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CANADA'S NEWEST SUBMARINE
Introduction

It is not unusual to get a good deal on a used CD, a used couch, or even a used car, but it is not every day that one finds a good deal on a used submarine. But that's exactly what the Government of Canada found in the four British submarines it bought in 1998. The government managed to acquire the diesel-powered vessels for only $610-million, a fraction of the cost of new submarines. Even better for the Canadian government, no cash would have to change hands; Canada will simply waive payment for the British military's use of training facilities in Alberta and Newfoundland over the course of eight years.

The Canadian navy has been looking forward to acquiring new submarines for some time now. The Upholder-class submarines are fine examples of the latest in diesel submarine technology. They are able to travel faster and dive deeper than their predecessors, the 30-year-old Oberons. They also make less noise and can be operated for longer periods of time. This means that the Canadian military will be a stronger force in international coalitions as well as on the home front, in enterprises such as patrolling its fisheries and the surveillance of illegal activities taking place off Canada's shores.

But the submarine's prowess is best demonstrated in wartime activities. In fact, the craft was developed specifically as a stealthy military weapon capable of tracking and inflicting great damage on unsuspecting enemies. Over the centuries since inventors first tried to build a ship that could navigate under water, the submarine's effectiveness has only increased. It first showed its frightening might during the First World War, when German U-boats, or "undersea boats," sank countless Allied vessels and caused a great disruption in the shipping of supplies to Britain. By the Second World War submarine combat and anti-submarine warfare were integral parts of the attempt to control essential supply routes and consequently the ability of the enemy to conduct war. Today, modern nuclear submarines are deadlier than ever. Unlike diesel-powered submarines, which remain in use, nuclear submarines' engines do not require air. This means they can stay under water for indefinite periods. They can even launch missiles from underwater, including powerful nuclear missiles.

Submarines are dangerous ocean-going vessels, particularly for those who work inside them. Submariners must constantly be on the alert for signs of trouble such as fires and leaks. They must also continually inspect the technology and tools that keep the ship running, to avoid disasters such as the mysterious explosion that sank the Russian submarine *Kursk* in August 2000, killing all aboard.

But even when all systems are functioning properly, life on board a submarine presents unique challenges. The living quarters are cramped and afford almost no privacy to crew members who share a common sleeping area. Workdays are long and demanding. But the job is a rewarding one for hard-working team players. And soon, women will be able to take the plunge, since the navy has recently changed its male-only submarine policy. In a number of ways, a submarine is a microcosm and a laboratory for many issues—technological, military, political, and sociological.

CANADA'S NEWEST SUBMARINE
➢*Underwater Life*

Working in a submarine is not like any other job. It means living in a restricted space under dangerous conditions. Subs have often been the subject of literature and film—a milieu for examining how humans cope in the most intense and stressful situations. The 1982 German film *Das Boot* (*The Boat*), about daily life on board a German submarine during the Second World War, is considered a classic portrayal of what can be a claustrophobic and menacing environment.

Visualizing and Imagining the Conditions

As you watch this *News in Review* report, pay attention to how CBC's Dan Bjarnason depicts in words and images the environment in a modern-day Canadian submarine. Note descriptive words, expressions, and images that have a significant impact on you.

A Specialized Human Environment

1. After you have viewed the report, discuss as a class your impression of a submariner's existence. Do you think you could work efficiently in the conditions on board a submarine?
2. Based on the video you have just watched, what qualities and personality traits do you believe are essential to being a successful submariner?
3. Research the term *microcosm*. In what ways does life in a submarine suggest a microcosm? In what ways is it a laboratory for examining human relations?

Private Spaces

This *News in Review* report discusses issues related to the fields of sociology, anthropology, technology, and military tactics and training. It also introduces matters studied in psychology, particularly the branch of psychology concerned with the interrelationship between environment and human behaviour. This field, known as environmental psychology, is a relatively new area of study. It includes investigations into the concepts of personal space and privacy.

Privacy has variously been defined as the right to be left alone or as the right to control information about oneself. It may take several forms: (a) solitude (being away from others); (b) intimacy (being with another, away from others); (c) anonymity (not being personally identifiable); (d) reserve (being able to keep information to oneself as one wishes); (e) seclusion (being sheltered from the sight and sound of others); (f) not neighbouring (desiring little contact with others who are nearby). Privacy is also important because it allows time for introspection, communication, and emotional release.

Post-viewing Reflection

1. Which of the above types and functions of privacy do you think would be most difficult to maintain on a submarine?
2. What other privacy mechanisms exist in society in general or on submarines in the absence of external safeguards such as walls and locks?
3. What role do you think privacy plays in the team environment of a submarine?

CANADA'S NEWEST SUBMARINE
➢*A History of Submarine Technology*

The sophisticated technology that makes the modern submarine a dangerous and stealthy weapon is the culmination of centuries of ingenuity and invention. What kinds of needs have submarines served? Have military requirements shaped technological innovations, or vice versa?

Submarine Vocabulary

- **Ballast** is heavy material taken on by a craft to control its stability and regulate the depth to which it is immersed.
- **Depth charges** are explosive devices launched from underwater that rise from the water, travel through the air, and then drop back into the water to detonate at predetermined depth. Depth charges are usually used against other submarines.
- **Periscopes** are optical instruments for observing objects that are not in direct sight. They work through an arrangement of prisms, or mirrors and lenses.
- **Radar** (the acronym for *radio detecting and ranging*) is a tool that calculates the proximity of an object by measuring the time for the echo of a radio wave to return from it and the direction from which it returns.
- A **snorkel** is a pair of tubes that extend from under water to the surface. One tube allows fresh air to be taken in for the operation of diesel engines and for general ventilation, and the other tube allows exhaust gases and stale air to be released.
- **Sonar** (the acronym for *sound navigation ranging*) is a system for detecting underwater objects by means of the sound waves they generate or reflect. Passive sonar finds undersea objects by detecting the sounds they make, while active sonar locates objects by sending out an acoustic signal that bounces back.
- **Torpedoes** are self-propelled underwater missiles that are launched from submarines and explode when they hit another ship, often another submarine.
- ***U-boat*** is the German term for a submarine. It is a shortened form of *Unterseeboot* (undersea boat).

A Submarine Chronology

No one knows who built the first submarine. The concept of a naval craft capable of operating under water appears to date back thousands of years. According to some accounts, Alexander the Great ventured under water in some type of submersible vessel in 332 BCE. The earliest extant reference to a ship that can be navigated under water dates from AD 1578, in a manuscript written by the British gunner William Bourne. Bourne's work, *Inventions and Devices*, is one of the first English-language texts on military tactics and navigation, and it described a ship built with two hulls so that it could be submerged when water was taken in as ballast, and brought to the surface when the water was emptied. Such a craft would have a clear edge in naval warfare because it would be able to sneak up on enemy ships. During the American Revolution, the colonies put this tactic into practice with the *Turtle*, a one-person submersible vessel that carried a time bomb to be affixed to the bottom of an enemy ship's hull. The *Turtle*'s only mission, however, was unsuccessful. Some 20 years later, when the American

inventor Robert Fulton designed a submarine that proved in the experimental stage to be more effective in sinking ships, he could find no country that would invest in the technology because governments worried that such a furtive weapon would undermine their own naval capabilities.

By the beginning of the 20th century, inventors in several countries came up with various conceptions of submarines. Aware of this, the United States navy looked for a suitable model to incorporate into its own fleet, and adopted the design of Irish-American John Holland, who introduced numerous characteristics that made submarines hardy military tools. Holland's design featured an improved hull shape for easier navigation as well as a gasoline engine, which not only propelled the submarine while it was on the surface but also supplied energy for batteries to be used while it was under water. Concurrent advancements in periscope and torpedo technology and the advent of less expensive diesel fuel also contributed to the development of the modern submarine.

Submarines in the World Wars

The newly improved submarines proved to be a major force in the two World Wars. Germany's U-boats were especially formidable in their attacks against Allied ships during the First World War. As a result, techniques of antisubmarine warfare (ASW), such as the use of depth charges and of armed vessels masquerading as merchant ships, became an essential aspect of naval combat. German submarines were in fact such lethal weapons that when the Treaty of Versailles was signed at the end of the war, Germany was officially prohibited from maintaining submarines. During the post-war period, military engineers in the United States, Britain, Japan, Russia, Italy, and even Germany continued to work on plans to upgrade submarine designs.

When the Second World War broke out in 1939, submarine warfare played a crucial role in the strategies of many countries and caused great destruction on all sides. One of the major advances during this time was the development of snorkel tubes that, by allowing fresh air in and letting foul air out, made it possible for submarines to remain just below the surface even as they recharged their batteries with diesel power. Germany made use of its mighty U-boats as soon as the war began and, by sending "wolf packs" of 10 to 15 submarines against shipping convoys, caused extensive damage to the Allies' source of supplies. In the Pacific, U.S. submarines led the charge against Japanese merchant vessels and warships. But submarine combat was not just dangerous to the ships being attacked, it was also extremely risky for the submariners themselves. Only 25 per cent of German U-boat crews survived the Second World War. In the U.S. service, casualties were also steep; no other division of the navy lost a higher proportion of its members.

Modern Submarines

For all the destruction caused by submarines in the Second World War, submarine technology would soon see dramatic advances that would allow these ships to travel farther and faster, and to destroy a greater number of targets. During the Cold War years, the United States, aware that Russia had established the world's largest submarine fleet, sought ways to counter its enemy. In the mid-1950s, U.S. efforts resulted in the development of the first nuclear-powered submarine. A nuclear submarine carries a small nuclear reactor that, through controlled nuclear fission, produces the heat that transforms water into steam to run a turbine

engine. Since this source of power does not require a steady stream of air to run, and since it does not need refuelling the way a diesel engine does (although it does need a replacement of the reactor's uranium core after about 640 000 kilometres of travel), nuclear submarines can remain under water almost indefinitely. Some nuclear-powered submarines have sailed around the globe without once coming to the surface.

Nuclear submarines are able to fire missiles without surfacing. Others can carry up to 24 ballistic missiles that can each launch 14 nuclear warheads against land targets. Just one of these submarines has more explosive capacity than was held by all the countries that participated in the Second World War combined.

Certain features have become standard on all modern submarines, whether nuclear or diesel. As in William Bourne's early designs, most submarines have double hulls. The space between the two hulls is used for water ballast and fuel tanks, and for missile-launching tubes. At the top of the submarine is the observation tower—known as the conning tower—that contains essential gear such as periscopes, snorkels, and antennas. Periscopes, which may stretch 12 metres in length and narrow to only a few centimetres in diameter, allow sailors to monitor activity on the surface. In addition, modern submariners "see" the undersea and surface world through sonar and radar.

Follow-up Activity

How do the technological features of a submarine make it a very useful part of any country's military toolkit? What defensive uses (as opposed to offensive) and what non-military uses are possible because of these technological features?

Canada's Submarines

The advent of nuclear-powered submarines did not supplant diesel-engine submarines. The craft recently acquired by the Canadian navy, for example, are diesel- rather than nuclear-powered. According to Canadian navy officials, certain properties of diesel submarines make them better-suited than their nuclear counterparts to meeting Canada's needs in patrolling its borders and monitoring illegal activities. Naval Commander Rick Payne described the newly bought diesel submarines as "vehicles of position" that are suited to surveillance duties because they make very little noise when they run on batteries and thus are very capable of hiding from other ships. In contrast, Payne described nuclear submarines as "vehicles of movement" that can cover vast distances in short periods of time.

Canada's new Upholder-class submarines are fine examples of the latest in diesel submarine form and function. Their equipment is one to two generations ahead of the gear in the old submarines, the 30-year-old Oberons. The Upholders, built in the 1980s and early 1990s, are able to travel faster and dive deeper than the Oberons. They also make less noise and can be operated for longer periods of time. As one military engineer put it, "It's like going from a Volkswagen to a Mercedes." The advancements mean that certain functions are now fully automated, and crews—about 50 people—are smaller.

Follow-up Discussion

Military and defence spending is usually a contentious issue in Canada. With reference to the information in this section, do you think the purchase of new submarines from Britain was warranted?

CANADA'S NEWEST SUBMARINE
Why Do We Need Them?

Most Canadians who are not members of the armed forces are only familiar with submarines through depictions of the undersea craft in popular culture. Some films and books, such as Tom Clancy's *Hunt for Red October*, focus on intense and exciting military situations. Other well-known works, like Jules Verne's *Twenty Thousand Leagues Under the Sea* or the Beatles' *Yellow Submarine*, are highly imaginative, and often just playful. Although the Hollywood-style images of submarines engaging in military intrigue or fanciful adventures are a far cry from the pragmatic climate of the Canadian military, the navy's recent purchase of four submarines did elicit public debate in Canada about the need for submarines. The following information suggests reasons why submarines are considered by the military and others to be important to Canada.

Weapons of War

While Cold War-era dramas did exaggerate certain features of undersea life, they also accurately depicted the integral role of submarines in naval warfare. Since the terrorist attacks of September 11 and especially since Canada joined the U.S.-led retaliation forces, Canadians have been reminded of our country's role as a military nation, whether on land, in the air, or on or under the sea. It is perhaps now easier to see how submarines are useful, whether as part of a coalition in far-off waters or as defenders of coastlines closer to home.

Aside from their capacity for stealthy attacks and surveillance, submarines are also the best means of defence against other submarines. History reminds us that submarine warfare may even take place on Canadian territory if we are not adequately prepared. In both the First and Second World Wars, German U-boats were able to cause considerable destruction in Canadian waters, primarily because Canada's defence resources were concentrated on combat and convoy escorts in other locations. In 1942, six different U-boats managed to travel up the St. Lawrence River as far as Rimouski. During that operation, they sank 23 ships, including the ferry SS *Caribou*, which was carrying 237 passengers between Sydney, Nova Scotia, and Channel-Port aux Basques, Newfoundland. The attack took 137 lives.

Canadian submarines are not just important for the defence of Canada, but also for that of the United States. In fact, under the North Atlantic Treaty Organization (NATO), Canada has a responsibility to help protect the whole of North America. Although our powerful southern neighbour would become more involved in defending Canadian borders if we could not do it ourselves, the United States prefers to work in conjunction with Canada's military.

Challenging Assumptions

In your opinion, is it realistic or even possible that hostile submarines could penetrate Canadian waters and attack civilians again? Why or why not? Do you believe that the attacks of September 11 and the events that have taken place since then could have an effect on Canada's maritime interests? Carefully justify your answer.

Peacetime Roles for Submarines

Proponents of the submarine purchase point out that the vessels' utility is certainly not limited to times of war. Military leaders have emphasized the need to protect Canada's sovereignty in war or peace. They say that for Canada to have power over the totality of its territory, it must have an independent means of monitoring activity both on land and in water. This will not only ensure that Canada gathers information that is free from the bias of other countries' interests, but also will supply Canada with leverage that can be used in international relations. Moreover, some military analysts assert that since Canada is surrounded by such vast expanses of three separate oceans, sovereignty will never be achieved without equipment that can patrol underwater and coastal regions. Without new submarines, for example, Canada has no way to oversee the activities of submarines from the United States, Britain, and Russia that regularly travel through the Arctic.

Furthermore, the Canadian military suggests that better submarine capabilities will allow its forces to assist civil authorities in monitoring a broad range of illegal activities such as pollution, overfishing, drug smuggling, and acts of terrorism. Submarines might help curtail crime simply by their presence or potential presence; individuals or groups contemplating conducting unlawful activities in or near Canadian waters can be detected if they are being watched by a concealed submarine.

A Different Perspective

Not all Canadian voices are united in support of the navy's new acquisition. Federal New Democratic Leader Alexa McDonough has expressed concern that the purchase will become very expensive as costly renovations are made to adapt the submarines to Canada's needs. Members of the Bloc Québécois have also questioned the government's decision to buy military equipment instead of putting money back into areas such as education or health that have recently suffered from spending cuts. And Project Ploughshares, an ecumenical group dedicated to the promotion of peace, has argued that submarines are not essential to Canada's sovereignty either in times of peace or conflict. The organization asserts that better monitoring of illegal activities could be achieved by allotting extra money into agencies such as the RCMP or the Coast Guard. Even during times of war, members of Project Ploughshares say, Canada would never have to supply all types of forces, since we would always fight as members of a larger coalition.

In Whose Best Interests?

Disagreements about whether new submarines are a worthy investment for Canada are related to differences of opinion about the role of the military in this country. On the next page you will see a statement from the Department of National Defence (DND) regarding the function of the Canadian Forces (CF) in general. How do our new submarines fit into the goals and activities described on the next page?

What is the goal of the DND/CF?

The fundamental mission of the DND/CF is to protect Canada, contribute to world peace, and protect Canadian interests abroad.

How does the CF help achieve this goal?

The CF defends Canada by protecting its territory and areas of jurisdiction, helping civil authorities protect and sustain national interests, and assisting in national emergencies.

It also defends North America by protecting Canadian approaches to the continent in partnership with the United States, promoting Arctic security, and pursuing opportunities for Canada-U.S. defence co-operation in other areas.

Internationally, the CF contributes to security by: participating in multilateral operations through the United Nations, the North Atlantic Treaty Organization, and regional organizations and coalitions of like-minded countries; supporting humanitarian-relief efforts and helping to restore conflict-devastated areas; and participating in arms control and other confidence-building measures.

The CF also contributes to and helps ensure an adequate and reasonably uniform level of emergency preparedness throughout Canada.

Follow-up Activity

Write a one-page editorial in which you summarize the importance of the recent purchase by Canada of submarines from Britain. Post your editorials and examine the diversity of viewpoints expressed by the class.

CANADA'S NEWEST SUBMARINE

➢*Undersea Safety*

In August 2000, a tragedy unfolded on the floor of the Barents Sea in the Arctic Ocean, when the Russian nuclear submarine *Kursk* mysteriously sank with 118 crew members on board. (For full information on this accident see www.russialink.org.uk/kursk/.) Family members of the sailors, initially heartened by reports of taps coming from within the vessel, eventually gave up hope. It was not until recovery work began on the ill-fated submarine that notes found on crew members' bodies confirmed that 23 men survived the blast that damaged their craft. The 23 survivors, however, were well aware that they were running out of oxygen, and died shortly after the sinking. The cause of the disaster remains unknown; while initial press reports variously suggested that the *Kursk* was accidentally hit by a Russian warship's missiles, that it crashed into a U.S. or British submarine, or that it ran into a mine, the most likely explanation is that it experienced an internal explosion, possibly caused by one of its own torpedoes. For submariners and their families the world over, the *Kursk* disaster served as an unsettling reminder that work aboard submarines can be a perilous mission. Danger can come into a submarine in many forms, and certain factors are crucial for human survival on board submarines. As you read the following information, take point-form notes on the different ways that submariners try to minimize the risks involved in their work.

1. **Air quality:** Air is a mixture of nitrogen, oxygen, and other gases. When humans inhale, we use the oxygen in the air and convert it to carbon dioxide, which makes up approximately 4.5 per cent of the air we breathe out. In an airtight vessel such as a submarine, a method must be in place to maintain the level of oxygen and reduce the level of carbon dioxide. Otherwise, crew members are in danger of suffocating. Oxygen levels are replenished with emissions from pressurized tanks or other devices that can form oxygen through electrolytic or chemical processes. A tool known as a scrubber carries out a chemical reaction to eliminate carbon dioxide.

2. **Fresh water supply:** Submariners require a large quantity of fresh water, not only for personal use and consumption but also for the operation of cooling systems that prevent equipment from overheating. Special appliances on submarines can distill up to 150 000 litres of seawater into fresh water each day.

3. **Temperature control:** Because submarines travel in cold waters, it is important that the crew's quarters be adequately heated. The main power source for the vessel also supplies power to heaters.

4. **Training, training, training:** Submariners continually drill their responses to fires and floods, the two major types of disasters on board their vessels.

Soon after Canada bought its four Upholder-class craft from Britain, it was discovered that the navy already had serious problems to contend with. Navy inspections revealed that three of the ships had welding defects in the pipes through which high-pressure air is pumped into ballast tanks so that the submarines' density becomes less than the water around them, enabling them to surface. A problem with these pipes could mean that submarines would have

trouble resurfacing, with deadly consequences. Security checks also discovered that a crucial part was missing from the submarines' escape hatches. Without the missing piece, rescue craft would not be able to properly latch onto the submarines. Finally, Department of National Defence reports suggested that scrubbers in the air-quality system may not be of adequate quality. As in the Oberon-class submarines that came before the Upholders, it appeared that carbon dioxide levels could reach unacceptable levels after only 12 hours. The military assured naval staff that all safety issues would be addressed before the submarines would become operational.

The Nuclear Hazard

According to some environmentalists and peace activists, submarine safety issues might not just concern the sailors who choose dangerous professions on board the underwater vessels; nuclear submarines could pose a risk to civilian populations in a variety of countries, for several different reasons.

One concern, the threat of radioactive contamination, gained attention after the sinking of the *Kursk*. Organizations such as Greenpeace raised the alarm that fuel could leak out from the wrecks of downed nuclear submarines, first poisoning surrounding ocean waters and then entering the food chain via sea creatures. There are currently seven nuclear submarines on ocean floors worldwide, including two U.S. vessels that sank accidentally, four Russian ships that sank accidentally, and one other Russian submarine that was purposely scuttled when it was deemed beyond repair. In addition, some environmentalists warn that improperly stored nuclear fuel from retired Russian submarines will soon become an international problem. It is estimated that fuel from about 250 submarine reactors remains in the hulls of laid-up ships or in temporary storage facilities. But other experts see no cause for alarm yet. Nuclear engineers say that it could take a millennium before the protective layers around the rods of fuel disintegrate. At present, no tests have shown detected levels of contamination in wildlife that could be attributed to nuclear waste from submarines.

Another cause for concern is raised by groups that campaign for the abolition of nuclear weapons. They say that it is not enough that the major powers of the Cold War period have ended their obsession with long-range missiles. The explosive power of the missiles on U.S. Trident submarines is so great, they assert, that the use of the full weapon capabilities of just six of the 18 submarines could pose the threat of a nuclear winter.

Follow-up Discussion

In your opinion what safety issues related to submarines are of the most importance to the general public?

CANADA'S NEWEST SUBMARINE
Women on Board

When the Canadian navy purchased four Upholder-class submarines from Britain in 1998, proponents of the deal commented on the many changes that would ensue. With newer, faster, and quieter equipment, Canada would be a stronger military presence. With vessels that could patrol currently impassable spaces such as the Arctic, we would have better surveillance.

It was perhaps not immediately obvious, however, that the deal would also lead Canada to become a more equal-opportunity employer. In March 2001, the Department of National Defence announced that women would be eligible to serve on submarines, the last area of service to remain male-only. Although the Canadian Forces had been working for 11 years to put federal equality rules into practice, submarines posed a peculiar problem because of privacy concerns that arose in the ships' cramped quarters. Even the Canadian Human Rights Tribunal agreed with this. In a 1989 decision, however, the Human Rights Tribunal specified that the male-only rule should be reconsidered if new vessels were purchased. When Canada bought the four British submarines, the navy appraised the ships' living quarters and found that they did provide enough privacy for men and women to live together. The new crafts have separate change rooms and toilets for men and women.

The announcement, however, has been met with some opposition from male sailors. One survey has shown that over 60 per cent of submariners do not want women on board. A commonly given reason for this objection is that their spouses disapprove of the arrangement, particularly since it involves a common sleeping area for men and women. Indeed, although the new submarines do afford more privacy than the old ones did, they are by no means spacious. Male and female submariners will live in close proximity to one another 24 hours a day.

Currently, women make up about 10 per cent of the navy's 10 000 members. However, most women do not work on ships but in administrative offices onshore. A survey of the 475 women on board navy ships found that 27 per cent would consider working in the submarine service. Some women, such as Master Seaman Sophie MacArthur, expressed interest in the challenge of submarine service: "I like to try new things. I don't know if I'd want to do it for the rest of my life but I definitely want to have a try at it. . . . On a submarine you have to basically be able to perform any job on board in an emergency so it takes a lot of skills just to be a submariner."

Submariners do face rigorous work in harsh conditions, but evidence suggests that allowing women to serve with men on submarines would have a beneficial effect on overall quality of life. For example, even though many men in the navy expressed opposition to the idea of women on board when the Canadian Forces integrated its crews on other vessels, the program has generally worked out well. According to Former Chief of the Maritime Staff Vice Admiral Greg Maddison, one can notice a positive change in the behaviours and attitudes of integrated crews. Others have suggested that this is because women, whether by nature or nurture, have traits such as verbal proficiency and low aggression levels that are valuable in confined quarters.

The other three countries that have already allowed women to join their submarine service—including Sweden, which has had integrated crews for more than 10 years—have reported no major problems with the arrangement. In Norway, a woman has even served as a submarine commander. In Australia, the navy makes sure that at least three women are posted to the same submarine, following the advice of experts who propose that integration works more smoothly when minorities are introduced as a group. In general, though, no special arrangements are made for women on board any of these countries' submarines. Some military observers explain that the same discipline that is essential to other demanding military situations is enough to manage issues in submarines, including the thorny matter of romantic relationships. Further, those who have worked in submarines' tight spaces point out that the very lack of privacy that would seem to cause problems for men and women working together is actually a check on inappropriate behaviour; crew members are continuously under each other's surveillance.

Step by Step

The Canadian military has employed women for more than a century. In early years, however, women could only work as nurses in the medical service. During the First World War, over 2500 of the approximately 3100 nurses in the forces worked in military hospitals and casualty-clearing stations overseas. By the Second World War, a need for more workers in various fields resulted in the employment of women as support personnel in the Canadian Women's Army Corps, the Royal Canadian Air Force (Women's Division), and the Royal Canadian Naval Women's Service.

But at the end of the war, the women's services were dissolved. It was not until the 1970s, following the Royal Commission on the Status of Women, that women could once again work in non-traditional occupations in the military. They began taking on jobs as mechanics and air traffic controllers, among other positions. Changing societal values brought about the development of the Canadian Human Rights Act and the Canadian Charter of Rights and Freedom, which in turn led to greater possibilities for women in the Canadian Forces. Following the Human Rights Tribunal decision of 1989, every occupation in the Canadian military gradually became open to women.

Follow-up Discussion

What larger societal factors have created the context that has led to changes in women's roles in the military? How is a submarine a microcosm for gender issues faced elsewhere in Canadian society?

CANADA'S NEWEST SUBMARINE
Discussion, Research, and Essay Questions

1. Research the history of submarines in the Canadian navy by reading and reviewing Julie H. Ferguson's *Through a Canadian Periscope: The Story of the Canadian Submarine Service*.

2. Writing in *Maclean's* in 1997, Peter C. Newman adds a light note to his argument in favour of new submarines for Canada by ending with the statement that "[i]t's high time Canada's navy had more submarines than the West Edmonton Mall." Indeed, the West Edmonton Mall's "Deep Sea Adventure" has four submarines, more than the navy had before it made its recent purchase. To what extent is this fact relevant to the purchase of new Canadian submarines?

3. During the Second World War, efforts to stop German submarines' assault on Allied ships became known as the Battle of the Atlantic. Find out more about this struggle. What role did Canada play in it? Write a one-page report summarizing your findings.

4. Large government expenditures often cause controversy. Research the problems that have arisen as the government has contemplated another big military purchase: replacements for Canada's aging Sea King helicopters. How long has the issue been around? Has it been resolved?

5. Compare and contrast the official Web sites of the Department of National Defence (www.dnd.ca) and Project Ploughshares, a Canadian organization committed to reducing the use of military force in international relations (www.ploughshares.ca). How does each site represent and communicate the values of the organization it represents?

6. The Canadian navy has a "Youth Section" on its Web site that includes information on the different codes used by sailors to communicate. Visit the site at www.navy.forces.ca/youth/home/youth_home_e.htm, and make a poster describing one of the codes.

7. Read Tom Clancy's *The Hunt for Red October* or watch the film that was based on it. Prepare a 500-word review that includes your observations on its depiction of life in submarines.

8. In February 2001, a U.S. submarine struck a Japanese fishing boat off Hawaii and sank it, resulting in the deaths of nine people. Find out more about the collision between the USS *Greeneville* and the *Ehime Maru*. What factors were found to have contributed to the accident?

9. Submariners are career specialists, highly disciplined and highly trained in this high-technology field. Because of their unique training and personal attributes, they are also very adept at teamwork and human relations. Suggest reasons why this would be so. Research the career opportunities in the Canadian navy and especially in submarine work.