vessels.

Arlene Key

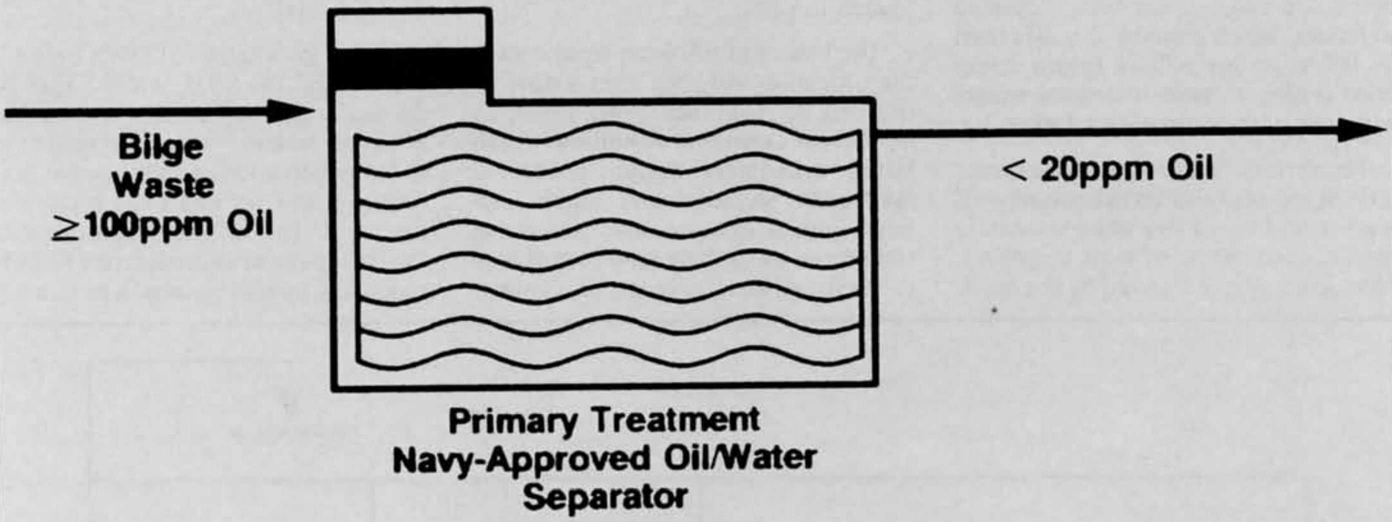


Fig. A. USN Oil/Water In-tank Separation System

clean up existing sources of pollution from all federally related government activities. DND received a share of "clean-up" funds for environmental protection equipment, and subsequently identified OWS for Canadian warships as one application of the available dollars. The Naval Engineering Test Establishment (NETE) in LaSalle, Quebec had already begun an evaluation of certain environmental protection equipment, including four commercial OWS systems.

Soon afterward, the destroyers *Ottawa, Saguenay, Annapolis* and *Nipigon* were earmarked to receive complete OWS and sewage handling systems. This was to prepare them for the major naval involvement at the Canadian Olympic Regatta at Kingston in 1975, various U.S. bicentennial celebration port visits the next year, and the 1976 Montreal Olympics. From approval to trials, the work was completed in 19 months for all four ships. Unfortunately, because of the very short time frame and the limited equipment available, each ship was fitted with its own particular OWS system.

At the same time as this was going on, HMCS *Margaree* was fitted with a three-stage filter/coalescer oil/water separator for developmental trial of a unit being evaluated by NETE. A rigorous testing program resulted in modifications to the filter/coalescer stages and the incorporation of an additional gravity separation stage.

In November 1975, the Maritime Commander recommended as a matter of policy that all HMC ships be fitted with oily water separators.[2] The NETE evaluations concluded that the modified filter/coalescer units were the best available, and that a Canadian supplier could assure rapid delivery. Approval was granted to procure 27 of the modified OWS units (21 for the DDE/DDHs, five for the PB 159-class training vessels and one for HMCS *Fort Steele*) using money still available from the Department of Fisheries and Environment (DOE had in the interim become DFE).

HMCS *Assiniboine* was the first ship to be fitted with the modified OWS unit, in time for *Norploy* 77. The naval engineering units were tasked as design agents for the ISL/MKE/IRE-class ships, with MDDO designing the 265- and 280-class packages (*Nipigon* and *Annapolis* would be retrofitted with the new units during their DELEX refits). The East Coast AORs had shipalts developed to fit oil/water separators as part of an Arctic improvements package. Shipalts were also raised for *Provider* and *Cormorant* to install the same filter/coalescer OWS units during refit or short work periods.

By April 1978 further procurement of environmental protection equipment had slowed almost to a halt. DND was reappraising its budget priorities and the DFE funds were exhausted. HMCS *Qu'Appelle* would not be fitted with an OWS due to her short projected service life.

The initiative to fit the approved environmental protection equipment had progressed rapidly toward implementation. The necessary equipment was identified, modified, developed and installed in a relatively short time. However, problems became apparent once the OWS were in service.

In 1983 NETE was tasked with a standing project to provide technical assistance to NDHQ to support the fleet's oil/water separators. A NETE field survey conducted two years later concluded the OWS units on board *Athabaskan, Huron, Algonquin* and *Nipigon* suffered from, among other things, incorrect coalescer elements, malfunctioning valves, insecure covers, suction main leaks, missing orifice plates, incorrect electrical connections and personnel being unfamiliar with the equipment. The DDH-280s also required a dedicated OWS suction system. The defects were remedied where possible and ships' engineering staffs were provided with instruction on the units.

A 1988 study of shipboard OWS installations found little or no improvement. The units on board *Margaree, Ottawa* and *Protecteur* were unserviceable and had been for some time. *Athabaskan* and *Preserver* crews reported their units to be unreliable and temperamental, plagued by frequent clogging and malfunctions. In one ship the Engineering Officer's Supersession Certificate even noted that the oil/water separator had "never been set-to-work" and did not have the necessary supporting documentation.

The surveys of the fitted OWS isolated the major problems. Some mixtures of oils, particularly hydraulic and turbine lubricating oil, were creating emulsions that could not coalesce. Also, the use of unauthorized detergents and excessive amounts of bilge cleaners were impairing the function of the coalescing elements. Such problems were not necessarily the fault of the OWS units, which performed satisfactorily in the laboratory environment, but more a failure of the system design and how it was operated. Low maintenance priority combined with the lack of maintainer training on the system contributed to the problem.

The frustrations in the fleet were further compounded by a supply system that carried various filter elements in new and old part numbers under the same NATO stock number for four different capacity OWS models. Ships requesting drawings and documentation received incomplete manuals and, in at least one case, upside-down and reversed prints!

Despite many such difficulties, the OWS can work as intended on board Canadian warships. In January 1986, for example, the Defence Research Establishment (Pacific) tested *Terra Nova*'s OWS and found the unit to be discharging effluent containing less than 5 ppm oil content. In this case a single marine engineering artificer had been assigned responsibility for maintaining the unit.

Efforts to initiate training for the engineers "on the plates" have proceeded slowly and irregularly since the units first entered service in the early 1980s. Mechanics and technicians in the fleet received only a basic familiarization with the OWS. Then, in 1989, a comprehensive four-day oil/water separator operation and maintenance course was incorporated into the TQ5 training syllabus.

On its own this was a major step forward. However, it will take more than training alone to ensure the effectiveness of oil/water separators in the fleet. A concerted effort by the navy to provide adequate technical and supply support, and a commitment on the part of engineers to use the equipment could be all that is needed to get the OWS program on its feet once and for all.

References

1. White Paper on Defence (Information Canada 1971), p.13
2. MARC 1568-1(COMD), 24 November 1975

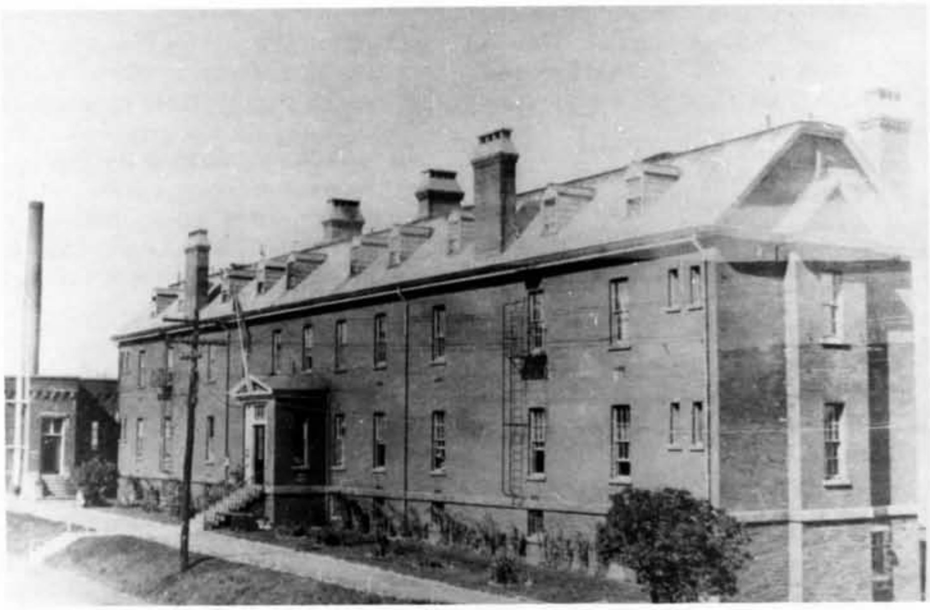
Lieutenant(N) Polvi is an engineering support officer in DMEE 5

Looking Back: 1910-1922

*The Royal Naval College of Canada**

By Marilyn Gurney Smith

***Excerpted from The King's Yard, An Illustrated History of the Halifax Dockyard, by Marilyn Gurney Smith (Nimbus Publishing Limited, 1985.) Reprinted with permission.**



The Royal Naval College of Canada opened its doors in 1911 to a class of 21 cadets. The college building, formerly the RN hospital (built in 1863), was severely damaged during the Halifax Explosion in December 1917. (*Maritime Command Museum photo*)

Not long after the Naval Service of Canada came into existence in May 1910, attention was turned to the recruiting and training of suitable young men as Canada's future naval officers. Under the provisions of the Act, a naval college capable of providing a complete education in naval science, tactics and strategy was authorized.

The best location for such a college was Halifax, and the old Hospital Building built in 1863 in the dockyard was chosen for the site. The college was to accommodate 45 cadets. In November of 1910 the Civil Service Commission set and graded a competitive entrance examination; 34 sat the examination and 21 passed. A two-year course was followed by a year's training on board one of HM cruisers. The curriculum was similar to that provided by British naval colleges.

In October 1910, the King's permission had been obtained to prefix the name of the college with *Royal* — thus the Royal Naval College of Canada. This privilege preceded the use of the word Royal by the Canadian navy by several months.

The College was under the command of Commander E.H. Martin, R.N. The instructional staff was lent by the Royal Navy.

With the advent of the Borden Government in September 1911 a change in naval policy was announced. The RNCC course outline was broadened so that in addition to naval training it offered programs for other careers as well. The course became three years rather than two and the obligation for cadets to follow a naval career was removed. In 1915 the subjects taught were mathematics, navigation, mechanics, physics, chemistry, engineering, seamanship, pilotage, geography, history (including naval history), English, French and German.

Once the boys arrived, a routine of classes, inspections and sports was quickly established. While the college may not have been idyllic, it did provide ample physical space.

On the lower floor were the senior and junior gunrooms, a large messroom capable of accommodating all the cadets, and a wardroom for officers and instructional staff. The officers' cabins and the senior and junior dormitories occupied the second floor, while the basement served as the lower deck for the ship's company. The annex on the north end was constructed during the early years of the college, and was used in part as a large study for general lectures, examinations and evening prep. The other half was known as the quarter deck, and was where divisions, evening quarters and defaulters were held. Occasionally, it was used as a gymnasium or for dances.

The first Canadian naval casualties of World War I were recent trainees of the college assigned as midshipmen in HMS *Good Hope*. In the Battle of Coronel, Falkland Islands on 1 November 1914, she was reduced to a flaming mass, exploded and sank with all hands, including midshipmen Malcolm Cann, William A. Palmer, Arthur W. Silver and John V.W. Hathaway. A classmate, William Maitland-Dougall was lost in a submarine later in the war.

The college did not remain unscathed during the Halifax Explosion of 6 December 1917 when the Belgian relief ship *Imo* collided with the French munitions ship *Mont Blanc* in Halifax harbour. The school was rocked to its foundation. While the outer wall stood fast, the windows, walls and ceilings were reduced to a pile of rubble. Classrooms, studies and corridors were littered with broken glass, fallen plaster and splintered wood. Many of the occupants received injuries.

Commander E.A.E. Nixon, head of the school, was flung through a door and lay unconscious until rescued by Mr. William Robinson. Chief Petty Officer King, Cadet Captain MacKenzie and Cadet Orde were blinded by splintered glass. Cadet Brett carried Orde out of the school. MacKenzie attempted to remove CPO King from the school, but injured himself further when he drove his fist through a pane of glass. Cadet Captain Kingsley led the other cadets out to the corridor only to find their way blocked. Engineer-Commander Howley led them out through a door on the west side of the school. Outside he ordered them to fall in and then to carry on by assisting the more seriously wounded to hospital. King was presumed dead and was removed to a morgue where he later regained consciousness and reached out to a passing soldier.

Within days of the explosion the cadets were sent home for Christmas leave. They reassembled two months later at the Royal Military College in Kingston, Ontario to complete the term, but rather than return them to Halifax the following August (1918) the college was permanently moved to Esquimalt. Due to severe financial restraints, the Halifax facility finally closed its doors 16 June 1922.

Marilyn Gurney Smith is the director and chief curator of the Maritime Command Museum in Halifax.

A 1913 graduation portrait of the first cadet class at the Royal Naval College of Canada. The original class of 21 cadets was reduced to 20 when one of their number died during the term. Two of the cadets went on to reach flag rank — L.W. Murray as a rear-admiral, and J.C. Jones as a vice-admiral. *(Maritime Command Museum photo)*

(1) J.D. Laurie, (2) W.A. Palmer, (3) Wm. Maitland-Dougall, (4) J.E. Oland, (5) L.J. Gauvreau, (6) R.C. Watson, (7) L.W. Murray, (8) R.I. Agnew, (9) J.V. Hathaway, (10) J.C. Jones, (11) D.B. Moffatt, (12) R.F. Lawson, (13) H.R. Tingley, (14) G.A. Worth, (15) H.J. Hibbard, (16) H.R. Dand, (17) J.M. Grant, (18) M. Cann, (19) C.W. Reid, (20) A.W. Silver.

FRONT ROW (L to R):
Capt(N) Brown, Cmdre Reilley, Cmdre Saker (Chairman), Cmdre Green and Capt(N) Sutherland.

MIDDLE ROW:
Capt(N) Schaumburg, Capt(N) Child, Capt(N) Embree and Capt(N) Dean.

BACK ROW:
Capt(N) May, Capt(N) Deblois, Capt(N) Mack, Capt(N) Preston, Capt(N) Verran (DCOS P&T — special invitee) and Capt(N) Riis.

NOT SHOWN:
Cmdre Lawder, Cmdre Murray, Capt(N) Richards, Capt(N) Harrison, Capt(N) Chiasson, Capt(N) Gibson, Capt(N) Faulkner and Capt(N) Blattmann.

1990 MARE Council

The MARE Council, chaired for the first time by Commodore M.T. Saker (DGMEM), convened at NDHQ last November 2nd to discuss personnel issues relating to MAREs and NCMs of the naval technical occupations.

Topics on the agenda included: the status of the MARE occupation; MARE reserves; progression of the MARE training review; the Naval Electronic Technician occupation review, and the Naval Combat Systems Technical Training Plan.

The MARE Council is made up of MARE naval captains and above, and meets every year to assist DGMEM in his capacity of MARE Branch Adviser.

News Briefs

Senior officers and chief petty officers of the MARE community in Halifax took the opportunity last June to express their appreciation and bid farewell to retiring naval engineers RAdm D.R. Boyle (seen at left with former Cdr David Riis), and Cmdre W.J. Broughton (at right with Cdr Bob Chanter). The farewell breakfast gathering was hosted by C1ER Lloyd Blagdon at the Chief and Petty Officers Mess in Stadacona. (*CF photos by CFB Halifax Base Photo Section*.)

Retired DMEE engineer honoured for distinguished service

Chief of the Defence Staff General John de Chastelain has approved the award of the Canadian Forces Medallion for Distinguished Service to retired DND civilian engineer Don Nicholson. Nicholson, a former DMEE section head for marine propulsion systems, is being honoured for his service as an internationally recognized expert on complex warship propulsion gearing technology.

The medallion is awarded by the CDS specifically to non-military persons in appreciation for exceptional service to the Canadian Forces and Canada. In a written statement announcing the award, Commodore M.T. Saker, DGMEM, said: "I am sure that those of you who know Don realize that this award is most appropriate."

Nicholson retired from DMEE in 1987 after 34 years of public service. Reached at his home in Ottawa, he told the *Journal*: "I'm honoured to feel there's something special like this in the wind."

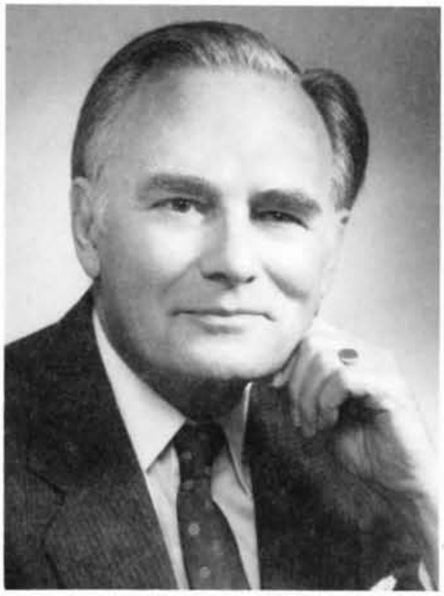
Bravo Zulu

Congratulations go out to Commander Darryl Hansen of Training Group Pacific Headquarters. On November 21st he received the prestigious Meritorious Service Cross from the Governor General, His Excellency, Ramon Hnatyshyn, during a formal ceremony in Ottawa.

Cdr Hansen earned the award for his work as leadyard commander at the Saint John Shipbuilding Ltd. yard in New Brunswick, witnessing the construction of the Canadian patrol frigates. He was honoured for his ingenuity, industriousness and initiative, leading to system improvements to both the CPF and future ship construction designs.

"It seemed like we were breaking new ground every day," said Cdr Hansen. "We had not built a warship in Canada since the early 1970s, and technology had come a long way. Not only were we seeing difficult technical problems, we were trying to resolve them within the bounds of an enormously complex contract. There were no precedents for the way we did business — we made it up as we went along."

Meritorious Service Cross: Commander Darryl Hansen with Governor General Ray Hnatyshyn. (*CF photo by Sgt Bertrand Thibeault*)



Don Nicholson.

Will the *real* Charles Cameron please stand up!

Hallowe'en prankster C1ET David Russell's "Charlie Cameron Lookalike" get-up seems to be a winner with DMEE 3 section head Bob Weaver and . . . er, the *real* Charles Cameron. (*Photo by David "V-12" Van Valkenburg*)

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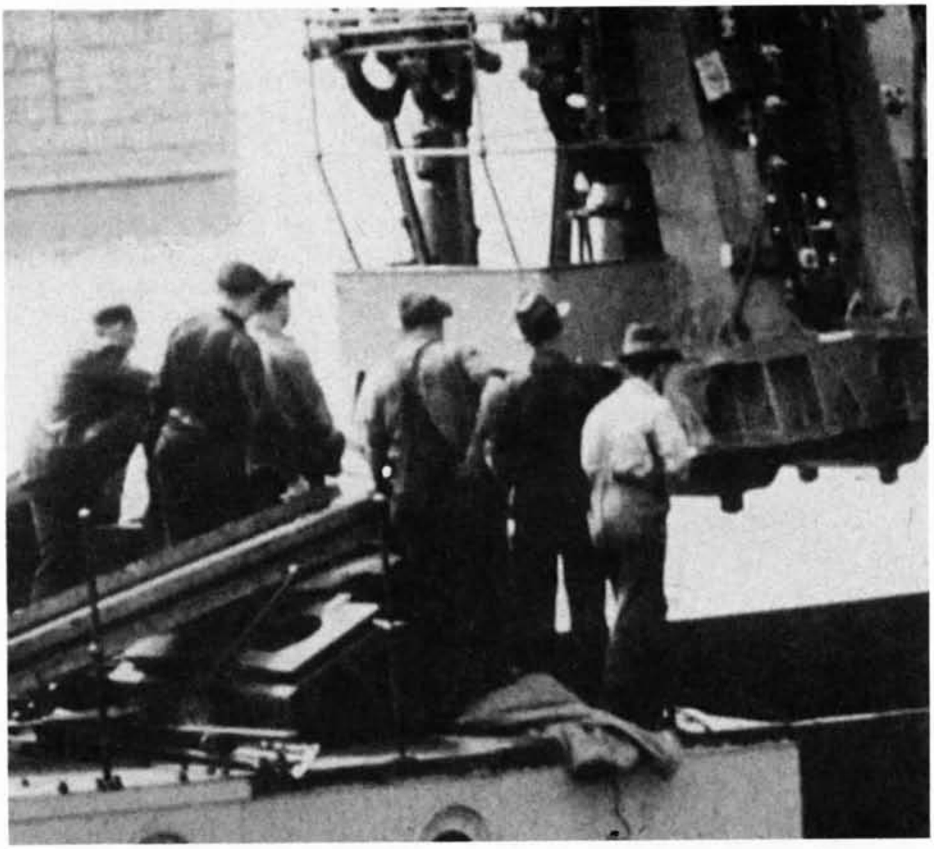
A coal-burner from the '30s . . .



Coming up in April


National Defence
Défense nationale
Pollu
is killing them !
ENVIRONMENTAL PROTECTION • THE CANADIAN NAVY CARES * LA
Canada