

## *Objects at an exhibition: reflections on 'Fast Attacks and Boomers'*

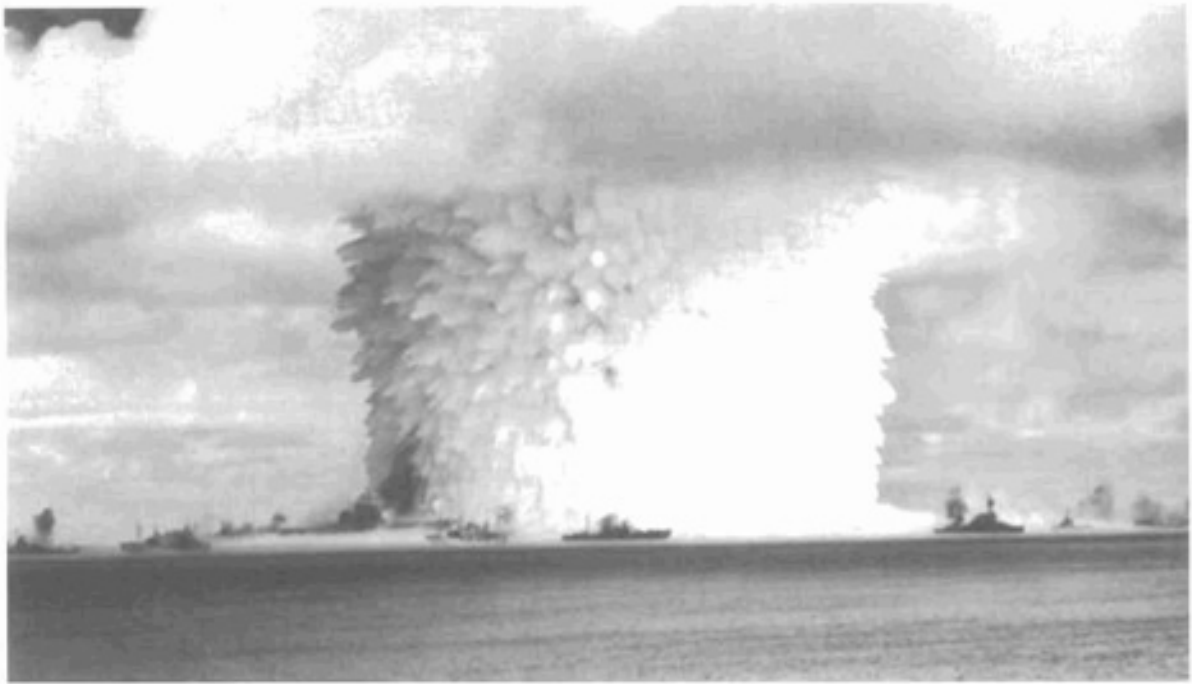
In April 2000, 'Fast Attacks and Boomers: Submarines in the Cold War' opened for what proved to be a three-year run at the Smithsonian Institution's National Museum of American History in Washington DC. It closed in June 2003. Both submarines and the Cold War were firsts for a major exhibition in the museum. In its final version, 'Submarines in the Cold War' comprised ten sections divided among three major themes, one primarily technological – how submarines work and fight – and two less technologically specific: how nuclear subs interacted with US foreign and military policy and how men and women interacted with submarines.

How some of the objects in the exhibition acquired to my mind special significance is the central concern of this paper. This is very much a personal reflection, but the exhibition was hardly a one-man show. It was, in fact, the work of a sizable team. When I refer to 'we' in my remarks, I'm including not only the two other curators who worked with me but also the project manager, two retired submarine officers who were regular consultants, the design and production team contracted for the exhibition, plus any number of technical specialists and outside advisers.

### **The Cold War context**

The exhibition began with a sweeping photomontage of the Cold War years which featured a video introduction by the veteran broadcaster Walter Cronkite, himself something of a Cold War icon. The largest and most striking images recalled iconic Cold War events such as the Berlin airlift and nuclear weapons tests (Figure 1). Below these images were two photo timelines: one devoted to cultural events of the Cold War years, the other to milestones related explicitly to submarine activities (Figure 2). This curved 12-metre (40-foot) wall provided the context for the exhibition at the same time that it led visitors in. The wall visually displayed the consequences of new technology for the military roles of submarines at every level, from tactics through operations to national strategy and foreign policy. Interspersed among the images several text blocks addressed such broad topics as Cold War origins, the Vietnam wars and the cost of submarines.

Following the Cold War panel into the exhibition brought visitors to a brief survey of the history of submarines before nuclear power,



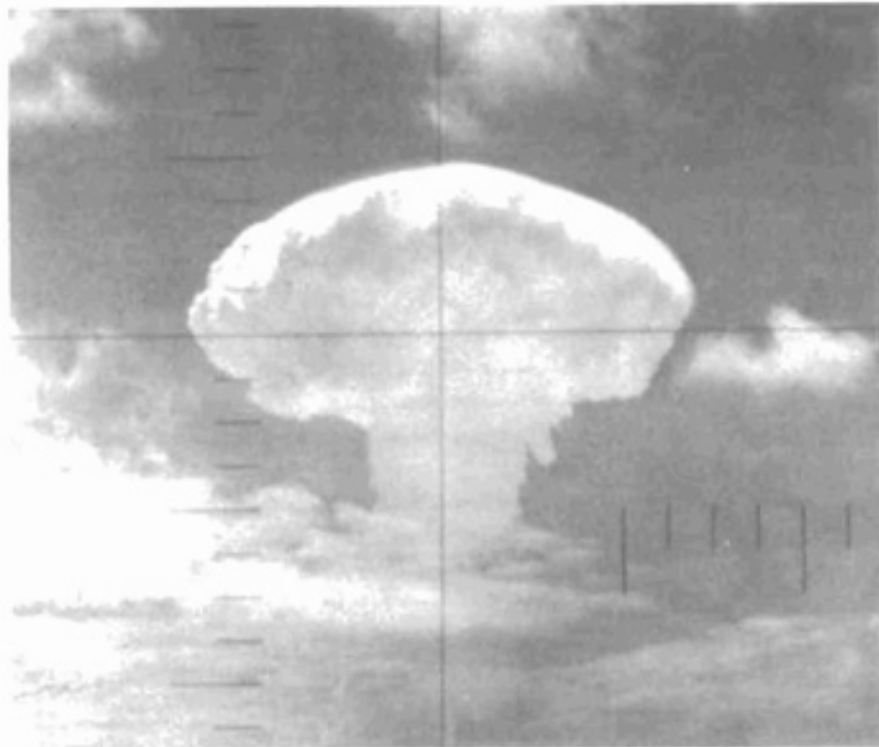
told chiefly with graphics and text. Deeper into the exhibition, other sections elaborated aspects of the varied roles of nuclear submarines in underwater research and exploration, as well as their primary Cold War missions – nuclear deterrence, antisubmarine warfare and special operations – using text and graphics. Particularly striking was a chronological set of maps that US Naval Intelligence declassified specifically for the exhibition. Hand-drawn symbols graphically illustrated how Soviet missile submarines gradually retreated during the last two decades of the Cold War from their initial deployments in American offshore waters to an Arctic bastion along Russia's northern coast. Withdrawal reflected in part the growing range of missiles, but even more the increasingly sophisticated and aggressive antisubmarine warfare practised by US forces.

#### **Submarine technology and weaponry**

One object was not in the show, physically speaking, but was nonetheless a compelling presence – the submarine itself. Our space was not big enough for an entire submarine. We settled for presenting sections of the interior, with one exception: a three-quarter-scale model of a submarine sail, displayed as if on a diving submarine, dramatically positioned in tense apposition to the Cold War wall. Often misidentified as a conning tower, the sail is quite different. Because conventional submarines were primarily surface ships that hid only briefly under water, they required a bridge, the conning tower. Nuclear submarines, in contrast, spend most of their time under water. The sail

*Figure 1 In July 1946, Operation Crossroads at Bikini Atoll in the Pacific received extensive news coverage. This image of the second test in the series, an underwater shot code-named Baker, quickly achieved iconic status. (US Navy)*

*Figure 2 On 6 May 1962, a submerged submarine launched a standard Polaris missile toward Christmas Island in the Pacific in a test code-named Frigate Bird. Just over a thousand miles late and still 11,000 feet high, the warhead exploded as planned. A second submerged submarine observed and photographed the detonation through its periscope, as shown here. This was the only US test of a nuclear missile ever conducted through a complete flight profile from launch to detonation. (US Navy)*



serves primarily as a streamlined shroud for the boat's periscopes and antennas. In nuclear submarines, the bridge equivalent is the attack centre in the heart of the ship.

A reconstruction of the attack centre inside the exhibition (Colour plate 11) gave visitors a glimpse of the submarine's nerve centre. All the equipment and furnishings came from USS *Trepang*, one of the attack submarines rendered expendable by the end of the Cold War. The Navy allowed us to visit the boat early in the exhibition planning to tag the items we wanted for this exhibit. Complementing this section, three short videos offered glimpses of fast attacks in action. Based on other material that the Navy declassified for this exhibit, they displayed three types of mission: (1) Tracking a Soviet submarine in the Atlantic (re-enactment of a real 1978 mission, with animated depictions of the manoeuvres of the two boats); (2) Observing a foreign surface-to-air missile test (re-enactment of a historic mission illuminated with authentic periscope photography); and (3) Under-hull survey of a US surface ship (a modern-day training exercise amplified with animation and periscope photography). Set against the background of authentic attack-centre equipment and instruments, the videos became extraordinarily compelling.

Displayed in and next to the attack centre were the submarine's electronic systems, including sonar, radar and radio. Sonar – an acronym for *sound navigation and ranging* – is the most important.

Sound is the primary source of information about the world outside the hull of a submerged submarine, detected by instruments and translated into visual data by computers. It allows submariners to locate and track their targets, identify potential threats and determine their own position, all while remaining safely submerged. Active sonar, which bounces sound waves off the target and picks up the reflected echoes, is rarely used because it is too easily detected. Passive sonar detects sounds generated by the target, such as clanking machinery or noisy propellers. To the sonar console on display we added a so-called acoustic workstation. Interested visitors could watch an animated video and hear some of the same sounds that a sonar operator might, then take a brief test to identify the sounds.

Next to the acoustic workstation we addressed submarine power and propulsion. The control panels for power systems – the so-called manoeuvring-room consoles (Colour plate 12), three in all – represented a particularly striking display of submarine workings. During operations, one petty officer would have manned each console, the three supervised by the engineering officer of the watch; they monitored and controlled the submarine's entire nuclear power plant. One console controlled the steam turbines. The centre console was the nuclear-reactor control panel, while the third controlled the electrical system. Heat from the reactor converted water to steam in a closed system. The steam drove the turbines that provided the boat's power, which was fed to the propeller shaft as well as the electrical system.

Displaying consoles like these in public – even most crew members had never seen them – required modifications to protect sensitive classified information about the design and operation of nuclear-powered submarines. Where necessary, scales on instrument faces were modified, instrument labels altered, or instruments repositioned, and some classified nuclear instrumentation was removed. The Navy worked closely with us to keep such changes to a minimum and preserve overall appearances. Our biggest problem was convincing overzealous Navy officers not to clean up the worn spots and coffee rings the consoles had acquired during their active life aboard the *USS Sand Lance*. The relatively small size of the nuclear control panel challenges the common notion derived from civilian nuclear power-plant control rooms of huge and immensely complicated controls. The fact that a nuclear sub is simply another kind of steamship also strikes me as beguiling.

Situated directly behind the model sail were the first of several displays devoted to the new technology of undersea warfare deployed by the United States from the 1960s to the 1980s, including weaponry and ballistic missiles. In addition to models of the several types of ballistic missiles deployed on US submarines, the Navy provided us with both a standard torpedo and a Tomahawk cruise missile (both without their inner workings). More unusual objects on display were

a weapons shipping hatch with hand ratchet; a missile guidance access door, watertight closure and portable crane; and an attack-centre indicator panel (ACIP) and missile-firing key. Unexpectedly declassified for our exhibition were a re-entry vehicle (RV) protective cover and a Trident I missile nose fairing and aerospike.

### **Living with submarines**

We had objectives beyond the technological in this exhibition. It appeared, after all, in a museum of American history, not a museum of science. About a third of the exhibition examined the human impact of technological change on the lives and activities of those who built and maintained subs, the sailors who crewed them, and the families who completed the special community of submariners.

Nuclear submarines challenged conventional ideas of life at sea. Sailors had to learn new skills and adapt themselves to living in a radically confined environment for weeks on end. The changes to life aboard ship were profound. Because a submarine's weight equals its displacement (i.e. its volume), minor changes in equipment weight or volume cannot be so easily compensated aboard a submarine as on a surface vessel, where deck space can be adjusted or draft slightly altered. Everything has to fit within a submarine's pressure hull and that is why a submarine is so inherently crowded. For the same tonnage, a submarine has roughly one-third the interior volume of a surface ship. Cramped quarters are the hallmark of life aboard a submarine.

Regulatory restrictions prevented us from reproducing, to the extent we would have liked, the cramped interior of even large nuclear submarines. The small section showing crew berthing (Colour plate 13) offered visitors a glimpse into the tight little world of the submariner. Just how tight was shown by the stacked bunks from USS *Trepang* on display. The sailor's personal space was limited to his bunk. The shallow bin beneath the mattress was the sailor's only storage space for all his clothing and any other personal items for the duration of a patrol. On a fast attack boat such as *Trepang*, the crowding could be so great that even one bunk might be more than a sailor could call his own. Three men may 'hot bunk', or share two bunks between them, so that when one is on duty another is asleep.

On the back wall of the exhibition we juxtaposed a clothes washer and dryer with a trash disposal unit (TDU) breach (Colour plate 14). In doing so, we intended to impress viewers with some of the complexities of the submarine environment. Finding an ordinary commercial washer and dryer on a nuclear sub should surprise many visitors. We wanted to emphasise, unobtrusively, that not everything was hi-tech. The Navy advisers in fact opposed including these items, just because they weren't anything special. But we thought that was precisely the point: a single, not-very-large washer and dryer serving

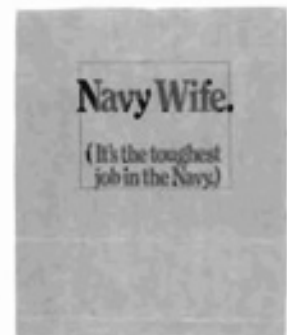
an entire 120-man crew for months at a time also seemed to bring home some of the strain of the submarine service. Early in the Cold War, submarines had space for only a single clothes washer that handled less than 4 kg (8 pounds) of dirty laundry. But even when bigger washers could be installed, as later happened, machine time always had to be rationed.

In contrast to the mundane means of clothes washing, trash disposal takes a more exotic turn on a nuclear submarine. Trash disposal, like many other activities that are relatively straightforward ashore, requires special arrangements in a submarine. If you pause to think about the amount of trash you produce in a week, then multiply that by 120 (the crew) and then again by 8 or 9 (two-month patrol), you begin to appreciate how important the TDU is. Trash is tightly compacted in a cylindrical steel-mesh container. A 3 kg (7 pound) weight ensures that it sinks to the bottom of the sea. Since the end of the Cold War, submarines operate under stricter rules about when and where they can discharge trash overboard, and some materials, such as plastics, can no longer be discharged at all. TDU operation can be relatively noisy. When a submarine is rigged for quiet running, trash can accumulate on board for days or even weeks, lest the sounds of disposal alert a potential foe.

One of our concerns about this exhibition in a history museum, as I have already mentioned, was to move beyond the machines themselves to the social systems in which they are embedded. This accounts, at least in part, for the Cold War setting and for our attention to training and maintenance, limited though it had to be in this relatively small exhibition, as well as crew life aboard a submarine on patrol. We believed the families of the submariners were no less important, but getting them into the exhibition ran into considerable opposition from those who felt they really weren't part of the Navy. We strongly disagreed, and a brown grocery bag (Figure 3) was one of our arguments. It bears the slogan, 'Navy Wife. (It's the toughest job in the Navy).' To attract, train and retain people in the all-volunteer military with skills in modern technology, by the mid-1970s the armed forces began to acknowledge the contributions of spouses and families to the military mission. These efforts included slogans on commissary shopping bags, as well as more substantial action.

### **Submarines in the Cold War**

Historically, the development of nuclear-powered submarines aroused controversy both within the military establishment and in the public arena, though for very different reasons. Internally, the issues were money and questions about the feasibility both of nuclear propulsion and submarine-launched ballistic missiles. External opposition derived in part from fears of nuclear power, which applied to all nuclear-powered ships. Opposition to ballistic-missile submarines, which led



*Figure 3 To attract, train and retain people in the all-volunteer military with skills in modern technology, by the mid-1970s the armed forces began to acknowledge the contributions of spouses and families to the military mission, an important theme in the exhibition. These efforts included mottos on commissary shopping bags, as shown here. (National Museum of American History)*

to demonstrations and picketing outside submarine bases at home and abroad, stemmed from concerns by some members of the public about the morality of nuclear deterrence as national policy.

Preparing our exhibition was not so contentious. The Navy expressed some concern about the label that discussed the cost of submarines, admittedly a complex issue to address in 200 words or fewer. That was worked out. The other issue involved the place of women in the story, which centred on the wives of submariners in the section on life ashore. Here the results were less satisfactory. The problem seemed to be chiefly one of perspective. We wanted to tell the story from the women's viewpoint. The Naval Submarine League representatives saw it from the perspective of the men at sea. They kept trying to make that portion of the exhibition a tale of wives longing for their husbands to return. That women, even Navy wives, might have lives of their own was almost literally unimaginable. Since ex-Navy people ran the production company, we achieved only limited success in imposing our version of the story. If you looked closely at the exhibition, you would have seen that the section on life ashore got short shrift compared with the rest of the exhibition. Our attempt to include in the epilogue some discussion of the prospect of women serving aboard submarines likewise met concerted opposition. This issue we didn't press, accepting the argument that this was not, properly speaking, a Cold War matter.

Overall, though, given the potential problems of exhibiting a topic still fresh in many minds and of much concern to many people still active, we had a remarkably trouble-free exhibition process. Although the physical exhibition has been deinstalled in the National Museum of American History and its future reinstallation at the Naval Historical Museum remains a hostage to fund-raising, a virtual exhibition lives on. At the Website <http://americanhistory.si.edu/subs/index.html> you can obtain a pretty good idea of what the exhibition looked like.

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