Experiences with Mixed Gender Submarine Crews

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ABSTRACT

The Canadian Forces has a longstanding history of pro-active integration of women into operational roles. Over the past 20 years, women have been fully integrated into service as fighter pilots, surface mariners, and into combat roles. With the introduction of the new VICTORIA-class submarines into naval service in the late 1990's – and with them living conditions more conducive to mixed gender crews – Canada joined several other allied nations in fully integrating women into service in the submarine environment. Although only a handful of women currently serve aboard Canada's operational submarines, they have been seamlessly integrated into the environment with few problems. No attempts have been made to segregate the genders, and no special provision has been made for bunking or shower facilities. Reproductive issues have been addressed, including potential risks to the mother and fetus should a female submariner become pregnant, as well as other gynecological concerns. In addition, the psychological impact of mixed gender crewing has been explored using space-analogous operations. Advantages and disadvantages of mixed gender crews have been identified, and recommendations made to mitigate any potential negative impact on operations.

1.0 INTRODUCTION

Section 3 of the Canadian Human Rights Act (CHRA) prohibits discrimination on the basis of sex [1]. A Canadian Human Rights Tribunal held hearings between 1986 and 1988 to hear complaints against the Canadian Forces with regard to discrimination against women based on gender [2]. The Tribunal concluded that none of the risk arguments associated with physical capability, environmental conditions, social relationships, cohesion or motivation were sufficient to warrant the continued exclusion of women from combat roles, and stated that the policy was therefore discriminatory on the grounds of sex. The Tribunal, in its 1989 decision, ordered the Canadian Forces to fully integrate women into all remaining combat roles, including those aboard surface warships, in combat arms, and as fighter pilots. But the Tribunal issued a single exception to this order: submarines. While a *bona fide occupational requirement* (BFOR) did not exist with respect to combat roles (that is, combat effectiveness would not be diminished by the integration of women), the Tribunal accepted the argument that the exclusion of women from the submarine environment did constitute a BFOR since a lack of privacy was identified as a factor that would significantly impact operational effectiveness. In other words, the discriminatory effect was 'nullified or overcome' by the occupational requirement. The Tribunal did, however, state that if a time came when the Canadian Forces operated types of submarines where privacy issues were not as prominent as in the OBERON-class, this restriction could be examined again. Virtually all other allied submariner nations at the time also prohibited women from serving in submarines despite permitting them to serve in other combat environments.

With the acquisition of the new VICTORIA-class submarines in the late 1990s, many of the conditions that originally lead the Human Rights Tribunal to recommend exclusion of women from submarine service were considered no longer valid. Published in 1998, the action plan for the Canadian Navy's 'Vision 2010: The Integrated Navy' [3] included the requirement to re-examine this policy. Fewer functions on board the VICTORIA-class submarines are performed manually, allowing for a smaller crew (on average 55 vs. 70). In addition, the new submarines are more spacious and are configured differently – there are two decks, so the main living areas and working areas are now on different decks (Figure 1). All these factors allow for more privacy and personal space, and a more habitable environment for two genders.

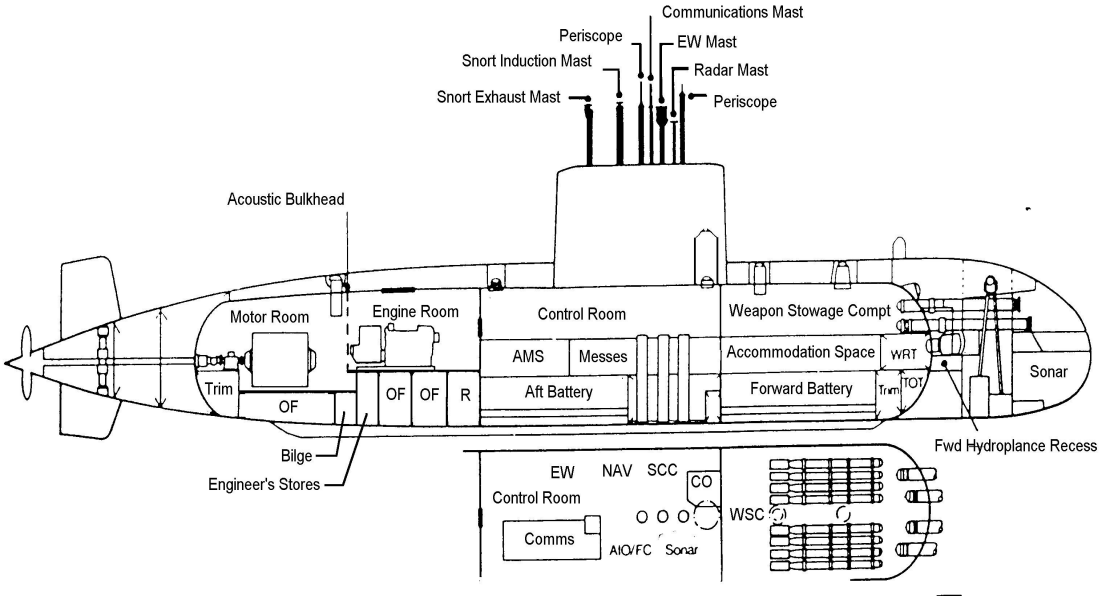

Figure 1: Illustration of the Layout of a VICTORIA-class submarine

Therefore, in 1998, the Chief of Maritime Staff (CMS) directed that a study be undertaken to determine if the presumed risk to operational effectiveness was still a valid assumption, and if there was a reason to continue to prohibit women from serving in submarines. Numerous methodologies were used in the study [4] including a search of archival data, a literature review, a 2-week site visit to the OBERON-Class submarine HMCS OKANAGAN while underway, a site visit to a VICTORIA-class submarine alongside in the UK, discussions and correspondence with subject matter experts, and a survey. The study concluded with the recommendation that women should now be employed in the new VICTORIA-class submarines, acknowledging that the transition would not be easy and would take time. In 2001, the recommendations made in the study were adopted by the Canadian Navy and women were accepted into submarine service.

2.0 FACTORS AFFECTING MIXED GENDER CREWING

Two major decision factors were considered when recommending that women be allowed to serve aboard submarines: crewing/bunk management and accommodations, and privacy. In addition, several other factors

were considered that could possibly affect implementation of mixed gender crewing, including the volunteer aspect of submarine service, health and medical care issues, and psychological aspects of mixed gender crews.

2.1 Crewing/Bunk Management

Arguably the most important factor in deciding whether or not women could be integrated in to service aboard the new VICTORIA-class submarines was how crew assignment and bunk management would be dealt with. A bunk policy had to be set. The essence of the bunking problem was as follows: if the sexes were segregated, when a female member of the crew is landed or posted, finding a qualified submariner of the same occupation, rank *and* sex would be virtually impossible since the replacement pool of women is smaller – there are fewer women than men in the Navy, and in particular in the submarine service, especially in the early years of mixed gender crewing. While there is some flexibility in surface vessels to accommodate women separately and generally within their rank and occupation group, it is simply not possible to reconcile these requirements with the limitations imposed by the small and specialized crew of a submarine. Also, the implications of bunks going empty are more critical in submarines, since it is less able to sail with empty billets than a surface warship where segregated bunking is practiced. Finally, designating a specific area for female bunks in the relatively inflexible crew accommodation spaces aboard the VICTORIA-class submarines would simply be impossible without major structural changes to the interior of the submarine.

Interestingly, survey results from the study indicated that there was much less resistance to the concept of mixed accommodations spaces amongst submariners than had been assumed by many senior submarine and surface naval personnel. Accordingly, it was recommended in the mixed gender crewing study that women should be employed in VICTORIA-class submarines ***only*** if the bunking policy was set such that bunks were assigned on a functional basis without regard to gender, that is, integrated vs. segregated bunking. This recommendation was adopted without modification, and to date there have been no problems whatsoever with mixed gender bunking.

2.2 Privacy

Privacy issues in mixed gender crewing also needed to be addressed. Some of the lessons learned during the initial integration of women on board surface warships 12 years previously were helpful during the early days of conversion to mixed gender submarine crews. Also, as previously mentioned, the structural design and configuration of the new VICTORIA-class submarines is more amenable to men and women serving together, since the main working and living spaces are on different decks; this allows for more privacy and personal space.

Short of segregating the sexes, all reasonable efforts have been made to provide for privacy requirements for the benefit of both men and women. With a smaller crew, the common practice of 'hot bunking' on the old OBERON-class submarines – in which two sailors on opposite watch rotations shared the same bunk – is no longer employed in the new submarines. All submariners are now allocated individual bunks with privacy curtains. Also, a minimum attire policy (eg. short/T-shirt) for sleeping and for relaxed dress in hot climates has been promulgated. In the very close quarters of the submarine environment, all crew members understand the need to respect each other's individual privacy whenever and as much as possible. Fraternization and inter-personal relationships between members of the boat's crew are strictly prohibited, as they have always been on board surface warships.

With respect to personal ablutions, the single heads and washplace area in the VICTORIA-class submarine which was designated for officers is used by officers and any female crew members on board. Doors, of course, can be latched. No other special measures were required.

2.3 Volunteer/Non-Volunteer Crewing of Submarines

In the majority of the world's navies, submarine service is voluntary in recognition of the inherently unique, austere and hazardous conditions of that environment. Submarine service in Canada was, similarly, entirely voluntary until 1 Jan 1986 when insufficient volunteers necessitated a change in policy such that naval personnel could be directed in to submarine service when required if the number of volunteers was insufficient to man the submarines. The Canadian submarine service was facing particularly difficult manning challenges in the late 1990s at the time the new VICTORIA-class submarines were coming into service.

Personnel who serve in submarines are drawn from the occupations which also serve in surface ships, both naval combat ('hard sea') and combat support occupations (although not all surface occupations are represented in submarines). In addition to basic seamanship and occupation training, members must also undergo specialized training to become submarine qualified. 'Dolphins' – the badge which denotes submarine qualification – is awarded only after successful completion of the Basic Submarine Qualification (BSQ) course, training alongside in the VICTORIA-class submarine trainers, and a consolidation period aboard a submarine at sea for 'on-the-job' training. Given the extensive training required to become a qualified submariner, and in part due to the small size of Canada's submarine service, submarine crewing has often been problematic due to insufficient qualified personnel. Manning shortages are critical because without sufficient qualified personnel, the submarine cannot sail.

The acquisition of the four new VICTORIA-class submarines in the late 1990s added to the historic problem of personnel shortages because now the submarine service faced the additional challenge of training enough personnel to crew a new platform. VICTORIA-class conversion training for qualified submariners who had previously served in the OBERON-class submarines began in March 1999. One of the benefits in opening up service in submarines to women is that it has helped to alleviate the chronic manning problems by tapping into a portion of the naval operational and support personnel population that had previously been unavailable to the submarine service. And by allowing women to volunteer for service in the new VICTORIA-class submarines, fewer men have to be directed in to service. Women must be employed in submarines on the same footing as their male counterparts, though. That is, volunteers are accepted as much as possible, but when the numbers are insufficient to meet manning requirements, female sailors may be directed into submarine service as well.

2.4 Health and Medical Care Issues

Several issues with respect to the medical care of female submariners needed to be considered during the implementation phase of mixed gender crewing of submarines. None of these, however, were considered 'make or break' decision factors as they have been in other navies when deciding if women could serve aboard submarines. Most gender specific medical problems in women tend to involve the reproductive and genitor-urinary systems, however, many of them can be managed or prevented entirely with proper screening and risk management. Medical emergencies in a submarine underway at sea are far more likely to arise from non-gender specific conditions (eg. burns, appendicitis, trauma, etc.) than as a result of a female-specific problem.

2.4.1 Medical Care

VICTORIA-class submarines do not have a large enough crew to warrant the services of a Medical Officer, however, each submarine does have an independent-duty Physician's Assistant (PA) on board. The PA is a fully trained submariner, and since his or her medical duties do not require their full attention, they are also responsible for monitoring air quality aboard the submarines, and stand regular duty-watches as helmsmen. In as far as it is possible, consideration is given to ensuring that there are at least two women per submarine crew. Although not always possible, this allows for a female attendant should a woman require medical treatment at sea when the PA is male. To date there have been no female Physician Assistant's on board the VICTORIA-class submarines, although they have served on board surface warships for almost 20 years.

Medical facilities aboard a VICTORIA-class submarine are extremely limited and there is no specific space dedicated for a Sickbay, although a mess can be cleared and the curtain drawn to provide privacy should the PA need to conduct a physical examination on either a male or female crew member. If women are part of a submarine's crew compliment, in addition to his other routine medical supplies, the PA also carries a special 'women's kit' on board. This kit contains medications, supplies and equipment that may be required to manage gender-specific medical problems while underway, and includes specific antibiotics and anti-fungal agents, Midol, pregnancy test kits, the birth control pill, a sterile speculum, etc.

2.4.2 Reproductive Health

The vast majority of female submariners are professional sailors who have volunteered for submarine service; any plans they may have for pregnancy and a family are generally carefully planned so as not to conflict with a posting to an operational submarine. Nonetheless, female members who believe they could be pregnant should be tested prior to deployment. It has been the policy in the Canadian Navy that pregnant members are deemed unfit sea and unfit alongside for the health and safety of the expectant mother and the fetus since women began serving on board surface warships in the late 1980s. This policy also extends to women serving in submarines. Due to the unique nature of submarine operations at sea, however, there are additional risks of which female submariners must be informed.

The principles of stealth and endurance are fundamental to the very nature of submarine operations at sea. Since VICTORIA-class submarines can remain submerged at sea for long periods of time, there is the potential for lengthy deployments with limited chance of early disembarkation. Given this reality, in the event of an unknown pregnancy, female submariners may be subject to potential complications including miscarriage, ectopic pregnancy and morning sickness aggravated by motion sickness for which definitive medical care may not be immediately available. In addition, they may be exposed to potential environmental hazards and atmospheric contaminants that could be dangerous to a developing fetus. All female submariners are briefed by the boat's PA about these risks when they join the submarine. They are then required to read and sign a '*Medical Advisory Statement for Women in Submarines*'[5]; this acknowledges that they have been briefed about the potential risks to themselves and a developing fetus should they be pregnant while embarked on board a submarine at sea. It is a type of 'informed consent'.

2.4.3 Infections and Hygiene

As personal hygiene on board a submarine underway is often less than optimal due to water restrictions, the lack of shower facilities, and the inability to change clothes on a daily basis, female submariners must take

particular care to prevent urinary tract and yeast infections. A clean set of cotton underwear daily goes a long way to preventing such infections.

2.4.4 Menstruation

Many female submariners use oral or intra-muscular injections of contraceptives to minimize the risk of pregnancy and shorten or eliminate monthly menstruation. Nonetheless, products of menstruation are considered natural, bio-degradable substances. According to the Canadian Forces Formation Environment, all female hygiene products are to be treated as normal garbage and can be jettisoned into the ocean in the submarine's 'gash gun' (garbage ejector) as necessary.

2.5 Psychological Aspects of Mixed Gender Crews

The psychological impact – both positive and negative – of integrating women in to service aboard submarines was also considered during implementation planning, however, since women had already been successfully integrated in to service aboard surface warships 12 years earlier, many male submariners had already had the opportunity to work with women in an operational environment. Efforts were made to disseminate information within the submarine community about the pending changes, and attempts were made to address any attitudinal issues including the provision of information on privacy issues, gender free performance standards and the integration process. Information about harassment, perceived harassment, harassment policies and procedures – including guidelines about what harassment is not – were also provided.

There is very little information available on women in submarine service in behavioural science databases or other research sources. NASA has done several studies on the psychological aspects of mixed gender crews [6], and the isolation of long periods of time at sea aboard a submarine are in many ways analogous to lengthy missions in space. Women's leadership styles have been characterized by task orientation, mentoring others, and concern with the needs of other group members. All-male expeditions on the other hand, are characterized by strong competitiveness and little sharing of personal concerns among crew members. Some advantages that have been reported by astronauts on missions with mixed gender crews include women assuming the role of peacemaker during times of conflict, crew members feeling it is easier to express their feelings, and a sense of calmer missions. In addition, 75% of men reported a reduction in rude behaviour and improved cleanliness – this would certainly be an advantage of mixed gender crews if it could be generalized to the submarine environment!

A few problem areas were also identified. Women reported being highly visible (the 'fish bowl' effect), especially when it came to making mistakes. Some rated perceived acceptance by peers as lower than male crew and felt their opinions were not considered as credible. Some recommendations for shuttle and space station crews that have come out of these NASA studies include attempts to select compatible crews (not practical in the submarine environment), evaluation of crew behaviour interactions during training (this could be accomplished by the submarine sea-trainers during work-ups), more research on the ratio of women to men, length of stay, and rotation patterns on missions (again, not very generalizable to the submarine environment due to manning challenges and operational commitments), and pre-flight sensitivity training (this type of training is already mandatory for all military personnel upon entrance in to the armed forces).

3.0 PRACTICES OF OTHER NAVIES

In 2001 when Canada began accepting women into submarine service, NOR and DEN were the only other NATO nations at the time to have successfully integrated women into this role. (DEN no longer has a submarine service). NOR has allowed women to serve in submarines since the late 1980s, and in 1995 Solveig Krey of the Royal Norwegian Navy became the world's first female officer to command a submarine, HNoMS KOBBEN. Today several other NATO nations, including POL and ESP, are looking at the possibility of integrating women into submarine service. Outside of NATO women began serving aboard submarines in SWE in 1991; as with Canada, no special provisions are made for bunking or shower facilities. In addition, AUS began training female submariners in the late 1990s. The Australian COLLINS-class submarines carry a crew of 55, and contain a six-berth bunkroom for women. Segregated bunking has created some difficulties with filing billets when a female leaves an operational submarine. In addition, there has also been a negative impact on group cohesion and a detriment to informal learning caused by accommodating women separately rather than with their work group.

Most allied nations, however, still forbid women to serve as submariners, including the USA, GBR, DEU, FRA, NLD, TUR and ISR. Some nations site safety concerns; for other nations the decision is a religious or cultural one. In the United States, combat vessels were opened to women in 1994 following congressional repeal of the 'Combat Exclusion Law' with the single exception of submarines. Reasons cited for this exclusion include the prohibitive costs of berthing women and privacy arrangements (some US submarines employ the practice of 'hot bunking', and the US Navy has a strict fraternization policy that it feels may be compromised if women begin serving aboard submarines). In addition, in their paper on '*Medical Implications of Women on Submarines*' [7], Kane and Horn raise concerns over the length of patrols of their nuclear submarines, and the distance from coastal waters should a female crew member require medical evacuation for pregnancy or a gynecological problem. The US Navy feels placing women on board submarines would raise medical considerations that require critical evaluation, and that more research is needed to better elucidate the impact on not only the individual female's health, but also on the submarine's mission effectiveness.

GBR also prohibits women from serving in submarines for bunking and privacy issues. Under British law there is also a legal requirement to provide for the care and safety of women and their unborn children at work. The Royal Navy maintains that if a female submariner does not know that she is pregnant, they cannot give assurance for the safety of an unborn child from a number of atmospheric contaminants found in the submarine environment, including elevated levels of carbon dioxide.

4.0 CONCLUSION

In April 1998, Canada announced the acquisition of four UPHOLDER-class submarines from the Royal Navy, subsequently renamed the VICTORIA-class submarines. The VISION 2010 Submarine Service Review project began in May 1998 to examine the feasibility of mixed gender crewing of the new submarines, and to consider potential implementations factors, since the presumed risk to operational effectiveness by employing women in the submarine service in the Canadian Navy was no longer a valid assumption. Although a number of important factors such as crewing and bunk management, privacy, health and medical care issues, and the psychological aspects of mixed gender crews needed to be carefully addressed during a transition period, the study concluded that there was no longer sufficient reason to exclude women from submarine service.

Since it may take up to two years to qualify a submariner beyond basic occupation qualification because of the time required for the medical and administrative screening process, the scheduling of the BSQ course, and the limited number of training billets on board operational submarines, it was some time before the first trained female submariners were assigned to an operational unit. In 2003, a sonar operator and NCI-operator became the first two women to serve as trained submariners aboard HMCS WINDSOR. Today there are four female submariners serving aboard VICTORIA-class submarines and others undergoing training; all are non-commissioned members (NCMs). Although one female Maritime Officer did complete the Basic Submarine Qualification course, she did not complete the sea phase of training in order to receive her dolphins. Interviews with female submariners about their experience serving in submarines reveals common themes: all are mature, experienced sailors who simply wish to be considered one of the crew, and do not want to be singled out because they are women. They are very professional and dedicated to their careers, and work hard to gain the respect of their male peers for their skills as submariners, not specifically as *female* submariners. Mature, experienced sailors

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